

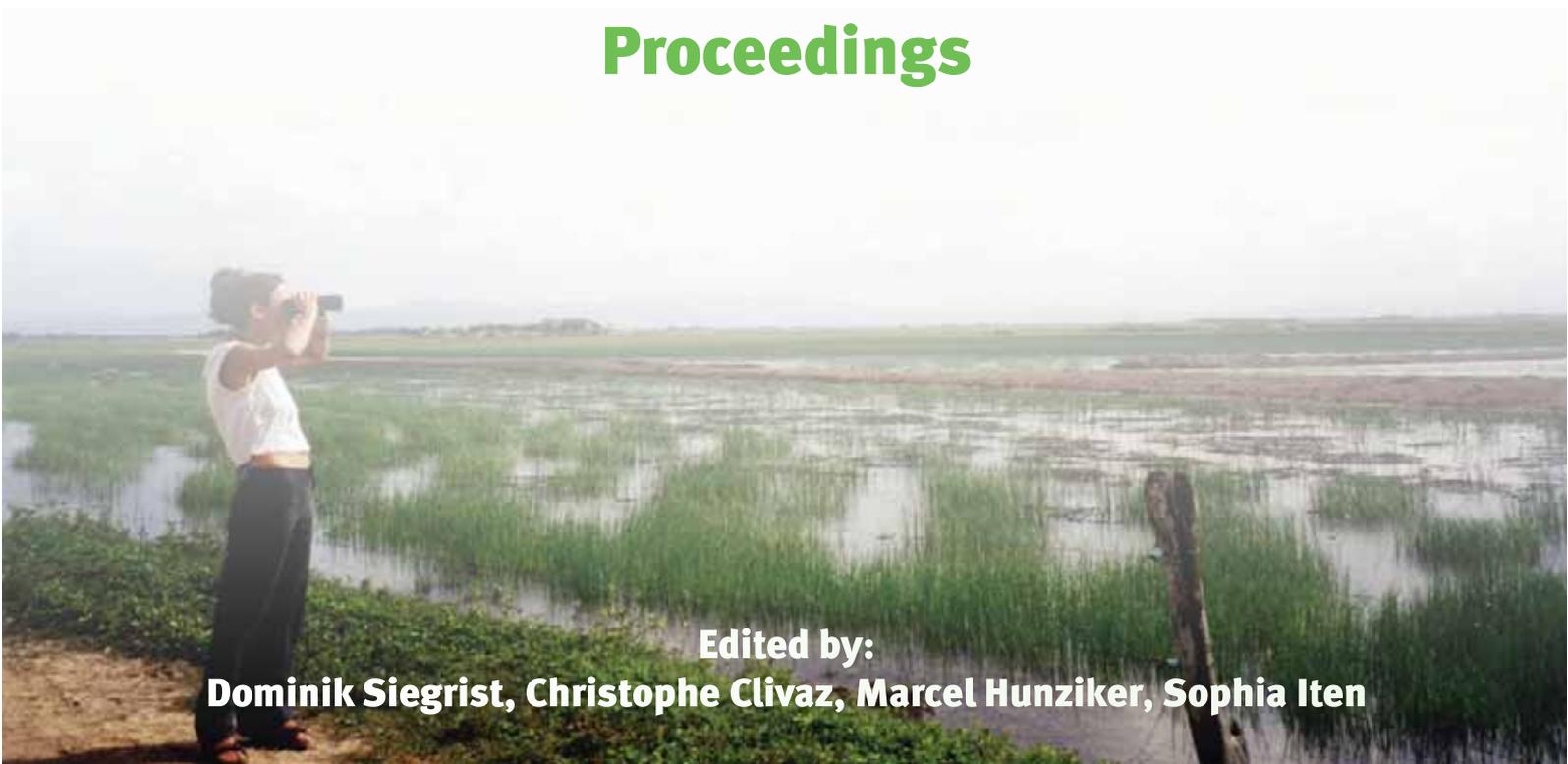


## Exploring the Nature of Management

### The Third International Conference on Monitoring and Management of Visitor Flows in Recreational and Protected Areas

Rapperswil, Switzerland  
13 - 17 September 2006

## Proceedings



Edited by:  
**Dominik Siegrist, Christophe Clivaz, Marcel Hunziker, Sophia Iten**

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# Introduction

**Dominik Siegrist, Christophe Clivaz, Marcel Hunziker & Sophia Iten**

Management and monitoring of visitor flows in recreational and protected areas are topics of growing importance worldwide. Today more than 100,000 protected areas exist globally, and the trend shows that their number is increasing, as the IUCN statistics demonstrate. To these, we must add numerous smaller areas that also have special natural or cultural heritage values, but do not have a special protected status. Many of these areas do not only serve the protection of natural and cultural values or biodiversity, they are also important points of attraction for tourism and recreation. These areas must be professionally maintained and managed if they are to conserve their natural and landscape values in the future.

After Vienna, Austria (2002) and Rovaniemi, Finland (2004), the third international conference “Monitoring and Management of Visitor Flows in Recreational and Protected Areas” (2006) takes place in Rapperswil, Switzerland. Both of the previous host countries have pursued large scale park management strategies and established numerous new protected areas. Accompanying this, research is evolving, in which visitor flow management is finding an increasingly important place. Switzerland also has a long standing tradition in research on protected areas, although it has until now mainly concentrated on the only large protected area, the Swiss National Park in Engadin.

The creation of new parks in Switzerland has met opposition for a long time. Only lately two large protected areas have been established: the UNESCO Biosphere reserve Entlebuch and the UNESCO World Heritage site Jungfrau-Aletsch-Bietschhorn. At the moment, a modification of the Swiss federal environmental legal framework is in progress in the Swiss parliament, which should facilitate park creation in the near future. Three categories of protected areas are planned: “National Park”, “Nature Experience Park” and “Regional Nature Park”. In the coming years at least one new National Park is to be established.

With the ongoing legal revision, the debate about the protection of nature and landscapes as well as the issue of the future of remote regions enjoy new dynamics. As a result, current strategies promote the defusing of the classical antagonism between “conservation” and “development” through new synergies between protection of nature and tourism. Remote regions will benefit from a new economic functionality due to the creation of protected areas, and it should be expected that natural and cultural heritage will be professionally managed. Since human use is a central issue of the newly created parks, funded monitoring and expert visitor flow management will gain increasing significance.

From this background, these proceedings contain contributions pertaining to four central questions:

1. Which impacts do tourist use and recreational activities have on recreational and protected areas and how can these be presented?

This question addresses the advancement of research in visitor monitoring methods, visitor modelling and data management. What new results have been found in recreation ecology and visitor impact research? What are the latest developments in the study of visitor/user conflicts, behaviour studies, sustainability and carrying capacity studies? How are new methods for simulating recreational behaviour through agents progressing? How can we bridge the ecological and social science divide in visitor impact monitoring and management?

2. Which images of landscape, nature and wildlife are the basis for the use and management of recreational and protected areas?

This question aims to investigate society's perception of landscape as well as the implications for visitor management. How do landscapes act as push and pull factors of leisure motivation? Which images of the landscape are tied to the concept of sustainable development? What is the state of research in exploring the foundations of human-wildlife conflicts in parks and protected areas?

3. What requirements must be met for regional development and nature based tourism to take place in relation to recreational and protected areas?

This question addresses new paradigms of regional development in the context of large protected areas. Which concepts and experiences arise in the domains of nature recreation and nature tourism and what economic and social effects are to be expected? How can one increase the value added of a protected area without diminishing the quality of the landscape and biodiversity?

4. How relevant is research for actual practice and how are research results integrated into planning and management?

This question examines the significance of visitor monitoring data for management, planning and policy and for visitor information. Which requirements exist for recreation and how can they be integrated into landscape planning? What value can be given to participation processes? What do good solutions between sports, nature and landscape look like?

These questions are discussed by scientists and managers from almost 30 countries and we are pleased to welcome so many to this MMV3 conference. This active participation is a positive sign for the network of experts that has developed to such prosperity in few years. The following proceedings contain the contributions which were accepted for presentation at the MMV3 conference. The choice was offered to the contributors to submit a short abstract or a longer extended one. The sessions are listed here in the order they are given at the conference. Within the different sessions, the presentations are sorted alphabetically by the first author's name. The full speeches made by the invited keynote speakers are also included. An index of authors at the end of the volume will make finding a contribution easier.

To guarantee scientific quality, each submitted presentation was given a blind reviewing by two international experts who read the contributions critically and commented them anonymously. Many were accepted, others were returned for a minor or major revision. As linguistic quality was not a criterion for acceptance, the contributions were edited in the compilation of the proceedings. We would like to give sincere thanks to all the reviewers for their support.

At this point we would like to recognize all those who contributed to the success of the MMV3 conference. Special thanks go to the partner institutions and the members of the National Organizing Committee for their active assistance in making this conference possible. We thank the members of the International Steering Committee for their valuable guidance and suggestions. In particular we thank the University of Applied Sciences Rapperswil, the Swiss Federal Institute for Forest, Snow and Landscape Research, the University of Applied Sciences Western Switzerland, the University of Applied Sciences Wädenswil, the SANU – Training for Sustainable Development, the Swiss National Fund and the Swiss Academy of Sciences for their financial and material support. Last but not least we would like to thank the session and workshop chairs as well as all the contributors, upon whose work the scientific quality of the MMV3 conference depends.

## Keynote Addresses

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# North American Idols: Personal Observations on Visitor Management Frameworks and Recreation Research

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North American visitor management frameworks and the closely associated outdoor recreation research paradigm are frequently the envy of recreation researchers and managers in Europe and around the world. In many countries, initiatives have been started to explore the applicability of these frameworks, and an ever increasing number of recreation studies follow the theories, concepts and methods originally developed in North America. In Europe their popularity spread first to Great Britain and Scandinavia, but lately, other European countries also follow that trend. Inevitably questions arise about the applicability and suitability of these methods in many European settings, where the smaller scale of administrative units, national boundaries, and cultural as well as natural landscapes constitute management challenges to the unconditional roll-out of these frameworks. I will reflect on the relationship between the frameworks and recreation research, attempt to identify future trends, and comment on the European situation.

## Visitor Management Frameworks

“Visitor management frameworks provide a systematic process so that managers (or decision processes) are fully aware of (1) the desired future they wish to attain, (2) the alternative routes to the future, and (3) consequences of those alternatives.” In addition, these frameworks provide the explicitness and feedback needed in a time of change, complexity and uncertainty (McCool 2005, p4). They provide land managers and agencies with pragmatic guidance, a standardized approach to management, simplified bureaucratic procedures, and guidance for research and monitoring. They also emphasize the need for public participation,

and the dissemination and presentation of future scenarios and research results to decision makers, stakeholders and the public.

In North America the need to manage recreation activities on public lands emerged during the 1960s and 1970s when increasing affluence and mobility of the emerging post-industrial society created more demand for these kinds of land uses. In response, the public land management objectives changed from sustained yield (with the primary goal to maximize extractive forest uses) to multiple use objectives. At the same time environmental concerns also lead to widespread concerns about the traditional forest management practices, while concerns over conservation lead to the establishment of protected areas (National Parks, Wilderness areas, etc.). These latter places required visitor management in their own right. In North America the focus of these recreation activities and their management is on huge tracts of public land, administered by large land management agencies who are in need of homogenous management approaches.

Early challenges of recreation management were driven by simply questions of carrying capacity: “How much recreation use can be accommodated without threatening the preservation and conservation concerns of parks and protected area” (Manning 2004), or other commercial uses on public land? It became apparent quickly, that a simple supply side management approach was insufficient, because carrying capacity is a function of management actions, and in the case of human activity is influenced by the desired experiences. This recognition gave rise to the notion of a spectrum of recreation opportunities,

and lead to more complete frameworks following a rational planning philosophy. At the core of most frameworks are the following stages:

1. Formulation of management objectives that are expressed by quantitative indicators and standards of quality.
2. Monitoring of indicator variables to determine their condition relative to standards of quality.
3. Application of management actions to ensure that standards of quality are maintained.
4. Most frameworks suggest that public participation guides the entire implementation.

Indicators are measures of resource or social conditions, which should be measured cost-effectively and accurately; should reflect some relationship to the amount or type of use occurring; social indicators should be related to user concerns; and must be responsive to management control. Typical examples of widely used indicators are water quality, soil compaction, or number of encounters.

Standards express the level of the indicator beyond which change is unacceptable. Standards may reflect existing conditions or future targets. Regarding encounters with other users, one may desire to manage a trail for no more than  $x$  encounters with other hikers per day. Standards may be homogeneous throughout one management area, or may differ between zones. Standards are the crucial concept for the operationalization of a framework, and in many situations a standard is formulated around the concept of 'acceptability'.

Finally, monitoring determines when and where management action is needed in order to maintain standards of quality, and also provides means for revision and improvement of standards. The application of a framework is not an end in itself but an iterative process fitting the spirit of adaptive management (Walters 1986).

These frameworks differ by their specific purposes and/or agency needs, and are strongly influenced by the ability of managers to share power with stakeholders, or vice versa the desire of stakeholders to do so (Newsome et al. 2003). The Limits of Acceptable Change (LAC) framework (Stankey et al. 1985) has been proposed as the fundamental visitor management framework for wilderness areas, and

also includes an ROS component (Clark & Stankey 1979) for larger scale zoning. It also served as a blueprint for the later frameworks. The Visitor Impact Management (VIM) framework (Graefe et al. 1990), developed for the US Park Service has a stronger emphasis on impacts and a more top-down agency driven management approach. The Visitor Experience and Resource Protection (VERP) framework (Manning 2001, US Dept. of the Interior 1997) suggests a focus on parks purpose and management objectives, and advocates a strong public participation strategy. Parks Canada experimented with a more activity focused framework, the Visitor Activity Management Process (VAMP) (Nilsen & Tayler 1997), and is currently developing an experience based framework. The only major adaptation of a visitor management framework outside of North America produced the Tourism Optimization Management Model (TOMM) (Newsome et al. 2003) in Australia, which is focused on the complexities of a tourism destination, including private entrepreneurship. No detailed description of the various frameworks will be provided here, as they are readily available in published texts (e.g. Newsome et al. 2003).

Below I will explore the relationship between these frameworks and research. Modern management principles such as ecosystem management (Grumbine 1994) and adaptive management (Walters 1986) emphasize the importance of research in resource management in general, and visitor management frameworks should function in a similar manner. Many links between these visitor management frameworks and recreation research are fairly obvious, but explicit comments about them are rather scarce.

## Recreation Research

Usually outdoor recreation research is associated with a fairly distinct research tradition and body of literature, which has its root in North America and is heavily influenced by social psychological theory, concepts and methods. During the beginnings of recreation research in the 1960's it became apparent very quickly that a focus on the management of supply (i.e. opportunities) was insufficient. Instead, the notion of a triad between

opportunities, activities and experiences was conceived, which is crucial to the first visitor management framework, the ROS. Thus, the importance of social sciences was apparent to managers and academics alike, and led to the pivotal position of social psychology as the arguably most influential discipline of early outdoor recreation research (e.g. Driver 1976). This way of thinking directed early recreation research to specific recreation related topics and theories such as research on crowding, recreation conflict, displacement and product shift, recreation specialization, and the application and adaptation of more general social and or psychological concepts such as satisfaction, motivation, and norms and standard research. By the time the visitor management frameworks were conceptualized, a paradigm of outdoor recreation research was well established (see below) and obviously the same group of researchers was highly influential in the development of these frameworks.

In short, within 15 years, a strong recreation research 'paradigm' had established itself with a sound theoretical base, an important set of applied research questions, continued agency need and support for research, academic based training of students who would grow into these agency jobs, and a peer reviewed literature lead by such journals as *Journal of Leisure Research* and *Leisure Sciences*. Even though these journals carried surprisingly few publications about frameworks, the recreation research 'paradigm' propagated by these journals continuously influenced decisions of framework guided management processes (e.g. norms research on crowding). Before moving into a discussion of outdoor recreation research paradigm and the recent trends and future options, I would like to present Kuhn's concept of the scientific paradigm and its evolutionary processes, and then discuss outdoor recreation research within Kuhn's framework.

## Recreation Research as a Scientific Paradigm

The notion of a research paradigm has been introduced by Kuhn in 1970, and he observed four stages in the progression of science:

1) Normal science is conducted over a long period of time by a group of scientists forming a distinctive discipline, working within a paradigm, and accepting a self-imposed framework of theory, objectives, and techniques. This acceptance is what Kuhn means by tradition-bound. Scientists are using theory, not challenging it.

2) Appearance of discrepancies within the paradigm. These are observations of experimental results at odds with the propounded theory rather than expanding or amplifying it. There may be no immediate attempt to change the theory in order to accommodate these discrepancies.

3) A revolutionary period, short compared to the period of normal science, during which discrepancies are resolved in a new theory. The new theory is generated from outside the established practitioners of the normal science rather than logically developed from within the group.

4) Solidification of the new theory into a new paradigm, which gathers new adherents. The new group of scientists then proceeds to conduct another period of normal science. Research under the old paradigm may continue – but at a reduced level of activity – and it eventually ceases. (Kuhn as quoted in Ford 2000, 312)

According to Kuhn's observations, by the late 70s / early 80s recreation research carries most of the traits of a mature paradigm in a place where none existed 15 years earlier. It represents a clearly defined applied academic discipline, offers well established academic programs, relevant journals, and pursues a wide range of applied research questions that follow the paradigm.

Now, 25 years later the question may be asked if the paradigm is still intact as it was originally, if it has changed gradually, or if indications towards a serious and radical paradigm shift can be observed. First, there are definitely a number of indications of a healthy paradigm of 'normal science', as described by Kuhn's Stage 1.

- The theoretical basis of outdoor recreation research which draws heavily from social psychology and some related disciplines has, and still is, making important contributions. The

theories which are, in Kuhnian terms, slowly advancing and are repeatedly applied and tested, are as relevant today as they were initially.

- The fact that the field came together so quickly and withstood the test of time reflects a need for this research. The paradigm now represents a fairly standardized field of inquiry, which provides important continuity for agencies as the main users of this applied research.
- Certain areas of outdoor recreation research have seriously influenced the design and implementation of visitor management frameworks; for example the entire area of norms based research, especially in the area of perceived crowding.
- The two major journals of outdoor recreation research, *Leisure Sciences* and the *Journal of Leisure Research* have become the main outlets of the academic work, and continue to thrive. They have shown a certain capacity of adaptation by expanding the scope of theoretical coverage, most notable into the qualitative and post-modern research 'revolution' of the 1980s and 1990s.

However, one can also observe a number of discrepancies (Stage 2), to say the least. Arguably, these discrepancies do not affect the theory or theories per se, but are predominantly methodological, and also pertain to other aspects of the modus operandi of recreation research.

- One main discrepancy appears with the research methods applied. Even today, the majority of research in outdoor recreation relies on methods developed during the 1970s in conjunction with the theoretical aspects of the paradigm, and ignores recent methodological advances. For example, the classical research on attitudes, values and preferences, using single item scaling, is still widely used today. It is fundamental to the academic process of testing and re-testing of many of the theories, and provides great insights into various behavioral antecedents. However, when it comes to predicting human behavior, as is the explicit goal of the theory of reasoned action (Ajzen and Fishbein, 1980), the link from attitudes to intended behavior an actual behavior is rather tenuous. Significant methodological progress with various multivariate methods

(i.e. revealed and stated preference/choice modeling) finds its way into the core recreation literature surprisingly slowly.

- The main recreation journals appear to scrutinize submissions predominantly for their theoretical contribution, or at least for a sound theoretical basis of the applied research presented. Inevitably, such a screening mechanism precludes top level peer reviewed debate on important management questions, on the application of frameworks, and other legitimate issues associated with applied research.
- The heavy emphasis on theory testing within a case study context makes a conceptual debate challenging, because contributions without an empirical component have a much lower chance of acceptance.
- The focus on theory also precludes serious methodological debate, especially about emerging methods, as well as their rapid dissemination. This barrier affects methods pertaining to research on theories, and even more so methods and concepts which might be important for practitioners or in the implementation of management frameworks (i.e. monitoring). For example, Manning (2004) points out that "there is little guidance to be found in the professional and scientific literature on cost-efficient and effective monitoring approaches and techniques."
- The main journals remain largely closed to an expanded set of research questions, approaches and solutions, which frequently appear in the management context. Besides monitoring and enumeration issues, the 'classical' literature rarely covers articles containing GIS or GPS applications, or any state-of-the-art more sophisticated modeling approaches. The last few issues of the major journals might indicate the overdue departure from this point of critique, as several papers contain state-of-the-art methods, albeit mostly embedded in traditional theory.
- Consequently, it comes of little surprise that many important papers on recreation are published outside the traditional domain of recreation research. For example, a large number of papers on recreational fishing by leading resource economists can be found in the resource

economics literature. Unfortunately, these papers are written for the purpose of developing economic theory and/or modeling, and cater to a very different audience, going largely unnoticed by recreation managers, and even by many of the recreation researchers (for a summary see Hunt 2005).

If one evaluates the visitor management frameworks through a similar lens, a somewhat different picture emerges. Many applications of these frameworks by many jurisdictions across North America as well as occasional applications elsewhere have taken full advantage of state-of-the-art methods and techniques. Public participation processes and information dissemination are further enhanced with web-based technology, GIS based maps summarize information, and visualizations of possible future scenarios further debate (see the LAC sites for the Daniel Boone National Forest for an example (<http://www.fs.fed.us/r8/boone/lac/>). Occasional negative examples of framework applications also exist, in which an agency uses the framework merely as a prescriptive management or inventorying tool (e.g. the ROS in British Columbia).

This observation of a dynamic and innovative environment around the visitor management frameworks, contrasts with the rather conservative mode of conduct of 'normal science' within classical recreation research. Maybe this discrepancy in itself indicates a paradigm shift, and the answer will depend on a precise definition of the term paradigm. In my opinion, these observations signal a significant expansion of recreation research, towards much more interdisciplinarity. This shift seems to be driven more by the practitioners than by the established researchers. In all likelihood, academics will remain in respective niches, but managers ought to embrace these new opportunities and become much more interdisciplinary in their outlook. Apparently outdoor recreation research is morphing into a much larger endeavor than the classical lens alone would suggest.

### Future Research Directions

Manning (2004) lauds the frameworks "for making the trade-offs inherent to the management issues transparent on a conceptual basis." McCool

(2005) observes "a growing need for frameworks and concepts that assist decision makers in assembling a set of informed alternatives and evaluating them."

To this I would add that conceptual transparency of trade-offs is certainly an important trait of public processes, but by now social science methods exist which can contribute to this need more explicitly. And McCool's jargon actually reflects the language of decision analysis, without making any further use of it. Taking advantage of these techniques should represent the next logical step in the development of these frameworks. It would bring the social science contributions to the decision making processes on par with the natural science information, and decision makers and stakeholders alike will work with values and trade-off positions of the various interest groups explicitly, instead of relying on anecdotal evidence of round tables.

Decisions support tools can be based on revealed and/or stated choice models which document the trade-off positions of user and stakeholder groups. A more formal framing of a decision problem along a decision analysis concept would provide a tight framework for monitoring, data collection, analysis, and a formal track record of decision making. Yet hardly any applications of decision analysis in recreation management in general or visitor management specifically exist (for a first attempt see Rudolphi & Haider 2003).

Closely related is a move towards integrated modeling, in which ecological, managerial and recreational information are organized in a related manner, and subcomponents of the respective models influence each other. It is conceivable that social science information on values and trade-offs be collected in such a manner that it can be applied in spatially explicit GIS models.

Are these North American Visitor Management Frameworks Applicable in Europe?

As I have claimed in the beginning, in Europe these types of frameworks are – with some exceptions- absent. With the exception of some attempts in Scandinavia, no visitor management frameworks have been applied in Europe to this day. The most obvious explanation might be that they simply were not known due to language bar-

riers, which prevented many practitioners, and to a lesser extent academics, to delve into the relevant North American literature. However, that would be too simplistic. Instead the main causes seem to be of a legal and structural nature, as well as a very different research environment.

The different land ownership structure seems to be crucial. While North America contains huge amounts of public lands, only some regions in Europe, most notably in Scandinavia have a similar dominance of public land ownership. In the remainder of Europe land ownership is a much more complex patchwork of private and several layers of public owners, leading to a much more diverse management structure which is much less conducive to rolling out generic management frameworks. Instead, one finds a diverse set of locally adapted, and sometimes unique, planning applications. Access to recreation opportunities should also be considered, which seems to be more readily available in most European nations compared to North America. In Scandinavia, the 'everyman's right' provides ubiquitous recreation access on all land. And in most continental European countries, various blends of legislation and local customs provide wide recreation access. In tourist areas, such as the Alps, the importance of recreation and scenic services over forestry have long been decided in favor of recreation. The combination of already established broad public recreation access and many private landowners is not very conducive to recreation management frameworks.

At the same time, Europe has developed very different types and notions of protected areas, which lead to different planning approaches. In North America, significant portions of land (up to 10-12% in many jurisdictions) are protected from most commercial uses in parks. Consequently, they designed their own recreation management approaches. In Europe, on the other hand, strict protected areas are few, while nature parks, landscape protection areas, and Natura 2000 allow many other land uses. Furthermore, throughout Europe, regional identity is of utmost importance, especially in the more peripheral areas which serve as the prime recreational and tourism areas. This regionalization requires more specific local planning and management solutions. Many European planning

processes have applied some of the quintessential components of the visitor management frameworks already - sometimes deliberately, sometimes coincidentally, as they simply followed a common sense approach. Many of these applications have grown organically out of the respective processes, and throughout Europe, public participation and the use of standards have become widespread planning and management tools with or without an explicit framework. For example, the EU-directive governing Natura 2000 areas mandates public participation for the management planning process. Its implementation varies enormously between various jurisdictions.

The restructuring of academic institutions throughout Europe has introduced a much more competitive environment, in which researchers must compete internationally for grants and for publications in the peer reviewed literature. Many of these researchers, and their students who eventually end up as managers, did not get trained in the classical recreation research paradigm, and might therefore be much more open to innovation and to state-of-the-art research approaches with focus on the research goals. Hence European research has an opportunity to establish itself on par with North American research.

In summary, given these discrepancies between European and North American approaches to and traditions in recreation management and research, further exchange of ideas between these positions will be beneficial to both parties.

## References

- Ajzen, I. & Fishbein, M. (1980). *Understanding Attitudes and Predicting Social Behavior*. Englewood Cliffs.
- Clark, R.N. & Stankey, G.H. (1979). *The Recreation Opportunity Spectrum: A Framework for Planning, Management and Research*. Gen. Tech. Report PNW-98. Portland.
- Driver, B.L. (1976). *Towards a Better Understanding of the Social Benefits of Outdoor Recreation Participation*. Ashville.
- Ford, D.E. (2000). *Scientific Method for Ecological Research*. Cambridge.
- Grumbine, R.E. (1994). What is ecosystem management? In: *Conservation Biology* (8/1), p 27-38.

- Hunt, L. M. (2005). Recreational fishing site choice models: Insights and future opportunities. In: *Human Dimensions of Wildlife* (10), p 153-172.
- Manning, R. (2001). "Visitor experience and resource protection: A framework for managing the carrying capacity of national parks." In: *Journal of Park and Recreation Administration* (19), p 93-108.
- Manning, R. (2004). Recreation Planning Frameworks. In: M. J. Manfredo, J.J. Vaske, B.L. Bruyere, D.R. Field, P.J. Brown (eds.). *Society and Natural Resources – A Summary of Knowledge*. Prepared for the 10th Intl. Symposium on Society and Resource Management. Jefferson.
- McCool, S. (2005). Outdoor recreation in the new century: frameworks for working through the challenges. Presentation at the 2005 Society of American Foresters National Convention, October 19-23, Ft. Worth, TX.
- Newsome, D., Moore, S.A. & Dowling, R.K. (2002). *Natural Area Tourism – Ecology, Impacts and Management*. Clevedon.
- Nilsen, P., & Tayler, G. (1997). A comparative analysis of protected area planning and management frameworks. In S.F. McCool and D.N. Cole (eds.) *Proceedings of a Workshop on Limits of Acceptable Change and Related Planning Processes: Progress and Future Directions*, University of Montana's Lubrecht Experimental Forest, Missoula, MT, May 20-22, 1997, p 49-57. Odgen.
- Rudolphi, W. & Haider, W. (2003). Visitor management and ecological integrity: one example of an integrated management approach using decision analysis. In: *Journal for Nature Conservation* (11), p 346-354.
- Stankey, G.H., Cole, D.N., Luca, R.C., Petersen, M.E., Frissell, S. (1985). *The Limits of Acceptable Change (LAC) System for Wilderness Planning* (Gen. Tech. Report, INT-176. Odgen.
- US Dept. of the Interior, National Park Service (1997). *VERP – Visitor Experience and Resource Protection (VERP) Framework – A Handbook for Planners and Managers*. Denver.
- Walters, C. (1986). *Adaptive Management of Renewable Resources*. New York.

# Trends in Alpine Tourism: The Mountaineers' Perspective and Consequences for Tourism Strategies

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*Keywords: Alpinism, summer tourism, mountaineering, hiking, climbing, user survey, use trends, demands.*

Summary: Mountaineers are a core group in Alpine tourism, their demands and expectations are an essential foundation for every tourism development strategy. This paper is based on the authors' surveys and other studies from the Alpine region. The image of mountain sports in the media (extreme climbing, paragliding, canyoning etc.) does not reflect the actual use patterns, as hiking is still by far the most important activity. Mountaineers are a very conservative group, usually well educated and of higher income. They perform this activity frequently and are generally satisfied with the current situation, thus sceptical towards any changes and management measures. Mountaineers accept lower comfort levels, e.g. in huts, as compared to their everyday life as part of a back-to-the-roots experience. If tourism development strategies want to attract new user groups, they need to comply with the demands of this core group.

## Introduction

The mountain ranges of the Alps offer a wide variety of opportunities for landscape based recreation and tourism. Traditional alpinist activities are hiking and climbing in summer and downhill as well as cross-country skiing in winter. These long established mainstream sports have been complemented in the past decades by numerous other activities such as mountain biking, canyoning, paragliding, snowshoeing, waterfall climbing, often referred to as 'trend sports'. There is extensive media coverage of these trend sports, thus also shaping the public image of alpine sports as a whole: for lifestyle and leisure magazines it is much more attractive to report on extreme sports rather than on 'old-fashioned' activities such as hiking. As most of the trend sports are highly commercialised, the media coverage is also often financed by tour operators or outfitters as part of their marketing campaigns. However, is this image consistent with reality? Doesn't the majority of mountain tourists still perform the traditional activities hiking, climbing and skiing? How do they themselves perceive trends and demands for action in mountain tourism?

This article specifically addresses issues of mountain tourism in the summer season. Since the mid 1980s there has been a significant change in many Alpine regions regarding to the seasonal distribution of tourism, with winter tourism still booming and summer tourism stagnating or in decline (see also Lüthi & Siegrist 1996). Tourism boards in various regions are concerned about the further development, as a two-seasonal utilisation of the touristic infrastructure (hotels, restaurants etc.) is essential for the economic sustainability of regions depending on tourism income.

## Project context

The project "Trends and Needs of Action in Summer Mountain Tourism" was commissioned by the Tourism Section of the Austrian Federal Ministry of Economy and Labour within the framework of the "Plattform Sanfter Bergtourismus" (Platform Soft Mountain Tourism), a cooperation of major players of the Austrian tourism industry. The study was conducted by the Institute of Landscape Development, Recreation and Conservation Planning at BOKU University of Natural Resource and Ap-

plied Life Sciences Vienna in the year 2005. The main goal was to identify the current activities and behaviour patterns of the core group of mountain tourists, which is characterised by the activities of hiking and climbing, further to detect significant trends and to provide base information for the formulation of touristic strategies.

### **Target group**

The target group of the study was the current population of mountaineers and mountain hikers in the Austrian Alps. They can be seen as the core group of mountain tourism, and any touristic strategy has to consider the needs and expectations of this group. Many different terms are used to describe activities in this context, such as “hill walking”, “mountain hiking”, “mountaineering” and “mountain climbing”. There are no universally valid definitions for these terms, nor is it possible to separate them from each other without overlaps. In the context of our study we use the term “mountain hiking” (in German: “Bergwandern”) for walking in mountainous terrain on tracks or off track, usually without the need of using the hands or any specific equipment. Opposed to that, “mountaineering” (German: “Bergsteigen”) often involves the use of the hands to proceed, as well as technical equipment such as ropes, ice axes or crampons (see Munter 1988, Lorch 1995, Brämer 2001). Therefore, mountaineering requires more specific knowledge, skills and training than mountain hiking. Both activities have in common a high dependency from the environment and actual conditions such as weather and natural hazards.

### **Study design**

The study was conducted via on-site interviews using a structured questionnaire. In order to separate the target group from other mountain visitors, e.g. tourists accessing summits by cable cars, interviews were conducted in mountain huts, access to which involves at least two hours of walking from the closest starting point such as roads or lift stations. In total, 1189 interviews were achieved on 44 huts in different ranges of the Austrian Alps, covering both the more easily accessible lower mountain ranges of Eastern Austria and the higher and in parts also heavily glaciated ranges of Western Austria, which are usually visited by more ex-

perienced and well equipped mountaineers. The interviews were conducted in afternoons, which is the time when mountaineers return from the tours to the huts and when they are usually open to discussions. The rejection rate was relatively low, less than 20% for overnight visitors and less than 30% for day visitors, who needed to descend down to the valleys on the same day and therefore had less time for an interview.

### **Reference data**

The results from the survey were compared with data from other sources, such as demographic data and other touristic survey studies, in particular the Tourism Monitor Austria 2004 (T-MONA), the most important general tourism survey in Austria with a data base of about 15000 interviews. Comparisons were also made to studies from other Alpine countries, e.g. Switzerland (SAC 2004).

## **Selected Results**

### **Demography of mountaineers**

**Country of origin:** The largest group of mountain tourists in our study are visitors from Germany (43%), followed by domestic tourists (35%) and tourists from the Netherlands (12%), thus reflecting the general visitor structure of Austrian tourism outside the major cities.

### **Gender**

Mountaineering has for a long time been a male domain. In our survey we had 60% male and 40% female interviewees, indicating a still unbalanced gender distribution.

### **Age**

The mean age of the sample was 41 years. When comparing the data from the survey with the general age distribution of the population in the countries of origin, it can be observed that the age group under 24 years is significantly underrepresented. Mountaineering can not really be seen as a typical activity of the younger generations, which it had been traditionally. Whilst rock climbing is a popular sport throughout the Alpine countries, attracting large crowds to competitions and show events often staged indoors, it does not seem to promote nature based mountaineering.

### Education

The survey sample had a surprisingly high percentage (41%) of persons with completed tertiary education, compared to the general mean of about 15% in both Germany and Austria. This result proves findings from other studies which also reported a very high proportion of highly educated persons engaging in hiking and mountaineering (e.g. Brämer 2000).

### Income

Questions about the interviewees' income were not included in the survey, however, as education is often correlated to income, it can be assumed that many mountaineers are also in income levels above the average.

### Membership in Alpine Clubs

62% of the persons interviewed are members of Alpine Clubs, however, only a small group of mountaineers are actually active members engaging in the club life (group tours, social events etc.). Most mountaineers join Alpine Clubs only to receive discounts on huts and to benefit from the mountain rescue insurance which is usually included in the membership fee.

### **Character, frequency and organisation of tours**

Days spent in the mountains: Most mountain hikers and mountaineers have a high commitment to alpinism, as they perform their activities frequently, spending in average 17 days per year in the mountains, which covers a considerable part of the individual leisure time budget.

### Length of tours

About 70% of the persons in the sample have been interviewed during overnight tours, the average duration of the tours was between three and four days.

### Activities

Mountain hiking without climbing is the dominant type of activity, although 40% of the interviewees also occasionally perform rock climbing or glacier tours. A specific activity of the Eastern Alpine mountain ranges is Via Ferrata climbing, i.e.

rock climbing in routes provided with wire ropes, iron handrails, ladders etc. enabling less skilled climbers to experience the atmosphere of exposed climbing terrain. There is a large range of Via Ferrata tours in Austria, Slovenia and Italy, and about 70% of the persons interviewed climb such routes at least occasionally. This means that Via Ferrata climbing is performed more often than classic rock climbing. Only a very small part (less than 10%) of the persons interviewed have experiences with activities such as canyoning, white water kayaking or paragliding. This is of course in contrast to the image communicated in media and in particular in touristic marketing campaigns.

### Organisation mode

Most mountaineers prefer to organise their tours individually, alpine activities are usually performed in small groups of three to four persons. Larger groups are usually only found on huts where training courses are held by alpine clubs or by professional mountaineering schools. There is little demand for all-inclusive tour packages. Hiring professional mountain guides is much less common in Austria compared to the situation in the Western Alps of Switzerland.

### Travel mode

Mountain sports in Austria rely to a great extent on access by car. Less than 15% of the persons interviewed travelled to the starting point of their tour by public transport. Therefore car traffic and the related effects can be seen as the major environmental impact of mountain sports.

### Equipment

Interviewees were asked about safety and emergency equipment. Some results were surprising, in particular the relatively low use of GPS technology for navigation as opposed to traditional navigation instruments such as compass and altimeter (figure 1). More than 80% of the persons interviewed indicated that they never used a GPS device.

While most mountaineers carry some first aid kits with them, bivouac sacs, which can be essential in sudden weather changes in high alpine areas, are obviously not seen as part of the standard equipment. With the wide spread use

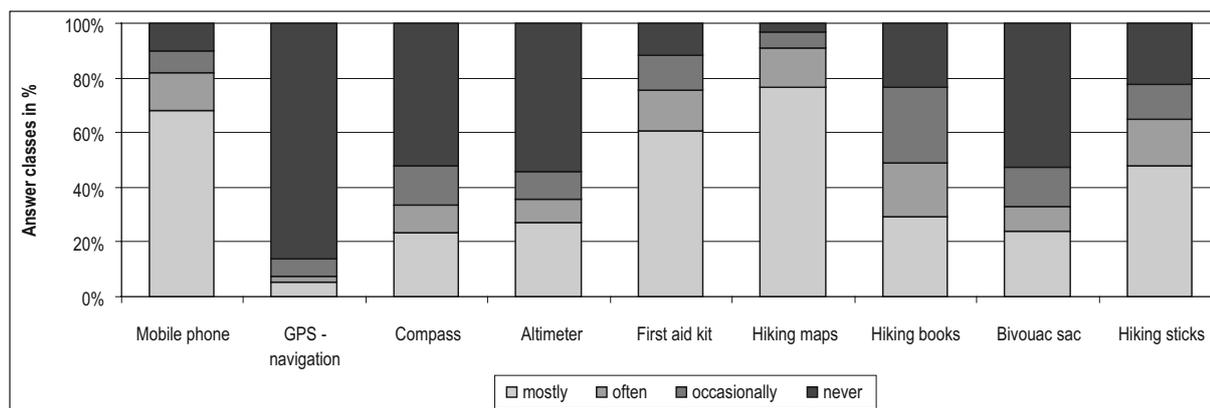


Figure 1: Safety and emergency equipment carried with by mountain hikers and mountaineers (N=1189).

of mobile phones and improved reception conditions in many mountain ranges, mountaineers seem to assume that rescue services can easily be alarmed in emergency situations.

### Satisfaction levels and conflict potentials

A number of questions referred to specific demands concerning facilities and services e.g. on huts, and to conflicts with other touristic user groups such as mountain bikers or other land uses such as farming or forestry. It could be observed that the general satisfaction level is very high, and only few conflicts with other uses were reported. In particular, the conflict level concerning nature protection is very low, as conservation regulations usually do not impose restrictions on alpinist activities. This is in contrast to the situation e.g. in rock climbing areas in Germany, where there is a long history of conflicts between conservation and climbing.

### Consequences for touristic strategies and needs for action

As stated before, summer tourism in the Alps is in decline, threatening the economies in many regions depending on tourism income. Touristic strategies to stabilise or moderately increase the visitation have of course to consider natural conditions, which limit the development options, but also the needs and demands of the current visitor population.

### Focus on core activities

In recent years, “adventure activities” such as canyoning, paragliding or white water rafting have been in the centre of touristic marketing concepts. The Alps have been advertised as an adventure ground. Our data show that hiking is still by far the most dominant activity, and it can be assumed that this will not change in the future, in particular in the context of an aging society (see Opaschowski 2004). Therefore, marketing strategies should rather focus on the core activities than on activities which obviously are attractive only for a very small group of tourists.

### Activation of potential visitor groups with similar expectations

Mountain huts, where most visitors spend their nights, are a very sensitive social environment, as they accommodate a relatively large number of visitors in a small space. Introducing new, fun- or adventure- oriented user groups to this environment would most probably cause conflicts with the current population.

### Female mountaineers as welcome visitors

Touristic strategies in Alpine areas rarely target female hikers or mountaineers. The traditional image of mountaineering as a male domain might deter potential visitors, and male chauvinism can still be found on some huts. A marketing campaign to attract more female visitors would therefore also need to be complemented by awareness training e.g. for hut wardens.

### **Coordination of information sources on the internet**

Currently there is a plethora of websites for mountaineers offering tour information, discussion forums, GPS tracks etc. Some of the platforms are purely commercial, others managed by regional tourist boards, alpine clubs or just by amateurs. Even for experienced web users it is often difficult to identify the most relevant websites for a specific region. The major players of Alpine tourism are challenged to improve this chaotic situation e.g. by forming a joint portal.

### **Reduction of entry barriers**

Mountain hiking and in particular high alpine mountaineering require a certain level of fitness, skills and experience as well as some special equipment. The current visitor population is very much dedicated to this sport, however, the non-mountaineers seem to perceive a high entry barrier. This needs to be overcome by low-level offers such as guided one-day tours rather than talking candidates into full-week training courses.

### **Intensification of youth work**

Youth work in Alpine Clubs is obviously successful in the context of sport climbing, which more and more develops into an indoor sport. However, traditional nature-based activities seem to be less attractive for young people. In former times, mountaineering was one of the few affordable touristic activities for young people in Alpine countries, today's more affluent youth also has much more options. It also appears, that people pursuing outdoor activities on a regular basis in their childhood, tend to continue these activities as adults (Ward Thompson et al. 2005). The fact that outdoor activities of children generally decreased in the past decades therefore is a big challenge for designing outdoor programs for young people and children.

### **Development of comprehensive mobility concepts for alpinism**

Transport modes vary significantly throughout the Alpine countries: In Switzerland there is a dense network of railway and bus lines providing access even to remote valleys. The use of public transport is actively promoted by Alpine Clubs (Matti et al. 2004). Opposed to that, in Austria and Italy

the accessibility of alpine regions by public transport is minimal. If mountaineering in these countries wants to be recognised as a sustainable form of tourism, integrative mobility concepts need to be developed.

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### **References**

- Brämer, R. (2001). Trendmarkt Wandern - Argumente für einen radikalen Perspektivwechsel. Marburg. <http://www.staff.uni-marburg.de/~braemer/koelln.htm>
- Lorch, J. (1995). Trendsportarten in den Alpen. Vaduz.
- Lüthi, M. & Siegrist, D. (1996). Alpinismus und Umwelt. Zürich.
- Matti, D., Haefeli, U. & Wigger, D. (2004). Wirkungsanalyse der Mobilitätskampagne "Alpen retour" des Schweizer Alpen-Clubs SAC. Luzern.
- Munter, W. (1988). Bergsteigen 1 – Bergwandern und Felsklettern. Bern
- Opaschowski, H.W. (2004). Deutschland 2020 : wie wir morgen leben - Prognosen der Wissenschaft. Wiesbaden.
- Schweizer Alpen-Club SAC. (2004). Mitgliederumfrage 2004. Ergebnisse und Schlussfolgerungen. Bern.
- Ward Thompson, C., Aspinall, P., Bell, S. & Findlay, C. (2005). It Gets You Away From Everyday Life: Local Woodlands and Community Use—What Makes a Difference? In: Landscape Research (30/1), p 109-146.

## People, Pixels and Parks: Forest Conservation in the Tropics

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*Keywords: Parks, protected areas, community forestry, forest conservation, land cover change, satellite remote sensing, South Asia.*

**Abstract:** While protected areas have become a cornerstone of conservation efforts, there is significant debate about whether parks have been effective in enabling conservation. A meta-analysis of information on rates of land cover clearing in protected areas finds that government protected areas are significantly likely to lower rates of habitat clearing over time. At the same time, it is essential to ask whether government protection is the only successful approach to conservation. A focused set of studies in Nepal and India indicates that it is not the official designation of a forest as government or community that impacts forest conservation as much as the actual degree of monitoring that takes place on the ground. Communities can be effective forces for conservation, if properly involved. By locating individual protected areas within the context of the biophysical, social and institutional landscape in which they are embedded, we will be able to better devise more effective approaches to conservation.

Protected areas have become a cornerstone of conservation efforts across the globe. By 2003, over 100,000 parks and other protected areas were in existence on paper, covering an area of over 18,000,000 km<sup>2</sup> across the world (UNEP 2004). In response to increasing awareness of the impact of these exclusionary strategies of conservation on local communities, park managers have attempted to establish more inclusive management strategies that involve local communities in conservation, especially in countries where the lives of indigenous communities are closely intertwined with forest habitats. Yet, there is significant debate about the impact of these participatory approaches on conservation, with arguments that habitat fragmentation and species loss have increased in areas where local communities coexist with protected areas (Brandon et al. 1998, Terborgh 1999).

Given the centrality of this debate in the international conservation community - and when viewing the vast effort expended in setting up and managing parks - it is surprising to note that there have been very few comparative studies that evaluate park effectiveness across multiple sites, and simultaneously examine community and government conservation. The few multi-site assessments

of park effectiveness have been based largely on interviews with park managers (e.g. Bruner 2001, Hockings 2003). Although these are experienced individuals with a great deal of information on their specific areas, there is also the danger of introducing biases in the analysis, since these same individuals are in charge of monitoring, and could have a vested interest in declaring the parks as successfully managed (Vanclay 2001).

Part of the difficulty has been in developing quantitative surveys by monitoring ecological change in a manner that enables comparison across multiple sites located across the globe. Yet, this remains a crucial task, if we are to be able to critically evaluate the effectiveness of parks as a policy strategy for conservation. A major challenge has been to identify a set of criteria applicable to protected areas embedded in different ecological habitats across the world, which can be used to evaluate their functioning in a commonly applicable, acceptable manner. Satellite remote sensing, possibly the most frequently used technique for the mapping of changes in forest cover, provides a particularly effective tool for such an analysis (Nagendra et al. 2004a, 2006). A meta-analysis of quantitative data on land cover change in 37 parks from 20

countries was conducted by this author, based on published literature on rates of land cover change in officially designated protected areas.

How effective have parks been in limiting land clearing? This can be assessed in two ways. In the first approach, rates of clearing within the park were compared to the surrounding landscape, which receives less protection. The rate of habitat clearing within the parks were significantly lower compared to its surroundings ( $p < 0.01$ ), indicating that these areas have been successful in limiting habitat destruction. The second approach tested whether parks were successful in limiting land cover clearing over time, by comparing rates of land cover change in the area before and after establishment of the park. Although there was limited data on this aspect, the numbers indicate that the majority of parks were successful in maintaining or lowering rates of land cover change following their establishment ( $p < 0.10$ ) – an impressive record when one considers how rates of land cover clearing have been steadily increasing over time, across the world.

There was no significant variation in rates of habitat clearing parks belonging to different regions – Africa, Asia, Latin America and North America-Europe. Rates of land cover clearing also did not differ significantly between low, medium and high income countries. Indeed, some protected areas in low income countries are performing very well, with positive rates of habitat regrowth – such as the Royal Chitwan National Park Buffer Zone in Nepal (Nagendra et al. 2005). Finally, there were no significant differences in rates of land cover change between parks managed in higher IUCN categories indicating stricter protection, and parks which are subject to a greater degree of human intervention for management or sustainable use. This is a particularly interesting finding in light of the intense debate in the conservation community about whether participatory management has negatively impacted park effectiveness. Clearly, the variation in park effectiveness can not be accounted for by simple, broad-brush arguments that apply consistently across sites.

Drivers and agents of land cover change did however appear to differ across regions. In North America and Europe, timber logging was frequently mentioned as a major cause for land cover clearing. Park managers appeared to play a more significant role in determining the location and extent of forest clearing, and these parks appeared to be managed predominantly for recreational purposes and forestry. Thus, the need is for these landscapes to satisfy the requirements of forest dependent communities is less pressing, which can make it easier for official management plans to translate into practice. In Africa, Asia and Latin America the actors were predominantly local communities, indicating the pressing need to involve communities with park management in these parts of the world. Managers in these countries presumably have to deal with a doubly difficult situation – working with lower levels of investment into park management and protection, as well as managing local communities living in conditions of poverty and forest dependence. Yet, these do not appear to be worse off when compared to protected areas in higher income countries.

This analysis finds that officially designated, government protected areas are likely to lower rates of habitat clearing. It does not however answer the question of whether government protected areas are the only successful approach to conservation (Dietz et al. 2003). Hayes (2004) and Hayes and Ostrom (2005) examined this question in greater detail, conducting detailed evaluations of whether formal government ownership was related to forest protection. Drawing on a dataset of 163 forests across multiple locations in different countries, their analysis did not find any statistically significant difference between forest density in officially designated protected areas, as compared to other public, private and communally owned forests. Thus, while some government protected areas may be effective at forest protection, other protection mechanisms appear to be equally effective. Banana and Gombya-Ssembajjwe (2000) found that the monitoring activities of local communities have been remarkably successful in conserving a government forest in Uganda. Batistella, et al. (2003) similarly found that rubber tappers have proved to be very active and effective (even

though unofficial) forest monitors in 16 forest reserves in Brazil. These studies indicate that local forest dwellers can be active and motivated monitors under appropriate conditions.

Similar findings emanate from our research in South Asia. Based on a rigorous set of methods developed over the past decade at the Center for the Study of Institutions, Population, and Environmental Change (CIPEC, [www.cipec.org](http://www.cipec.org)), we have studied forests managed under a variety of tenure arrangements across the world. Our findings indicate that multiple factors impact the effectiveness of forest conservation. Formal ownership – whether private, community or government – is less important than the actual rules and mechanisms used to manage these forests on the ground.

Our studies in South Asia are particularly illustrative. Forests in this biodiversity-rich region are a priority for conservation, yet subject to some of the highest population pressures, with forest-dependent communities, emerging markets and substantial conflicts over forest resources. A variety of forest institutions co-exist, ranging from traditional systems to fenced government parks and recent co-management initiatives - providing an environment that facilitates careful comparative study of which policies, rule systems and institutions appear to assist effective forest conservation.

Through a focused set of studies in Nepal and India, where some of the most thickly populated settlements coexist with dense tropical forest cover, we have attempted to address these questions in multiple landscapes (Nagendra et al. 2004 b, 2005, 2006). Time series analyses of remotely sensed images enable us to identify the trajectories of land cover change in different parts of the landscape. By overlaying management boundaries on these images, we are able to interpret the impact of different government, community or co-managed systems on forest conservation. Through in-depth interviews conducted with local inhabitants, we can hope to understand the major factors associated with successful conservation in these forested landscapes.

The multi-temporal remote sensing studies in India cover landscapes within which government protected national parks and reserve forests. The

Mahananda Wildlife Sanctuary in northern India and the Tadoba Andhari Tiger Reserve (TATR) in central India contain relatively stable forests, while the less protected government protected reserve forests nearby have witnessed some degradation and thinning over time. Yet, small patches of clearing are also visible within the parks, where the density of surrounding habitation is high, and there is sustained pressure for grazing, and extraction of firewood and timber (Ghate 2003, Nagendra et al. 2006). Increased conflicts between park guards and local people have amplified the difficulties involved with monitoring. Despite the strongly and often expressed opinion that the communities within the park are responsible for most of the negative impacts on the forests, our findings indicate that local communities, if appropriately involved, can act as a powerful force for conservation. The primarily subsistence villages located within the TATR do not have a significant negative impact on forest clearing or fragmentation. Instead, it is the villages located outside the park, well connected to urban markets for timber and forest products, that appear responsible for most of the forest degradation, which is primarily taking place at the outer boundary (Nagendra et al. 2006).

In contrast to the government protected areas we study in India, we examine a range of community protected areas in Nepal. Amongst developing nations, Nepal has proved to be a forerunner in implementing innovative and effective programs of decentralized forest management. The Nepal analyses demonstrate the potential of community protected and co-managed areas to provide effective forest conservation. We find significant regrowth in community managed buffer zone forests adjoining the Royal Chitwan National Park. While these areas experienced increased clearing between the first two dates, this trend was reversed with forest regrowth following establishment of protection. Some areas belonging to the buffer zone program have been able to completely halt all deforestation activities within their boundary. These buffer zone forests are located near the park main gate, earn substantial incomes from tourist visits, and have a much greater financial incentive for conservation (Nagendra et al. 2004 b, 2005). All these forests have substantial monitoring by the communi-

ties, or by forest guards hired and supervised by the community. Encouragingly, recent field visits in May 2005 indicate that these communities have been able to protect their forests even in the face of some very difficult and insecure situations following the intense conflicts within the country, indicating the resilience of these efforts.

These in-depth case studies indicate that it is not the official designation of a forest as government, community or co-managed that impacts forest conservation as much as the actual degree of monitoring that takes place on the ground. Whether community forests in Nepal, or government protected reserve forests in India, if these forests are not adequately monitored for violations by official guards or by the users themselves, they are not substantially protected. If substantial monitoring is present, whether through government or community inputs or a combination of both, as in the case of the Nepal community forests and Indian national forests, they are able to maintain forest cover and encourage regeneration, even in a landscape that is otherwise surrounded by degrading forests.

The meta-analysis of land cover clearing found that a large proportion of parks in developing countries, where human demands for scarce forest resources are particularly acute, are placed in IUCN categories that indicate they are being managed through strict protection - yet, this analysis has demonstrated that these parks appear no likely to provide more protection compared to parks that employ more participatory approaches. Our case studies in South Asia indicate that both community and government protected areas can be successful in halting and reversing habitat clearing, if properly monitored. Given the context of forest protection in many low income regions of the world, limited by manpower and by resources, these studies indicate that it is critical to effectively involve local communities in the management of these parks, and provide them with economic incentives for conservation. This will prevent the burden of protection from falling solely on often ill-equipped national Governments and can help bring ill-equipped, understaffed and underfunded parks on an even footing with others working in easier conditions – as is being increasingly demonstrated in countries such as Mexico and Nepal (Bray et al.

2003, Nagendra et al. 2005). It is only by moving away from universalized, global “blueprint” management approaches, and locating individual protected areas within the context of the biophysical, social and institutional landscape in which they are embedded, that we will be able to better devise more effective and inclusive approaches to conservation (Dietz et al. 2003).

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## References

- Banana A.Y. & Gombya-Ssembajjwe, W. (2000). Successful Forest Management: The Importance of Security of Tenure and Rule Enforcement in Uganda Forests. In: Gibson, C., McKean, M. & Ostrom, E. *People and Forests: Communities, Institutions, and Governance*, p 87-98. Cambridge.
- Batistella, M., Robeson, S. & Moran, E.F. (2003). Settlement Design, Forest Fragmentation, and Landscape Change in Rondônia, Amazônia. In: *Photogrammetric Engineering and Remote Sensing* (69), p 805–812.
- Brandon, K., Redford, K.H. & Sanderson, S.E. (eds.) (1998). *Parks in Peril: People, Politics, and Protected Areas*. Washington, DC.
- Bray, D.B., Merino-Pérez, L., Negreros-Castillo, P., Segura-Warnholtz, G., Torres-Rojo, J.M. & Vester, H.F.M. (2003). Mexico's community-managed forests as a global model for sustainable landscapes. In: *Conservation Biology* (17), p 672-677.
- Bruner, A.G., Gullison, R.E., Rice, R.E. & da Fonseca, G.A.B. (2001). Effectiveness of Parks in Protecting Tropical Biodiversity. In: *Science* (291), p125–128.
- Dietz, T., Ostrom, E. & Stern, P. (2003). The struggle to govern the commons. In: *Science* (302), p 1907-1912.
- Ghate, R. (2003). Global Gains at Local Costs: Imposing Protected Areas: Imposing Restricted Areas in India. In: *Journal of Sustainable Development and World Ecology* (10), p 377-395.

- Hayes, T. (2004). Parks, People, and Forest Protection: An Institutional Assessment of the Effectiveness of Protected Areas. Bloomington: Indiana University, Center for the Study of Institutions, Population, and Environmental Change. Working Paper CWP-04-01.
- Hayes, T. & Ostrom, E. (2005). Conserving the World's Forests: Are Protected Areas the Only Way? In: *Indiana Law Review* (38), p 595-617.
- Hockings, M. (2003). Systems for assessing the effectiveness of management in protected areas. In: *Bioscience* (53), p 823-832.
- Nagendra, H., Munroe, D.K. & Southworth, J. (2004). Introduction to the special issue. From pattern to process: Landscape fragmentation and the analysis of land use/land cover change. In: *Agriculture, Ecosystems and Environment* (101), p 111-115.
- Nagendra, H., Southworth, J., Tucker, C.M., Karmacharya, M., Karna, B. & Carlson, L.A. (2004). Remote sensing for policy evaluation: Monitoring parks in Nepal and Honduras. In: *Environmental Management* (34), p 748-760. (Note: Publisher has listed authors incorrectly as Nagendra, Tucker, Carlson, Southworth, Karmacharya, Karna).
- Nagendra, H., Karna, B. & Karmacharya, M. (2005). Cutting across space and time: Examining forest co-management in Nepal. in: *Ecology and Society* (10), p 24. <http://www.ecologyandsociety.org/vol10/iss1/art24/>.
- Nagendra, H., Pareeth, S. & Ghate, R. (2006). People within Parks—Forests Villages, Land-Cover Change and Landscape Fragmentation in the Tadoba Andhari Tiger Reserve, India. In: *Applied Geography* (26), p 96-112.
- Terborgh, J. (1999). *Requiem for Nature*. Washington D.C. UNEP-WCMC (United Nations Environmental Programme World Conservation Monitoring Centre). (2004). Defining Protected Area Management Categories. Protected Areas and World Heritage Programme. [http://www.unep-cmc.org/index.html?http://www.unep-wcmc.org/protected\\_areas/categories/~main](http://www.unep-cmc.org/index.html?http://www.unep-wcmc.org/protected_areas/categories/~main).
- Vanclay, J.K. (2001). The effectiveness of parks. In: *Science* (293), p 1007.

## The New Paradigm for Protected Areas: Implications for Managing Visitors in Protected Areas

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### Introduction

Systems of protected areas<sup>1</sup> are an essential component of a healthy, functioning landscape. Protected areas deliver environmental goods and services which underpin sustainable development and human well-being. Such areas are vitally important for achieving key global targets such as the United Nations Millennium Development Goals.

In recent years a number of highly influential events for protected areas have been held. The first of these events was the 2003 Vth IUCN World Parks Congress (2003 WPC) held in Durban, South Africa. This Congress brought together some 3,000 participants from 160 countries and embraced a rapidly growing and diversifying constituency for protected areas. The Congress reached out to a range of key stakeholders: political leaders; protected areas agencies; NGOs; the development assistance sector; industry; indigenous groups; and young people. In so doing the 2003 WPC served to focus global attention on protected areas, and generated renewed energy and support for future action. Importantly, the WPC produced a wide array of technical outputs which are shaping protected area global policy and practice.

The second key event was the Convention on Biological Diversity (CBD) Convention of the Parties (COP) Meeting, held in Kuala Lumpur, Malaysia in February 2004. This meeting adopted a comprehensive and targeted Program of Work on Protected Areas. This Program was strongly influenced by the 2003 WPC outcomes and out-

lines a number of actions for countries to take in relation to the establishment and management of protected area systems.

The outcomes from 2003 WPC, together with the framework provided by the CBD Program of Work on Protected Areas, underpin a “new paradigm” for protected areas. Within the context of the new paradigm, the management of visitors to protected areas and the need to better engage with local communities in and around protected areas takes on particular importance. In particular there must be a shift towards planning for protected areas with and for, rather than against, people, as has been the situation in some cases in the past.

This paper will focus on some of the key messages from the WPC and the CBD Programme of Work on Protected Areas and their implications for the management of visitors within protected areas. The paper will cover: (a) the role of IUCN in protected areas; (b) an introduction to Vth World Parks Congress; (c) the key elements of the CBD Programme of Work on Protected Areas; (d) a new paradigm for protected areas, and priorities highlighted at the 2003 WPC; (e) Implications for the management of visitors to protected areas; and (f) conclusion.

### IUCN's role in protected areas

IUCN, the World Conservation Union brings together States, government agencies and a diverse range of non-governmental organizations in a unique world partnership: over 900 members spread across some 140 countries. IUCN's mission is: “to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically

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<sup>1</sup> Defined by IUCN as: “An area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means” IUCN (1994).

sustainable". Through its six Commissions, IUCN draws together over 10,000 expert volunteers in project teams and action groups focusing in particular on species and biodiversity conservation and the management of habitats and natural resources. IUCN operations are increasingly decentralized and are carried forward by an expanding network of regional and country offices, located primarily in developing countries.

Protected areas have been a major focus of IUCN's work since its origin in 1948. The Sixth IUCN General Assembly (IUCN GA) in 1958 in Athens, Greece, recommended the organization of the First World Conference on National Parks as a mechanism to exchange experience on nature conservation, and this was subsequently implemented in Seattle, Washington in July 1962. Since that time World Parks Congresses have been held every 10 years and have had a profound influence on protected areas thinking and practice worldwide. The Sixth IUCN/GA also recommended that the United Nations establish an International List of National Parks and Equivalent Reserves; the first of such lists, was published by IUCN in 1967. Since then the UN List of Protected Areas<sup>2</sup> has emerged as the definitive reference on the global protected area estate and it has recently been endorsed by the CBD<sup>3</sup> as a key tool for global monitoring and assessment of protected areas.

IUCN's early work on protected areas was supported by the International Commission on National Parks, created in 1960<sup>4</sup> by the Seventh GA of IUCN, (Warsaw, Poland). The Commission was established "to strengthen international cooperation in matters relating to national parks and equivalent reserves in all countries throughout the world". The Commission, which started with less than 40 members, mainly from the USA, Canada, the UK and France, has evolved into today's WCPA network of 1330 members in 159 countries (see figure 1).

IUCN established a Secretariat Programme on Protected Areas (PPA) in 1963 with one permanent staff position appointed in the early 70s. A close and effective working relationship between the

<sup>2</sup> Produced with the United Nations Environment Programme – World Conservation Monitoring Centre (UNEP-WCMC).

<sup>3</sup> Convention on Biological Diversity.

<sup>4</sup> Now known as IUCN's World Commission on Protected Areas.

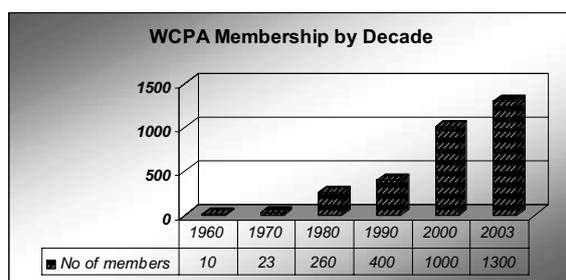


Figure 1: Evolution of WCPA membership by decade.

Commission and the Secretariat has always been a feature of IUCN's work in this area and has been one of the factors contributing to IUCN's global influence in this area.

The work of IUCN in protected areas has significantly increased since that time, both in complexity and quantity. One of the most significant activities is convening on behalf of IUCN the World Parks Congress every 10 years. IUCN's convening role in relation to protected areas has also been fundamental in convening Forums such as the World Protected Areas Leadership Forum, the annual meeting of the world's protected areas CEOs; and focussed workshops on issues such as World Heritage and mining. IUCN has also played a key role in relation to the establishing best practice for protected areas, particularly through its Protected Areas Guideline Series, and in influencing protected areas policy, through initiatives such as the IUCN System of Protected Areas Categories and projects such as the IUCN/EC Biodiversity and Development Project.

At a regional level IUCN, through the World Commission on Protected Areas, has also been very active. Sixteen WCPA regional programmes have been established; where possible these are linked with the IUCN Secretariat regional offices.

### The Vth World Parks Congress

A key role of IUCN in relation to protected areas has been the planning and implementation of the World Parks Congresses. These have been watershed global events for assessing progress and setting targets for protected areas. Since 1962, Congresses have been convened as follows:

The Vth IUCN World Parks Congress (2003 WPC): "Protected Areas Benefits Beyond Boundaries" represented the largest and most diverse gathering of protected area experts in history. Congress Patrons – Former President of

Table 1: Summary Details on IUCN World Parks Congresses.

<b>World Parks Congresses</b>	<b>When ?</b>	<b>Where ?</b>	<b>How many attended ?</b>	<b>From how many countries ?</b>
First	1962	Seattle, USA	262	63
Second	1972	Yellowstone National Park, USA	1,200	80
Third	1982	Bali, Indonesia	353	68
Fourth	1992	Caracas, Venezuela	1,840	133
Fifth	2003	Durban, South Africa	2,897	160

South Africa, Mr. Nelson Mandela and Her Majesty Queen Noor of Jordan – set the scene in the inspiring opening session, urging delegates to celebrate one of the most significant conservation achievements of the last century - the inclusion of more than 11.5% of the earth's land surface in protected areas. However they also noted that many threats face these precious areas and urged all involved with protected areas to reach out - beyond their boundaries and constituencies - to engage the wider community.

The Congress illustrated the message of “Protected Areas: Benefits Beyond Boundaries” through an rich range of plenary sessions, workshop sessions, side events and exhibitions. More than 150 workshops (organized around 10 major themes) and 200 side meetings were held, underscoring the depth and richness of the technical component of the Congress. A wide range of stakeholders, including indigenous peoples, youth and the private sector, were actively involved in all Congress sessions. A range of communication tools was used throughout the Congress including theatre, video, song and dance as well as formal presentations. An unprecedented level of genuine engagement and partnership characterized the Congress. This is reflected in the nature of the Congress outputs and offers exciting new opportunities to work together in the future to implement the ambitious agenda arising from Durban.

The 2003 WPC delivered a number of key outcomes which will significantly impact the future of the world's protected areas. These included the Durban Accord and Action Plan, a set of 32 Congress Recommendations, a series of initiatives for African protected areas and a Message to the Convention on Biological Diversity. Since the Congress more than 50 pub-

lications have been produced, largely arising from the Congress Workshop Streams. Numerous commitments were also made at the Congress to assist the world's protected areas, including the establishment of 200,000 sq km of new protected areas, and support of more than US\$ 50 million to strengthen management of existing areas.

### **The CBD Programme of Work on Protected Areas**

The 2003 WPC adopted and transmitted a Message to the CBD. This message emphasised the importance of protected areas for both biodiversity conservation and for sustainable development. This Message was discussed at the CBD COP7 in February 2004 and this meeting discussed and adopted a wide ranging and ambitious Programme of Work on Protected Areas (PA PoW). This PA PoW includes many of the key recommendations for the Durban Accord and Action Plan. Its main objective is to ensure the establishment and maintenance, by 2010 for terrestrial and by 2012 for marine areas, of comprehensive, effectively managed, and ecologically representative national and regional systems of protected areas that contribute to achieving the three objectives of the Convention and the 2010 target to significantly reduce the current rate of biodiversity loss. The adoption of this PA PoW represents a watershed opportunity, binding country parties to far reaching action on protected areas. While the 2003 WPC played a central role in the adoption of the PA PoW it is only through the commitment of 188 national governments that real progress can be made for protected areas globally.

Table 2: Old and New Paradigms of Protected Areas (Phillips 2004).

<i>Topic</i>	<i>As it was: protected areas were ...</i>	<i>As it is becoming: protected areas are ...</i>
Objectives	<ul style="list-style-type: none"> <li>• Set aside for conservation</li> <li>• Established mainly for spectacular wildlife and scenic protection</li> <li>• Managed mainly for visitors and tourists</li> <li>• Valued as wilderness</li> <li>• About protection</li> </ul>	<ul style="list-style-type: none"> <li>• Run also with social and economic objectives</li> <li>• Often set up for scientific, economic and cultural reasons</li> <li>• Tourism a means to help local economies</li> <li>• Valued for the cultural importance of so-called "wilderness"</li> <li>• Also about restoration and rehabilitation</li> </ul>
Governance	Run by central government	Run by many partners
Local people	<ul style="list-style-type: none"> <li>• Planned and managed against people</li> <li>• Managed without regard to local opinions</li> </ul>	<ul style="list-style-type: none"> <li>• Run with, for, and in some cases by local people</li> <li>• Managed to meet the needs of local people</li> </ul>
Wider context	<ul style="list-style-type: none"> <li>• Developed separately</li> <li>• Managed as 'islands'</li> </ul>	<ul style="list-style-type: none"> <li>• Planned as part of national, regional and international systems</li> <li>• Developed as 'networks' (strictly protected cores, buffered and linked by green corridors)</li> </ul>
Perceptions	<ul style="list-style-type: none"> <li>• Viewed primarily as a national asset</li> <li>• Viewed only as a national concern</li> </ul>	<ul style="list-style-type: none"> <li>• Viewed also as a community asset</li> <li>• Viewed also as an international concern</li> </ul>
Management techniques	<ul style="list-style-type: none"> <li>• Managed reactively within short timescale</li> <li>• Managed in a technocratic way</li> </ul>	<ul style="list-style-type: none"> <li>• Managed adaptively</li> <li>• Managed with political sensitivity</li> </ul>
Management skills	<ul style="list-style-type: none"> <li>• Managed by scientists and natural resource experts</li> <li>• Expert led</li> </ul>	<ul style="list-style-type: none"> <li>• Managed by multi-skilled individuals</li> <li>• Drawing on local knowledge</li> </ul>
Finance	Paid for by taxpayer	Paid for from many sources

## A New Paradigm for Protected Areas

The 2003 WPC reinforced the need for a new paradigm for protected areas, as first articulated by Adrian Phillips, previously chair of IUCN's World Commission on Protected Areas (Phillips 2004)

This paradigm reflects changing concepts of protected areas over time. The earlier concepts of protected areas were of large natural areas set aside primarily for conservation and for appropriate visitor enjoyment, as summarised in the "As it was" column in table 2 below. The trends of protected areas as noted in the "As it is becoming" Column in table 2 were reinforced at the Durban World Parks Congress.

The 2003 WPC demonstrated how the elements of this paradigm are being practically achieved. In particular a number of key issues relevant to this paradigm were highlighted at the Congress.

Targeted future expansion of the protected area estate is essential

World Parks Congresses since 1962 have called on governments to rapidly expand the number and extent of protected areas. In particular the recommendation at the Caracas World Parks Congress (IUCN 1993) called on governments to: "ensure through international cooperation that protected areas cover at least 10 percent of each biome by the year 2000". This

acted as a rallying cry for many in the protected areas movement and provided a stimulus for countries to expand their protected area estate. The results of this were seen at the World Parks Congress where the 2003 United Nations List of Protected Areas was launched. This noted there are now 102,102 protected areas covering 18.8 million km<sup>2</sup> in all, and 11.5% of the global land surface – representing a dramatic growth since

1962 when there were only 1,000 protected areas covering 3% of the Earth’s land surface. The rapid growth in the number and area of protected areas is shown in figure 2 below:

The Congress also noted that protected areas are a significant land use in their own right third only to forestry and permanent pasture (see figure 3 below).

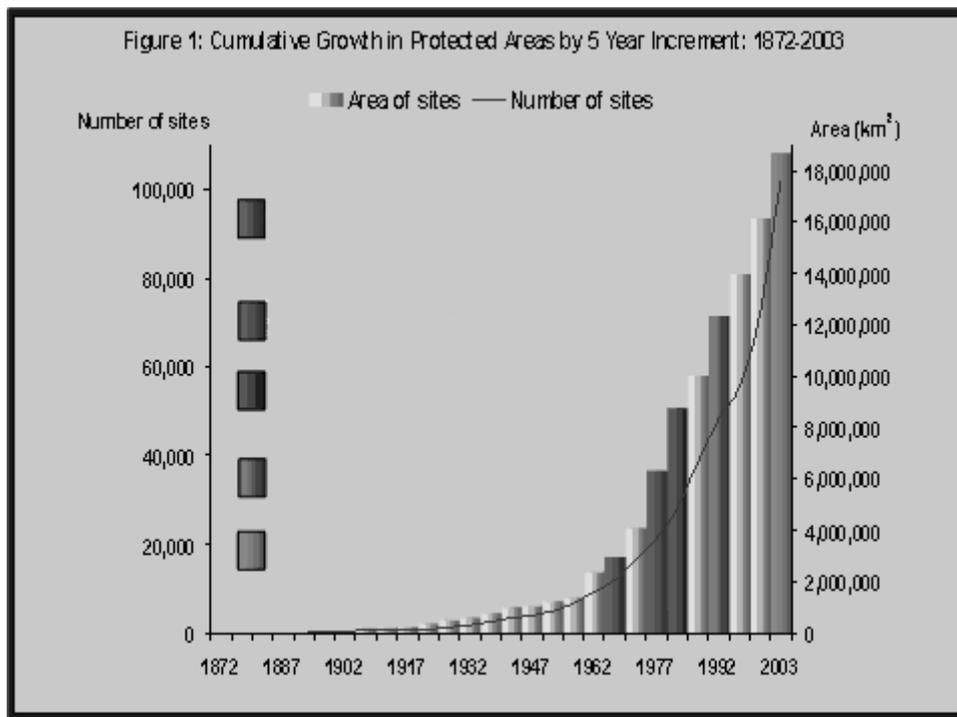


Figure 2: Cumulative Growth in Protected Areas by 5 Year Increment: 1872 to 2003.

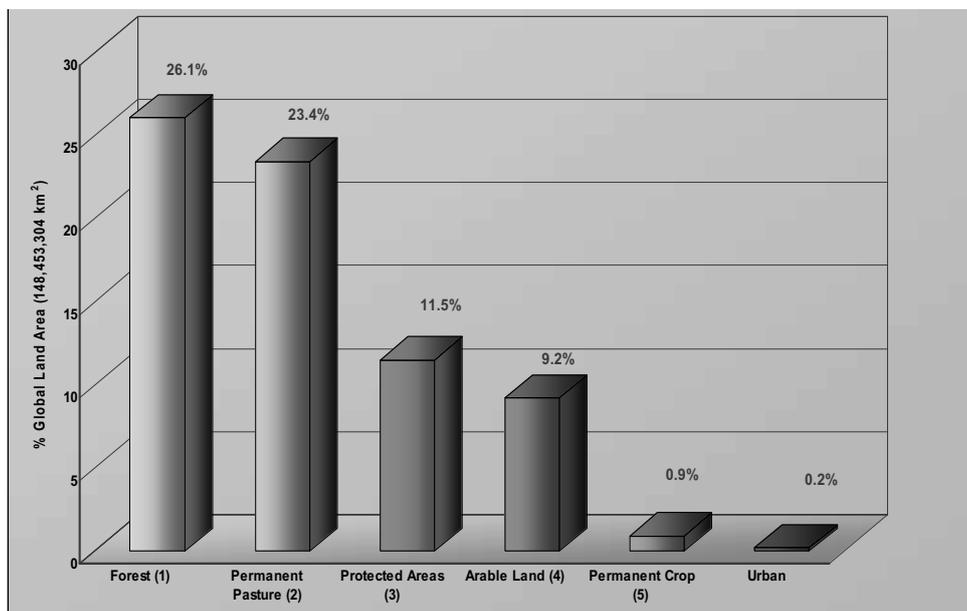


Figure 3: Protected Areas as a Proportion of Global Land Use.

Remarkably, the global estate under protection has gone from an area the size of the United Kingdom to an area the size of South America in just 4 decades. The current global coverage of protected areas exceeds the ambitious target set at the last World Parks Congress (Caracas, Venezuela, 1992) of ensuring that protected areas cover at least 10% of each biome by 2000.

While the number of protected areas has tripled over the past 20 years, with the majority of such areas being established in developing countries, there remain serious gaps in coverage. Initial establishment of protected areas often focused on criteria such as outstanding scenic values or wildlife rather than on biological or ecological criteria. Consequently, many national PA networks do not adequately reflect the distribution of biodiversity within national boundaries. Furthermore, most PAs were originally conceived in a national context and took no account of regional biodiversity or of the existence of similar networks in adjacent countries. The major exceptions to this rule are those countries that have adjusted their national networks to take account of biodiversity distribution, or those countries that have created their PA networks in recent times and according to modern ecological principles, such as Equatorial Guinea, Madagascar and Gabon in Africa and Lao PDR in Asia. For most countries therefore, there is a need to better compare PA networks with biodiversity distribution, regionally, in adjacent countries and outside protected area sites. This is essential to enable prioritization for the establishment of protected areas in the future.

New analyses presented at the World Parks Congress highlighted significant gaps in the coverage of certain ecosystems, particularly marine ecosystems, including the High Seas, freshwater and lake ecosystems, temperate grasslands, deserts and semi-deserts. Gaps in marine coverage are of particular concern given the poor relative level of protection of the marine area<sup>5</sup>. The most recent IUCN Red List of Threatened Species (IUCN, 2006) noted a dramatic growth in the number of species that are threatened with extinction, with now more than 16,000 threatened species worldwide. This dichot-

omy shows a clear need for the establishment and implementation of clearer and more effective conservation priorities; in turn highlighting the need for future protected areas to be more strategic in relation to biodiversity conservation and, specifically, to better target threatened species.

The need for more comprehensive and targeted protected area systems has been recognized. The WSSD<sup>6</sup> and CBD have established ambitious targets relating to protected areas; specifically to establish an effectively managed and ecologically representative system of terrestrial protected areas by 2010 and a system of marine protected areas by 2012. Addressing these gaps and challenges requires expansion of existing protected areas, and the strategic creation of new ones, while ensuring the connectivity of suitable habitat between them. The Durban Congress emphasized that the establishment of future protected areas is essential, that it must be targeted and that it must be based on application of the best available scientific data and tools.

### **The effectiveness of protected areas must be strengthened.**

The World Parks Congress underlined a key message from the late 1990's – the need to improving the effectiveness of existing protected areas and protected areas systems. This reflected the fact the many and growing threats and challenges facing protected areas and also the fact that many protected areas are not achieving their original objectives, such as biodiversity conservation. Thus the message from the Durban Congress was to improve the effectiveness of what we already have under protected area designation. While the period since the Caracas World Parks Congress was marked by a rapid expansion of the quantity of the protected area estate, the Durban World Parks Congress called for consolidation and for more emphasis to be placed on improving the quality or effectiveness of existing protected areas. The Congress highlighted the need to develop and apply new tools for assessing management effectiveness. A number of tools and approaches have emerged over the past decade, such as the IUCN Management Effectiveness Framework and the WWF/World Bank Man-

<sup>5</sup> Marine protected areas are estimated to cover 0.8% of the earth's surface.

<sup>6</sup> World Summit on Sustainable Development, held in Johannesburg in 2002.

agement Tracking Tool, and these offer practical ways to assess the effectiveness of protected areas. Many of these tools are now being applied to protected areas around the world and such approaches need to be more widely used and linked to action by a range of actors including donors, protected area agencies and local communities.

The Congress noted that management effectiveness comprises many inter-related elements, of which capacity development and sustainable financing are particularly important.

### Capacity Development

Improving the effectiveness of management of protected areas requires a significant increase in human and financial resources for protected areas and also strengthening the capacity of people and agencies involved. The World Parks Congress noted that the managers of protected areas and other primary stakeholders often do not have sufficient knowledge, skills, capabilities and tools to ensure that protected areas can more effectively respond to the challenges posed by global change. Enhanced capacity is essential and is needed at a range of levels, including for protected areas agencies, park managers, and key stakeholders. Protected Area management is a challenging task as noted by veteran conservationist, John MacKinnon: “After a lifetime of working in the protected area management business, I have finally worked out why the job seems so complicated...it simply is very complicated” cited in Appleton et al. (2003). Skills and competencies need to be more specialized than in the past requiring a range of innovative and adaptive approaches to protected area management. Competency requirements reflect the evolving nature of protected area management. Traditionally the protected area manager was an expert in the natural sciences, and management was seen as an exercise involving the application of expertise to natural systems. However, the challenges facing the protected area manager in the 21st century are increasing in scale and complexity and must be broadened to include skills in areas such as:

- Cultural and social expertise – for example relating to negotiation and conflict resolution required for activities such as initiating joint man-

agement arrangements with local communities and negotiating with a wide range of stakeholders;

- Information Technology – for example in relation to the application of GIS and web based tools for protected area management;
- Policy expertise – such as understanding and better influencing the broader legal framework and the other sectoral policies within which protected area activities need to be implemented; and
- Strategic Planning and Management – such as in relation to strategic planning and financial management.

This will require a change of approach on the part of protected area agencies, both in terms of recruitment strategies and also in terms of approaches to training and career development. The need for focused and effective training for protected area managers has never been higher and it is critical that it comprehensively address the skills needed for protected areas to adapt to the requirements of the 21st century. Existing training efforts, such as those implemented through the Wildlife Institute of India in Asia or through the Mweka Wildlife College in Africa, should also be strengthened and expanded.

Capacity development should be based on the assessment of skill needs and requirements. Recent work on the development of competency standards in Asia (Appleton et al. 2003) provide a useful model for the assessment of skills and needed competencies as a key element of establishing future directions for capacity development for protected areas. Capacity development must also target young people and encourage them to see protected areas as an attractive and viable career option. The World Parks Congress emphasized the importance of reaching out and engaging the support and energy of youth to build a prosperous future for protected areas. The protected areas profession needs to connect better with young people and empower the next generation.

### Sustainable Financing of Protected Areas

Improving management effectiveness of protected areas requires the development of more reliable and sustainable finance flows for protected areas. The Durban World Parks Congress noted that protected areas require a significant boost in financial investment and noted that existing financial resources are still seriously inadequate. The Sustainable Financing Workshop Stream at the Congress considered that between \$US 20-30 billion per year would be required over the next 30 years to establish and maintain a comprehensive global protected areas system, including adequate coverage of terrestrial, wetland and marine ecosystems. Only about 20% of this is currently available. Under-investment by governments and others in protected areas means that these areas are often failing to meet their conservation and social objectives. Inadequate human and financial resources mean that many protected areas lack effective protection and management, particularly in developing countries. The challenge is to achieve a major boost in investment in protected areas and to develop more sustainable methods of protected area financing.

### **Protected areas must be better linked to sustainable development**

The Durban Congress emphasized that protected areas are vital for both nature and for people. Experience highlighted at the Congress demonstrated that protected areas play a vital role in protecting vital ecosystem services, such as clean water and clean air, and thus are critical for supporting the livelihoods of local people. However, in many parts of the world protected areas as viewed as a barrier to the activities and aspirations of local communities. Many poor people also live in and around protected areas, which serve as a vital source of food and fibre. In a number of cases local communities have been excluded from decision making regarding protected areas, or worse, forcibly removed. As a result such areas have traditionally not been considered in the context of contributing to development objectives or to helping the livelihoods of local communities.

The Durban Congress urged governments and all involved in protected areas to make the link between conservation and livelihoods clearer and

more explicit. This is an important element of influencing decision makers to support the further expansion of protected areas around the world. This is particularly relevant in making the link between protected areas and global agendas such as the Millennium Development Goals relating to environmental sustainability and poverty alleviation and the 2010 targets agreed at the World Summit on Sustainable Development (Johannesburg, South Africa, August 2002) which aim to significantly reduce the loss of biodiversity. However this link has not been clearly articulated and this is one area where more attention is required in the future. The relationship between protected areas and the Millennium Development Goals and WSSD Targets is shown in Annex 1 of this paper. Values of protected areas to key resource and other sectors is also shown in table 3.

Protected area values need to be clearly articulated and communicated. Recent work by IUCN on the economic values of protected areas, (IUCN 1998), reveal that protected areas are often significant revenue-earning entities and can make an important contribution to local economies. For instance, recent studies indicate that Canada is expected to create \$C 6.5 billion dollars in annual Gross Domestic Product from the expenditure of participants in wildlife-related activities which sustain 159,000 jobs and creates \$C 2.5 billion in tax revenue each year. Australia receives over \$A 2 billion in expenditure from eight national parks – at a direct cost to Governments of some \$A 60 million. In Costa Rica, about \$US12 million is spent annually to maintain the national parks but foreign exchange generated in 1991, associated with these parks was more than \$US 330 million with 500,000 overseas visitors; park-generated tourism is the second largest industry in the country.

There is thus a clear message that investment in protected areas can provide significant benefits to national and local economies. Far from being locked up and lost to local users, these areas represent an opportunity for sustainable industries and for the generation of financial returns. However these messages are not being articulated and conveyed to decision makers. Those involved in protected area must communicate the linkages between protected areas and development objectives,

Table 3: Values of protected areas and principal sectoral policy implications.

<i>Biodiversity conservation:</i> nature conservation, health, agriculture, industry, foreign affairs
<i>Watershed protection:</i> natural resources management, water supply
<i>Storm protection:</i> disaster prevention
<i>Tourism:</i> economic development, transport
<i>Local amenity:</i> local government, recreation, public health
<i>Forest etc. products:</i> forestry, economic development, community affairs
<i>Soil conservation:</i> agriculture, natural resources management
<i>Carbon sequestration:</i> energy policy, foreign affairs
<i>Research and education:</i> research, science, education (all levels)
<i>Cultural values:</i> community affairs, local government

particularly through emphasizing the vital role that such areas play in the protection and enhancement of vital ecological services such as the provision of clean water. The role of protected areas in contributing to economic development through appropriate nature based tourism should also be better identified and communicated.

### **New and innovative approaches to protected area governance should be applied.**

The 2003 WPC underlined one key element of the new paradigm: the shift of governance arrangements, from protected areas being run by central government agencies to being run by many different types of organizations and partners. The reasons are varied: in some cases this is a response to specific budget cutbacks or broader financial constraints. In other cases it reflects general patterns of decentralisation, where power and responsibility are being devolved from the centre, and with it power and responsibility for protected areas.

There are now many models of protected area governance. The 2003 WPC noted the need for a range of approaches to protected areas governance to be applied. One particular trend highlighted at the Congress was the increasing involvement of local communities and indigenous peoples in the management of protected areas. A number of specific examples of such areas, increasingly recognized as "Community Conserved Areas" were highlighted at the Congress.

Non-Governmental Organisations (NGOs) are increasingly involved in conservation and protected areas throughout the world. Experience has shown

that NGOs have an important role to play in the establishment and management of protected areas. They often have particular strengths in working with and through local communities for example. A critical aspect in relation to NGOs is the need to build more effective and long term partnerships with government agencies involved in protected areas. In many parts of the world the relationship between Government and Non Government organisations has traditionally been marked by suspicion. This needs to be replaced by an attitude of co-operation, partnership and mutual benefit, and there are many examples from around the world where NGO management of protected areas is working very effectively.

In many parts of the world the private sector is becoming increasingly involved in protected areas. There are limited successful examples to date of private sector management of protected areas but this appears to be an area with potential, although not without pitfalls. Potential advantages of private sector involvement in protected areas are the high level of motivation, relative efficiencies in management, and economies of scale available to large companies. On the other side of the coin, is the need for care, to ensure that conservation objectives are not subsumed by the "profit motive" and also the concern that very few private companies currently have the expertise necessary for effective conservation management. In South Africa, an increasing number of protected areas are being managed by the private sector. In Japan the Keidanren Nature Conservation Fund, also based in Japan, has made a considerable contribution to

nature conservation, with many programmes focused on protected areas, both in the region and internationally (Matsukawa 1996).

As well as examining alternatives to supplement government management of protected areas, there is a need to improve existing government structures and procedures in relation to protected areas. Options such as amalgamation of conservation oriented departments with similar objectives and the development of mechanisms for improving inter-agency coordination are being examined in many countries, such as Australia and Africa. One interesting trend in many countries, particularly in Africa, is the establishment of Parastatal bodies with responsibility for protected area management. Such agencies, which have been established in countries such as Kenya, Tanzania and Uganda, have a greater level of independence and autonomy than traditional government agencies, particularly in relation to the ability to generate and retain revenue.

Another issue related to governance is the application of the IUCN Protected Areas Categories System. A number of countries are increasingly applying this system in their legislation and policy frameworks. (Refer to Annex 2 for more detail on the IUCN PA Categories System). A clear message from the 2003 WPC was the need for countries to apply a range of IUCN Category Types, within the context of their national systems plans for protected areas. This does not imply a retreat from the establishment and management of the more strictly protected areas, such as the category I and category II protected areas but it does imply the need to develop a system which can accommodate a broader range of activities without compromising conservation objectives.

A message from the 2003 WPC was that there is no right answer to the question "What is the ideal institutional structure for protected areas". The right approach will depend on the unique circumstances of each country -- in most cases it will involve a mix of the above governance options. It is assumed that this trend will accelerate in the 21st century. While this appears positive, it is important to be clear on the respective roles of these sectors in relation to government. It is critical that there be clearly defined management objectives for each

countries protected area system as a whole, and that this provides the framework for the clarification of roles of different actors.

## **Implications for the Management of Visitors to Protected Areas**

The new paradigm for protected areas is changing the way in which protected areas are being managed and being perceived around the world. There are many elements of the new paradigm highlighted at the 12003 WPC which will have significant implications for the management of visitors and the involvement of people in protected areas in the future. These include:

### **Tourism, focussed on protected areas, will continue to increase in the future**

Tourism is a major issue for the management of protected areas. This reflects the major influence and impact of this sector, with tourism and related activities now contribute to over 10% of global GDP and over 8% of global employment. Clearly, this is an industry which can positively or negatively impact the world's economy, environment, and culture, in a very significant way.

The tourism sector is characterised by considerable diversification. Tourism based in and around protected areas is one of the future growth areas over the coming decades, particularly as leisure time, mobility and environmental awareness increase. Protected areas serve as magnets for tourists and also for tourism developers; thus posing significant challenges and also opportunities.

Tourism was highlighted at the 2003 WPC in a number of ways – through a range of side events, a major plenary session and also in the key outcomes from the Congress – the Durban Accord and Action Plan. Congress delegates underlined that tourism is a critically important issue for protected area managers and stakeholders at many levels and that this importance will only grow in the future.

Global tourism is growing rapidly and is significantly outpacing the growth of global Gross Domestic Product. Tourism focused on protected areas is increasing at a relatively greater rate within this overall global growth. In many coun-

tries this growth poses many challenges – on the one hand tourism provides a vital source of revenues for park agencies which, in some cases, are seeing their revenues from traditional government sources decreasing. As noted above in the examples from Canada, Australia and Costa Rica, tourism related to protected areas makes a major contribution to national economic growth.

Tourism also provides a key means for protected area agencies to realize their objectives relating to visitor appreciation and enjoyment. On the other hand poorly planned and unregulated tourism can cause many negative impacts such as environmental degradation on ecosystems within and around protected areas and can also negatively impact on the livelihoods of poor people.

Delegates to the 2003 WPC called for increasing recognition on the part of all involved in tourism – from the side of the protected area agency and from the side of the tourism industry. There is a need to learn from past experience and, in this light, publications such as this which share the rich experience from around the world in relation to tourism and protected areas - both good and bad - is particularly important. There is also a need for much more effective dialogue between the tourism and protected areas sector and Congress delegates called for forums to be set up to facilitate and encourage such interaction.

The main implications for the management of protected areas, particularly in relation to visitor management are that:

- Increasing tourism growth focussed on protected areas will mean that agencies will have to strengthen their planning and capacity building activities relating to tourism. In many cases this will require protected areas agencies to recruit more specialists in tourism and visitor management;
- Protected area agencies will have to cooperate more effectively with the tourism sector. In some cases this will involve protected area agencies being linked with tourism within the one government agency, such as is the case in Tasmania, Australia. In other cases it will involve the development of joint programmes and initiatives.

The example from Canada, where Parks Canada has developed an Accord with the Tourism Industry Association of Canada, provides a useful example in this regard.

### **There will be an increasing focus on urban protected areas**

The World Parks Congress noted that half the world's population now lives in cities and this proportion is expected to grow to 60% by 2030. These trends are expected to accelerate after 2030. Protected areas provide major benefits for urban dwellers, including education, recreation, and also the protection of vital services for cities such as the provision of clean water. The links between protected areas and health is also becoming increasingly clear and has been demonstrated by such innovative programmes as the Parks Victoria (Australia) Programme: "Healthy Parks, Healthy People" which encourages people living in Victorian cities to use and enjoy protected areas.

It is clear that urban residents can gain greater appreciation and love for nature through positive experiences in natural areas and open spaces. The importance of such experiences is only likely to grow with increasing urbanisation. The need for urban protected areas for education is also very important. Experience highlighted at the 2003 WPC noted that the management of protected areas in urban settings poses a set of unique challenges, such as in relation to issues like the management of fire and invasive species.

There is also a strong link between urban populations and political support given that voters are increasingly concentrated in cities. The base of political support for protected areas needs to be mobilised and broadened. Protected area agencies can contribute to this by offering positive and energising opportunities for city dwellers to interact with nature.

The main implications for the management of protected areas, particularly in relation to visitor management are that

- Governments and protected areas agencies need to give more priority to the development of protected areas in and around urban areas;

- More emphasis needs to be given within protected area agencies to the development of programmes which promote the appreciation and enjoyment of nature by urban dwellers;
- The management of the interface between urban areas and natural areas will require special skills and effective outreach and communication strategies on the part of protected areas agencies; and
- Innovative programmes such as the “Healthy Parks, Healthy People” Programme in Victoria, Australia need to be more widely applied and the results communicated.

### **People, at all levels, have to be more involved in protected areas**

One of the key elements of the new paradigm for protected areas is that protected areas management has to shift from being “against people” to being “with and for people”. A clear and strong message from the 2003 WPC was that local communities and indigenous peoples must be more effectively involved in protected areas at all levels. The Congress specifically emphasised that the rights of indigenous peoples must be fully respected and noted that the indigenous involvement in protected area management has increased although there is still a long way to go. This is particularly important as many indigenous peoples live in areas of high biodiversity and usually have unique knowledge of the natural environment which can be applied in protected area management.

Protected areas agencies around the world have developed a range of programmes for better involving local communities in protected area management. These include the development of Advisory Committees for national parks, volunteer programmes and a range of other mechanisms.

### **The main implications for the management of protected areas, particularly in relation to visitor management are that**

- Programmes for involving local communities and indigenous peoples in protected areas need to be more widely applied;

- Protected areas agencies need to ensure they have staff with skills in community outreach and consultation. This will involve the recruitment of new staff with skills in this area as well as retraining of existing staff; and
- Innovative examples of community management of protected areas, such as Community Conserved Areas need to be more widely encouraged and applied

### **Better information on visitors to protected areas is required**

The 2003 WPC Congress noted the importance of better data to underpin decisions relating to protected areas. This is particularly relevant in relation to visitor use of protected areas, where the absence of global data on visitor use of the world’s protected areas is a limiting factor in developing cohesive visitor and tourism related policies and frameworks. Information on visitors is currently not collected consistently within or between countries and there are few agreed definitions and approaches in relation to visitor monitoring. IUCN has recently published guidance on this issue (Hornback & Eagles 1999) and it is hoped that this will encourage the application of more consistent approaches to visitor monitoring within protected areas.

Visitor information also needs to be more effectively applied at all levels. At national levels this will require greater use of visitor monitoring data in the development of visitor management policies. At the global level there is a need to integrate visitor data within the UN List of Protected Areas and within the World Data base on protected Areas (WDPA).

The main implications for the management of protected areas, particularly in relation to visitor management are that

- More emphasis needs to be placed by protected areas agencies on the collection and application of visitor use information;
- Consistent frameworks and standards in this area, such as those set out in (Hornback and Eagles 1999) need to be adopted and applied;
- Visitor Use data needs to be incorporated with the UN List of Protected Areas.

## Conclusion

Protected areas are a vital element of attempts by countries to conserve their biodiversity and to support sustainable development. The challenges facing protected areas are significant and the nature of the work of the protected area agency is changing rapidly and very significantly. Many of these challenges are encapsulated within the new paradigm on protected areas. The management of visitors to protected areas will be influenced by the new paradigm. In particular, protected area agencies will need to be more responsive to the needs of visitors and to the needs of local communities in and around protected areas.

## References

- Appleton, M.R., Texon, G.I. & Uriarte, M.T. (2003). Competence standards for Protected Area Jobs in South East Asia. Los Banos.
- Borrini-Feyerabend, G., Kothari, A., & Oviedo, G. (2004). Indigenous and Local Communities and protected Areas: Towards Equity and Enhanced Conservation. Gland, Switzerland and Cambridge, UK.
- Chape, S., Blyth, S., Fish, L., Fox, P., & Spaulding, M. (2003). 2003 United Nations List of Protected Areas. IUCN, Gland, Switzerland and Cambridge, UK and UNEP-WCMC, Cambridge, UK.
- China Man and the Biosphere Programme (1996). China's Biosphere Reserves. Chinese National Committee for MAB, China.
- GBRMPA, World Bank, IUCN (1995). A Global Representative System of Marine Protected Areas. (vol III).
- Green, M.J.B. & Paine, J. (1997). State of the World's Protected Areas at the end of the Twentieth Century. Paper presented to the WCPA Symposium, Albany, Western Australia, 1997.
- Hornback, K.E. & Eagles, P.F.J. (1999). Guidelines for Public Use Measurement and reporting at parks and protected areas. Gland.
- Ishwaran, I. (1996). Sub-regional networking for global strategies and conventions. Paper presented to CNPPA Working session, Indonesia, May 1996.
- IUCN (1993). Parks for Life: Report of the IVth World Congress on National Parks and Protected Areas. Gland.
- IUCN (1994). Guidelines for Protected Area Management Categories. Gland, Switzerland and Cambridge, UK.
- IUCN (1996). A Regional Action Plan for Protected Areas in East Asia.
- IUCN (1998). Economic Values of Protected Areas: Guidelines for Protected Area Managers. Gland.
- IUCN (2004). Speaking a Common Language: the Uses and Performance of the IUCN System of Management Categories for Protected Areas. Cardiff University.
- IUCN (2006). IUCN Red List of Threatened Species.
- Matsukura, H. (1996). Keidanren Nature Conservation Fund, Japan. Paper to CNPPA East Asia meeting, Kushiro, Japan, July 1996.
- McNeely, J.A. & Wachtel, P.S. (1991). Soul of the Tiger. Doubleday.
- McNeely, J.A., Harrison, J. & Dingwall, P. (eds.) (1994). Protecting Nature: Regional Reviews of Protected Areas, IUCN.
- McNeely, J.A. (1997). Conservation and the Future: Trends and options towards the year 2025. IUCN.
- Munasinghe, M. & McNeely, J. (eds.) (1994). Protected Area Economics and Policy - Linking Conservation and Sustainable Development. World Bank and IUCN.
- Phillips, A. (1998). Taking Stock at the End of the Century. Paper to NSW (Australia) New Millennium Review.
- Phillips, A. (2004). The New Paradigm for Protected Areas, IUCN
- Sheppard, D.A. (1996). Protected Areas in East Asia in the 21st Century – Key challenges. Paper to Second Conference on National Parks and Protected Areas of East Asia, Kushiro, Japan, July 1996.
- The Economist (1994). A survey of the global economy. Supplement in October, 1994 Issue.
- Wong, F.Y. (1996). Community Involvement in the Country Parks Programme in Hong Kong. Paper to CNPPA East Asia meeting Kushiro, Japan, July 1996.
- Xue, D. & Tidell, C. (1999). Valuing Ecological Functions of Biodiversity in Changbaishan Mountain Biosphere Reserve in Northeast China. Proceedings of IUCN/WCPA – EA – 3 Seoul Conference. WCPA/East Asia.

# **New Parks of National Importance in Switzerland**

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## **Introduction**

This year, the MMV3 conference takes place in a special context here in Switzerland. Due to the revision of the Law on the protection of Nature and Cultural Heritage, some new parks of different categories are already planned. Therefore we hope to learn from different countries' experience and know-how in the field of Park and Visitor Management.

## **Current situation „Parks in Switzerland“**

The Swiss National Park, situated in the Canton of Graubünden, was established in 1914, and was the first in Central Europe and in the area of the Alps. At that time, Switzerland had a pioneering role, but since then various parks have been created throughout Europe. Up until now, there has been a lack of legislative basis to enable new parks to be created and financed.

## **Revision of the Law on the Protection of Nature and Cultural Heritage**

Switzerland should soon have new parks of national importance: national parks, regional nature parks and nature experience parks. On 23 February 2005, the Federal Council passed the relevant partial revision of the Law on the Protection of Nature and Cultural Heritage. This had been specifically requested by the parliament after the topic of parks was deleted from the legislative plan for a year, on financial grounds. Since then, the parliament has incorporated the results of consultations on the draft legislation. After the referendum, the revised Law on the Protection of Nature and Cultural Heritage and the Ordinance on Parks could come into force in summer 2007, at the earliest.

Parks of national importance help to protect and to increase the value of exceptional natural habitats and landscapes of particular beauty. They also encourage the economic development of a region, providing incentives for tourism, creating employment and enabling visitors to experience nature. The creation of parks makes sense economically. This can be seen from many years of experience in other countries, and with the Swiss National Park in the Canton of Graubünden, where the direct net added value of the park through tourism averages 10 million Swiss Francs per year, whereas indirect employment and income provide a further 7 million Swiss Francs.

## **Parks for different needs and uses**

Based on experience in other countries, in the future there should be three categories of parks in Switzerland: national parks, regional nature parks and nature experience parks.

## **National parks: large, protected natural landscapes**

National parks provide undisturbed habitats for the indigenous flora and fauna and for internal development of the natural landscape. They also act as recreational areas and provide possibilities for environmental education and research. They are divided into a central core zone and the surrounding zone. The area of the core zone is to be at least 100 square kilometres in the Pre-alps and the Alps, at least 75 square kilometres in the Jura and at least 50 square kilometres on the Central Plateau. Within the core zone, nature is protected from all human intervention.

The surrounding zone is normally between three quarters and one and a half times the size of the core zone. It includes existing small villages that have protected their rural character. The landscape of the surrounding zone is not impaired by major

technical infrastructure, and its ecosystems have not suffered any important losses. The main objective is to encourage sustainable use of the land and of natural resources. Tourism and recreational use are also oriented towards sustainability.

#### **Regional nature parks: near natural cultural landscapes**

Regional nature parks are larger, partially populated rural areas, which are particularly distinctive within Switzerland for the quality of their natural and cultural landscapes and cover at least 100 square kilometres. They contribute to making the most of the natural and culture heritage of the region, to invigorating the network of communities, thereby strengthening the regional identity. Therefore, they contribute to the prerequisites for sustainable development in the region and to environmental education, and they promote innovative and environmentally-friendly technologies. This means that ecologically valuable and particularly beautiful landscapes are maintained. Regional nature parks create and ensure employment, with business activities particularly geared to the sustainable utilisation of local resources.

#### **Nature experience parks: near natural compensation areas in urban regions**

Like national parks, nature experience parks consist of a core zone and a transition zone. The total area is at least six square kilometres, of which at least four square kilometres are in the core zone. Nature experience parks are near natural compensation areas close to densely-populated regions. In the core zone the same rules apply as for national parks. While nature can develop unhindered, in the transition zone the main focus is on experience of nature. Therefore nature experience parks should be easily accessible by public transport.

#### **How does a park come into being in Switzerland?**

About 30 park projects have now been launched, in all parts of Switzerland, and they have reached different stages of achievement ranging from the project idea to measures that have already been carried out. The area of a park must have high natural and landscape value. The federal government only acknowledges a park if it is based on voluntary regional initiatives, supported by the local population

and linked into a cantonal programme. The cantons have an important role to play in creating parks of national importance, and subsequently managing them, by supporting regional initiatives.

Based on the park projects known today, it can be assumed that about two new national parks, ten regional nature parks and three nature experience parks will be created within the next ten years. The number of future parks in Switzerland will depend on the quality of the nature and landscape values of a region, the initiative of the local population, the financial resources available and the distribution of projects throughout Switzerland.

#### **Visitor management begins as soon as a park is planned**

During the phase of planning a park, detailed consideration must be given to issues such as where visitor flows will come from, how great these are likely to be, how people will reach the park and what bottlenecks or problems might arise.

A new park can only be planned if there is sufficient information on expected visitor flows. This enables to design infrastructure of the correct dimension in the right place, and furthermore this is the essential information needed for good planning to manage visitors within the park.

## **Conclusion**

As new parks of national importance are being created in Switzerland, the management of visitor flows will be an important aspect so “best practice” experience from other countries will be very welcome.

Therefore, Switzerland is happy to host the Third International Conference on Monitoring and Management of Visitor Flows in Recreational and Protected Areas.



The Significance of Visitor Monitoring Data  
for Management, Planning and Policy

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& Odd Inge Vistad

## Monitoring Public Reactions to the U.S. Forest Service Recreation Fee Program

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*Keywords: Forest recreation, fees, public perceptions, monitoring, evaluation.*

### Introduction

Natural resource managers need to better understand the clientele for the recreation areas under their management. This clientele includes existing users and potential or former visitors who may have been displaced from the areas. Recently, scientists have debated the impact of recreation fees on visitors and potential visitors, and on social issues such as justice or fairness. The recreation fee program that was authorized by the U.S. Congress in 1996 is now permanent (the Federal Lands Recreation Enhancement Act of 2004), in part due to the research that has helped managers develop and implement the program. This paper presents highlights of ongoing research/monitoring for the Forest Service recreation fee program in the Pacific Northwest. Statewide surveys of residents in Washington and Oregon were conducted in 1999, 2001, and 2003. This paper integrates findings from these efforts to describe public perceptions about the Forest Service's fee program in the Pacific Northwest over a six year period. The key issues are: Which activities should have a fee attached, what the balance should be between taxes and fees, and how the revenue should be spent.

### Methods

This study built on earlier fee research and provides a means of longitudinal evaluation of the recreation fee program. Accordingly, some survey

questions were replicated in each wave of the survey in order to track changes in the public's attitudes. New questions were added for assessment of the effectiveness of selected aspects or changes in the fee program. The data are from three independent telephone surveys, each in the fall and spaced two years apart, of randomly selected adults in the states of Oregon and Washington. The initial survey in 1999 had 1,676 completed interviews, the second in 2001 had 2,005 respondents, and the third one in 2003 obtained 800 completed interviews. Thus the entire database has 4,481 respondents.

### Results

In-depth questions about the fee program and revenue use were repeated on each survey. When asked about the acceptability of fees for various recreation activities, results were generally consistent between the three surveys. Fees were most acceptable for activities like RV camping, camping at campgrounds with facilities, and boat dock or ramp use— all activities for which fees have traditionally been charged. Likewise, fees were most unacceptable for stopping at scenic overlooks and picnicking or swimming at areas with no facilities. Respondents in 2001 were slightly less supportive of fees for off-highway vehicle use and collecting forest products, and more supportive of fees for boat dock/ramp use, rafting/canoeing, climbing, and interpretive programs and visitor centers.

Public opinion about the proper balance between taxes and user fees for operating recreation areas is a second major topic. The dominant response in all years was equal support from taxes and user fees, although there was a slight trend in 2001 towards increasing the proportion derived from taxes. Most people felt that charging some fees is acceptable and helps the Forest Service do a better job of protecting the land and providing recreational opportunities. In 2001, they were less likely to believe that charging fees will make it so only the rich can use the best areas of the National Forests. In general, residents strongly preferred imposing fees to closing sites or allowing them to deteriorate (if inadequate funds were available). In all three waves, respondents generally supported a variety of implementation options designed to enhance the fairness of the fee program, such as giving free passes to volunteers who have worked at Forest sites, setting aside some areas where no fees are charged, offering an annual pass that is accepted at all recreation areas, and making certain days free of charge.

All surveys asked residents about their priorities for how fee revenue should be spent. Maintaining the quality of the natural environment was the top rated priority, followed closely by maintaining restrooms and trails. Consistent with the earlier growth in acceptability of fees for interpretive programs and visitor centers, respondents in later waves expressed greater support for spending fees to provide recreation information.

## **Discussion and Implications**

Results of the fee monitoring program suggest that people's support for the recreation fees is related to their awareness of the reasons behind the program, how the money collected is used, and what benefits have come from the program. The results were used to fine tune the program during the demonstration period and influenced the permanent federal fee legislation passed in late 2004. For example, this legislation specified which types of fees could be used and the types of areas at which fees could be charged, based on the public's response to the tested fee programs. The repeated waves of surveys provided valuable information to gauge public reactions and make important improvements to

the fee program. Longitudinal surveys can play an important role in generating a positive outcome for agency programs that rely on public interaction, acceptance, and compliance to be successful.

# Outdoor Recreationists in Oregon and Washington: A Comparison of Recreationists' Perceptions of Experience Satisfaction Across Two US Pacific Northwest States

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*Keywords: Recreation satisfaction, visitor monitoring, visitor segmentation.*

## Introduction

The purpose of this study was to explore the differences in trip characteristics, levels of satisfaction, and economic expenditures of outdoor recreationists in two similar US states; Oregon and Washington. The states of Oregon and Washington make up the geographic area known as the US Pacific Northwest. The socio-economic makeup of the two states is somewhat different. The population of Oregon is approximately 3.5 million, while the Washington population is nearly 6 million. The median income for Oregon residents in 2000 was \$40,916, while the median income for Washington residents was \$45,776. Given a median income of US households of \$41,994, Oregon residents' income levels were similar to the national median, while Washington households were somewhat higher (US Bureau of the Census, 2002). The mean number of persons per household was 2.59, compared to 2.51 in Oregon, and 2.53 in Washington. According to statistics provided by the US Bureau of Census (2002), the poverty rate for families with three people is \$14,128. A total of 11.6% of Oregon households were under the US poverty level, compared to 10.6% of the Washington households.

The Pacific Northwest (PNW) includes 20 US National Forest (NF) units, including some urban-oriented forests (forests near Portland, Oregon and Seattle, Washington) and many rural National Forests in both states. The USDA Forest Service (USFS) is the land management agency charged

with providing recreation opportunities and other non-recreation uses on the 20 NF units. The NF units in the PNW are all managed under Region 6 of the USFS.

## Methods

The study was conducted as part of the US Forest Service's National Visitor Use Monitoring (NVUM) initiative. NVUM interviewers conduct face-to-face interviews of recreationists as they exit from a national forest to understand recreation use patterns in every national forest. The NVUM study examined basic visitation patterns, satisfaction indicators, and spending patterns in and around the Forest unit. This study examines three years of data collected in Oregon and Washington (N=12,909). Data were collected through the use of on-site surveys of exiting recreationists from Oregon/Washington National Forests. Analysis was conducted through comparing mean scores, using SPSS (version 11.5).

## Results

Significant differences were noted for several of the trip characteristics. Washington users visited National Forests less frequently (WA=13.50 visits in past 12 months, OR=18.18), reported fewer days away from their homes on this trip (WA=4.97 nights away from home, OR=7.92), and visited undeveloped day use areas more often (WA=1.24 visits, OR=.48). The respondents reported their

economic expenditures in and around the National Forest that they were visiting. Although many of the economic expenditure categories showed no significant differences, some interesting disparities were noted between respondents in the two states. Washington respondents reported a significantly higher amount of money spent on outdoor recreation in an average year (WA=\$2392 in typical year, OR=\$2088). Washington respondents also reported that they spent over twice the amount of money on recreation fees on this trip than Oregon residents (WA=\$23.05 on this trip, OR=\$10.31). This study included ratings of importance and satisfaction for 14 experiential variables, using a 5-point Likert scale (1 is lowest, 5 is highest). Three of the importance variables and five of the satisfaction variables showed significant differences across the states. Interestingly, Washington respondents showed a higher satisfaction level for “value for fee paid” than Oregon respondents, for “condition of natural environment,” and for “helpfulness of employees.” Conversely, Oregon respondents reported higher satisfaction scores for “condition of developed facilities” and “condition of forest roads.” Regarding the importance of these same attributes, Oregon respondents rated the importance of “safety” higher, while Washington residents rated the importance of “condition of trails” and “helpfulness of employees” higher than Oregonians.

## **Conclusion and Discussion**

Numerous differences were noted in the responses of Oregonians and Washingtonians with regards to outdoor recreation. Although these two states are in close geographic and relatively close economic proximity, many differences were noted across the trip characteristics, economic variables, and satisfaction indicators. These differences highlight the importance of segmenting populations that may seem to be homogeneous at first glance, and validate the effort the US Forest Service is making in this monitoring effort. The Forest Service now uses these results in concert with management decisions, such as allocating funds for maintenance of recreation areas and deciding what sites may be too costly to operate, making these data increasingly important to managers.

# Monitoring the Value of Visitors to Protected Areas: The Australian Approach

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*Keywords: Visitor expenditure, protected areas, survey toolkit.*

## Objectives of the Study

The key aim is to develop a 'toolkit approach' to assess the direct visitor expenditure attributable to protected areas. The toolkit is based on a critical appraisal of selected evaluation methods and techniques that have been implemented in Australia and abroad. The toolkit enables protected area managers to readily assess the economic benefits of visits to localities and regions containing protected areas. Such data has been used to present cases to better resource the management of these areas, that attract so many domestic and international visitors. This project builds on work undertaken by Wood and Dowling (2002), Wood (2003) and Carlsen and Wood (2004); to measure the direct economic value of visits to two areas in Western Australia, the Southern Forest Region and the Gascoyne Coast Region.

## Methods

The project builds on other Australian (Carlsen 1997, Wood 2003) and international studies to establish methods of assessing the direct economic value of visits to protected areas, to clarify key explanatory variables of visitor expenditure and to develop and proof a simple survey instrument. More specifically, the project includes:

- a) Desktop research to identify methods to assess the economic value of protected areas.
- b) Statistical analysis of survey data collected at two protected areas in Western Australia, between 1997 and 2004, to identify key explanatory variables of direct tourist expenditure;

- c) Development, assessment and modification of a survey instrument that addresses the key variables of visitor expenditure based on (b).

Whilst sample sizes for this project were relatively large, data was also compared with that collected by Wood (2003) since 1997 with samples varying from around 100 to 400 surveys. This comparison produced remarkably consistent results across varying sample sizes with the exception of one survey that was dramatically skewed by a predominance of campers in the survey, suggesting that samples should be moderated by knowledge of accommodation types and occupancy rates at the time a survey is conducted. Similarly, average length of stay was influenced by responses from long-term campers in the sample (especially in the Gascoyne Coast Region), so these 'outliers' had to be removed from the final data set.

## Key Findings

The study finds that the most appropriate measure of assessing the contribution of visitors to a local/regional economy is direct expenditure and that the key explanatory variables of direct expenditure are:

1. Visitor origin
2. Visitor accommodation type
3. Visitor activities
4. Visitor household income
5. Visitor age

Table 1: Key explanatory variables of visitor expenditure.

Variable	Statistical significance (level)	
	Southern Forests Region	Gascoyne Coast Region
Visitor place of origin	-	significant (0.01)
Visitor accommodation	significant (0.01)	significant (0.01)
Visitor activities	-	significant (0.01)
Visitor household income	significant (0.05)	-
Visitor age	-	significant (0.01)

Consequently, a very useful visitor expenditure survey can be restricted to questions related to expenditure and these five key explanatory variables (Table 1). Additional questions enable the attribution of visitor expenditure to the protected area and a measure of the substitution effect. Attribution and substitution were key elements in presenting direct expenditure data to the Western Australian Treasury (see Carlsen and Wood, 2004) as they provide an indication of the significance of the protected area in attracting visitor expenditure (attribution) and retaining visitor expenditure in the state economy (a form of import substitution).

## Conclusion

The survey instrument developed by the researchers can be used to collect direct expenditure data attributable to protected areas.

Sample sizes can be small provided they are representative of the key explanatory variables. Consequently, it is recommended that surveys be conducted in all accommodation types in and around protected areas. The results can be used to generate more resources for protected areas, commensurate with the direct economic value of tourism to those sites. For example, the State Government Department of Conservation and Land Management [CALM] successfully used these direct expenditure estimates to present a business case to the

Western Australian Department of Treasury, to obtain substantially increased management resources for protected areas. The protected area evaluation toolkit will be employed in other regions of Australia and overseas to obtain increased resources for protected areas.

## Acknowledgements

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## References

- Carlsen, J. (1997). Economic evaluation of recreation and tourism in natural areas: a case study in NSW, Australia. In: *Tourism Economics* (3/3), p 20-29.
- Carlsen, J. & Wood, D. (2004). Assessment of the Economic Value of Recreation and Tourism in National Parks, Marine Parks and Forests. In: *Cooperative Research Centre for Sustainable Tourism Technical Report*.
- Wood, D & Dowling, R. (2002). *Tourism surveys in North West Cape region 1989-2002, a summary report prepared for the Department for Planning & Infrastructure*. Perth.
- Wood, D.S. (2003). *Tourism on the Carnarvon-Ningaloo Coast between Quobba Station and Exmouth and its Implications for Sustainability of the Coast*. In *Future Directions: Sustainable Tourism and Land Use Scenarios for the Carnarvon-Ningaloo Coast*. Perth. <http://www.planning.wa.gov.au/cgi-bin/index.cgi?page=/whatsnew/content.html>.

# Monitoring Sustainable Nature Tourism in Practice – Experiences From Pyhä-Luosto National Park, Finland

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*Keywords: Sustainability, nature tourism, limits of acceptable change (LAC), national park.*

## Introduction

Natural Heritage Services of Metsähallitus manages the majority of protected areas in Finland, including 34 of Finland's 35 national parks. The main purpose of national parks is nature protection, but during the last few years, promoting local communities and economics has played an increasing role in management, especially in remote areas like Finnish Lapland.

Pyhä-Luosto National Park is located in central Lapland. The oldest part of the park was established in 1938. The estimated number of visits paid to the national park is about 100 000 annually which are mainly done by domestic visitors.

In order to incorporate nature tourism and nature conservation, Metsähallitus has created general principles for sustainable nature tourism in protected areas managed by Metsähallitus. The principles include all the three dimensions of sustainability: ecological, economical and socio-cultural. These general principles are implemented in practice by preparing management plans of sustainable nature tourism for all the important protected areas where nature tourism plays a significant role. The planning framework is based on the Limits of Acceptable Change (LAC) concept.

## Methods

In the LAC process, the use of an area and its impacts are monitored by carefully selected indicators. To be a useful and valid method also in practice, the selection of indicators plays a crucial role. It should be possible to set justified limits which

are based on the best information available. In addition, it should be possible to measure the indicators with reasonable economical and human resources.

However, applying ideal indicators is seldom possible in practice for several reasons. On the other hand, protected areas are monitored for many other purposes anyway. Data collected in these monitoring systems is often available and can also be applied for monitoring sustainability as such or with minor changes.

## Results

The Limits of Acceptable Change process was modified to fit the purposes of the management plan of sustainable nature tourism for Pyhä-Luosto NP. It turned out to be a process as follows and an example of it is shown in table 1.

- The goals for nature tourism were set by establishing the general nine principles of sustainable nature tourism in Metsähallitus.
- More specific desired future conditions were defined for nature tourism and its impacts.
- A list of indicators and ways of measuring them was selected.
- Current values of the indicators were inventoried.
- Limits of acceptable change were set for the indicators.
- The management actions available to achieve or to maintain desired conditions or to react beforehand to unacceptable changes were identified.

Table 1: Example of LAC indicators in Pyhä-Luosto NP under the following principle of sustainable nature tourism: Customers' appreciation and knowledge of nature and culture are promoted.

Desired condition	Indicator	Method of measuring the Indicator	Current value 2005	Limits of acceptable change	Management actions
Nature is a major motive of visits	Visitor survey (question 8/1, recreational motives).	Visitor survey year 2010	Nature experiences are either very or rather important reason of the visit for 97%.	Nature experiences are either very or fairly important reason of the visit for 90%.	1. Co operation with entrepreneurs in marketing and developing products.
The customers should know the special features of the local nature and culture	Customer contacts in Nature Centre	Visitor counting and annual statistics (visits, telephone and e-mail)	33 000 contacts in 2005	30 000 contacts	1. Developing nature centre and its exhibition. 2. Marketing and communication 3. Co operation with entrepreneurs

Eventually, this pilot study of applying LAC process in practice proved that a set of indicators of sustainability in nature tourism or recreational use of protected area can be found without massive surveys or large economical costs. Applicable indicators can be found by using existing data collected mainly under regular management operations and through daily customer services. Visitor monitoring plays essential role in this process as standardized visitor survey includes several important indicators of sustainability together with number of visits.

This presentation describes the process of monitoring sustainability in nature tourism. It also describes creating a management plan of sustainable nature tourism, and the ways in which the indicators are being used through incorporation into the overall planning process.

## References

- Cole, D.N. & McCool, S.F. (1997). The Limits of Acceptable Change Process: Modifications and Clarifications. In: McCool, S.F. & Cole, D.N. (comps.)(1998). Proceedings – Limits of Acceptable Change and related planning processes; progress and future directions, May 20–22 1997, Missoula, MT. Gen.Tech.Rep. INT-GTR-371, p 61–68. Ogden.
- Hendee, J.C. & Dawson, C.P. (2002). Managing for Appropriate Wilderness Conditions: The Limits of Acceptable Change Process. In: Hendee, J.C. & Dawson, C.P. (eds.) Wilderness Management. Stewardship and Protection of Resources and Values, p 231–261.

- Kajala, L., Erkkonen, J. & Perttula, M. (2004). Measures for Developing Sustainability of Nature Tourism in Protected Areas. In: Sievänen, T. et al. (2004)(eds.). Policies, Methods and Tools for Visitor Management – Proceedings of the Second International Conference on Monitoring and Management of Visitor Flows in Recreational and Protected Areas, June 16-20, 2004, Rovaniemi, Finland. Rovaniemi, p 241–246.

# Using Visitor Monitoring to Reduce Ecological Impacts Due to Picnicking and Grilling in Urban Forests in the Vicinity of Basle, Switzerland

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*Keywords: Picnicking / grilling in forests, ecological impacts, visitor preferences, recreational planning.*

## Introduction

Outdoor recreation in urban forests has increased in recent decades, leading to ecological conflicts, such as trampling damage to the ground vegetation and soil compaction, making management actions and well-founded recreational planning necessary in highly frequented areas (Baur 1999, Baur et al. 2003). In order to achieve satisfactory results, management decisions should preferably be based on information provided by visitor monitoring, rather than on managers' intuition alone.

A common outdoor activity in Switzerland is picnicking and grilling. The usage of fire rings outside official picnic sites can lead to soil compaction, a reduction of vegetation cover and changes in the soil seed bank (Amrein et al. 2005). The extensive damage in certain highly frequented forest areas is making measures necessary.

## Methods

In our study area (an oak-hornbeam forest) in the vicinity of Basle in north-western Switzerland, we are using data from two surveys to develop appropriate management actions in order to reduce ecological impacts caused by picnicking and grilling. In order to develop measures, it is important to find out why forest visitors build fires outside picnic sites. Therefore, we conducted a survey in two forest areas and questioned 214 forest visitors picnicking and grilling, half of them at official sites

and half of them at "wild" fire rings. We also conducted a postal survey aimed at forestry officials, foresters and public forest owners in the whole of Switzerland. 562 experts returned a completed questionnaire.

## Results

The results of the survey aimed at forestry experts show that picnicking and grilling are among the most frequent activities in the whole of Switzerland. When asked about the reasons why forest visitors might create their own "wild" fire rings, most respondents stated that visitors might be looking for adventurous or romantic spots or simply might want to be alone. Respondents also thought that there were probably not enough official picnic sites and that woody debris lying around might animate visitors to build a fire. Only a minority attributed self-made fire rings to an unattractive location or unattractive infrastructure of existing picnic sites (Fig. 1).

The survey conducted in the forest itself showed that visitors using official picnic sites differ from visitors using fire rings outside official sites, especially in their preferences concerning location and infrastructure. Visitors using "wild" fire rings preferred sites away from forest service roads with infrastructure as natural as possible (no concrete barbecue pit, tree trunks to sit on) and possibilities for children to help build the fire by collecting wood and stones for the ring.

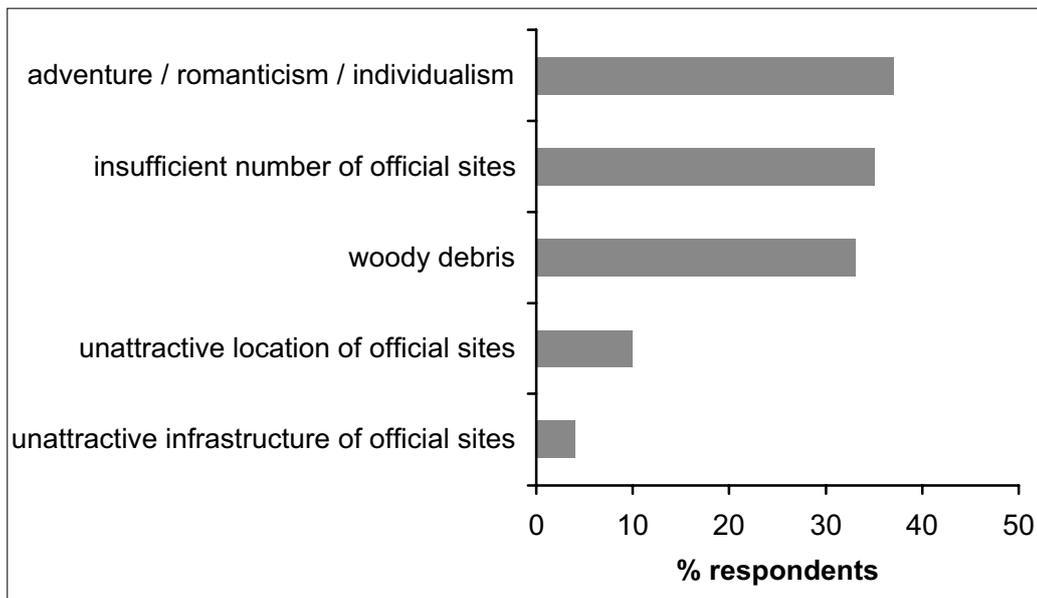


Figure 1: Reasons for creating and using self-made fire rings outside official picnic sites.

It can be concluded that picnickers are not a homogenous group of forest visitors. Existing picnic sites meet the requirements of a subset of picnickers. Other visitors do not want picnic sites with a lot of infrastructure near car parks and forest service roads. Visitors wanting more natural surroundings fulfil their requirements by creating their own fire rings. This behaviour can lead to uncontrolled trampling damage in previously untouched forest areas and contribute to the degradation of already heavily used areas.

Visitor management in Switzerland already includes installing new recreational infrastructure such as barbecue pits, but location and infrastructure are usually based on tradition, intuition of forest managers and practicability rather than on visitor preferences. Based on our results, we recommend providing some picnic sites that are closer to the requirements of visitors that have steered away from official sites up to now, but that do not necessarily want to be in a remote area. As new sites can be installed away from ecologically sensitive areas, these measures should reduce the number of self-made fire rings being created in the sensitive forest area and hereby also reduce ecological impacts by picnicking and grilling away from picnic sites.

## References

- Baur, B. (Ed.) (2003). *Freizeitaktivitäten im Baselbieter Wald. Ökologische Auswirkungen und ökonomische Folgen*. Liestal.
- Baur, B. (1999). *Der Allschwiler Wald*. In: *Allschwiler Schriften zur Geschichte, Kultur und Wirtschaft* (11).
- Amrein, D., Rusterholz, H.-P. & Baur, B. (2005). Disturbance of suburban *Fagus* forests by recreational activities: Effects on soil characteristics, above-ground vegetation and seed bank. In: *Applied Vegetation Science* (8), p 175-182.

# The Influence of Motorized Access on Hiker's Route Selection at Mt. Tsukuba

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*Keywords: Car-dependency, circulation, Mt. Tsukuba, route selection, trailhead, walking experience.*

## Introduction

Mt. Tsukuba, designated as one of the quasi-national parks of Japan, is not only a regional landmark but also has been a major outdoor recreational area since the 1730s. As a result, in spite of its modest altitude of 875 meters, diverse hiking routes to its twin peaks have been developed from all directions. At present, seven routes are officially recognized, and they bring hikers to the summits in less than two hours. The number will be doubled if off-beaten tracks are counted. In addition, two motorized means such as cableways are supplied for casual tourists. Thus, the hikers have diverse options to choose from almost 200 combinations at Mt. Tsukuba. This study was conducted to clarify the relation between hiker's route selection and its reasons as a basis for the better management of this area.

## Methods

The authors surveyed hiker's route selection and its reasons in 2003, then they did similar one focusing on its relation to the mode of traffic access in 2005. Both surveys conducted on clear days in autumn at the col between the peaks because this is the only place most hikers from various routes come and have a break. The interviewers showed a route map to hikers and asked them the routes they took or going to take, then wrote down their selection and its reasons. The 2003 survey was conducted on 17th and 18th of December, and answers from 461 hikers were obtained. The 2005 survey was done on 23rd of October and 13th of November and collected 185 answers.

## Results

The 2003 survey revealed that hiker's route choices are quite limited in spite of diverse possibilities (figure. 1). Popular trailheads are located close to cableway terminals with large parking lots. Such a trend brought crowding and soil impact on these trails. Further analysis on the route-selection patterns among hikers showed that three fourths of them took different routes for descending (figure 2). It is understandable that hikers prefer to experience different routes on their way back to enjoy a diverse environment just like experiences of Japanese strolling gardens. The traversing will give more diverse experiences than circulating, but those who left their cars have to walk on a road to recover them. Thus, car-dependent hikers must choose a circulating route as a compromise.

It also became clear that almost 70 % of hikers to Mt. Tsukuba came by car. These hikers have more freedom to choose diverse trailheads than those who come by bus because bus stops are limited to

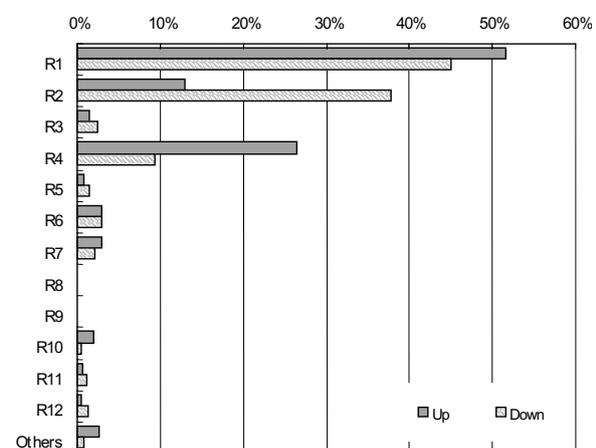


Figure 1: Ratio of Visitors on each Route (N=485).

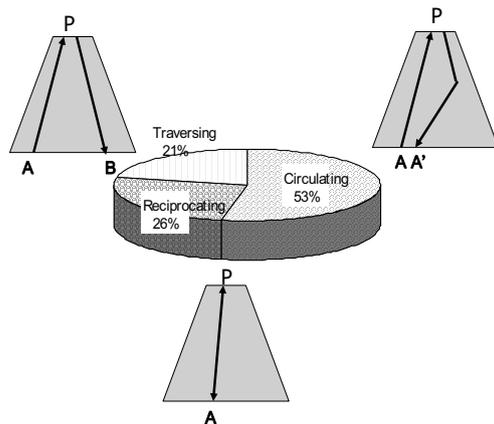


Figure 2: Three Patterns of Visitor's Route choices (N=485).

two major trailheads. However, the 2005 survey results showed that 70% of those who arrived by bus chose a different route on their way back while 70% of car-dependent hikers took exactly the same route to descend. From these results, it can be said that private vehicles restrict the spectrum of hiker's route selection. Once they leave their cars, they have just two choices, a simple return or a circulating with relatively shorter distance from the starting trailhead. Regarding cableway users, 43% of them purchased one-way tickets. This means they prefer to walk on their way up or down to diversify their experiences while enjoying easy transfer.

Shiratori and Ito (2001) mentioned that trekkers tend to choose trailheads at higher altitude whenever available at Mt. Daisetsuzan. Such a trend is not obvious at Mt. Tsukuba since the altitude of the most popular trailhead is 200 meters while some of less-used ones are around 500 meters. However, hikers with cars prefer to come back to or close to the same trailhead regardless of its altitude. They have ambivalent demands that they want to enjoy walking on a trail while avoiding walking on the road on which they drove to come.

## Conclusions

The introduction of a shuttle-bus service stopping at each trailhead or opening more circulating trails will alleviate the dilemmas of car-dependent hikers. This will encourage easy walking at the foot of Mt. Tsukuba since there are diverse cultural resources including a historic pilgrim-

age route developed in the early 18th century. However, such options might disperse hiker's impacts under current management conditions.

Mt. Tsukuba has an unusual number of trails, and gives hikers diverse walking experiences. This partially explains why it attracts repeaters in spite of its compact size. However, they tend to avoid crowded times, days or routes. Such factors make hiker surveying at Mt. Tsukuba difficult. We need to develop more sophisticated monitoring techniques.

## References

- Shiratori, K. & Ito, T. (2001). Motorized Access Control as a Wildland Recreation Management Tool: Access Changes and Visitor Behavior at Daisetsuzan National Park. In: Sievanen, T., Konijnendijk, C. & Langner, L. 2001 (Eds.). *Forests and Society the Role of Research* Finnish Forest Research Institute. Research Papers (815), p 29-41.

## Visitor and Environmental Impact Monitoring as Basis for Sustainable Nature Tourism in Estonian Recreational Areas

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*Keywords: Forest recreation, environmental impact monitoring, recreational load, visitor counting, visitor survey.*

The State Forest Management Centre (SFMC) is the agency responsible for the management of state forests, with a total forested area of about 1.08 million hectares, which is about a half of all Estonian territory covered by forest (2.2 million hectares). In addition to silviculture and wood production, the SFMC is also responsible for multiple forest recreation activities in recreational areas located in state forests without damaging forest and biota.

Since 1997 the SFMC has created diverse opportunities to spend time in nature in 10 recreational areas.

In order to clarify the development needs of recreational use of forests and to adopt optimal financing decisions the SFMC has conducted surveys and accounting of visitors of recreational areas since the year 2002.

In order to manage the recreational areas in the best way, the needs of users and changes in needs shall be periodically monitored (visitor survey), the number and distribution of visits shall be assessed (visitor counting) and the environmental impact of recreational activities shall be systematically observed (surveys on the environmental impact and carrying capacity of landscape).

Continuous visitor counting provides information of the areas most visited and the division of the recreational load by objects and types of use.

Visitor counting is carried out in all of the ten recreational areas of the SFMC during the period when land is not constantly frozen. The first counters

were installed on the focuses of visitor traffic of a recreational area in 2002. As of 2005, based on the visitor surveys, 29 electronic counters have been installed in the recreational areas of the SFMC.

The results of visitor counting reveal a steep growth in the number of visits within the last years. SFMC network of recreational areas accommodated nearly 450'000 visits in 2003 and 600'000 in 2005.

Periodic performance of visitor surveys provides the manager with the knowledge of the users profile and types of use.

The results of visitor surveys show that three main types of usage are dominant – coastal holiday and camping with a duration of up to 2 weeks, and picnics as well as visits to natural monuments significant in Estonian conditions usually as brief visits.

Due to the increasing recreational load against the background of diverse types of use and expected special preparation of forest landscapes the assessment of environmental impacts caused by outdoor recreation has become more and more important.

Regular observation of environmental impact of recreational load allows the impacts of different types of use practiced in different capacities on various landscapes to be clarified.

In 2002 the Estonian Centre of Forest Protection and Silviculture (CFPS) in good cooperation with the SFMC started environmental impact monitoring in recreational areas. There was an urgent need to develop a low-cost monitoring system with suf-

ficiently high levels of accuracy. The primary objective of the monitoring was to determine the state of recreational forests and the direction and amount of changes which may vary to some extent in terms of time and causes.

In Estonia, environmental impact is concentrated at and around recreational sites usually developed for visitor use – visitor centers, different hiker and educational trails, campsites, picnic and fire pits and other areas of rest, especially on the coastal areas of rivers, lakes and the Baltic Sea.

In 2002-2005, a network of permanent monitoring transects and sample plots have been established and environmental impact assessments and evaluations started in 7 recreational areas. The network of permanent monitoring transects with distances mainly of 30 m between was established in the campsites. The small sample plots with areas of 1 m<sup>2</sup> were located systematically on transect lines. An original system of ecological indicators characterizing the condition of the forest ground vegetation, trees, natural regeneration and forest soils has been worked out and tested. Zones of the trails and camping areas with different levels of vegetation and soil damages, shares of bare mineral ground, root exposure and decreases in the soil ground level were measured. In the surrounding forest the vegetation cover, plant species composition, distribution and abundance of injuries were also assessed.

As results of environmental impact assessments on campsites the appearance of soil and soil vegetation damages, injuries of natural regeneration and trees seem to be a very real problem, whereby on trails and the surrounding forest damage to the soil and roots of the trees is considerable.

In almost all of the assessed recreational areas, at least in some parts, the environmental impact is already now higher than an acceptable level.

According to our experience, once every 3-5 years seems to be a reasonable frequency for environmental impact assessments in most situations.

Recreational use of Estonian state forests has increased by 25% within the last three years, the recreational types of use have diversified and the possibly greatest share of the recreational activities has been directed to recreational areas prepared for

visitors. The demand for ecotourism is expected to grow in the future. Different survey and monitoring systems are required in order to assess the supply and demand of recreational resources.

Regular implementation of the surveys and monitoring provides a combined result, which enables the manager of the state forest (SFM) to adopt the best resolutions by the recreational load of recreational areas, which is increasing,

- upon planning development tendencies and managing the existent system;
- upon building infrastructure supporting different needs and types of use;
- upon planning and implementing activities of landscape protection;
- upon making the most optimal financing resolutions.

# Visitor Satisfaction Surveys and the Development of Access Standards for National Nature Reserves in England

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*Keywords: Qualitative monitoring, work planning, access standards, visitor satisfaction.*

**Abstract:** It is estimated that National Nature Reserves in England receive around 15 million visitors each year, and this number is increasing. Since the mid 1990s English Nature has undertaken a series of visitor satisfaction surveys on a number of the National Nature Reserves in England. The purpose of the initial studies was to establish the visitors' understanding of National Nature Reserves and what it was that those visitors wanted by way of facilities to improve the experience of their visit.

The results of the surveys influenced the development of 'access standards' for use in work planning and financial resource allocation across the suite of 160 National Nature Reserves managed by English Nature.

Following major investment between 2002-2004, a further round of visitor satisfaction surveys has been completed and this paper discusses the results of these and the implications for future access improvement funding and works.

## Introduction

English Nature is the government agency that champions the conservation of wildlife and natural features throughout England; work which includes the identification, declaration and management of National Nature Reserves. There are more than 200 National Nature Reserves (NNRs) in England, of which around three quarters are directly managed by English Nature<sup>1</sup>.

## Background to visitor satisfaction surveying

Since the creation of English Nature's predecessor, the Nature Conservancy, in 1949, there has been a significant change in the view taken by the statutory nature conservation organisations in the United Kingdom of the value and use of National Nature Reserves (NNRs). Their original purpose, to be managed for conservation and as a source of scientific and conservation management advice, has not been lost but expanded to include their potential for recreation and

public enjoyment. In the early 1990s, it was estimated that some 3 million visits were made annually to NNRs in England. We currently believe that figure to be around 15 million visits. Visitors to NNRs form the largest single defined and accessible target for English Nature to promote its messages relating to nature conservation and sustainable management of biodiversity.

Early in the 1990s English Nature instigated a programme known as Public Appreciation of National Nature Reserves (PAN) through which a series of projects were set up to promote the knowledge and use of NNRs in England by the general public. One of the projects was to obtain an understanding of visitors perceptions about the sites and how they were managed.

## Methods

Following an initial qualitative stage of research and benchmarking, English Nature employed consultants to carry out a series of interviews on 15 NNRs during the Summers and Winters between 1995 and 1997. At each Reserve, three days of interviews took place in the summer and a further

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<sup>1</sup> National Nature Reserves in England fall into four categories with regard to their tenure. They may be owned or leased by English Nature, subject to statutory Nature Reserve Agreement or be owned and managed by an 'approved body' (or a combination of these forms of tenure). Only NNRs in the first three are subject of this paper.

day during the winter. Over the six stages of interviews the following numbers of interviews were achieved:

Table 1: Number of interviews achieved in each season.

1995		1996		1997	
Summer	Winter	Summer	Winter	Summer	Winter
247	109	297	120	304	94

Visitors were approached when leaving the Reserve and asked to take part in a short survey during which the interviewer asked inter alia:

- How do you know of the site?
- How often do you come?
- How long have you been coming?
- Why did you come?
- How do you rate the importance of the following aspects of service provision?  
Car parking, Well marked paths, Information panels, Easy paths, Signposting to the NNR, Maps/ path guides, Toilet facilities, Disabled access, Remote area access, Visitor/Information centres, Seats/Benches, Visitor events, Picnic areas, Café/refreshments,

- How do you rate the performance of each of these aspects of service provision?, How satisfied were you with your visit?
- Do you know who manages the NNR?

They were also asked personal, demographic information.

### Interpretation of results

These surveys showed that most (two thirds) of visitors were male, and tended towards higher socio-economic groups (again two thirds being ABC1). Over 75% of visitors were aged over 35. Those who had visited the sites previously had generally been doing so for many years – around 25% had been visiting for over 20 years; fewer than 10% made their first visit in the current year.

There were distinct differences between summer and winter visitors, the former travelling further, tending to come in groups rather than singly, coming less frequently and being more likely to be on their first visit. The implication of this is that winter visitors tend to be local

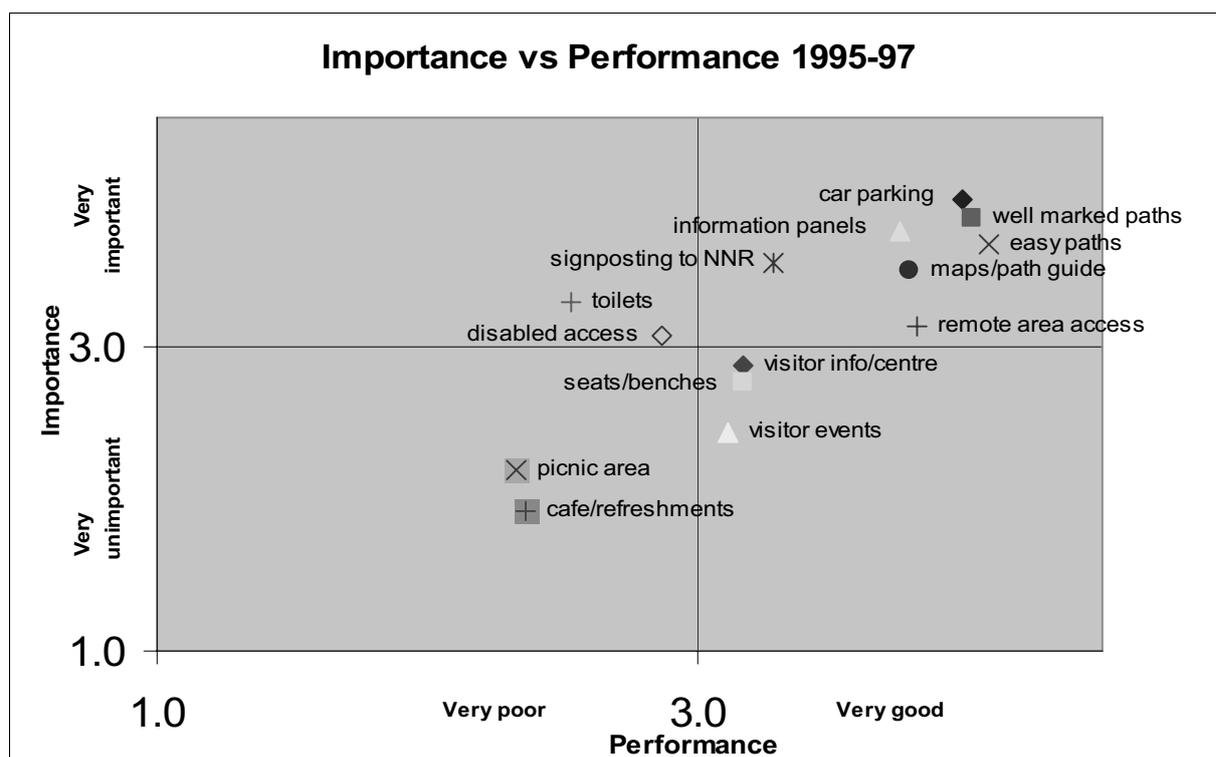


Figure 1: Visitors' perceptions of importance and performance 1995-97 (mean scores are shown).

people who are regular and frequent users of the sites (often for dog walking). However, winter visitors were more likely to arrive by car.

Figure 1 shows the performance of various aspects of 'visitor facilities' on the Reserves in the context of their importance as perceived by the visitors during the first phase of the study (1995-97). Ideally, all items should be toward the top right hand corner – where the performance of the most important items is best. Items in the top left quadrant, deemed by visitors to be important but performing badly, are those that need to be prioritised for attention by site managers.

The aspects of the site which were consistently most important to visitors throughout all of the surveys in this first phase were car parking, well marked paths and information panels. Aspects of service 'not required' – especially by winter visitors - were visitor events, café/refreshments, picnic areas, disabled access (although visitors did place some significant importance on this facility, even though not for themselves personally). Overall, 84.6% of visitors expressed themselves as either 'completely' or 'very' satisfied with their visit. Only a very small percentage (around 3%) expressed any degree of 'dissatisfaction'. The two items in the top left quadrant, toilets and disabled access, will be referred to later in this paper.

Awareness of English Nature as managers of the sites was 48% for summer visitors and the mean figure for the period of study was just 52%. Awareness by visitors of English Nature as an organisation was somewhat higher at 69% (compared to just 2% recognition in a national MORI opinion poll).

### Implications for resource allocation

The results from the survey clearly showed the areas that visitors considered to be important to making their visit more pleasureable. It also indicated that, generally, English Nature was already providing these facilities to a high standard on the Reserves where the study had taken place. While around 40% of visitors wanted no change, what appeared to come from the study was that visitors wanted 'more of the same' rather than an investment in different kinds of facilities.

From an organisational management point of view, while satisfaction was felt at the general tone of visitors' comments, some dissatisfaction was expressed in the poor recognition of English Nature.

There did not appear to be any particular urgency to provide improvement to any particular service to satisfy visitors needs although it was recognised that a programme of continued investment in the 'capital' estate fabric of the Reserves was required. On the other hand, it was suggested that an overhaul of information panels and other signage across the Reserves could bring about an improvement in visitor recognition of English Nature's role as managers as well as improving the performance of this third-most-important service.

Other factors influencing the allocation of resources for visitor-related works on NNRs included impending changes to disability discrimination law in the UK and new legislation to improve countryside access in England and Wales. There was a recognition of the part that National Nature Reserves had to play in the provision of better countryside access; in particular, following the impact of restrictions during the Foot and Mouth Disease crisis. At the same time, English Nature was undertaking a rebranding of its house style which gave opportunity for new on-site signage; while developments in sustainable transport brought consideration of its application to National Nature Reserves, many of which are in relatively remote areas.

### Development of access standards

Clearly, improvements to physical estate attributes can be costly. When one is considering works over some 160 sites, of varying size/habitat/proximity to urban areas/etc, the costs soon begin to mount up. For example, to provide basic replacement of entrance signs to all of the Reserves was estimated to cost around £160,000 (232,000 Euros). Yet this allowed just £1,000 per site (1,444 Euros) – a miniscule amount.

Other works are needed to be considered to upgrade facilities on sites - both where the surveys had taken place and others - to take account of the results of the visitors' opinions as well as the effects of the legislation changes referred to above and other 'political' pressures. Upgrading popular

paths to make them easier for visitors – whether with or without disabilities, new roadside signage to sites, better waymarking of paths and improvements to car parking arrangements all come at enormous cost and would need to be carefully prioritised to ensure that scarce resources were well spent.

As a first stage in the process of prioritisation, it was determined that the Reserves themselves needed to be categorised according to their appropriateness for development for public access. It was decided that four groups should be identified and the criteria for this categorisation were as follows:

- **Spotlight NNRs**  
These Reserves should be robust and able to be managed for large numbers of visitors; provide the opportunity for visitors to enjoy the wildlife experience and be suitable for making a significant contribution to promoting core nature conservation messages.
- **Gold NNRs**  
These Reserves have robust species and habitats and no intractable problems of access. They will be developed in order to attract more visitors and may aspire to Spotlight status. It is likely that most NNRs will fit this classification.
- **Silver NNRs**  
These NNRs are used mostly by local people. They are robust enough to allow modest numbers of people to visit them, using predominantly marked paths and tracks.
- **Bronze NNRs**  
These Reserves may contain a high degree of risk to the public or, in most cases, have access restraints linked to tenure. They will have restricted access but may include access for specific purposes such as scientific research and education.

The next stage was to consider which of the range of ‘facilities’ were felt to be appropriate for each category of Reserve.

These 26 facilities, shown in Table 2, became known ‘the standards’ and site managers were subsequently asked to report progress towards achievement of each for the NNRs under their control.

## Subsequent works schedule

Fortuitously, at this time English Nature was allocated £10 million (14.4 million Euros) through the government’s Capital Modernisation Fund (CMF) which was set up “as part of the Comprehensive Spending Review in 1998 to support government departments’ capital investment projects to improve key public services or public infrastructure.” (Treasury 1).

The aims of the funding to English Nature was “to improve Sites of Special Scientific Interest (SSSI) and increase public access to National Nature Reserves”. (Treasury 2).

Site managers were invited to bid for funds for particular projects which would deliver improvements against the targetted standards and which could be completed within the allowed 2 year time frame dictated by CMF. In addition, two corporate projects were run concurrently to achieve re-signing of all of the NNRs and to pilot visitor counting apparatus (Melville & Ruohonen, 2004).

## Follow-up qualitative survey

Following the substantial completion of the works funded through CMF, with additional funding from English Nature’s core funds, a second phase of visitor opinion surveying was carried out using the same set of questions as in the first tranche. As with the first phase, specialist consultants were used to carry out the field work and assessment. Single day-long surveys were carried out during Winter 2004 and Summer 2005 on 15 sites, 6 of which had been included in the original phase. 125 interviews were conducted during the winter survey: 443 during the summer.

Figure 2. shows the importance and performance of the same set of ‘visitor facilities’ perceived by the visitors during the second phase of the study (2004-05). Comparing this figure with Figure 1 shows that, again, the majority of items fall into the top right quadrant. Disabled access appears in this quadrant now (having moved from the top left).

The only item in the top left quadrant (‘very important’ but ‘very poor performance’) is toilets and, in comparison with the earlier survey, their

Table 2: The 'standards' required for each category of National Nature Reserve.

<b>Standard</b>	<b>Spotlight</b>	<b>Gold NNRs</b>	<b>Silver NNRs</b>	<b>Amber NNRs</b>
Off-site signing – brown 'tourism' sign	Required	Preferred	<i>Not required</i>	<i>Not required</i>
Off-site signing – white sign	Required	Preferred	Preferred	<i>Not required</i>
Reserve leaflet – full colour	Required	Required	Preferred	<i>Not required</i>
Reserve leaflet – b/w or two-colour info sheet	Required	<i>Not required</i>	Preferred (b/w or full-colour)	Preferred
Web site	Required	Required	Required	Required
Media relations ongoing	Required	Required	Required	Required
Media training	Required	Required	Required	Required
Interpretation training	Required	Required	Required	Required
Interpretation plan	Required	Required	Required	Required
Green travel plans	Required	Required	Preferred	<i>Not required</i>
Educational facilities	Required	Required	Required	Required
Community involvement and volunteers	Required	Required	Required	Preferred
Links to other places	Required	Preferred	<i>Not required</i>	<i>Not required</i>
Entrance signs	Required	Required	Required	Required
Orientation panel(s)	Required	Preferred	Preferred	<i>Not required</i>
Interpretation panel(s)	Required	Required	Preferred	<i>Not required</i>
Self-guided walks	Required	Required	Preferred	<i>Not required</i>
Access for all abilities	Required	Required	Required	Required
Risk assessments	Required	Required	Required	Required
Structures in safe condition	Required	Required	Required	Required
All year access	Required	Required	<i>Not required</i>	<i>Not required</i>
Visitor counting mechanisms	Required	Preferred	<i>Not required</i>	<i>Not required</i>
Staff presence (% time)	Required	Preferred	<i>Not required</i>	<i>Not required</i>
Events programme	Required	Required	Preferred	Preferred
Car parking	Required	Preferred	<i>Not required</i>	<i>Not required</i>
Cycle parking	Required	Required	Required	<i>Not required</i>

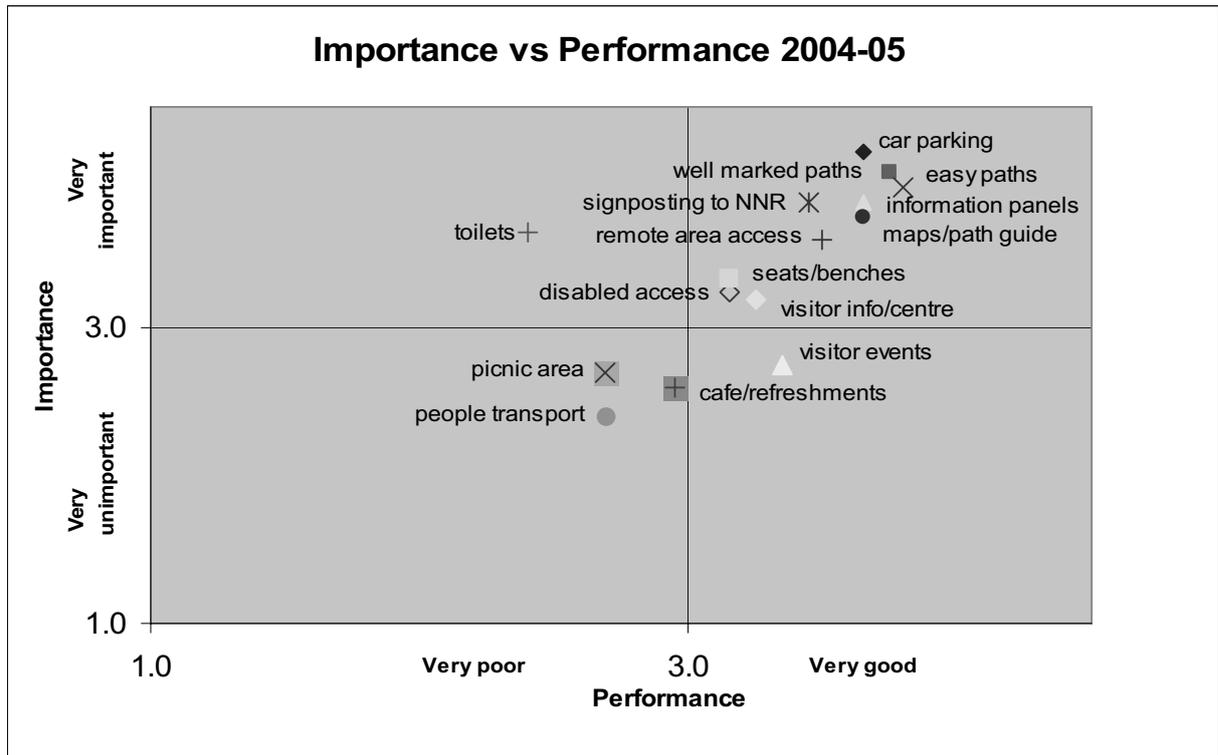


Figure 2: Visitors' perceptions of importance and performance 2004-05 (mean scores are shown).

importance to visitors has increased while their performance is worse. It is suggested that the reduced 'performance' is a result of the increased perceived 'importance' of facilities and relates to lack of availability as opposed to poor standards. Because visitors think that toilets are more important, they express greater dissatisfaction at the fact that none are available.

### Opinions of changes

These surveys showed that overall satisfaction with the visit had actually fallen from the original phase, at 84.7 to 84% (winter) and 84.7 to 83% (summer). Figure 3 indicates that visitors to NNRs were less satisfied following the improvement works than before they had been carried out. However, it is important to consider the individual changes, as this can shed some light on the views expressed in the importance and performance section.

Respondents who had visited the area more than once were asked if they noticed any changes at the site since they started visiting it. The question was firstly asked spontaneously and then prompted. In Winter 2004, the largest proportion of respondents

noticed a change in the ease of paths to walk on, with 18% of respondents mentioning this spontaneously and 42% when prompted. In second place were car-parking facilities with 13% of spontaneous and over a third (35%) of prompted mentions. When prompted, information panels on site and way paths had now been marked were mentioned by 33% and 31% respectively. Positively, all of these aspects of on-site service provision were previously named as the most important to visitors. As an aside, it is interesting to consider just how unobservant people are about changes to their surroundings. If the highest spontaneous response identifying changes was only 18%, it means that a staggering 82% had not realised any changes had been made to the facilities on the sites. There was a substantial contrast between Summer 2005 and Winter 2004 in terms

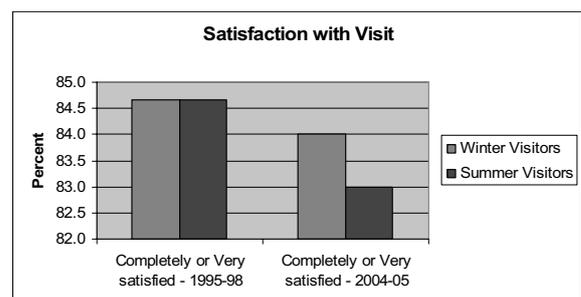


Figure 3: Visitors' overall satisfaction ratings.

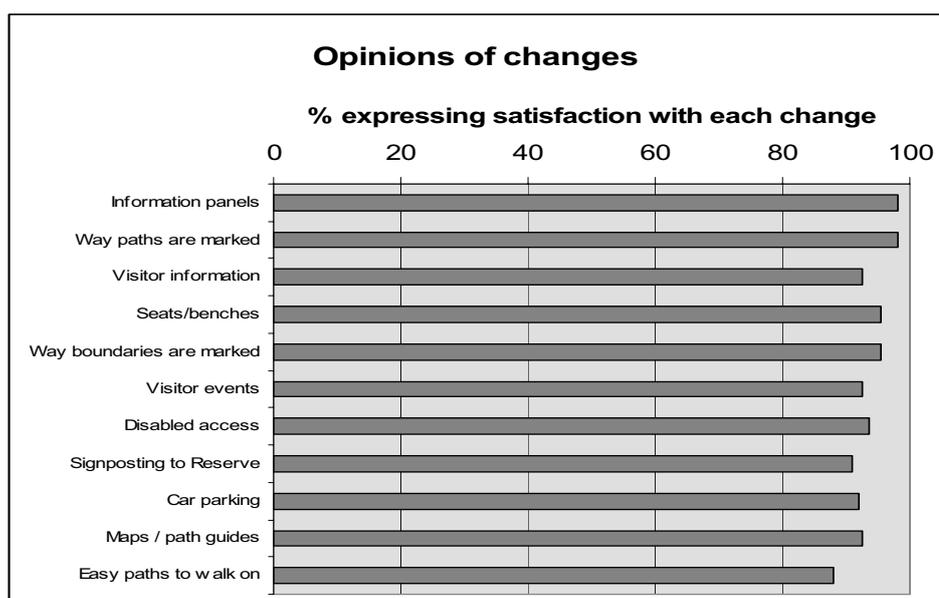


Figure 4: Visitors' opinions of the changes to the standard of facilities on sites.

of the visitors noticing changes but this can be explained by the differences examined in these two audiences examined above (summer visitors being more likely to be first-time visitors). Generally, summer visitors noticed far fewer changes and of the changes they did notice were principally related to car parking and to the ease of paths to walk on. Respondents were also asked to assess if changes they observed have been for the better or for the worse (Figure 4). Overwhelmingly, changes observed were for the better as the negative responses were negligible.

Taking these results with the assessment of importance and performance, it appears that our visitors are expressing a need for increased comfort and guidance, building on the work that has already been carried out. Bearing in mind the high proportion of visitors who have previously visited (90%), this need cannot be attributed to a new, more cosseted, audience now visiting the sites but must indicate greater expectations amongst long-term visitors generated by the works that have recently taken place – whether they consciously noticed them or not.

### Implications for future development work

When asked to suggest further improvements to on-site facilities, 43% of those interviewed in the first tranche suggested that English Nature was do-

ing a good job and nothing needed doing. Following the works identified above, only 31% respondents in the second tranche made the same comment. Of the specific improvements respondents asked for, requests for better information and signage by 18% in the first tranche had fallen to 7% in the second survey, indicating that the improvements to information availability and signage made from the CMF funding had been noticed and appreciated.

In the second survey, 6% were asking for more and improved paths – a slight increase on the 4% in the first survey. The 6% who were wanting more seating were still wanting it but the 8% demanding toilets had grown to 11% in the second survey. The surveyors reported that 'overwhelmingly, the provision of more/better toilets is the improvement that the greatest number of respondents wanted to see'. Currently, English Nature has no proposals to provide toilet facilities at its NNRs but should consider including directions to those nearest available in information about the Reserves.

This project has shown that the use of visitor satisfaction survey data has been valuable in informing the priority of access improvement works to be undertaken on NNRs and, taken with other 'political' priorities, has shown that the use of 'standards' for reporting progress in implementation has worked. The analysis of two

sets of survey data from ‘before’ and ‘after’ the works were carried out has shown somewhat conflicting results but these can be explained by the increasing demands and expectations of visitors to National Nature Reserves.

## References<sup>2</sup>

- English Nature (1999). NNR Visitor Satisfaction Survey: presentation of baseline findings, Unpublished report prepared by Business & Market Research plc.
- English Nature (2006). NNR Visitor Satisfaction Survey Stage2: Summer 2005, Unpublished report prepared by Harris Interactive.
- Melville, S. & Ruohonen, J. (2004). The development of a remote-download system for visitor counting. Proceedings of the Second International Conference on Monitoring and Management of Visitor Flows in Recreational and Protected areas 2004, p 37–43.
- Treasury1: [http://www.hm-treasury.gov.uk/Documents/Public\\_Spending\\_and\\_Services/Capital\\_Modernisation\\_Fund/pss\\_cmf\\_intro.cfm](http://www.hm-treasury.gov.uk/Documents/Public_Spending_and_Services/Capital_Modernisation_Fund/pss_cmf_intro.cfm)
- Treasury2: [http://www.hm-treasury.gov.uk/Documents/Public\\_Spending\\_and\\_Services/Capital\\_Modernisation\\_Fund/pss\\_cmf\\_round3.cfm?](http://www.hm-treasury.gov.uk/Documents/Public_Spending_and_Services/Capital_Modernisation_Fund/pss_cmf_round3.cfm?)

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<sup>2</sup> Further information is also available at: <http://www.english-nature.org.uk>

# Visitor Counting with Acoustic Slab Sensors in the Swiss National Park

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*Keywords: Visitor counting, acoustic slab sensor, Swiss National Park, walking experiments.*

## Introduction

Monitoring of visitor flow in recreational parks is important to various tasks of management, e.g. to assess the impact of visitors to the nature, to get information about the signification to the regional market or to estimate the demand trends for the future (Cessford & Muhar 2003). However, data acquisition is a very time-consuming and money-intensive assignment. There are three main categories of data collection methods: self-counting, direct-counting and indirect counting (Hollenhorst et al. 1992). Depending on the goal of visitor monitoring, different data collection types are used. Self-counting methods are quite uncertain because their back-flow is low. With direct-counting methods a lot of information, such as visitor characteristics, visitor behaviour and visitor numbers can be collected. The disadvantage of these methods is their big costs. A lot of human resources are needed to collect data. Indirect-counting systems generate simple estimations of recreational use, which are quite accurate after calibration (Hollenhorst et al. 1992).

The Swiss National Park (SNP) is situated on the extreme south east of Switzerland, on the border to Italy. The Park was established in 1914 as the first national park of the Alps and of central Europe. Its aims are total protection of nature and research. It covers an area of 172 km<sup>2</sup> and has 80 km of public accessible hiking trails. Many research programs concerning various themes of natural environment without direct influence of humans are taking place in the area. So far, there was only little research of visitor use and distribution. Any use of the park, ex-

cept hiking, is prohibited and it is strictly forbidden to leave the trails. That makes it easier to use an indirect-counting system. The last visitor counting in the Swiss National Park originates from the years 1991-1993 (Lozza 1996). However, since these investigations, some outer circumstances changed (e.g. new direct railway-line into the region) and the technological development progressed. In summer 2005 the SNP started a new visitor monitoring experiment with a pilot project. At four places in three different valleys of the park indirect-counting systems with acoustic slab sensors were installed. For two days in July, human observers counted the visitors who passed the sensors on every counting site. This data was used for checking and calibrating the counting system.

## Main questions

In this survey the calibration process of the automatically collected data will be presented. Furthermore, main problems of miscounting will be figured out to improve the application and the handling of such acoustic slab sensors. Recommendations to get more exact data will be elaborated. Furthermore the number of visitors of the SNP during the year 2005 was estimated and will be discussed on the basis of the collected data.

## Methods

Four acoustic slab sensors were installed in the first days of July at Mingèr and Margunet Valley and two at Trupchun Valley. The sensors consist of

two pressure sensitive slabs. According to the manual of the manufacturer they are buried under an 8 to 10 cm thick layer of soil. Each slab has a socket on which it is connected to a data logger. The system registers the visitors hourly. To calibrate the sensors and check the accuracy of the automatically collected data, simultaneous counting by man during two days was performed, on Monday and Tuesday the 18th and 19th of July 2005. Each day there were observations from 8 a.m. until 6 p.m. The observers counted people who passed the system and kept an eye on their passing behaviour.

To estimate the number of visitors in the SNP, the automatically imposed data must be calibrated. For that reason the number of visitors observed was divided by the number of automatically registered visitors. This factor is used as a calibration factor (Ross 2005). To calculate a consistent calibration factor, the mean of every hour can be used (Formula I). As there were no evident reasons to explain the outliers with an index bigger than 1, they were also used to calculate the calibration factor.

a: automatically collected data with acoustic slab sensors

cf: calibration factor

m: manually collected data

$$I. \quad cf = \text{mean} \left( \sum \frac{m}{a} \right)$$

Based on the data of the counting days and estimations about visitor distribution in the SNP for the year 1993 (Lozza 1996) the total number of visitors for the whole year 2005 (with the assumption of a similar visitor distribution) was calculated. The sensors were located near the four main entrances of the SNP. On the counting days more sites and directions were observed than the sensors covered. On each site the total number of visitors on these days was compiled. The comparison between the estimated persons on the site and the number of people that passed the counter leads to another correction factor. It is described in Formula II.

a: automatically collected data with acoustic slab sensor

cf: calibration factor

s: number of visitors that passed the sensor site

t: total number of visitors in the valley on counting days

T: estimated total number of visitors

$$II. \quad T = cf * a + \left( \frac{t-s}{s} \right) * cf * a$$

Lozza (1996) figured out that the four sites cover about 65% of all visitors in the SNP. So the visitor numbers as calculated in Formula II were divided by 0.65.

According to the passing behaviour of the visitors and the results of visitor monitoring in SNP, hypotheses were formulated and tested with walking experiments. The loggers are assumed to work correctly. The hypothesis concerned the following questions:

- What is the sensitive area of the counter?
- How does step length affect the counting?
- How must groups pass the sensor to be counted correctly?
- Does composition of covering material affect the sensors counting?

For the experiments the sensors were installed on three different locations covered with different material. Before covering, the exact position of the panels was flagged to test the stepping sensitivity on the edge and near the counter. To test the sensitivity for groups, the group sizes and distance between the hikers were varied. The test persons carried a stick of a given length to keep the distance between them constant. In another experiment artificial boundaries were constructed to force the hikers walk in line. The experiments consisted of 10 repeated exceedances. Experiments of bigger groups were not repeated 10 times, but read off after every exceedance.

## Results

### Visitor counting in the Swiss National Park

To calibrate the sensors counting visitors in SNP, the automatically and manually counted data were compared. The results show quite a big deflection and data is not very constant. On the x-axis in Figure 1 the number of manually counted visitors is shown. On the y-axis is an index that represents the

division of automatic counts by manual counts. An index below 1 indicates sensor under-count and indices above 1 represent sensor over-count.

Except for some over-estimates, when there were few visitors, the counting sensors always measured fewer visitors than really passed. Particularly when a lot of visitors passed the system the counting seems to be constant by an index of about 0.5. Causes of under-estimates could be visitors with very long stride who step over the sensors, visitor passing in groups even side by side or with very small distance among each other, or the counter can become less sensitive if the soil above is frozen or very compact (Ross 2005). If the path is too wide, visitors can miss the sensors and are not recorded. Another problem may be caused by the time synchronisation. The sensors count people hourly. Hikers who pass the system on clock hour may be counted manually for the previous and by the sensors for the following hour. Probably this was the problem on site Trupchun 1, where an index greater than 2.5 was calculated (Figure 1). There was a quite big over-count from 3 to 4 p.m. and an under-count during the hour before. When there are more visitors per hour this problem cannot be figured out. Other reasons for over-counting by the sensors may be people crossing the slabs

very slowly, or even turning over. As the sensors were placed near crossings, tourists who are not sure where to go may act as described. Walking experiments in the following section will give more information about the counting problems.

In Table 1 the difference between the two data collection methods are shown. On site Mingèr and Trupchun 2 the mechanical under-estimate was very high. Less than 50% of the actual visitors were counted by the sensors. Causes of miscounts are described above.

The calculated correction factors range between 2.28 and 1.63 on the four observation places. The quite big (but not significant) differences on the four sites show that the under-estimates are not a bias of the sensors itself, but are specific for the sites. There must be differences in outer circumstances or in the composition of visitors. Outer circumstances could be wrongly installed sensors, the depth in which the sensor is buried, the path width or the sort of the material that covers it (Muhar et al. 2002).

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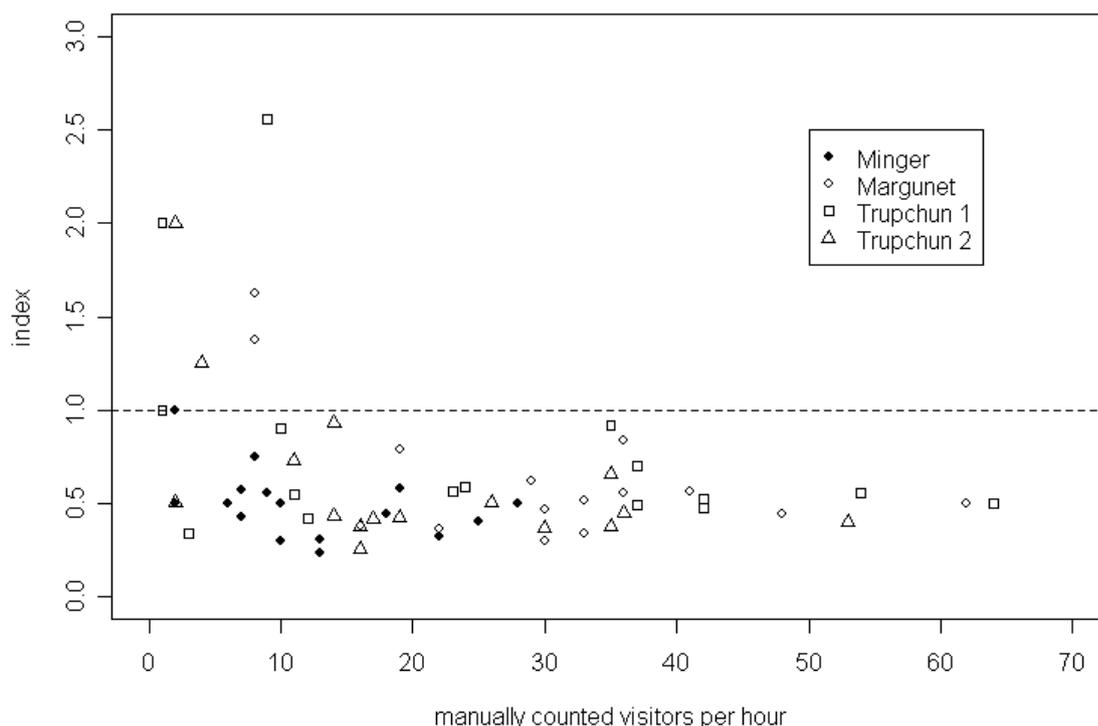


Figure 1: Comparison of manually collected data with automatic data collection. The index is calculated by the division of automatically and manually collected data. An index below 1 represents an under-count by the sensor.

Table 1: Collected data, deviance and calibration factor on 2 observation days in July.

Observation Sites	Total of manually counted visitors	Total of automatically counted visitors	Percentage of automatically counted visitors	Calibration factor (cf)
Mingèr	201	90	44.8%	2.28
Margunet	469	255	54.4%	1.81
Trupchun1	405	254	62.7%	1.63
Trupchun2	330	159	48.2%	1.96

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#### Total of visitors for the year 2005

The calculation of 110'000 visitors for the year 2005 is lower than the last estimations (Figure 2). It must be considered that the bases of the estimations are different for the 3 years. In 1991 the estimation of 250'000 visitors per year based on just two counting days in August. Possibly the good weather on these days resulted in an over-estimation. Already Lozza (1996) could not approve a visitor number of 250'000. In 1993 the visitors were counted on 15 days (Lozza 1996). Lozza estimated 150'000 visitors for the year 1993. Counting over the whole period gives lower visitor numbers than extrapolation of some test days. A peculiarity of the observed data in the year 1993 is the fact that a very popular program to settle bearded vultures in the SNP has been carried out. Also in 2005 there was a bear as special attraction that may have increased visitor numbers. The error bar of the estimation in 2005 describes the confidence interval of the correction factor (cf).

Comparing the observations of the year 1993 with 2005, a trend for future attendance could be ventured. Because the type of data collection differs for 2005 it is difficult to give a secure statement. Highly decreasing visitor numbers are not expected. As the insecurity of the calculation reaches the number of 150'000, the visitor numbers are expected to be slightly decreasing or to remain constant for the last decade.

#### Experimental sensor tests

The sensitivity of the sensors was tested with walking experiments. The main results of the experiments are listed in Table 2.

The experiments of stepping on the slab border demonstrate that the sensor can not detect every passing hiker. The deviance is not very big. The sensor is less sensitive on the side with the sockets, where it missed 10 hikers out of 100. On the opposite side without sockets, the miscount is just half as big.

Big step length may cause problems for the counter but only for very long strides (Ross 2005). For a step length of 80 cm the deviance is 4 percent. Short steps do not cause any deviance. Stepping between the two slabs did not provoke any miscount either.

The manufacturer declares that children heavier than 10 kg trigger counting. Our experiments with two children approve this information only partly. A child that weighs 14 kg provoked an under-counting of 13 percent, which is a significant miscount. A child of 22 kg was always counted accurately.

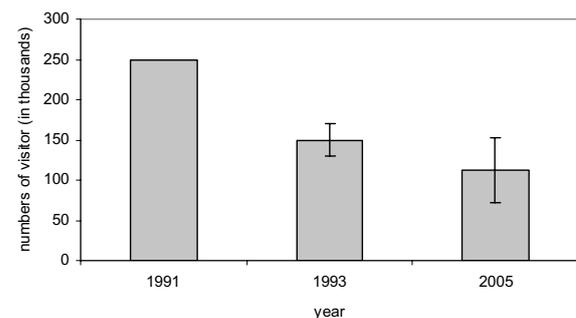


Figure 2: Estimations for visitor numbers in the SNP. The data is based on two observation days in 1991, 15 days in 1993 and 4 months of automatic counting in the year 2005.

Table 2: Mean deviance between sensor counting and passing experiments.

Number of repetition	Total observations	Experiment	Mean deviance
10	100	step on border of sensor (socket side)	10%
10	100	step on border of sensor (opposition side)	5%
10	100	step on border of sensor (both sides)	8%
10	100	step length 80cm	4%
10	100	step length 30cm	0%
10	100	step between two sensors	0%
10	100	hiker with sticks	0%
5	50	children (22kg)	0%
5	50	children (14kg)	14%
10	200	2 persons 100cm distance	0%
10	200	2 persons 80 cm distance	42%
10	200	2 persons 60 cm distance	32%
10	300	3 persons 80 cm distance	16%
10	400	4 persons 80 cm distance	13%
10	60	6 persons in group	53%
10	60	6 persons in line	13%
10	70	7 persons with boundaries	6%

If the distance between two persons is one meter and more, the counting is correct. With less space between hikers there is a quite big deviance of up to 40 percent. Walking in line with less than 80 cm distance is not very comfortable. But if the path is wide enough for hikers to walk at least partly side by side it is very probable that they walk closer. If the distance between persons is too small for the counter it does not matter how close they walk. Groups of three and four persons with small distance provoke fewer miscounts than groups of two persons. Probably it is more difficult to keep the distance constant. Furthermore, a group of three and more persons triggers at least twice. If a group passes the sensor side by side the counting is not cor-

rect. A deviance of over 50% was measured for a group of 6 people. If the same group walks in line as close as possible, the deviance is much smaller. It is very interesting that the experiment with 7 persons walking as close as possible with boundaries is quite correctly counted by the sensor. That means, with boundaries people can not walk closer than one meter, neither do they step beside the slabs. A problem for recreational areas such as the SNP is that the boundaries must be natural or designed inconspicuously, in a way that neither tempts children to play and provoke an over-count nor allows people to walk closely together or side by side to provoke under-counts.

Table 3: Experiments with different type cover material.

Number of repetition	Total observations	Cover material	Experiment	Mean deviance
5	50	Soil and gravel	Normal walking	0%
5	50	Soil and gravel	Step on border of sensors (side without socket)	2%
10	100	Soil and wood chips	Normal walking	0%
10	100	Soil and wood chips	Step on border of sensors (side without socket)	46%
5	100	Gravel	Normal walking	4%

## Further research

It is important that the sensors always work properly during the whole season. They must be checked regularly. Ross (2005) mentioned the problem of frozen ground that can provoke under-counts with such sensor systems. In the test period it was not possible to check this situation. Another question concerns the verification of the 65% (Lozza 1996) of total park visitors that can be reached with the four test sites. For further calibration work a proper observation of the time synchronisation between the observers and the sensors is recommended.

## Conclusion

For every sensor on each site calibration must be performed (Ross 2005). The calibration may be realized together with visitor interviews to perform visitor surveys at the same time. For the calibration, special regard should be spent on the time synchronisation between the observers and the sensors.

In the year 2005 there were 110'000 estimated visitors in the SNP, which is less than the number of visitors in the year 1993. The data collection was different. Nevertheless, the total number of visitors slightly decreased or remained constant over the last decade.

The results of walking experiments with acoustic slab sensors showed that they perfectly count single persons who step in the centre of the sensors. Under covering material of soil and gravel the sensor detects persons passing on the border of the slab. But the sensor is less sensitive on the sides of the sockets. Long steps may affect the counting accuracy (Ross 2005), but with steps up to 80 cm there are no incisive problems, even if the hikers step only in the middle of the two slabs. Children lighter than 15 kg may not be counted correctly. Groups affect the counting most. If persons are walking very close together, with a distance under 1 meter, they are often counted as just one person. The hikers must be forced to walk in line. If there is not enough space to walk side by side, their distance normally is in the sensitive band of the counting system. It is recommended using even natural

boundaries or, if such obstacles are not available, to construct light artificial railings that do not encourage to be played with. For example, such railings could be wire fences.

## References

- Cessford, G. & Muhar, A. (2003). Monitoring options for visitor numbers in national parks and natural areas. In: *Journal of Nature Conservation* (11), p 240-250.
- Hollenhorst, S.J. (1992). *Monitoring Visitor Use in Backcountry and Wilderness: A Review of Methods*.
- Lozza, H. (1996). *Tourismbefragung 1993 im Schweizerischen Nationalpark*. Semesterarbeit University of Zurich, Arbeitsberichte zur Nationalparkforschung. Zernez.
- Muhar, A., Arnberger, A. & Brandenburg, C. (2002). *Methods for Visitor Monitoring in Recreational and Protected Areas: An Overview*. In: Arnberger, A., Brandenburg, C., Muhar, A. (Eds.). *Monitoring and Management of Visitor Flows in Recreational and Protected Areas*. Conference Proceedings. Bodenkultur University Vienna, Austria, January 30 – February 02, 2002. Vienna, p 1-6.
- Ross, J. (2005). *Visitor counters in parks: management practice for counter calibration*. Wellington.

# National Park Characteristics, Regional Setting and Visitor Flows

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*Keywords: Recreation, national parks, visitor flows, regression analysis, classification.*

## Introduction

The importance of national parks as national icons and tourist destinations is widely recognized. The visitor flows to national parks are increasing all over the world, which affirms their significance for tourism and recreation. Nature-tourists choose their destinations on the basis of natural environment, location and man-made facilities provided for tourists. The travel experiences of park visitors also include their experiences of tourist services in area surrounding the national park. Understanding the relationship between visitor flows and park characteristics, as well as between visitation and the attractions that are provided outside the park, is crucial in planning and management of existing national parks. This information is also needed in assessing impacts of establishment of new parks as the visitor flows and related tourism income can have a significant affect on local economies.

## Methods

The objective of this study is to examine the factors which contribute to national parks popularity. The study focused on factors such as the natural characteristics of a park, its recreation facilities and services, tourism services in the surrounding communities, and park's location related to potential users. Two distinct methods, classification and regression modelling were used to analyze the visitor flows to all thirty-five national parks in Fin-

land. The park data was received from Finnish Forest and Park Service, and the community data was gathered from various statistical sources.

## Results

National parks were first classified in categories which reflected their features in natural conditions, provision of recreational facilities, and tourism services in the surrounding communities (table 1). The results of the classification approach show the accumulation of natural values and services. National parks having a high level of natural values typically had a good provision of recreation facilities and both were related to a high number of visits. If the level of natural values were lower a high level of services did not increase the visitor flow. Furthermore, the high level of natural values and recreation facilities inside a park were typically associated with a good provision of services in the surrounding communities, which tended to further increase visitation levels.

Next a multiple regression analysis was used to examine the coexistent impact of several independent variables to park visitation (table 2). The results showed the relative importance of supply factors on visitation. Recreation opportunities, number of biotopes, provision of trails and park's age increased the number of visits. The results revealed the minor effect of the demand factors on park visitation. Only in more

Table 1: National park classification according to natural and man-made features of the parks, and the average number of annual visits per park group.

Inside park facilities	Outside park tourism services	Increasing natural values → Dominating feature of nature			
		Mire	Forest	Water & valuable landscape	Field & valuable landscape
		number of parks (average number of visits / year)			
Low	Low	2 (13 000)	4 (13 600)		
	Medium	2 (10 000)	2 (6 800)	1 (7 200)	
	High	1 (20 000)			
Medium	Low		4 (14 300)	1 (6000)	
	Medium		2 (19 500)	5 (37 600)	
	High				
High	Low				
	Medium		2 (32 000)		1 (95 000)
	High	1 (15 000)	1 (100 000)	3 (104 300)	3 (129 000)

Table 2: Multiple regression models for visitor flows.

	Model 1		Model 2	
	$\beta$	p-value	$\beta$	p-value
Distance to the nearest city of more than 100 000 inhabitants in southern and western Finland	-.003	.062	-.004	.021
Recreation activities	.273	.000	.328	.000
Number of biotopes	.037	.039	.037	.037
Trails (km)	.004	.073		
Park age			.013	.053
R <sup>2</sup>	.676		.682	
N	35		35	

densely populated southern Finland the close location of a park to a bigger city had significance in explaining visitation.

## Conclusion

The classification enabled a generalised picture to be gained concerning the properties of national park and the association between park visitor flows and adjacent regions. The regression model enabled a more detailed examination of the relative importance of park and regional characteristics in relation to visitor flows. Being at the national level, the analysis offers park administrators the opportunity to identify strengths and weaknesses in the whole national park network. In the future, it

would be useful to expand the analysis to other types of recreation and protection areas in order to obtain a more comprehensive picture of the factors that attract visitors those areas.

# **Visitor Monitoring in Norwegian National Parks? If so: How Will it Find a Position in the Present Situation with Low Funding, Biological Hegemony, Expanding User Interests and Indistinct Management Priorities?**

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*Keywords: Social monitoring, ecological monitoring, national park management, tourism, rural development.*

## **Monitoring in Norway**

There is no tradition for social monitoring in Norwegian national parks, only a few examples of isolated visitor studies. On the other hand, several biological monitoring projects exist, partly as national programs and partly because of the conservation goals within each area. Often the monitoring locations (for national programs) are in national parks because the environmental conditions are presumably more stable and predictable than elsewhere. Generally, even monitoring of biodiversity (in Norway) has to be implemented with very low funding, and often under sub optimal conditions (scientifically, practically and concerning database development). Monitoring in protected areas in Norway has a long way to go before reaching a satisfying level and quality (Hagen et al. 2005).

## **Changes in society and conservation management – conflicting goals?**

- But something is about to happen that highlights the need for better monitoring. During the last years there has been political focus on the national parks and the mountain areas (where most of our national parks are located):
- New national parks are still being designated, partly on private land and very often through processes revealing land use conflicts. The rural municipalities want “something back” when “providing” the national and international society with national parks.

- The result is often pilot projects with community based management, and a stronger “will” (meaning political statements) to develop a combination of sustainable use and nature conservation. The “mountain text” (St.prp.nr. 65 (2002-2003)) states that commercial activity in national parks is no longer illegal. The critical question is: How can we do it, without developing conflicts, and threatening conservation goals?
- The “crisis” in traditional agriculture and poor economy in rural districts increases the pressure on economical development in remote areas (for instance in and around national parks). Tourism is often thought of as the answer.
- A new national tourism plan emphasizes the national parks as an important branding of Norway, and presents an ambitious goal of 25 % more foreign tourists in Norway by 2010 (Nærings- og handelsdepartementet 2005).
- In addition we have the European Community biodiversity strategy, and the ambition of halting the biodiversity loss by 2010.
- Can all these possible conflicting goals and ambitions be combined, or are they simply in conflict? Monitoring can be helpful in trying to answer this.

## **A pilot study area**

In one of our newly established national parks, Dovrefjell-Sunndalsfjella National Park, two pilot projects are being implemented: A community based management model, and the development of a monitoring program.

The local ambition concerning tourism development is especially high in this area because one of the main national roads (E 6) and the railway between Oslo and Trondheim (Dovrebanen) are crossing the Dovre mountain plateau. On the other hand: The most important reason for establishing this national park was to secure the environmental conditions for the wild reindeer – a species for which Norway has a special international responsibility. The reindeer population is vulnerable towards different kinds of human activity and infrastructure. These are two important reasons behind the monitoring plan that is now being developed. NINA is responsible for the plan, and the Dovrefjell council (Dovrefjellrådet - the management authority) is the employer. The national authority for national park management (DN – The directorate for nature management) is also involved in this project, because of the principal aspects. Both ecological and social monitoring is included, and the critical frame is to develop a monitoring plan based on the management objectives of the park. This might be the starting point for a new (national) strategy: To develop and improve the monitoring in national parks of (hopefully) both ecological and social qualities, and to concentrate on the potential threats and developments that are within the possible frame of action for the responsible manager. The management goals for each area shall guide the priorities for the monitoring. It seems like The Norwegian Nature Inspectorate (Statens Naturoppsyn – SNO), together with local supervisors, will have the main responsibility for the practical monitoring in most national parks.

### Local and principal issues

In the presentation I will discuss several (principal and case) challenges in this process:

- Integration of monitoring knowledge as a base for management planning and action.
- The co action and cooperation between the NINA (and other) researchers, SNO, the local supervisors and the management staff.
- The long term building of easy accessible databases
- Who will own and have access to databases?

- Co action and cooperation between the managers and the different stakeholders? (Monitoring data can be relevant input even for tourism developers).
- Monitoring knowledge - management actions? (Moving from traditional management to adaptive management?).

### References

- Hagen, D., Eide, N.E., Vistad, O.I., Framstad, E. & Saks-gård, L.(2005). Evaluation of the Provincial Governors monitoring in protected areas (in Norwegian). In: NINA-report 48. Trondheim.
- Nærings- og handelsdepartementet (Ministry of Trade and Commerce). (2005). Action plan for Tourism development (in Norwegian). Oslo.
- St.prp.nr. 65 (2002-2003). Additional funding etc. in the state budget... (in Norwegian). Chap. 3.13. Miljøverndepartementet (the so called "Mountain Text").



Recreation Ecology and Visitor Impact Research:  
Past, Present and Future

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Yu-Fai Leung (Chair)

## Recent Recreation Ecology Research in Australia

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*Keywords: Recreation, ecology, Australia, impacts.*

Why do we need recreation ecology research in different countries? Recreational impacts differ considerably between activities and between ecosystems, and Liddle (1997), Sun and Walsh (1998) and Buckley (2004) used these criteria to structure their reviews of research literature. But do findings from one country apply to comparable ecosystems elsewhere?

Different continents and geographical regions have different flora and fauna, even if they have structurally similar vegetation types. Considerable effort has been devoted to identifying the differences as well as the similarities: e.g., for coral reefs (Dubinsky 1990), coastal heaths (van der Maarel 1997), or tropical rainforests (Primack & Corlett 2004).

Except at the crudest level such as wholesale vegetation clearance, recreational impacts are different in different continents. The broad types are similar, but the specific mechanisms, the quantitative relationships, and the shape of stress-response curves may depend on the terrain, climate, evolutionary history of plant and animal species and communities.

In addition, people in different countries tend to take part in different recreational activities, using different equipment and in different ways (Weaver 2001, Buckley 2004, Chizhova 2004, Magro & Amanda de Barros 2004). Land management authorities also use different resource and visitor management tools and techniques. These human differences, however, can be adjusted for much more easily than the ecological differences outlined above.

It is hard to make reliable intercontinental comparisons, because recreation ecology research effort has been heavily skewed to northern developed nations with strong science research funding programs (Buckley 2005). Land management agencies in southern and developing nations have wrongly assumed that research from the UK and USA applies globally. In Australia, the tourism industry has captured research funding programs and suppressed research on impacts.

Australia is one of the world's 17 megadiverse regions (Barlow 1994, Williams et al. 2001). Its flora and fauna have many endemic species, and are generally well adapted to fire, drought and low soil phosphorus, but not to large placental grazing mammals with hard hooves, or to pests and pathogens from elsewhere. We could thus use comparisons between semi-arid ecosystems in Australia, southern Africa and north America, or between subtropical forests in Australia and south-east Asia, to examine how similar recreational activities may produce different impacts in structurally similar but functionally different ecosystems.

Most recreation ecology research in Australia has been on high-impact activities within protected areas, carried out at a management level and thus relevant for international comparisons. This includes activities such as: off road driving (Priskin 2003); horse riding (Whinam et al. 1994, Whinam & Comfort 1996, Newsome et al., 2002, Phillips & Newsome 2002); mountain biking (Goelt & Alder 2001); heavily-used backcountry hiking trails (Whinam & Chilcott 1999, 2003, Whinam et al., 2003 McDougall & Wright 2004); camping (Tur-

ton et al. 2000; Smith & Newsome 2002; Talbot et al. 2003); swimming in freshwater dune lakes (Hadwen et al. 2003, 2005); scuba diving on corals (Rouphael & Inglis 1997, Plathong et al. 2000, Rouphael & Inglis 2002); power-boating in freshwater lakes (Mosisch & Arthington 2004) and coastal seas (Byrnes & Warnken 2004); and whalewatching in New Zealand (Higham & Lusseau 2004).

There is also recent work on the impacts of infrastructure, such as: roads and powerlines in rainforest (Goosem 2000, Turton 2003); roads and formed tracks in alpine and subalpine areas (Jones 2000, Johnston & Pickering 2001, McDougall 2001, Johnston & Johnston 2004, Hill & Pickering 2006), and tourism infrastructure on coral reefs and islands (Walker 1991). Most protected area management agencies in Australia also carry out monitoring, but this is generally unpublished and not intended as research.

Several recent Australian studies have advanced recreation ecology research at a global level. Two studies have tested the asymptotic stress-response curve proposed as a general model for the impacts of recreational trampling in North American ecosystems (Cole 2004). Rouphael and Inglis (2002) found that impacts of divers on coral reefs are both spatial and temporally heterogeneous, and do not necessarily increase with increasing use. Some individual divers cause so much more damage than others, that their impacts mask any cumulative effects from larger numbers alone.

Growcock (2005), studying trampling and camping in burnt and unburnt alpine and subalpine vegetation, found that the stress-response curve is commonly sigmoidal, with very little vegetation damage below a lower threshold of use, rapidly increasing damage at intermediate levels, and little increase in damage at the highest levels. The thresholds represent transitions between different types of impact. Below the lower threshold there may be physiological effects on plants, but not loss in cover. Between the lower and upper thresholds there is a loss in overall cover caused by death of individual plants, some species before others. Above the upper threshold the living plant cover is largely gone, and the principal impact is loss of leaf litter and soil.

These impacts have been identified and quantified previously (Cole 1995, 2004, Monz et al. 1996, Liddle 1997). The strength of Cole's work was to identify one parameter, number of passes yielding 50% cover loss, to compare results from different times and places. The key contribution of Growcock's (2005) approach is that it allows the disaggregation of a rather generalised parameter, loss of plant cover, into a series of successive ecological effects each with its own identifiable mechanism.

There have also been several methodological innovations. Giese et al. (1999) used artificial eggs with monitoring devices and remote telemetry to examine physiological stress suffered by nesting penguins approached by tourists. Bridle and Kirkpatrick (2003, 2005) examined the breakdown of human waste of various types, in various ecosystems, and under various weather conditions using novel forms of synthetic human waste.

Some recreational impacts are hard to detect but still significant ecologically. Warnken and Buckley (2004) distinguished microbiological impacts of hikers swimming in rainforest creeks, from the numerically much larger changes due to natural rainfall fluctuations. Buckley et al. (1998) identified previously unrecorded waterborne pathogens, introduced by tourists, in pristine Australian rainforest creeks. Various nocturnal marsupial species respond differently to spotlights of different colours as well as intensities.

Recreational impacts can occur through complex ecological mechanisms. There is recent Australian research on: effects of trackside weeds on pollination success of native plant species; effects of food supplementation by tourists on community ecology of bird populations (Oost 2006 in prep.); effects of backcountry hiking trails on predation by quolls and feral dogs; and effects of snow compaction on small marsupials which travel through subniveal space (Sanecki et al. 2006). One particular issue which has vexed recreation ecologists and protected area managers for some years is the degree to which an education and interpretation program can reduce visitor impacts, actual rather than self reported. Controlled experimental tests are not easy to design, but have been carried out successfully for guided walks in a rainforest World Heritage area (Littlefair 2004).

Transport of weeds is a major recreational impact in Australia (Lonsdale & Lane 1994). Whinam et al. (2005) found ~1000 weed propagules on clothing and equipment from 64 expeditioners to sub-Antarctic islands. Hill and Pickering (2005) examined weeds alongside formed walking tracks in the Australian Alps. Raised steel-mesh walking tracks have far less impact than gravel, paved or informal tracks. In Australia, tourism use of protected areas is a major factor in the spread of the root rot fungus *Phytophthora cinnamomi*, which threatens a wide range of plant species, many of them already at risk of extinction from other causes (Kelly et al. 2003, Schahinger et al. 2003, Buckley et al. 2004, DPIWE 2005, Turton 2005).

Introduced foxes are a threat to many native marsupials in Australia. In the Australian Alps, foxes occur at higher densities immediately around ski resorts, leading to increased predation on native marsupials (Green & Osbourne 1994). Snow grooming in winter increases predation even further, since compaction of subnival space forces native marsupials onto the snow surface where they are more vulnerable to foxes (Sanecki et al. 2006). Even minor additions of nutrients by tourists can result in significant impacts in some Australian ecosystems. In freshwater dune lakes on Fraser Island, a World Heritage site, increased use by tourists causes algal growth, both by direct nutrient input and through resuspension of sediment (Hadwen et al. 2003, 2005, Hadwen & Bunn 2004). Similar mechanisms were reported for rainforest streams by Warnken and Buckley (2004).

Despite such research, we don't know whether Australian species and ecosystems behave like international counterparts. Are trampling impacts in the Australian Alps different from North America because of the species or the experimental design? Do birds on Australian lakes or shorelines take flight at similar distances from approaching tourists as those in North America or Europe? Do vehicle passes along a sandy beach crush the same number of tern eggs or burrowing crabs? Do marsupials subject to spotlighting behave similarly to placental?

Key opportunities for international comparisons include the following. We could compare: types and intensities of impacts from the same recre-

ational activities in similar ecosystems on different continents; and the relative ecological significance of different types of impact in different ecosystems. We could set out to identify and test subtle and indirect mechanisms of recreational impacts on particular plant and animal species and communities, by applying other specialist ecological disciplines such as pollination ecology, fire ecology, ecotoxicology, population ecology, predation ecology, reproductive ecology and foraging ecology. We could also examine the indirect impacts of tourism and recreation in altering ecosystem functions, e.g. in dune lakes, snow country, rainforests and coral reefs.

## References

- Barlow, B.A. (1994). Phytogeography of the Australian region. In: R.H. Groves (ed.) Australian Vegetation 2nd Edition, p 3-36. Cambridge.
- Bridle, K.L. & Kirkpatrick, J.B. (2003). Impacts of nutrient additions and digging for human waste disposal in natural environments, Tasmania, Australia. In: Journal of Environmental Management (69), p 299-306.
- Bridle, K.L. & Kirkpatrick, J.B. (2005). An analysis of the breakdown of paper products (toilet paper, tissues and tampons) in natural environments, Tasmania, Australia. In: Journal of Environmental Management (74), p 21-30.
- Buckley, R. (ed.) (2004). Environmental Impacts of Ecotourism. Oxford.
- Buckley, R. (2005). Recreation ecology research effort: an international comparison. In: Tourism Recreation Research (30), p 99-101.
- Buckley, R., Clough, E. & Warnken, W. (1998). *Plesiomonas shigelloides* in Australia. In: Ambio (27), p 253.
- Buckley, R., King, N. & Zubrinich, T. (2004). The role of tourism in spreading dieback disease in Australian vegetation. In: R. Buckley (ed.) Environmental Impacts of Ecotourism, p 317-324. Oxford.
- Byrnes, T. & Warnken, J. (2004). Establishing best-practice environmental management: lessons from the Australian tour boat industry. In: R. Buckley, C. Pickering & D.B. Weaver (ed.). Nature-Based Tourism, Environment and Land Management, p 111-122. Oxford
- Chizhova, V.P. (2004). Impacts and management of hikers in Kavkazsky State Biosphere Reserve, Russia. In: R. Buckley (ed.) Environmental Impacts of Ecotourism, p 377-382. Oxford.
- Cole, D. (1995). Experimental trampling of vegetation. I. Relation between trampling intensity and vegetation response. In: Journal of Applied Ecology (32), p 213-214.

- Cole, D. (2004). Impacts of hiking and camping on soils and vegetation: a review. In: R. Buckley (ed.) *Environmental Impacts of Ecotourism*, p 41-60. Oxford.
- DEST - Department of the Environment, Sport and Territories. (1994) *Australia's Biodiversity: an Overview of Selected Significant Components*. Biodiversity Series Paper No. 2. Canberra.
- DPIWE - Department of Primary Industries, Water and Environment (Tasmania State Government). (2005). *Managing *Phytophthora cinnamomi**. <http://www.dpiwe.tas.gov.au/inter.nsf/WebPages/EGIL-53Y8FA?open>
- Giese, M., Handsworth, R. & Stephenson, R. (1999). Measuring resting heart rates in penguins using artificial eggs. In: *Journal of Field Ornithology* (70), p 49-53.
- Goeft, U. & Alder, J. (2001). Sustainable mountain biking: a case study from the southwest of Western Australia. In: *Journal of Sustainable Tourism* (9), p 193-211.
- Goosem, M. (2000) Effects of tropical rainforest roads on small mammals: edge effects in community composition. In: *Wildlife Research* (27), p 151-163.
- Green, K. & Osborne, W. (1994). *Wildlife of the Australian Snowy Country*. Sydney.
- Growcock, A.J., Pickering, C.M. & Johnston, S.W. (2004). Walking on ashes: Short-term impacts of experimental trampling on soils after bushfire. In: *Victorian Naturalist*, (12) p 199-206.
- Growcock, A.J.W. (2005). *Impacts of Camping and Trampling on Australian Alpine and Subalpine Vegetation*. PhD Thesis, Griffith University.
- Hadwen, W.L., Arthington, A.H., & Mosisch, T.D. (2003). The impact of tourism on dune lakes on Fraser Island, Australia. In: *Lakes and Reservoirs: Research and Management* (8), p 15-26.
- Hadwen, W.L. & Bunn, S.E. (2004). Tourist increase the contribution of autochthonous carbon to littoral zone food webs in oligotrophic dune lakes. In: *Marine and Freshwater Research* (55), p 701-708.
- Hadwen, W.L., Bunn, S.E., Arthington, A.H. & Mosisch, T.D. (2005). Within-lake detection of the effects of tourist activities in the littoral zone of oligotrophic dune lakes. In: *Aquatic Ecosystem Health and Management* (8), p 159-173.
- Higham, J. & Lusseau, D. (2004). Ecological impacts of tourist engagement with cetaceans. In: R. Buckley (ed.) *Environmental Impacts of Ecotourism*, p 171-186. Oxford.
- Hill, W. & Pickering, C.M. (2006). Vegetation associated with different walking track types in the Kosciuszko alpine area, Australia. In: *Journal of Environmental Management* (78), p 24-34.
- Johnston, F.M. & Johnston, S. (2004). Impacts of road disturbance on soil properties and on exotic plant occurrence in subalpine areas of the Australian Alps. In: *Arctic, Antarctic and Alpine Research* (36), p 201-207.
- Johnston, F.M. & Pickering, C.M. (2001). Alien plants in the Australian Alps. In: *Mountain Research and Development* (21), p 284-291.
- Jones, M.E. (2000). Road upgrades, road mortality and remedial measures: impacts on a population of Eastern quolls and Tasmanian devils. In: *Wildlife Research* (27), p 289-296.
- Kelly, C., Pickering, C.M. & Buckley, R.C. (2003) Impacts of tourism on threatened plants taxa and communities in Australia. In: *Ecological Restoration and Management* (4), p 37-44.
- Liddle, M. 1997. *Recreation Ecology*. London.
- Littlefair, C.J. (2004). Reducing impacts through interpretation, Lamington National Park. In: R. Buckley (ed.) *Environmental Impacts of Ecotourism*, p 297-307. Oxford.
- Lonsdale, W.M. & Lane, A.M. (1994). Tourist vehicles as vectors of weed seeds in Kakadu National Park, northern Australia. In: *Biological Conservation* (69), p 277-83.
- Magro, T.C. & Amanda de Barros, M.I. (2004). Understanding use and users at Itatiaia National Park, Brazil. In: R. Buckley (ed.) *Environmental Impacts of Ecotourism*, p 361-376. Oxford.
- McDougall, K.L. (2001) Colonization by alpine native plants of a stabilized road verge on the Bogong High Plains, Victoria. In: *Ecological Management and Restoration*, (2), p 47-52.
- McDougall, K.L. & Wright, G.T. (2004) The impacts of trampling on fieldmark vegetation in Kosciuszko National Park, Australia. In: *Australian Journal of Botany* (52), p 315-320.
- Monz, C.A., Meier, G.A., Welker, J.M., Buckley, R.C., Cole, D.N. & Loya, W.M. (1996). Responses of moist and dry arctic tundra to trampling and warmer temperatures. In: *Bulletin of the Ecological Society of America* (77/3), p 311.
- Mosisch, T. & Arthington, A. (2004). Impacts of recreational powerboating on freshwater ecosystems. In: R. Buckley (ed.) *Environmental Impacts of Ecotourism*, p 125-154. Oxford.
- Newsome, D., Milewski, A., Phillips, N. & Annear, R. (2002). Effects of horse riding on national parks and other natural areas in Australia: Implications for management. In: *Journal of Ecotourism* (1), p 52-74.
- Oost, M. (2006)(in prep). *Indirect Effects of Park Visitors on Bird Population Dynamics*. PhD Thesis, Griffith University.
- Phillips, N. & Newsome, D. (2002). Understanding the impacts of recreation in Australian protected areas: Quantifying damage caused by horse riding in D'Entrecasteaux National Park, Western Australia. In: *Pacific Conservation Biology* (7), p 256 - 273.

- Plathong, S, Inglis, G.J. & Huber, M.E. (2000). Effects of self-guided snorkelling trails on corals in a tropical marine park. In: *Conservation Biology* (14), p 1821-1830.
- Priskin, J. (2003). Physical impacts of four-wheel drive related tourism and recreation in a semi-arid, natural coastal environment. In: *Ocean and Coastal Management* (46), p 127-155.
- Rouphael, A.B, & Inglis, G.J. (1997). Impacts of recreational scuba diving at sites with different reef topographies. In: *Biological Conservation* (82), p 329-336.
- Rouphael, A.B, & Inglis, G.J. (2002). Increased spatial and temporal variability in coral damage caused by recreational scuba diving. In: *Ecological Applications* (12), p 427-440.
- Sanecki, G.M., Green, K. Wood, H. & Lindenmayer, D. (2006). The implications of snow-based recreation for small mammals in the subnivalian space in south-east Australia. In: *Biological Conservation*. In Press.
- Schahinger, R., Rudman, T. & Wardlaw, T. (2003). Conservation of Tasmania Plant Species and Communities Threatened by *Phytophthora cinnamomi*: Strategic Regional Plan for Tasmania. Technical Report 03/03, Nature Conservation Branch, Department of Primary Industries, Water and Environment, Hobart.
- Smith, A. & Newsome, D. (2002). An integrated approach to assessing, managing and monitoring campsite impacts in Warren National Park, Western Australia. In: *Journal of Sustainable Tourism* (10), p 343-359.
- Sun, D. & Walsh, D. (1998). Review of studies on environmental impacts of recreation and tourism in Australia. In: *Journal of Environmental Management* (53), p 323-338.
- Talbot, L.M., Turton, S.M. & Graham, A.W. (2003). Trampling resistance of tropical rainforest soils and vegetation in the wet tropics of north east Australia. In: *Journal of Environmental Management* (69), p 63-69.
- Turton, S.M. (2005). Managing environmental impacts of recreation and tourism in rainforests at the Wet Tropics of Queensland World Heritage Area. In: *Geographical Research* (43), p 140-151.
- Turton, S.M., Kluck, T. & Day, T.J. (2000). Ecological impacts of visitors at day-use and camping areas. In: J.M. Bentrupperbaumer and J.P. Reser (eds) *Impacts of Visitation and Use: Psychosocial and Biophysical Windows on Visitation and Use in the Wet Tropics World Heritage Area*, p 123-134. Cooperative Research Centre for Tropical Rainforest Ecology and Management, Cairns.
- Walker T.A. (1991). Tourism development and environmental limitations at Heron Island, Great Barrier Reef. In: *Journal of Environmental Management* (33), p 117-122.
- Warnken, W. & Buckley, R. (2004). In-stream bacteria as a low-threshold management indicator of tourist impacts in conservation reserves. In: R. Buckley (ed.) *Environmental Impacts of Ecotourism*, p. 325-338. Oxford.
- Whinam, J. & Chilcott, N. (1999). Impacts of trampling on alpine environments in central Tasmania. In: *Journal of Environmental Management* (57), p 205-220.
- Whinam, J. & Chilcott, N. (2003). Impacts after four years of experimental trampling on alpine/sub-alpine environments in western Tasmania. In: *Journal of Environmental Management* (67), p 339-351.
- Whinam, J. & Comfort, M. (1996). The impacts of commercial horse riding on subalpine environments of Cradle Mountain, Tasmania, Australia. In: *Journal of Environmental Management* (47), p 61-70.
- Whinam, J., Cannel, E. J., Kirkpatrick, J.B. & Comfort, M. (1994). Studies on the potential impact of recreational horse riding on some alpine environments of the central plateau, Tasmania. In: *Journal of Environmental Management* (40), p 103 - 117.
- Whinam, J., Chilcott, N. & Bergstrom, D.M. (2005). Subantarctic hitchhikers: expeditioners as vectors for the introduction of alien organisms. In: *Biological Conservation* (121), p 207-219.
- Whinam, J., Chilcott, N., Ling, R. & Wyatt, P. (2003). A method for calculating environmental sensitivity to walker trampling in the Tasmanian Wilderness World Heritage Area. In: R. Buckley, C. Pickering & D.B. Weaver (ed.) *Nature-Based Tourism, Environment and Land Management*, p 151-165. Oxford.
- Williams, J., Read, C., Norton, A., Dovers, S., Burgam, M., Procter, W. & Anderson, H. (2001). *Australia State of the Environment Report 2001 (Biodiversity Theme Report)*. Canberra.

## Recreation Ecology: Learning from the Past

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*Keywords: Recreation ecology, visitor impacts.*

Although it is a relatively young discipline, with few full-time practitioners, recreation ecology has already developed an impressive array of research traditions. In this paper, I identify the primary traditions of recreation ecology research and trace their origins. I use this perspective to suggest future directions for the discipline.

Work on recreation impacts on vegetation had begun by the 1920s (Meinecke) and work on animal response to approaching humans by the 1930s (Hediger). But it was not until the 1960s and early 1970s that substantial and cumulative recreation ecology research programs were begun. Prior to this, individuals conducted a study or two and then moved on to a different topic.

Many of the primary research traditions were instigated by the earliest substantive recreation ecology research programs. The earliest programs were developed on both sides of the Atlantic – with government-sponsored programs in the United States and Great Britain. Concern about recreation impacts led the U.S. Forest Service to support work by Al Wagar, Sid Frissell and Larry Merriam. Although none of these scientists made careers of recreation ecology, they made substantial contributions to the field. Wagar (1964) provided initial conceptual development of the carrying capacity concept, conducted the first simulated trampling experiments and also initiated work on restoration of damaged campsites. Frissell conducted the first study of campsites that receive different levels of use (Frissell & Duncan 1965). This study illustrated that impact is inevitable wherever use occurs, suggesting that the manager's task is to define the maximum acceptable level of im-

act—not to decide whether or not to allow impact. It illustrated the curvilinear relationship between use and impact and was the basis for techniques for monitoring campsites. Merriam, also working on campsites in the same area as Frissell, provided the first long-term studies of trends in impact (Merriam & Smith 1974).

In Great Britain, the government sponsored work by Neil Bayfield, over a 20-year period, on trampling and footpath impacts in the mountains of Great Britain. Bayfield developed more realistic experimental techniques, allowing him to describe variation in impact across different vegetation types. He effectively used experimentation in concert with general survey techniques on impacted sites (Bayfield 1979). His long-term studies allowed him to differentiate between the processes of initial damage and recovery. He also developed some of the earliest techniques for monitoring impacts on trails and experimented with restoration techniques. Finally, Mike Liddle brought some of the rigors of an academic tradition to the field in the early 1970s with his work on impacts on sand dunes in Wales. In particular, Liddle was among the first to propose generalities about recreation impact and to provide syntheses of knowledge (Liddle 1975).

Current recreation ecology research, largely an extension of this early work, is being conducted on all continents. There have been expansions in the types of ecosystem responses that have been studied, as well as recreational activities. Eco-tourism effects are a recent emphasis area. Substantial progress has been made in translating research results into management implications. Studies of recreational impacts on animals are

now about as numerous as those on vegetation and soil, although less progress has been made in developing generalities from this research.

One major challenge for the future is to develop a stronger theoretical basis for recreation ecology, to develop more useful general principles and to increase our predictive abilities. A second challenge is to link our understanding of impacts at small spatial scales (the scale at which most research is conducted) to larger spatial scales (the scales at which most management planning occurs).

## References

- Bayfield, N.G. (1979). Recovery of four montane heath communities on Cairngorm, Scotland, from disturbance by trampling. In: *Biological Conservation* (15), p 165-179.
- Frissell, S.S. & Duncan, D.P. (1965). Campsite preference and deterioration in the Quetico-Superior canoe country. In: *Journal of Forestry* (65), p 256-260.
- Liddle, M.J. (1975). A selective review of the ecological effects of human trampling on natural ecosystems. In: *Biological Conservation* (7), p 17-36.
- Merriam, L.C. & Smith, C.K. (1974). Visitor impact on newly developed campsites in the Boundary Waters Canoe Area. *Journal of Forestry* (72), p 627-630.
- Wagar, J.A. (1964). *The carrying capacity of wild lands for recreation*. Washington, DC.

## Recreation Ecology in East Asia: Redefining Impacts?

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*Keywords: Recreation ecology, visitor impacts, impact monitoring, impact management, trampling, trails, recreation sites, protected areas, East Asia.*

East Asia is one of the most populated regions of the world, but it also possesses very rich and diverse natural and cultural heritage that is protected by a network of over 760 protected areas (Shepard 2001). Such resources are, however, subject to tremendous and increasing visitor use pressure. For example, international tourist arrivals in East Asia are estimated to have annual growth rates of 7.2-7.6% between 2000 and 2020, which are the highest among all world regions (WTO 1999). Domestic recreation and tourism have also experienced rapid growth as socio-economic conditions of the region continue to improve. Protected areas are prime destinations of international and domestic visitors. Use pressure is further exacerbated by recent interests of embracing ecotourism as a sustainable development strategy in most countries/territories. Growing concerns about visitor resource impacts have prompted recreation ecology research that seeks to understand and manage impacts effectively. This paper assesses the current state of recreation ecology research in East Asia and discusses related challenges and opportunities.

Recreation ecology research in East Asia started late compared to that in Europe and North America. Previous studies were conducted most countries and territories of the region, including Japan, South Korea, Taiwan, and to a less extent, Hong Kong, China and North Korea (Leung & Lee 2003). Many previous studies were published in oriental languages that have prevented them from widely communicating to international colleagues.

A thorough literature review suggests that there are three main developmental stages of recreation ecology research in East Asia that largely mirrors the evolution of recreation ecology in general. At the

earliest formative stage before 1970 research was conducted by Japanese botanists who investigated trampling effects on alpine plant communities along trails. Visitor impacts received no research attention elsewhere in the region during that time period.

The situation changed substantially between the 1970s and 1990s when recreation ecology expanded to most parts of the region as a likely response to soaring participation of outdoor recreation and resultant impacts in natural and protected areas (Leung & Lee 2003). During this expansion stage concepts and methods of recreation ecology developed in Europe and North America were adapted by East Asian colleagues, though unique measurements were also developed. Results of long-term impact monitoring studies on trails were also reported (Yoda & Watanabe 2000). These studies enjoyed greater international exposure as more of them were published in English language. The primary focus of research during this stage, however, was still placed on mountainous protected areas and trail-related impact problems.

Since 2000 recreation ecology research in East Asia has continued to grow with more sophisticated methodologies applied in recent studies. At this strengthening stage theoretical discussion on recreation ecology began to appear. More recent studies tend to frame research questions in the context of sustainable tourism/ecotourism management (Deng et al. 2004).

Through several decades of recreation ecology a modest body of literature has accumulated for East Asia. However, the diversity and maturity of research is still low and research efforts are highly uneven within the region. Recreation ecology re-

search in the region remains to be scholarly pursuits with very weak ties to management practices. The biggest challenge of all, is how impact and acceptable impact should be defined in the East Asian context. With the sheer amount of visitors to protected areas there are few options besides high concentration of use and site hardening. Some commonly used impact indicators, such as soil compaction, may not be as relevant in East Asian protected areas. Other challenges include lack of baseline data, high levels of non-recreation human influence on protected areas that may mask recreation impacts, lack of devoted researchers in the field, communication barriers due to language and cultural differences, development-dominated planning strategy in some protected areas, and difficulties in gauging the amount and character of use in high-density use environments.

Despite the challenges there are numerous opportunities for recreation ecology in East Asia. There are many under-examined research topics and geographic areas, especially non-mountain protected areas. Some established knowledge in recreation ecology, such as use-impact and productivity-resilience relationships, can be evaluated in unexplored habitats and landscapes of the region that may yield new understandings. Landscape-level ecological effects of recreation impacts, such as fragmentation and wildlife disturbance, can be examined. Due to high levels of use in most protected areas, research on effective methods of restoration and environmentally and socially sound methods of site hardening is likely to make a unique contribution to the region. The feasibility and utility of establishing a region-specific set of visitor use/impact indicators and associated monitoring protocols for East Asia can also be examined (Leung & Lee 2003). Finally, ways to enhance communication between researchers and protected area managers and facilitate application of research results should be investigated.

## References

- Deng, J., Qiang, S., Walker, G. J., & Zhang, Y. (2003). Assessment on and perception of visitors' environmental impacts of nature tourism: A case study of Zhangjiajie National Forest Park, China. In: *Journal of Sustainable Tourism* (11/6), p 529-548.
- Leung, Y.-F., & Lee, J.-H. (2003). Recreation ecology and visitor carrying capacity management: Implications for protected areas in East Asia. In: *Korean Journal of Ecology* (26/2), p 53-58.
- Sheppard, D. (2001). Twenty-first century strategies for protected areas in East Asia. In: *George Wright Forum* (18/2), p 40-55.
- WTO (World Tourism Organization) (1999). *Guide for Local Authorities on Developing Sustainable Tourism: Supplementary Volume on Asia and the Pacific*. Madrid.
- Yoda, A., & Watanabe, T. (2000). Erosion of mountain hiking trail over a seven-year period in Daisetsuzan National Park, Central Hokkaido, Japan. In Cole, D. N., McCool, S. F., Borrie, W. T., & O'Loughlin, J. (comps.), *Wilderness Science in a Time of Change Conference - Volume 5: Wilderness Ecosystems, Threats, and Management*, p 172-180. Ogden.

## Recreation Ecology Research in the Americas

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From its origin in the United States and United Kingdom, recreation ecology as a field of study is over 70 years old and has grown to include a large international audience of scientists and protected area managers. Though there are few full-time recreation ecologists, the number of studies investigating recreation and visitor impacts has grown substantially in the past decade and a recent annotated bibliography included 1108 references (Leung, 2005). This paper provides a brief characterization and review of recent recreation ecology research in the Americas. Due to the large number and diverse array of relevant studies this review is largely limited to characterizing the recent research topics and publications of those scientists most active in recreation ecology research. Recent reviews providing a more comprehensive discussion of this literature include Cole (2004a), Hammitt and Cole (1998), and Leung and Marion (2000).

### **Canada**

The most active recreation ecology research in Canada has been at the University of Guelph, Ontario, where Dr. Doug Larson directs a Cliff Ecology Research Group. This program has been very active in investigating the ecological impacts of rock climbers (Kelly & Larson 1997, McMillan, Nekola & Larson 2003, McMillan & Larson 2002). Other recent recreation ecology studies include investigations on visitor impacts to the intertidal zone (Alessa, Bennet, & Kliskey 2003), using GIS to determine suitability for hiking trails (Bridgland, Lemky & Allen 2001), mountain biking impacts to vegetation and soil (Thurston & Reader 2001), campsite impact monitoring (Peregoodoff 1998), chemical

impacts to soils from campfires and dishwashing (Arocena, Nepal & Rutherford 2006), and a study of human disturbance on duck nests (Olson & Rohwer 1998).

### **United States**

Land management agencies of the federal government are the primary source of funding for recreation ecology research in the U.S. Specifically, the National Park Service and Forest Service are the primary sponsors, with relatively few dollars available from other federal agencies, conservation foundations, state parks and forests, and private sources. Only the U.S. Forest Service has provided permanent "hard money" funding supporting recreation ecology research; most funding is for specific studies requested by land managers. Consequently, recreation ecology research continues to be very applied, generally focused on providing information for carrying capacity decision making or resolving recreation impact problems.

Numerous government and university scientists conduct occasional recreation ecology studies. However, only four U.S. scientists consider the primary focus of their program of research to be recreation ecology; two of these are employees of the federal government. The following discussion describes their recent and current research studies to illustrate the focus of the most active research programs. Many other studies have been conducted and published but are too numerous to include here.

David Cole is a U.S. Forest Service scientist with the Aldo Leopold Wilderness Research Institute in Montana. While the bulk of his research has focused on camping impacts and experimental trampling, he has recently broadened his work to

include studies of wilderness visitors and non-recreational threats to wilderness ecosystems. Recent recreation ecology studies include studies of camping impacts (Cole & Monz 2004a,b) and basic research on factors that limit natural recovery of campsites (Zabinski & Cole 2000) and evaluating the effectiveness of alternative restoration techniques (Zabinski, Wojtowicz & Cole 2000, Zabinski et al. 2002). He has also authored many recent syntheses of recreation ecology knowledge, including Hampton and Cole (2003), Cole (2004 a,b), Newsome, Cole and Marion (2004), and Gutzwiller and Cole (2005).

The author is a U.S. Geological Survey scientist stationed at Virginia Tech, a university in Virginia. He conducts studies in wilderness, national park backcountry and frontcountry settings, and in international protected natural areas. His early research and some continuing studies investigate camping impacts (Marion & Farrell 2002, Reid & Marion 2004, Reid & Marion 2005). Recent research has focused on trail degradation and management (Marion & Leung 2004), particularly soil erosion (Aust, Marion & Kyle 2005, Marion & Olive 2006), and methodological innovations for assessing trail conditions (Marion & Leung 2001, Marion, Leung & Nepal In Press). Other recent studies have investigated the efficacy of low impact education (Daniels & Marion In Press a, Marion & Reid In Press) and how visitors gauge the appropriateness of site management actions to limit visitor impacts (Cahill, Marion & Lawson In Press, Daniels & Marion In Press, b). Two current studies are examining rock climbing impacts, including collaboration with Chris Carr, a recreation ecology doctoral candidate at the University of Cincinnati.

Yu-Fai Leung is an Associate Professor at North Carolina State University in their Parks, Recreation, and Tourism Management program. His recent studies have focused on trail degradation (see studies cited in preceding paragraph), the selection and monitoring of recreation impact indicators (Leung, Marion & Cole 2002, Leung & Meyer 2004) and the efficacy of low impact education (Leung & Attarian 2002, Leung

& Attarian 2003, Wirsching, Leung & Attarian 2003). Other recent and related research has examined the application of geospatial technologies to visitor impact assessments (Leung, Shaw, Johnson & Duhaime 2002).

Chris Monz is an Assistant Professor at St. Lawrence University, New York, in their Environmental Studies program. His current research interests include the assessment and management of human impacts to parks with a particular focus on backcountry visitor use in high latitude or elevation environments (Cole & Monz 2002, Forbes, Monz & Tolvannen 2004, Monz & Twardock 2004, Monz 2002) and shoreline use on the Atlantic coast (Monz, Young & Leung 2004, Monz, Leung, Ingle & Bauman 2004).

Richard Knight, a wildlife scientist at Colorado State University, is also active in recreation ecology research, including several recent studies investigating visitor impacts to wildlife (Miller, Knight, & Miller 2001, Taylor & Knight 2003, Camp & Knight 1998).

Central and South America – Numerous recreation ecology studies have been conducted in Central and South American countries over the last decade though most are not reported in the more widely available peer-reviewed literature. The author has been involved in several studies of trail impacts in Belize, Costa Rica, Chile and Peru (Farrell & Marion 2000, 2001, 2002b, Marion & Linville 2000), recreation site impacts in Belize, Costa Rica and Mexico (Farrell & Marion 2000, 2001, Olive 2005), and development of a simplified carrying capacity decision-making process for protected natural areas (Farrell & Marion 2002a). Other similar studies include a study of soil erosion on trails in Ecuador and Costa Rica (Wallin & Harden 1996), trail and recreation site impact assessments at popular tourism sites in Dominica (Christian 1996), campsite monitoring in the Baja region of Mexico (Monz 1998), and recreation impact assessments related to implementation of carrying capacity planning at a park in Patagonia, Argentina (Encabo, Torre & Bergallo 2001).

Other studies have examined the impacts of visitation on wildlife, which are a principal feature of interest for nature-based tourists. These include

scuba diving impacts to Caribbean coral and fish communities (Hawkins et al. 1999), the effects of motorized tourboats on flamingos in Yucatan, Mexico (Galicia & Baldassarre 1997), impacts to wild pygmy marmosets in Ecuador (De la Torre, Snowdon & Bejarano 2000), and an assessment of wildlife densities in visited and unvisited areas of a popular Mayan ruin park in Guatemala (Hiding-er 1996).

## References

- Alessa, L., Bennett, S.M. & Kliskey, A.D. (2003). Effects of knowledge, personal attribution and perception of ecosystem health on depreciative behaviors in the intertidal zone of Pacific Rim National Park and Reserve. In: *Journal of Environmental Management* (68/2), p 207-218.
- Arocena, J.M., Nepal, S.K. & Rutherford, M. (2006). Visitor-induced changes in the chemical composition of soils in backcountry areas of Mt Robson Provincial Park, British Columbia, Canada. In: *Journal of Environmental Management* (79), p 10-19.
- Aust, M.W., Marion, J.L. & Kyle, K. (2005). Research for the Development of Best Management Practices for Minimizing Horse Trail Impacts on the Hoosier National Forest. In: *Management Report. USDA, Forest Service, Final Report. Bedford.*
- Bridgland, J., Lemky, K. & Allen D. (2001). Use of field-verified GIS classification to determine landscape suitability for hiking trail development. In: *Managing protected areas in a changing world: Proceedings of the 4th International Conference on Science and Management of Protected Areas, May 14-19, 2000, p 1470-1479. Wolfville.*
- Cahill, K., Marion, J.L. & Lawson, S. (In Press). Enhancing the interpretation of stated choice tradeoff analysis through the application of a verbal protocol assessment. In: *Journal of Leisure Research.*
- Camp, R.J., & Knight, R.L. (1998). Rock climbing and cliff bird communities at Joshua Tree National Park, California. In: *Wildlife Society Bulletin* (26/4), p 892-98.
- Christian, C.S. (1996). *Outdoor Recreation and Nature Tourism Related Environmental Impacts in a Tropical Island Setting: Commonwealth of Dominica. PhD Dissertation, Clemson University.*
- Cole, D.N. (2004a). Environmental Impacts of Outdoor Recreation in Wildlands. In: Manfredo, M., Vaske, J., Field, D, Brown, P. & Bruyere, B. (ed.) *Society and Resource Management: A Summary of Knowledge, p 107-116. Jefferson City.*
- Cole, D.N. (2004b). Impacts of hiking and camping on soils and vegetation: a review. In: Buckley, Ralf (ed.) *Environmental Impacts of Ecotourism, p 41-60. Wallingford.*
- Cole, D.N. & Monz, C.A. (2002). Trampling disturbance of subalpine vegetation, Wind River Mountains, Wyoming. In: *Arctic, Antarctic and Alpine Research* (34/4), p 365-376.
- Cole, D.N. & Monz, C.A. (2004a). Impacts of camping on vegetation: Response of acute and chronic disturbance on vegetation. In: *Environmental Management* (32/6), p 693-705.
- Cole, D.N. & Monz, C.A. (2004b). Spatial patterns of recreation impact on experimental campsites. In: *Journal of Environmental Management* (70), p 73-84.
- Daniels, M.L. & Marion, J.L. (In Press, a). Communicating Leave No Trace Ethics and Practices: Efficacy of two-day Trainer Courses. In: *J. of Park and Recreation Administration*
- Daniels, M.L. & Marion, J.L. (In Press, b). Visitor evaluations of management actions at a highly impacted Appalachian Trail camping area. In: *Environmental Management.*
- De la Torre, S., Snowdon, C.T. & Bejarano, M. (2000). Effects of human activities on wild pygmy marmosets in Ecuadorian Amazonia. In: *Biological Conservation* (94/2), p 153-163.
- Encabo, M. Torre, G., & Bergallo, A. (2001). Management of conservation in spaces of recreational use. In: *International Journal of Hospitality and Tourism Administration* (1/3-4), p 43-51.
- Farrell, T.A. & Marion, J.L. (2000). Identification and management of visitor impact problems within protected areas in Costa Rica and Belize. In: Harmon, D. (ed.) *On the Frontiers of Conservation: Proceedings of the 10th Conference on Research and Resource Management in Parks and on Public Lands, The George Wright Society Biennial Conference March 22-26, 1999, Asheville, NC, p 62-67. Hancock.*
- Farrell, T.A. & Marion, J.L. (2001). Identifying and assessing ecotourism visitor impacts at selected protected areas in Costa Rica and Belize. In: *Environmental Conservation* (28/3), p 215-225.
- Farrell, T.A. & Marion, J.L. (2002a). The Protected Areas Visitor Impact Management (PAVIM) framework: A simplified process for making management decisions. In: *Journal of Sustainable Tourism* (10/1), p 31-51.
- Farrell, T.A. & Marion, J.L. (2002b). Trail impacts and trail impact management related to ecotourism visitation at Torres del Paine National Park, Chile. In: *Leisure/Loisir: Journal of the Canadian Association for Leisure Studies* (26/1-2), p 31-59.

- Forbes, B.C., Monz C.A., & Tolvannen, A. (2004). Impacts of Ecotourism in Polar Environments. In: Buckley, R. (editor) *The Environmental Impacts of Ecotourism*, p 155-170. London.
- Galicia, E. & Baldassarre, G.A. (1997). Effects of motorized tourboats on the behavior of nonbreeding American flamingos in Yucatan, Mexico. In: *Conservation Biology* (11/5), p 1159-1165.
- Gutzwiller, K.J. & Cole, D.N. (2005). Assessment and Management of Wildland Recreational Disturbance. In: Braun, C.E. (ed.) *Wildlife Management Techniques Manual*, p 779-796. Bethesda.
- Hammitt, W.E. & Cole, D.N. (1998). *Wildland Recreation: Ecology and Management*. New York.
- Hampton, B., & Cole, D.N. (2003). *Soft Paths: How to Enjoy the Wilderness without Harming It*. Harrisburg.
- Hawkins, J.P., Callum, M.R., Hof, T.V., Meyer, K., Tratalos, J. & Aldam, C. (1999). Effects of recreational scuba diving on Caribbean coral and fish communities. In: *Conservation Biology* (13/4), p 888-897.
- Hidinger, L.A. (1996). Measuring the Impacts of Ecotourism on Animal Populations: A Case Study of Tikal National Park, Guatemala. In: Malek-Zadeh, E. (ed.) *The Ecotourism Equation: Measuring the Impacts*, Bulletin Series (99), p 49-59. New Haven.
- Kelly P.E. & Larson D.W. (1997). Effects of rock climbing on populations of presettlement eastern white cedar (*Thuja occidentalis*) on cliffs of the Niagara Escarpment, Canada. In: *Conservation Biology* (11), p 1125-1132.
- Leung, Y.-F. (2005). *Recreation Ecology and Visitor Impact Research – An Annotated Bibliography*. Final Report, USDA Forest Service, Rocky Mountain Research Station.
- Leung, Y.-F. & Attarian, A. (2002). Evaluating the Effectiveness of the Leave No Trace Program in the City of Durango, Colorado. Final report submitted to the Leave No Trace, Inc., Boulder, CO.
- Leung, Y.-F. & Attarian, A. (2003). Frontcountry visitor information/education programs: Are there lessons for wilderness? In: *International Journal of Wilderness*, (9/1), p 32-33.
- Leung, Y.-F., Marion, J.L., & Cole, D.N. (2002). Visitor impact assessment and monitoring systems: Evolution and current development. In: Bondrup-Nielsen, S. and N. Munro (ed.), *Managing Protected Areas in a Changing World: Proceedings of the 4th International Conference on Science and Management of Protected Areas*; May 14-19, 2000; Waterloo, Ontario, Canada, p 213-220. Wolfville.
- Leung, Y.-F. & Meyer, K. (2004). Research to Support Development of Resource Indicators and Standards for Implementing the Visitor Experience and Resource Protection (VERP) Framework at Boston Harbor Islands, A National Park area. Final report submitted to USDI National Park Service, Boston Harbor Islands National Park Area.
- Leung, Y.-F., Shaw, N., Johnson, K., & Duhaime, R. (2002). More than a database: Integrating GIS data with the Boston Harbor Islands visitor carrying capacity study. In: *The George Wright Forum* (19/1), p 69-78.
- Marion, J.L. & Farrell, T. (2002). Management practices that concentrate visitor activities: Camping impact management at Isle Royale National Park, USA. *Journal of Environmental Management* (66/2), p 201-212.
- Marion, J.L. & Leung, Y.-F. (2001). Trail resource impacts and an examination of alternative assessment techniques. *Journal of Park and Recreation Administration* (19/3), p 17-37.
- Marion, J.L. & Leung, Y.-F. (2004). Environmentally Sustainable Trail Management. In: Buckley, R. (ed.), *Environmental Impact of Tourism*, p 229-244. Cambridge.
- Marion, J.L., Leung, Y.-F. & Nepal, S. (In Press). Monitoring trail conditions: new methodological considerations. In: *George Wright Forum*.
- Marion, J.L. & Linville, R. (2000). Trail Impacts and their Management in Huascaran National Park, Andes Mountains, Peru. Report Issued by The Mountain Institute and the Virginia Tech College of Natural Resources Cooperative Park Studies Unit, Blacksburg, VA.
- Marion, J.L. & Olive, N. (2006). Assessing and Understanding Trail Degradation: Results from Big South Fork National River and Recreational Area. In: USDI, National Park Service, Research/Resources Mgmt. Rpt., Big South Fork National River and Recreation Area. Onieda.
- Marion, J.L. & Reid, S.E. (In Press). Minimizing visitor impacts to protected areas: The efficacy of low impact education programs. In: *Journal of Sustainable Tourism*.
- McMillan, M.A., & Larson, D.W. (2002). The effects of rock climbing on the vegetation of the Niagara Escarpment in Southern Ontario, Canada. In: *Conservation Biology* (16), p 389-398.
- McMillan, M.A., Nekola, J.C., & Larson, D.W. (2003). Effects of rock climbing on the land snail community of the Niagara Escarpment in southern Ontario, Canada. In: *Conservation Biology* (17), p 616-621.
- Miller, S.G., Knight, R.L. & Miller, C.K. (2001). Wildlife responses to pedestrians and dogs. In: *Wildlife Society Bulletin* (29), p 124-132.
- Monz, C.A. (1998). Monitoring recreation resource impacts in two coastal areas of western North America: An initial assessment. In: Watson, A.E., Alphet, G., & Hen-

- dee, J.C. (comps.). *Personal, Societal and Ecological Values of Wilderness: Sixth World Wilderness Congress Proceedings on Research, Management and Allocation* (1), p 117-122. Ogden.
- Monz, C.A. (2002). The response of arctic tundra plant communities to human trampling disturbance. In: *Journal of Environmental Management* (64), p 207-217.
- Monz, C.A. Leung, Y.-F., Ingle, C. & Bauman, H. (2004). Visitor Impact Monitoring in the Coastal and Barrier Island Network. In: Harmon, D., Kilgore, B. & Vietzke, G. (ed.) *Protecting our diverse heritage: The role of parks, protected areas and cultural sites. Proceedings of the George Wright Society/ National Park Service Joint Conference April 14-18, 2003*, p 135-139.
- Monz, C.A. & Twardock, P. (2004). The Resource Impacts of Sea Kayak Use in Prince William Sound, Alaska. In: Buckley, R. (ed.) *The Environmental Impacts of Ecotourism*, p 309-316. London.
- Monz, C.A., Young, E.A. & Leung, Y. (2004). Monitoring the impacts of visitors to shorebird populations in the Coastal and Barrier Island Network areas. In: Bricker, K. (ed.). *Proceedings of the 2004 Northeastern Recreation Research Symposium*, p 373-377. Newton Square.
- Newsome, D., Cole, D. & Marion, J. (2004). Environmental Impacts Associated with Recreational Horse Riding. In: Buckley, R. (ed.) *Environmental impacts of ecotourism*, p 61-82. Wallingford.
- Olive, N. (2005). An Assessment of Coastal Recreation Site Conditions in the Gulf of California and Baja Peninsula, Mexico: A Gulf Area Monitoring Program. In: *National Outdoor Leadership School Report*. Lander.
- Olson, R. & Rohwer, F.C. (1998). Effects of human disturbance on the success of artificial duck nests. In: *Journal of Wildlife Management* (62/3), p 1142-1146.
- Peregoodoff, G. (1998). Recreation impact monitoring of coastal campsites in Gwaii Haanas National Park Reserve/Haida Heritage Site. In: Munro, N.W. & Wilison, J.H. (ed.) *Linking Protected Areas with Working Landscapes Conserving Biodiversity: Proceedings of the Third International Conference on Science and Management of Protected Areas*, Calgary, p 967-971. Wolfville.
- Reid, S.E. & Marion, J.L. (2004). Effectiveness of a confinement strategy for reducing campsite impacts in Shenandoah National Park. In: *Environmental Conservation* (31/4), p 274-282.
- Reid, S.E. & Marion, J.L. (2005). A comparison of campfire impacts and policies in seven protected areas. In: *Environmental Management* (36/1), p 48-58.
- Taylor, A.R. & Knight, R.L. (2003). Wildlife responses to recreation and associated visitor perceptions. In: *Ecological Applications* (13/4), p 951-963.
- Thurston, E. & Reader, R.J. (2001) Impacts of experimentally applied mountain biking and hiking on vegetation and soil of a deciduous forest. In: *Environmental Management* (27/3), p 397-409.
- Wallin, T.R. & Harden, C.P. (1996). Estimating trail-related soil erosion in humid tropics: Jatun Sacha, Ecuador, and La Selva, Costa Rica. In: *Ambio* (25/8), p 517-522.
- Wirsching, A., Leung, Y.-F. & Attarian, A. (2003). Swatting little bugs: What agencies can do to decrease depreciative visitor behavior. In: *Parks and Recreation* (38/11), p 16-22.
- Zabinski, C. & Cole, D. (2000). Understanding the factors that limit restoration success on a recreation-impacted subalpine site. In: Cole, D.N., McCool, S.F., Borrie, W.T. & O'Loughlin, J., comps. *Wilderness science in a time of change conference, Vol. 5: Wilderness ecosystems, threats, and management; 2000 May 23-27; Missoula, MT. Proceedings*, p 216-221. Ogden.
- Zabinski, C.A., DeLuca, T.H, Cole, D.N. & Moynahan, O.S. (2002). Restoration of highly impacted subalpine campsites in the Eagle Cap Wilderness, Oregon. In: *Restoration Ecology* (10/2), p 275-281.
- Zabinski, C., Wojtowicz, T. & Cole, D. (2000). The effects of recreation disturbance on subalpine seed banks in the Rocky Mountains of Montana. In: *Canadian Journal of Botany* (78/5), p 577-582.

# Recreation Ecology and Visitor Impact Research: Past, Present and Future

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*Keywords: Recreation ecology, visitor impacts.*

## Introduction

Visitor activities in parks and protected areas inevitably have some consequences to natural resources. Even the most careful visitors can potentially disturb soil, vegetation, and wildlife; and in some cases affect water and air quality. Management decisions as to the level of acceptable disturbance to protected area ecosystems can be difficult and challenging and must be well informed by the best available science.

Considerable research conducted since the 1960's has demonstrated the relationships between visitor use and resource impact (e.g., Leung & Marion 2000, Buckley 2004). This discipline is often referred to as Recreation Ecology. Several fundamental principles can be generalized from this body of knowledge including:

1. Recreation activities can and often do directly affect the soil, vegetation, wildlife, water and air components of ecosystems.
2. Ecosystem structure and function can also be affected by visitor activities particularly given the interrelationships between ecosystem components.
3. For a given finite space, the relationship between many ecosystem responses and use is curvilinear, with the majority of impact occurring with initial use
4. Although some generalizations apply, resistance and resilience to visitor use disturbance is ecosystem specific
5. The distribution of use and visitor behavior are primary driving variables in determining the amount of impact

Given these principles, recreation ecology studies of two types are generally performed in parks and protected areas in an effort to assist managers in the avoidance and mitigation of visitor impacts. Experimental studies (e.g. Cole 1995, Cole & Monz 2004) examine causal relationships between use type and intensity and ecosystem-specific components. These studies employ carefully controlled experimental designs and can determine the levels of visitor use a given ecosystem (or ecosystem component) can tolerate. Monitoring and assessment studies (e.g. Cole & Hall 1992, Marion & Leung 1997) are perhaps more common as managers often find them to be of considerable utility. Conducted over a long term, these studies can provide an initial assessment of the current resource conditions, the trends of how impacts are changing over time, and an evaluation of the effectiveness of management actions.

While recreation ecology continues to be an important and growing field, and visitor impacts to natural resources are an ever present concern of park managers, numerous challenges exist in both the application of recreation ecology principles in management and in the expansion of knowledge in the discipline. First, full time practitioners in this field are very limited, especially compared to human dimensions research. In addition, researchers have mostly worked in relatively small, geographically separated groups, with few opportunities for dialog between the groups. Second, funding for basic scientific investigations utilizing experimental designs has been extremely limited in the best of times and frequently nonexistent. Managers in protected areas have supported most of the work in the field and therefore most studies – understand-

ably – have been monitoring and assessment efforts. While monitoring studies are useful, they are typically limited in their ability to examine causal factors and in quantification of use-impact relationships. Finally, confusion and conflicting opinions exist about the importance of recreation use impacts from both park ecologists and social scientists. Heretofore, few seem to recognize that while recreation impacts tend to be of limited extent on an area basis, they also tend to be much more intense than other types of impact in protected areas. Moreover, these intense impacts often proliferate in high value areas containing unique species or other desirable attributes, since these are places visitors often desire to go.

## Conclusions

In order to begin to address the above challenges and to expand and revitalize this important field, a group of researchers has recently organized to promote increased collaboration between practitioners worldwide. Recent meetings and panel presentations (in 2003 and 2005), including sessions at the biennial George Wright Society Conference, led to the formation of the Recreation Ecology Research Network. This group seeks to promote the field through increased visibility at professional meetings, research collaborations and expanded theoretical and conceptual development of important topics. The forthcoming panel session at this conference and the associated publications will be an excellent next step in this process and will strive to establish a future research agenda of international scope. This paper will provide a concise review of the science of recreation ecology including management implications, a discussion of the current challenges and limitations, and a direction for future research.

## References

- Buckley, R. *The Environmental Impacts of Ecotourism*. Wallingford.
- Cole, D. N. (1995). Experimental trampling of vegetation I. Relationship between trampling intensity and vegetation response. In: *Journal of Applied Ecology* (32), p 203-214
- Cole, D. N. & Hall, T. E. (1992). Trends in campsite condition: Eagle Cap Wilderness, Bob Marshall Wilderness and Grand Canyon National Park. USDA Forest Service Research Paper INT-453.
- Cole, D. N. & Monz, C. A. (2004). Spatial patterns of recreation impact on experimental campsites. In: *Journal of Environmental Management* (70), p 73-84.
- Leung, Y. & Marion, J. L. (2000). Recreation impacts and management in wilderness: A state-of-knowledge review. In Cole, D.N., McCool, S. F., Borrie, W. T. & O'Loughlan, J. (comps.) *Wilderness science in a time of change conference– Volume 5: Wilderness ecosystems, threats and management*. Proceedings RMRS-P-15-Vol-5, p 23-48.
- Marion, J.L. & Leung, Y.-F. (1997). An assessment of campsite conditions in Great Smoky Mountains National Park. USDI National Park Service Research Resources Management Report.



## Recreational Impacts on Park Ecosystems

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David Cole (Chair)

## Visitors to the Highlands of Itatiaia National Park, Brazil, and their Perceptions of Visitor Impacts

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*Keywords: Visitor characteristics, recreation impact, visitor's perceptions, Brazilian National Parks.*

**Abstract:** The goal of this research was to characterize the visit and visitors to the highlands of Itatiaia National Park (PNI), located in the state of Rio de Janeiro, Brazil and, based on that information, to explore the guidelines of a visitor education program designed to encompass minimum impact techniques that would help minimize management problems. A questionnaire was applied to 605 people from February to August 2002 in order to collect information about visits and visitors. Among the information collected were group size, activities carried out by visitors, duration of visit, and educational level of visitors, their previous experience and perceptions of the impacts caused by visitors.

### Introduction

In Brazil, outdoor recreational activities are not yet adequately explored or advertised, but the appeals of ecotourism and recreation in protected areas such as national parks have increased significantly in recent years. Many protected areas now face the pressure of the increase in the number of visitors, often associated with a demand for a more varied availability of recreational opportunities.

The rise in the number of people who seek closer contact with natural environments, who are interested in outdoor activities and who call for a wider array of recreational opportunities aggravate the need for preparing protected areas to cater to those uses through planning and management actions. While several countries have developed great knowledge based on research about recreation management of protected natural areas, Brazil has little information and few successful stories to offer on the subject. Not surprisingly, recreational use is mostly seen as a big encumbrance and the increase in recreation-induced impacts is managed mainly by means of restricting use, closing areas and strictly regulating activities, thus leading to a reduction of the available recreational options and to restraints to visitor freedom.

Information concerning the user of a certain protected area is essential to planning and implementation of recreation management actions. That information, which should include the type of visit, visitor's expectations and perceptions, previous experience and knowledge of minimum-impact techniques is lacking in Brazil, thus hampering development of recreation management.

The highlands of Itatiaia National Park in the state of Rio de Janeiro were chosen for the study due to their unique characteristics of recreational use and also for being in Brazil's first national park.

### Methods

During the development of this study (February-August, 2002), the Park administration registered the entry of 6,700 visitors. Data on characterization of the visit and visitor's profile were obtained by means of a questionnaire comprising closed questions, answered by 605 visitors, selected randomly and interviewed during 10 weekends and/or holidays. Among the data collected are:

Characteristics of the visit: information that describes relevant attributes of the visit, among them:

A. Group size. Information about visitor group size is important to help planning management strategies related to groups.

B. Activities done by visitors. The knowledge about visitor's activities is important to help the understanding of recreation opportunities preferred at a specific protected area.

C. Duration of visit. The information about visit duration can be used as a success indicator of an area in attracting visitors.

Visitor's profile: describes visitor's attributes, such as experience, preferences and demographic data:

A. Educational level (schooling)

B. Previous experience: how long the visitor has come to the Park; how often she or he visits it during one year; whether she or he usually visits other natural areas; and if she or he usually camps.

Visitor's characteristics will help the planning of management priorities, communication methods and tools as well as measure the effectiveness of educational programs.

Visitor's Perceptions: visitors were asked about their subjective evaluation of conditions encountered during the visit and their impact on the quality of the experience. Visitors' opinions about the area's current conditions generate important information for monitoring programs. Because that information helps one get a good perspective on how important those problems are to the visitor, it can be used in setting priorities for management actions and strategies. Visitors were also asked to assess several items such as "trails with erosion and with poor maintenance" and "recovery of vegetation in campgrounds", occurrences noticed by users during their visit to the Park.

Due the fact that this information provides a good perspective about how important the problems are to the visitors, they can be used to prioritize management actions and strategies.

## Results

Itatiaia National Park is one of Brazil's most visited national parks, although the majority of visitors concentrate around the so-called "Lower Part" at the foothills of the park, where easier-access at-

tractions are located. The average number of visitors to the area under study, called "Planalto" (Highlands) between 1990 and 2002 was 10,173 people per year.

### Characteristics of the visit

#### A. Group size

Group visits predominate among users of the Highlands, probably due to local characteristics of wildness and the difficult access. Only 2% of total interviewees declared being alone, 53% said they were part of a group of 2 to 4 persons, 29% were in a group of 5-10 people and 16% were part of a group larger than 10 people strong. Therefore, 84% of interviewees visited the park in small groups of up to 10 people, although the Highlands occasionally receive groups of 100 or more. According to a comprehensive study by Roggenbuck and Lucas (1987), aimed at systematizing several studies on characteristics of recreational use and of visitors to protected natural areas in the United States, visitor groups are small and tend to become smaller with time.

#### B. User activities during visit

Hiking was mentioned by 41% of interviewees as the main activity done during the visit. Climbing the main peaks is done by 44% of interviewees and only 8% do technical rock climbing. Among interviewees, camping is not currently a very popular activity, either; it is the main activity for only 4% of users. Data show that almost all visitors (84%) flock to the two most famous peaks in the Highlands (Agulhas Negras and Prateleiras) or hike on trails that lead to their bases or on the road to Rebouças mountain shelter.

Although there are other options for excursions such as Couto Peak, Mt. Altar and Aiuruoca Falls, visitors hardly ever visit them, concentrating their activities in three places and consequently increasing impact to those areas. That happens in part due to the lack of information available at the park entrance about the Highlands and their attractions, preventing users from learning about other opportunities for excursions and trails in the area.

### C. Duration of visit

Most interviewees (83%) planned to stay overnight in the region, probably because access to the area is difficult and long and because of their interest in knowing all attractions in the area, mainly Agulhas Negras and Prateleiras peaks. In spite of the fact that other areas and studies show a trend towards short visits (Roggenbuck & Lucas 1987), that does not happen in the Highlands of Itatiaia National Park, despite the reduction in the number of opportunities and activities during the past years after camping was banned and access to some trails was closed. According to Kinker (1999), comparison of the duration of stay in three Brazilian national parks indicated that duration is proportional to the number of attractions available as well as to the degree of freedom the visitor enjoys to move around the area. One can thus infer that the time of visitors' permanence in the Highlands would increase if the offer of alternative recreational activities were also greater.

### Visitor Profile

#### A. Educational Level (schooling)

A very relevant characteristic of the visitors interviewed is their high level of schooling. Those who have completed some graduate schooling represent 20% of the total and 19% have completed college. Undergraduate students represent 33%, while 16% are either attending or have graduated from secondary school and 11% are either attending or have completed primary school. That proportion is much higher than the national average and than the educational data for the states where the park is located. That may contribute substantially to the public acceptance of a visitor education program as people who visit the Highlands already possess an educational background that helps them understand the importance of everyone's attitudes and actions in natural areas.

#### B. Previous experience

Assessment of interviewed visitors' previous experience is not very conclusive because, while 51% of people declared that they were visiting the park for the first time, 40% stated that they visit the Highlands up to three times a year and 72% stated that they usually visit other natural areas. That last

result was considered a high level of previous experience by Roggenbuck & Lucas (1987). At the same time, 9% of people said they have been visiting the park for two years, 10% for 2-4 years, 12% for 4-10 years and 18% have visited the park for more than ten years.

As to previous camping experience, 41% said that when they visit other natural areas they sometimes camp, 29% said they always camp, 23% stated they never camp and 7% did not respond. Therefore, it can be noticed that visitors to the Highlands usually do different activities from those found in the park's lower part or in other natural areas, including camping.

### Visitor's perception

Recent studies suggest that the impacts perceived by visitors may reduce the quality of the experience (Roggenbuck et al. 1993, Vaske<sup>1</sup> et al. cited by Leung & Marion 2000). Perceptions are based on how visitors believe that the impacts affect the general qualities of the place such as scenic attributes and the opportunities for isolation, and when the impacts are considered undesirable. In general, visitors are apparently more sensitive to impacts caused by inappropriate behavior such as littering, damaging trees and to examples of particularly excessive impacts such as exposed roots.

A well-established principle about recreational use in natural areas is that visitors' perceptions about the conditions of an area are strongly influenced by their expectations about those conditions (Cole et al. 1997). Questions on visitors' perceptions were therefore conceived so that answers would reveal how their experience in the Park was different from what they had expected. They were asked about the number of people they encountered during the visit to the Highlands, about the degradation of the natural areas caused by other visitors and also about the number of management actions that the administration executed to correct the impacts caused by the recreational use. Table 1 summarizes those results.

<sup>1</sup> VASKE, J.J., GRAEFE, A.R. & DEMPSTER, A. Social and environmental influences on perceived crowding. In: ANNUAL CONFERENCE OF THE WILDERNESS PSYCHOLOGIC, 3., Morgantown, 1982. Proceedings. p.211-227.

Table 1: Visitors' expectations and perceptions as to number of visitors, impact of recreational use and presence of management actions.

<b>Question</b>	<b>%</b>	<b>Question</b>	<b>%</b>
<u>Number of people seen during visit</u>		<u>What that represented to your visit</u>	
Fewer than expected	19	Did not alter the quality of the visit	55
Same as expected	30	Diminished the quality of the visit	20
More than expected	35	Improved the quality of the visit	25
No expectations	16		
<u>Degradation of natural areas</u>		<u>What that represented to your visit</u>	
Less than expected	50	Did not alter the quality of the visit	58
Same as expected	27	Diminished the quality of the visit	9
More than expected	7	Improved the quality of the visit	33
No expectations	16		
<u>Number of management actions</u>		<u>What that represented to your visit</u>	
Fewer than expected	21	Did not alter the quality of the visit	57
Same as expected	26	Diminished the quality of the visit	10
More than expected	31	Improved the quality of the visit	33
No expectations	22		

Most visitors (35%) reported that they ran into more people during their visit to the Highlands than they had expected, while 30% said they had met the same number of people they had expected. For 55% of visitors that did not alter the quality of their visit.

Likewise, the study by Cole et al. (1997) for six protected mountain areas in the states of Oregon and Washington (USA) revealed that most visitors reported that the number of people they met did not affect negatively the quality of their visit.

Half the visitors interviewed (50%) stated that degradation of the natural resources caused by visitors was smaller than they had expected and that it did not affect the quality of the visit (58%). In relation to management actions, 31% of visitors said that the number of management actions in the Park was greater than they had expected. For 57% of visitors, the number of man-

agement interventions did not affect the quality of their visit, while for 33% of visitors that number improved the quality of their visit. Those data show the public's reaction to a greater presence of management actions related to visitation as compared to that of the past. Since that study was initiated just after a major fire in the Prateleiras massif, which triggered a series of management actions affecting recreational use, visitors noticed the changes and that did not alter the quality of their visit or rather improved it. That shows that visitors are receptive to a greater presence of management interventions, which may help future strategies for recreational use in the Highlands. The impacts observed by visitors during their stay in the Highlands can be seen in table 2.

Shortcuts and/or secondary trails were the impact visitors noticed the most. Following are "eroded and poorly maintained trails", "over

Table 2: Impacts observed by visitors during their stay in the Highlands of Itatiaia National Park.

<b>Impacts</b>	<b>%</b>	<b>Impacts</b>	<b>%</b>
Eroded and poorly maintained trails	29%	People cutting grass or trees for firewood	0%
Overcrowded trails	28%	Trash/residues left by visitors	20%
Shortcuts and secondary trails	44%	Feces in inadequate places	8%
Recovery of vegetation in campgrounds	20%	Noise caused by visitors	24%
Cut or damaged trees	8%	Remnants of campfires	6%

crowded trails” and “noise caused by visitors”, showing that bad conservation of trails and the large concentration of visitors on two trails did not go unnoticed by people, either.

Impacts least observed were “remnants of campfires”, “feces in inadequate places” and “cut or damaged trees”. That probably was due to the fact that those impacts were not readily visible as they occurred in campgrounds whose use is currently banned. Those results also indicate which management actions must be set as priorities to reestablish adequate conditions for trails and visitation areas in the Highlands, seeking the public’s recognition and approval.

## Conclusions

Due to their pristine conditions, the number of visitors is increasing faster in the Highlands than in the Park’s lower part, demonstrating that the demand for activities connected with hiking, peak ascents, rock climbing and camping has also increased. However, 84% of visitors to PNI concentrate their activities in three places: Agulhas Negras Peak, Prateleiras Peak and Rebouças mountain shelter, adding to ecological and recreational impacts to those areas.

Although the high concentration of people in the same area has been noticed by visitors and most of them did not report that it affected the quality of their visit, for 20% of the people crowding diminished the quality of their experience. Just as in relation to problems connected with campgrounds, the magnitude of crowding is influenced by the frequency of interactions, the types of groups encountered, the behavior of individuals during group encounters and the place where they meet (Cole 1989). Therefore, even though the judgment as to how many people represent “overcrowding” varies from person to person, many visitors want little contact between groups and one of the objectives of management is to minimize crowding and encounters between groups.

Many impacts of recreational use at the study area are caused by management-related aspects, but some impacts are strongly influenced by visitor behavior. The high educational level of visitors and the fact that 90% of them mentioned that the

presence of management actions did not disturb or contributed to their experience, is an indicator that PNI visitors are receptive to a higher presence of recreation management and would accept a visitor education program. Therefore, considering the techniques recommended by specialized literature and adopted by Leave No Trace program, guidelines have been elaborated including techniques related to the following issues: deterioration of constructed trails, development of undesired user-created trails, proliferation of campsites, deterioration of established campsites, litter, human waste and crowding.

## References

- Cole, D.N. (1989). Low-impact recreational practices for wilderness and backcountry. General Technical Report INT, 265. Ogden.
- Cole, D.N., Watson, A.E.; Hall, T.E. & Spildie, D.R. (1997). High use destination in wilderness: social and biophysical impacts, visitor responses, and management options. Research Paper INT, 496. Ogden.
- Leung, Y.F. & Marion, J.L (2000). Recreations Impacts and Management in Wilderness: A State of Knowledge Review. In: Wilderness Science in a Time of Change. Conference Proceedings: Wilderness Ecosystems, Threats and Management, Missoula, 1999, p 23-48. Fort Collins.
- Roggenbuck, J.W. & Lucas, R.C. (1987). Wilderness use and user characteristics: a state of knowledge review. In: General Technical Report INT, p 204-246. Fort Collins.
- Roggenbuck, J.W.; Williams, D.R. & Watson, A.E. (1993). Defining acceptable conditions in wilderness. In: Journal of Environmental Management (17/2), p 187-197.

## Trampling after Landscape Level Disturbance: Impacts on Subalpine Vegetation and Soils in the Australian Alps

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*Keywords: Trampling, subalpine, bushfires, recovery, visitation, protected areas, sustainability, Australia.*

The effects of trampling on soils and vegetation are among the most well studied areas in recreation ecology. A major gap in this field of study however, is research that examines the impact of recreation in conjunction with natural disturbance. This recognises that natural disturbances are key ecological processes and that protected areas can experience landscape level disturbance, which with subsequent visitor use following the natural disturbance could well exacerbate the impacts on the environment (Figure 1). Therefore, issues that need to be investigated by recreation ecology, include:

- 1) Comparing the severity of impacts of recreation activities vs impacts of natural disturbances.
- 2) Examining if recreation impacts can alter the pattern of recovery from natural disturbance in ecosystems, including the possible slowing or altering of the process of natural recovery.
- 3) If it is appropriate for management to allow visitation in protected areas after landscape level disturbances such as long term droughts or fires.

As part of a larger study into recreational impacts in the Australian Alps, this research examined the impact of visitor use before and after a large landscape level disturbance caused by bushfires in the subalpine grasslands of the Australian Alps in southeastern Australia (Figure 2). The Australian Alps area is recognised for its high conservation value and is a popular tourism destination in both summer and winter.

In January-February 2003 the Australian Alps experienced their largest bushfires in over 60 years with approximately 70% of the subalpine area burnt during the fires. The intensity of the fires was not constant however, with some areas being only partially burnt and resulting in a mosaic of unburnt



Figure 1: Visitor use following bushfires can exacerbate the impacts on the environment.

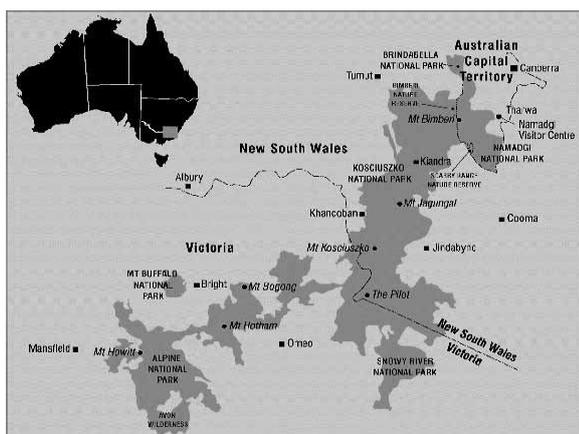


Figure 2: Protected areas in the Australian Alps.

and burnt vegetation, while other areas were extensively affected with no above ground vegetation remaining after the fire.

In studies prior to the fire, the subalpine grasslands community was identified as having a trampling threshold level of 150-200 passes before significant short-term damage began to occur to vegetation. Following the fire, a study was undertaken to compare the effect of trampling on the partially burnt and extensively burnt environments to see if the impacts of trampling by visitors differed with the intensity of disturbance.

The experimental trampling studies were based on the approach developed by Cole and Bayfield (1993). Trampling was applied at two time periods: within weeks of the fire, and then one-year after the fire when vegetation was starting to recover. Vegetation cover and composition and soil characteristics were each examined. The study found that for trampling that occurred within weeks of the bushfires:

- (1) Significant short-term impacts occurred with extensive changes to the soil surface evident after only 30 passes.
- (2) Natural events (i.e. rainfall) eclipsed the damage caused from up to 200 passes with no significant difference apparent after six weeks;
- (3) More than 200 passes may exceed a recovery threshold and exacerbate soil loss post fire;
- (4) Recovery of species one year after bushfire does not appear to have been affected by trampling activities.

When trampling occurred on new sites one-year after the bushfires there were significant impacts on both vegetation and soils. Changes occurred after as few as 100 passes with reductions occurring in vegetation cover, increases in litter and rapid increases in soil compaction.

These results indicate that trampling at low intensities soon after fire can change soil conditions and vegetation cover, with thresholds lower than occurred prior to the disturbance. Despite this, natural processes of recovery and change rapidly eclipsed these impacts. Trampling on recovering vegetation a year after the fire is of greater concern however, with trampling affecting soils and early colonizing species indicating that the system may have lost its resilience to disturbance. Longer-term effects on soils and vegetation may occur from trampling at this time.

These results should be treated as a best case scenario for post fire impacts in the Australian Alps, as trampling under wet conditions or on areas with a steeper gradient are likely to cause greater damage. Further, once disturbance thresholds have been passed, sites are likely to remain susceptible to damage in the future. Further research into recreation impacts in protected areas after natural disturbance will continue to enhance our understanding of these interactions and processes.

## References

- Cole, D.N. & Bayfield, N.G. (1993). Recreational trampling of vegetation: standard experimental procedures. *Biological Conservation* 63, p 209-215.
- Growcock, A.J. (2005). Impacts of Camping and Trampling on Australian Alpine and Subalpine Vegetation and Soils. PhD Thesis, School of Environmental and Applied Science, Griffith University, Gold Coast.

## A Prediction of a Human Action on Seashell-Digging at a Seaside Park Based on a Multi-Agent Simulation Model

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*Keywords: Seashell-digging, seaside-park, multi-agent-model, human action. human impact.*

### Introduction

“Uminokouen” is one of the major seaside parks in Tokyo-bay. Over 20,000 people visit it for seashell-digging (shell-gathering) in a holiday. The human impact on spatial and annual distributions of bivalves in the park is quite large.

In this paper, we propose a computational model which predicts the human action for seashell-digging at this park through a multi-agent-algorithm. When comparing the simulation results with the actual data, there is good agreement of the visitor’s staying time. Then, we investigate the spatial distributions of the amount of the caught bivalves, and show that the distribution is significantly affected by human impact rather than the initial spatial distributions of the bivalves.

Since the 1960’s, we have lost 90 percent or more of the tidal flat area of Tokyo-bay by land reclamation. “Uminokouen” is an artificial seashore park developed in 1988 at the southeast of Yokohama and is well known as a relaxation place for the citizens.

Seashell-digging is one of the major purposes of visiting the park. In Japan, a major season of the seashell-digging is from April to May. More than 20,000 citizens visit the park on a holiday of the season as shown in figure 1. The most part of living bivalves which grew up after the last summer or autumn disappears during the season. Thus, estimating the relation between the seashell-digging impacts and the amount of bivalves is important for the management of the park.



Figure 1: Seashell-digging visitors at “Uminokouen” in spring.

### Simulation model

The shell-digging action is dependant on each person and the surrounding situations; digging ability, tidal height, visitor density and so on. So, we try to use a multi-agent-algorithm for the simulation of the shell-digging action of all the visitors. The multi-agent-algorithm is a numerical simulation technique in which every agent autonomously and individually acts on a certain judgment standard.

To prepare the simulation we created the geographic data of the park by combining the general map and topography of the tidal flat zone measured by us as shown in figure 2. Since our investigation of the amount of bivalves shows that the spatial distribution of bivalves strongly relates to the topography of the seabed in this park, we assumed that the initial spatial distribution of the bivalves depends on the topography. The admission timings of visitors are decided by the actual data.

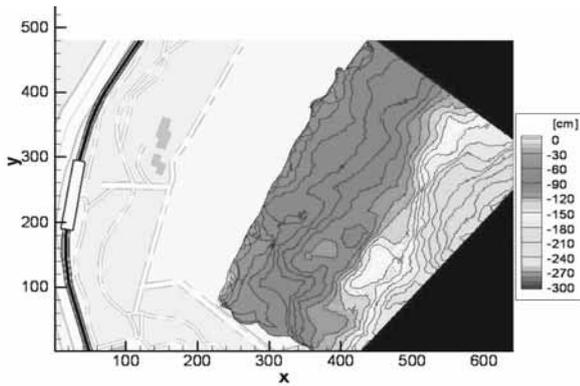


Figure 2: The standard depth of the sea in the seaside park.

The action of the visitors is categorized into movement-phase and seashell-digging-phase in this simulation. In the movement-phase, each virtual visitor starts with his/her conditions which consist of the tolerance range of the sea-depth and visitor's density, which are based on the result of our questionnaire and the video analysis. They make a survey of the situation around them and decide the direction of the movement. When they arrived at the position which fulfills the conditions, their modes change to the seashell-digging-phase.

In the seashell-digging-phase, the visitor catches bivalves by a certain probability. If the amount of the bivalves caught by one digging action has become less than a certain value, the visitor's mode is changed to the movement-phase for finding a new position of the seashell-digging. When the total quantity of bivalves gathered has reached a certain value or the sun sets, they stop seashell-digging and exit the park from their entrance point.

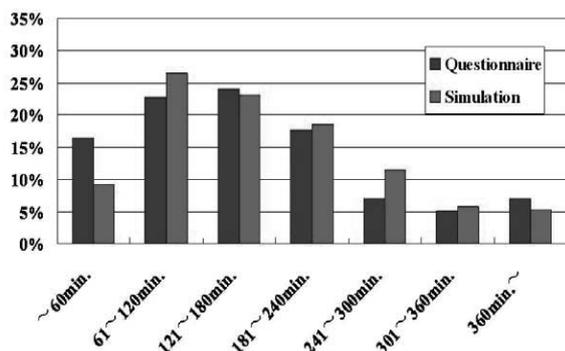


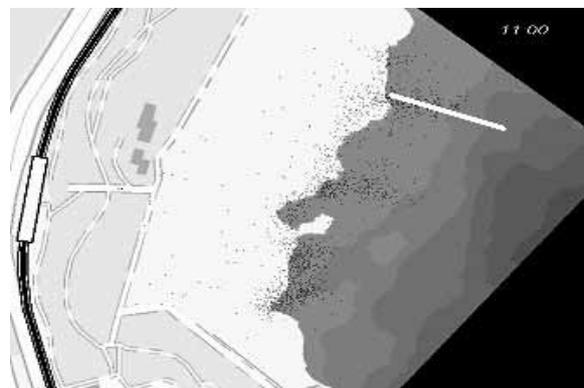
Figure 3: The distribution of staying time of the visitors.

## Results

Comparison of the distribution of visitors' staying time between the simulation result and the actual observed data is shown in figure 3. The figure shows that both results agree well. The snapshots of the spatial distributions of the seashell-digging visitors are shown in figure 4. We can recognize in both snapshots that the seashell-digging visitors vertically queue to the coastal line. These results indicate that the computer code of the multi-agent-algorithm can simulate the human action in the seashore park quite well.

The spatial distribution of the amount of bivalves caught by the virtual visitors is shown in figure 5. Figure 5 indicates that the distribution is affected more by the spatial distributions of the visitors rather than by the initial spatial distributions of the bivalves.

In studies conducted in the near future, we should extend this code to predict the human impact on the whole of the seashell-digging season and examine how to manage the park to sustain its role as being a relaxation place for citizens.



(A) Simulation



(B) Photograph

Figure 4: The snapshots of the spatial distributions of the seashell-digging visitors.

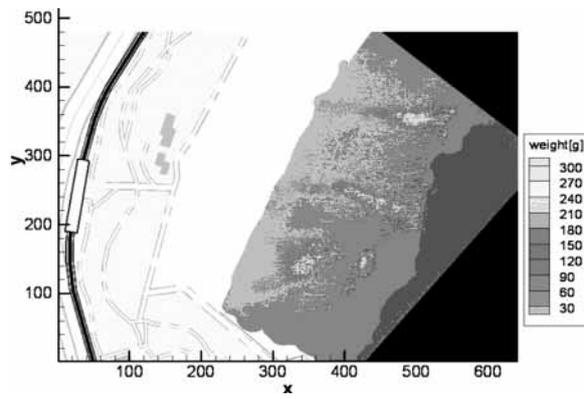


Figure 5: The spatial distributions of the amount bivalves which were caught by the virtual visitors.

## References

- Gilbert N. & Troitzsch, K.G. (1999). "Simulation for the Social Scientist" Open University Press.

# Environmental Impacts of Recreational Horse Riding in Protected Areas

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*Keywords: Introduced species, erosion, disturbance, horse manure, recreational horse riding, soil, vegetation, visitor impact.*

## Introduction

The use of protected areas as destination areas for nature-based tourism has increased remarkably during recent decades. Characteristics for this development have not only been the manifold numbers of visitors but also new types of recreational and tourism activities in protected areas. One greatly increased activity in protected areas is recreational horse-riding (e. g. Landsberg et al. 2001, Newsome et al. 2004). Furthermore, it seems that horse-riding will continue to be a significant recreational activity even with a considerable growing pressure. Conflicts between horse-riders and other recreational users arise because of direct impacts of horses and because of the greater erosion caused by horse-riding compared to other recreational activities. Environmental impacts of recreational horse riding are indeed both quantitatively and qualitatively greater than those caused by walkers. Horse-riding causes considerable damages to soils and vegetation by trampling and grazing, defoliation and nutrient enrichment by urination and defecation of horses (reviewed in Newsome et al. 2004). Even though recreational horse riding also poses a threat of spreading introduced species via horse manure (Campbell & Gibson 2001), the ecological impacts of horse-riding are poorly studied especially in northern areas.

## Methods

We investigated the influence of horse-riding on vegetation and soil characteristics by experimental and monitoring research at Oulanka National Park, north-eastern Finland during 2001-2005. The main aim of the study was to assess and to quantify the general environmental impacts of horse-riding in protected areas in northern Finland. Furthermore, we specifically focused on the potential risks of horse-riding in spreading alien species to protected areas by conducting a field experiment. The study was full-factorial with three factors: (1) removal of humus layer, simulating trails trampled by horses, (2) addition of horse manure and (3) addition of seeds of dwarf shrubs (*Vaccinium myrtillus*, *Vaccinium vitis-idaea* and *Empetrum nigrum*).

## Results

Our monitoring data from horse-riding trails and campsites show that even a low number of horse-back riders (about 80 – 100 per year) has caused considerable trail erosion and degradation. Erosion of trails was lowest in the driest forest type, *Myrtillus-Calluna-Cladina* (MC-CIT) compared to dry heath *Empetrum-Myrtillus* forests and moist *Hyloconium-Myrtillus* forests (figure 1a). Also topography and ele-

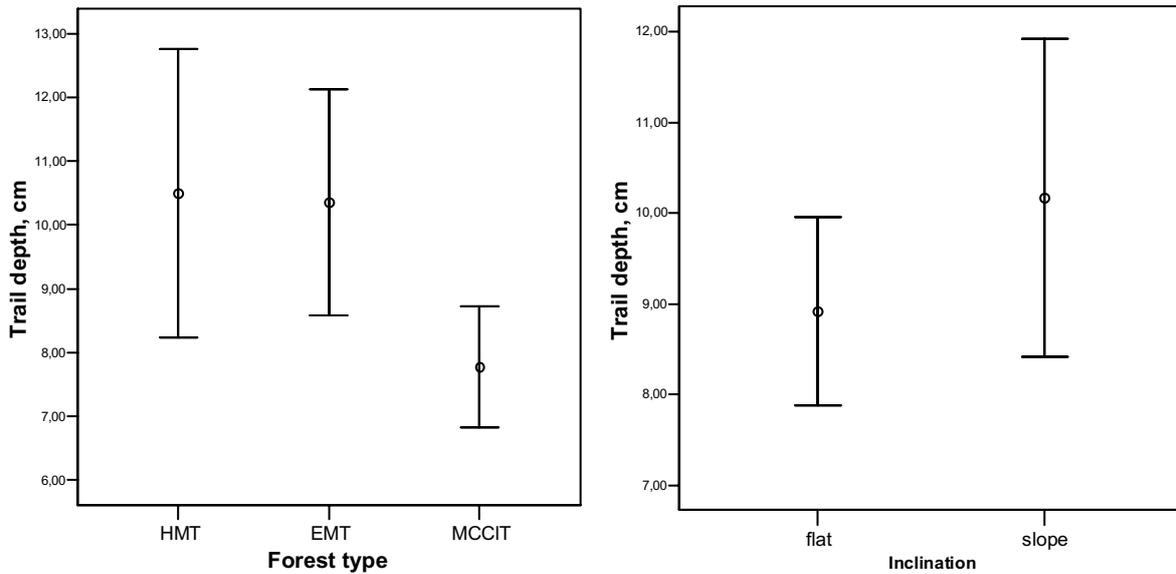


Figure 1: Mean (SE) trail depths (cm) of horse-riding trails in Oulanka National Park, Finland in (a) different boreal forest types (HMT = Hyloconium-Myrtillus; EMT = Empetrum-Myrtillus; MCCIT = Myrtillus-Calluna-Cladina) and (b) among trails in flat and slope terrain.

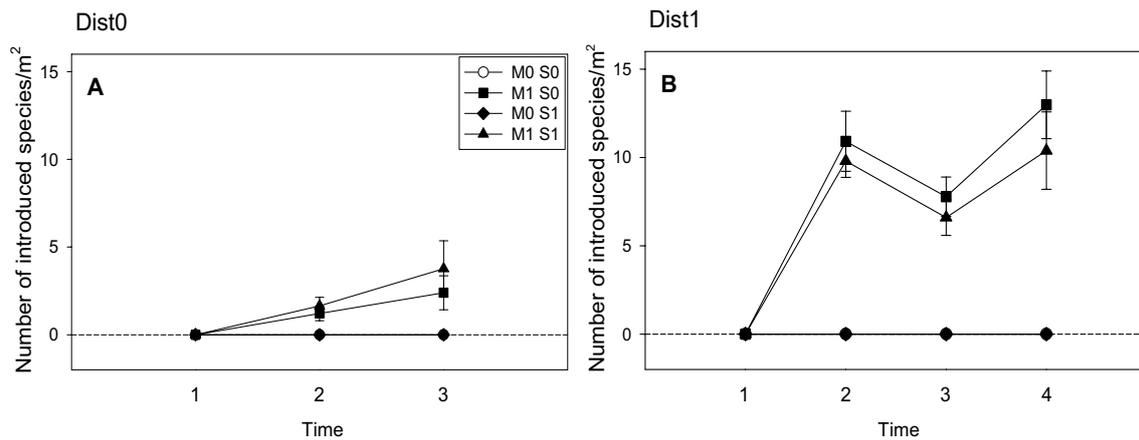


Figure 2: Change in the number of shoots of introduced species per m<sup>2</sup> in (a) undisturbed (Dist0) plots and in (b) disturbed plots with removal of humus after treatments. Treatment abbreviations: no manure addition (M0), addition of manure (M1), no seed addition (S0) and addition of seeds (S1). The response was measured at the starting point (Time 1), one month (Time 2), one year (Time 3) and two years afterwards (Time 4).

lower than in slopes (figure 1b). Monitoring results on horse resting areas show that the cover of evergreen dwarf shrubs and herbaceous plants decreased due to trampling and grazing by horses. Original forest plant communities were replaced by secondary ones with many species introduced to the national park.

Our experimental study on the effects of horse-riding shows that via horse manure a number of introduced species was able to establish themselves in study plots (figure 2.). Moreover, there was an interaction between horse manure treatment and humus removal treatment indicating that among eroded study plots the establish-

ment of introduced species was more quickly compared to control plots without humus removal (figure 2). This indicates that the potential risk of introducing alien species to protected areas via horse-riding is related to the level of human-induced disturbance. Alien species are more likely to establish themselves in protected areas when the vegetation and soils are prone to trampling disturbance either by horses, hikers or other users. Because of the diverse impacts to native species and to ecological processes, horse riding poses a serious risk for the biodiversity of conservation areas at least if not carefully planned and controlled.

## References

- Campbell, J.E. & Gibson, D.J. (2001). The effect of seeds of exotic species transported via horse dung on vegetation along trail corridors. In: *Plant Ecology* (157), p 23-35.
- Landsberg, J., Logan, B. & Shorthouse, D. (2001). Horse riding in urban conservation areas: Reviewing scientific evidence to guide management. In: *Ecological management & Restoration* (2), p 36-46.
- Newsome, D., Cole, D.N. & Marion, J.L. (2004). Environmental impacts associated with recreational horse-riding. In: Buckley, R. (ed.). *Environmental Impacts of Ecotourism*, p 61-82. Cambridge.

# Genesis of Trails in Nature: Monitoring of Visitors' Effect on Nature

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*Keywords: Trampling, trails, nature regeneration, mountain bikes, running, walking, vegetation.*

## Introduction

Off trail recreational behaviour in nature is a frequent event. In Denmark 60 % of visitors claim to have spent a proportion of their activities away from the established trails and roads (Jensen 1998). Sometimes, off trail activities give rise to generation of new trails. But how much does it take to make a trail? And how much time does it take before nature is again restored after the impact has stopped?

The effect of trampling is influenced by

- the type activity (bicycling, walking, running, riding etc.),
- the degree of impact (the number of passages) and
- the type of nature in which it is taking place (vegetation, soil type, climate etc.).

In classic experiments the effect of the trampling is investigated by application of the entire impact at once (Cole & Bayfield 1993). To assess the mutual effect of trampling impacts and nature's ability to restore itself, the present investigation has been set up as a series of impacts returning every 14 days over an entire year. It is expected that it will be possible to record less effect of trampling over time in fast growing nature types than in areas of less vigorous vegetation. Therefore the more vigorous the vegetation the more important it is to consider regeneration in trampling experiment designs.

## Methods

The experiment is carried out in three locations of Northern Zealand, Denmark. The three locations were selected to represent different soil and nature

types: Tisvilde Hegn (Pine on sandy soil – texture class 1), Gribskov/Kagerup (beech on clay – texture class 5) and Nødebo (open grass land on loamy sand– texture class 3). The three sites were selected to represent typical, but as different as possible Danish nature types. Nødebo, which was intermediate in terms of soil texture, was selected as a representative of an area exposed to sunlight all year round. At each location three experiments are set up for three activity types: Walking, running and mountain biking. At each location, for each activity type, test-trails were established according to

The setup means that after the first year, the maximum impact investigated will be (26 impacts of 105 passages) 2,730 which is a considerable number compared to the standard experiments carried out by Cole and Bayfield (1993) exploiting up to 500 passages.

After every campaign the characteristics of the trail are recorded. After the first year the impact is stopped, and then followed for up to two year

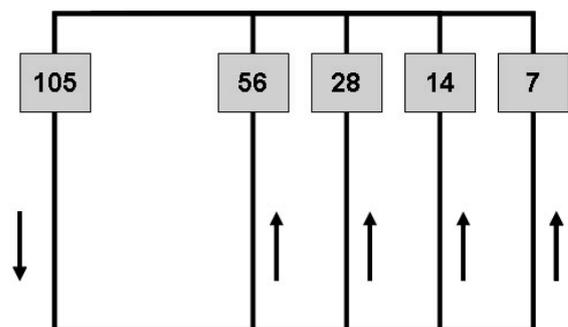


Figure 1: Experiment layout. For each activity (walking, running and bicycling) a trail was constructed. Every 14 days the trail was traversed the number of times indicated, in the direction shown by the arrows.

period where only the recording is continued. The recording includes a photograph of the trail at prescribed spot (see figure 2), registration of trail depth and width and a visual evaluation of the trail in the following categories:

1. No visible impact
2. Track visible
3. Soil in bottom of track visible
4. Soil in bottom of trail cut up
5. Sign of secondary erosion

Furthermore, every second month the soil compression is measured using a nuclear gauge (Randrup and Lichter 2001). At each trail, for each activity type, at each location the soil compression was measured in 10 and 30 cm depth and in triplicate.

The experiment was started in April 2005 and will continue onto 2007.

## Results

The presentation will give results from the experiment including comparative studies of trampling effects on different soil/nature types given different activity types and degrees of impact. Results including pictures can be assessed via a web-page which will be demonstrated. The web-page enables comparison of 4 pictures at a time. Along with the pictures, measures and visual evaluation characters are displayed.



## Conclusion

A clear management implication of the experiment is that if it is possible to document a correlation between impact and trampling effects (given activity and nature type), investigation in field of emerging trails would provide a rule of thumb for assessment of the number of people using the trail. Yet another possible application of the results will be for micro scale simulation of genesis of trails in the nature in the context of agent based modelling systems.

## References

- Cole, D.N. & Bayfield, N.G. (1993). Recreational Trampling of Vegetation: Standard Experimental Procedures. In: *Biological Conservation* (63), p 209-215.
- Jensen, F.S. (1998). *Friluftsliv i det åbne land* (recreation in the open landscape). Danish Forest and Landscape Research Institute.
- Randrup, T.B. & Lichter, J.M. (2001). Measuring soil compaction on construction sites: A review of surface nuclear gauges and penetrometers. *J. of Arboriculture* (27/3).



Figure 2: Example of pictures from the database. Both are from the site in Tisvilde Hegn (Sandy soil/pine forest). Both are taken on November 26 2005. Both are from the mountain bike tracks. To the left the track issued to 7 passages per 14 days (a total of 133 since the start of the experiment). To the right the track issued to 105 passages per 14 days (a total of 1995 passages).

## Trampling Impacts on Coastal Sand Dune Vegetation in Southeastern Brazil

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*Keywords: Trampling impacts on vegetation, recreation ecology, protected areas, coastal sand dunes.*

**Abstract:** Experimental trampling was conducted in a coastal sand dune community located in a State Park in Southeastern, Brazil. To evaluate the effects it was used 5 permanent plots. The trampling intensities were 25, 75, 200, 500 and 1,000 passes and each plot had a control area. Response to trampling was assessed by determining species composition, vegetation cover and height evaluation, right after trampling, 2 weeks, 3 months, 6 months, 9 months and 1 year after trampling. The same parameters were evaluated just before trampling. Although there was a substantial loss of vegetation cover on 500 and 1,000 treatment plots, the study area was recovered in a few months. Reductions in height occurred with less impact: 200 passes. The 500 and 1,000 pass interference didn't show statistical difference for cover and 200, 500 or 1,000 passes were statistically similar for the community, suggesting weak linearity between impact and amount of use. The results show that this community has a good resilience; probably in response to the natural stress the vegetation suffers continuously. The vegetation's changes in species composition seem to be more accurate; especially the extinction of rare species and the introduction of alien ones.

### Introduction

Large numbers of experiments on vegetation trampling have been conducted since Bates (1935) has published the first research on this subject in the United Kingdom. We could say that the 70s and 80s have produced most papers including different vegetation communities. These works, therefore, were developed in areas that had already been changed for agricultural or pastoral purposes. Then, the correlation between impact and amount of use were difficult to achieve. Experimental trampling research was rare and there was a lack of continuity to really understand the effects of the increasing recreational pressure over natural areas. In order to standardize the experiments around the world, Cole and Bayfield (1993) presented a protocol where they indicate a proposal on the way researchers should evaluate trampling experiments by using parameters that were comparable with

other sites. According to Cole and Monz (2002) research based on this kind of methodology have been contributing to the general knowledge of recreation ecology and to the efficiency of visitor management in protected areas.

Considering the growing knowledge on recreation ecology, we are now wondering what we have learned from all those experiments and if the managers have been using those experiences to control visitor impacts on natural areas. More than 10 years after Cole's and Bayfield's proposal, many rules are being used to control impacts of recreation in Latin America, but in many cases the decisions are still based on the concept of recreational carrying capacity. One can ask why this concept is still used, taking to account that we already know that the number of visitors in a certain area is not the main cause of impacts as we have to consider the type and distribution of use and the visitors' behaviour. One possible

answer is the lack of experiments that indicate the relationship between use and their effects on vegetation in Brazilian ecosystems.

What is considered in the present work is that we still need to raise answers to highlight the effects of trampling on Brazilian vegetation communities in order to make better decisions for the conservation of natural areas.

## Study Area

Considering the lack of information on impacts over Brazilian vegetation, this work will analyse the effects of experimental trampling on coastal sand dune vegetation at “Parque Estadual da Serra do Mar – Núcleo Picinguaba”, located in Ubatuba, São Paulo State, Brazil.

The total area of Picinguaba is 47,000 hectares, including five beaches. The study area (Fazenda Beach) was chosen because it has the reminiscence of original vegetation in better conditions, has fewer houses and also has low visitation. All these factors contribute to keep the experimental variables under control. The beach is 4 km long, and receives visitor flows on weekends, holidays and school vacations. Most visitors take a one-day visit, because there are no hotels there. It has a camping area for at about 40 tents, which is only open on holidays and vacation times (in general with no more than a hundred people). The beach receives school and university groups all year long and the park has simple accommodations for them.

The coastal sand dune vegetation is very threatened in Brazil, especially at São Paulo State where the big cities are concentrated. Urban people frequently go to smaller cities and natural areas to escape from the crowds. As our country doesn't have a cold winter, the beaches receive tourists all around the year, and the pressure on coastal ecosystems is always increasing as a consequence of the need to increase the number of tourist infrastructures. The climate in the area can be classified as tropical wet, with no dry period. The mean precipitation is 2,600 mm per year, and the mean temperature 21°C. The coldest period, from May to September, is also the driest one.

We have chosen the left side of the beach to install the samples, at the 800 final meters, where a very small number of visitors just walk around and rarely stay. In general people don't stop by this area because it is far from the entrance, where there are parking spaces, restrooms, showers and the Visitor Center.

## Vegetation

The dunes at the study area are near the shoreline, being susceptible to invasion by waves, which bring and remove sand and other substrates. When sea level is very high (frequently in winter time) the vegetation can be partially destroyed or removed, but the rhizomes and roots are generally kept in soil, which contributes to a quick regeneration.

The sand dunes' vegetation is composed mainly by herbs like *Hydrocotyle bonariensis*, *Blutaparon protulacoides* and *Ipomea pes-capre*, and grasses like *Panicum racemosum* and *Stenotaphrum secundatum*. In the transition to the fixed dunes, where there are more bushes than herbs, we can find some vines like *Mikania cordifolia*. The most frequent bush species in the area are *Dalbergia ecastophyllum* and *Sophora tomentosa*, which form a continuous cover on the ground. Among these herbs we can find some characteristic treelets like *Schinus terebentifolius*, *Rapanea umbellate* and *Rapanea ferruginea*. There is also an alien tree species on the beach (*Terminalia catapa*).

## Methods

To evaluate the effects of trampling on coastal sand dune vegetation, permanent plots were used. Five replications of 1,5 m x 5 m were located on the sand dunes, on areas with no evidence of human impacts, as suggested on the protocols of Cole and Bayfield (1993). The sample design was systematic, sorting the first sample and locating the plots in regular intervals. Each replication consists of six lanes delineated at the corners by stakes. The lanes were 0,5 wide, separated by a buffer of 0,4 m, both 1,5 m long (the entire extension of the replication). The treatments were randomly located (control, 25 passes, 75 passes, 250 passes, 500 passes and 1,000 passes) on each sample, in the 0,5 m x 1,5 m lanes (Cole & Bayfield 1993). We have standardized

the weight and the type of shoes (tennis) of the trampers (Cole & Bayfield 1993), as most experimental studies do. The trampling impact was done at once as suggested by Cole and Bayfield (1993). Trampling treatments were applied at the end of the growing season, on March, the end of summer season, the most visited period on this park. Trampling in this season simulates vegetation changes due to more intensive use in this period of the year. The period with more visitors starts on late December and generally finishes on early March, period of summer vacation ending with Carnival holidays. This is considered the better period for beach tourism, not only because it's vacation time, but also considering it's the hottest period of the year and the warmest water temperature.

Measurements were taken on two 30 x 50 cm sub-plots, located adjacent to each other, on each treatment (Cole & Bayfield 1993). The parameters measured were:

1. Visual estimates of the vegetation cover of each species
2. Visual estimates of bare ground;
3. Measures of vegetation height.
4. Species composition;
5. Species frequency.

The data were collected before trampling, immediately after, 15 days after, 3, 6 and 9 months after and 1 year after trampling. Most papers on trampling effects assess the measures just 15 days and one year after trampling. It was decided to take intermediate measures because the community appeared to have a quick recovery.

## Data Analysis

As suggested by Cole and Bayfield (1993), the evaluated variables were the community relative cover and relative height.

1. Relative cover (RC): based on the sum of the coverage of all species after trampling, over the initial cover, corrected by a factor that takes the variation of the control plots into account. It is calculated for each treatment as follows:

$$RC = \frac{\text{surviving cover on trampled subplots}}{\text{initial cover on trampled subplots}} \times cf \times 100\%$$

Where:

$$cf = \frac{\text{initial cover on control subplots}}{\text{surviving cover on control subplots}}$$

2. Relative Height (RH): similarly to relative cover, it is based on the mean of height measures after trampling and for each treatment. The relative height is calculated in a similar way as relative cover:

$$RH = \frac{\text{mean height of each treatment}}{\text{initial height on the same treatment}} \times cf \times 100\%$$

Where:

$$cf = \frac{\text{initial height on control subplots}}{\text{height of survivors on control subplots}}$$

A Friedman test was used to assess if there were significant differences among the treatments. When any significant difference ( $p$ -value= 0,05) was detected, comparison tests were employed between control and each treatment and between each pair of treatments.

## Results and discussion

### 1. Vegetation cover

After the data analysis, it was possible to figure out that the relative cover was mostly affected for the two first measurements (right after trampling and 15 days after it - Figure 1)

The treatment of 1,000 passes showed less cover reduction than the 500 one, considering the measurement right after trampling, but there were no statistical differences between them. After 15 days, there were no differences at all. We consider that the initial differences between these treatments may be a reflex of the species composition, because some species are less resistant than others. These results contribute to the presupposition that there is a weak or linearity between impact and use. After 500-passes, we can double the interference and the vegetation behaviour is still the same.

After one year, the cover differences in the treatments were not visible anymore. The same vegetation response was found by Cole (1995), for 18 vegetation types in the USA.

Some species were more vulnerable than others. Grasses like *Panicum racemosum* were more resistant, and the vegetation area where this species dominates appears to absorb more impact. Liddle (1988) suggests that the grasses' morphology is really more consistent than the dicotyledonous. The author points out that some of the most important features that give resistance to grasses are the rhizomatous or stoloniferous main stems with growing points near the surface of the ground, its frequent branching and the per-

sistent meristems at the base of the leaves, what was observed in this species. The vegetation cover regeneration has occurred in no more than 3 months, what shows the high resilience of this vegetation type (figure 1). Some treatments have even increased the cover after trampling. Liddle (1988) reports that some research has found this pattern, a little increase on vegetation cover and biomass in areas with low trampling intensities. For the author drifts in species composition may explain this increase.

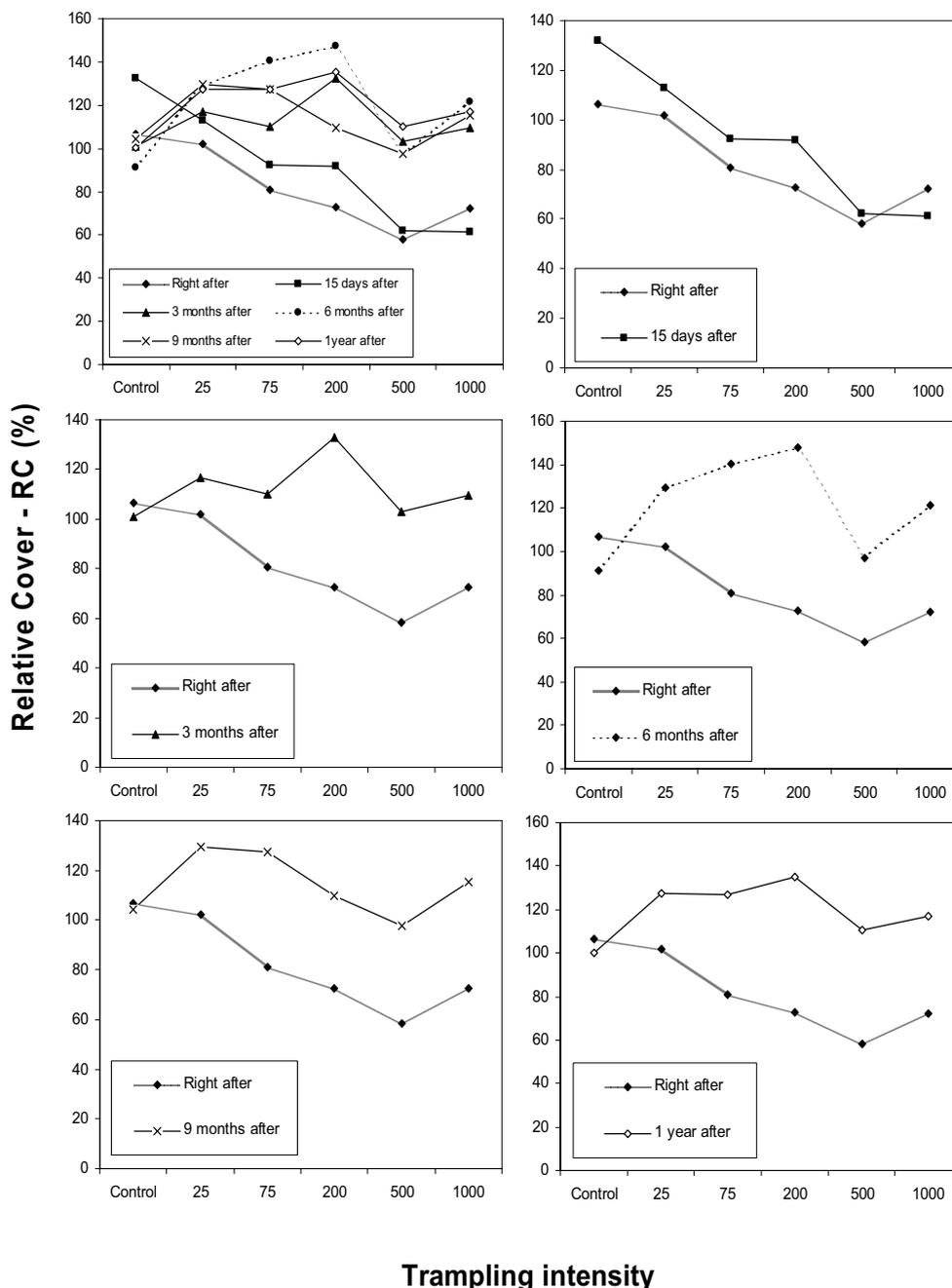


Figure 1: Relative vegetation cover of the coastal sand-dune, right after, 15 days, 3 months, 6 months, 9 months and 1 year after trampling application.

## 2. Vegetation Height

The 200-pass treatment showed a similar effect with 500 and 1,000 passes, considering relative height (figure 2). In fact, the 200, 500 and 1,000 trampling treatments showed no statistical differences between them, but all were different from control. This suggests that 200 passes is critical to height reduction on this vegetation, and that after this limit low extra interference is added. Cole and Monz (2002) indicate that in communities that show more resistance to the effects of

use, the height reduction is more pronounced. The findings on this experiment show the same tendency.

After 15 days the 200 passes treatment showed less recovery than the others. It is probably an effect of the vegetation composition, which gives specific resistance patterns to different samples in the same plant community. So, the relative height shows a reduction tendency with less impact. The recovery of it occurred in a slower way if compared with the relative cover recuperation. The

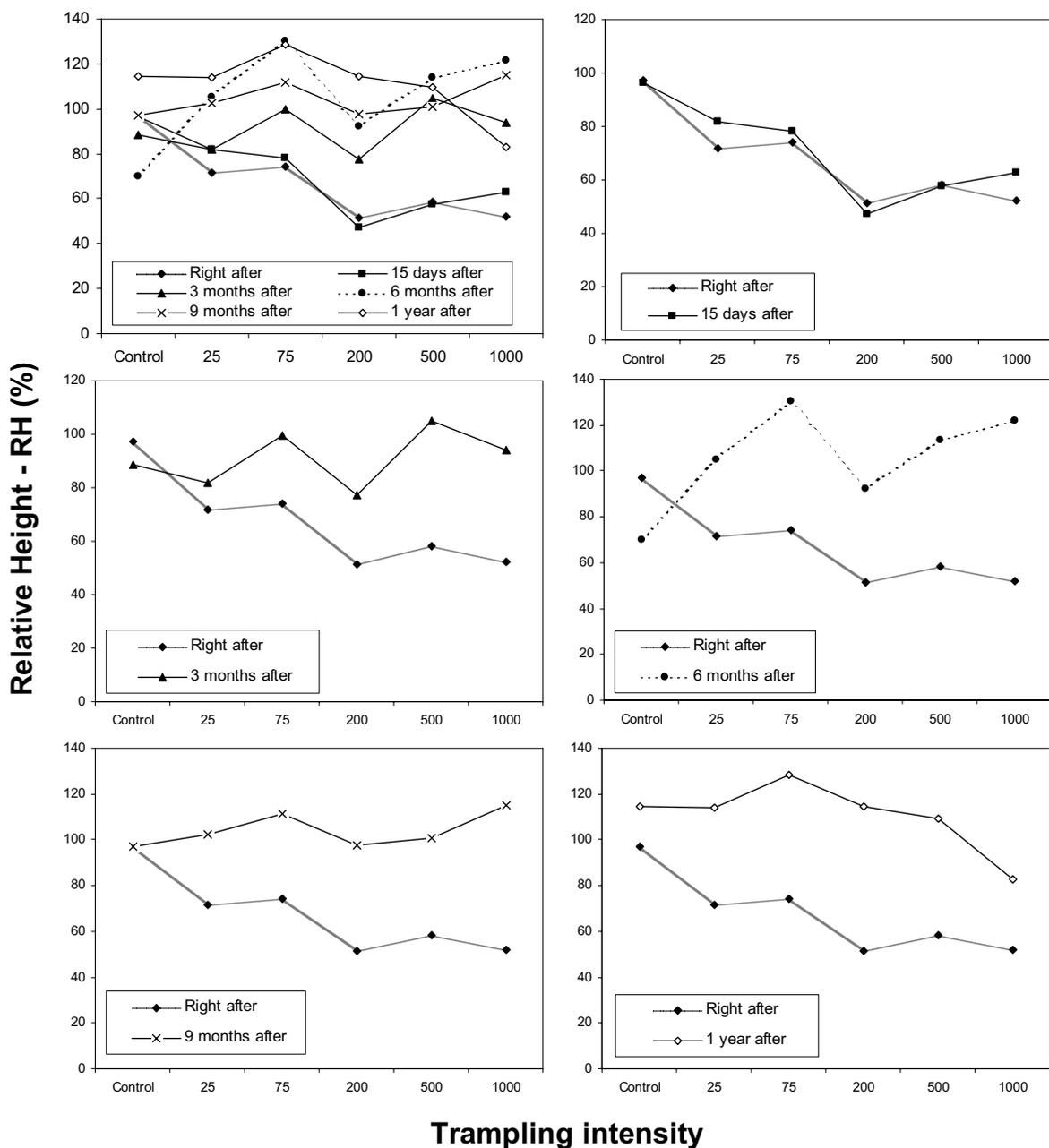


Figure 2: Relative vegetation height of the coastal sand-dune, right after, 15 days, 3 months, 6 months, 9 months and 1 year after trampling application.

same situation was observed by Cole and Bayfield (1993), in three different sub-alpine communities in the USA.

Areas where the species *Blutaparon portulacoides* dominates showed less resistance. These findings may suggest that heavy visitor use should be conducted into the areas where grasses dominate.

## Conclusions

The results indicate that maybe the chosen parameters (vegetation cover and vegetation height) are not appropriate to evaluate the trampling impacts in such a vegetation type, because sand dunes already have a high level of natural disturbance and recovery every year, associated with the dynamics of the area. As the community passes through natural stress, such as high tidal variations in winter, with substrate and vegetation removal, they have strategies to survive and to recover very quickly, showing a good resilience.

Reductions in height occurred with less impact than in cover. Probably the first effect of trampling for this vegetation type is a decrease in relative height. Similar patterns were found in other researches in the US.

The statistical analysis could demonstrate that the relation between impacts and amount of use is not very linear. After these findings we truly believe that we must reconsider the recreational carrying capacity usage for protected areas in Brazil.

This way, we consider that changes in composition of species can be more accurate to determine the limits of acceptable changes for this plant community, especially the extinction of rare species and the introduction of alien ones. This thought comes from the findings on this research, because although the community recovery was quick, there was species composition drift after the impact.

## References

- Bates, G.H. (1935). The vegetation of footpaths, sidewalks, car-tracks and gateways. In: *Journal of Ecology* (23), p 469-87.
- Cole, D.N. & Bayfield, N.G. (1993). Recreational trampling of vegetation: standard experimental procedures. In: *Biological Conservation* (63), p 209-215.
- Cole, D.N. & Monz, C. A. (2002). Trampling disturbance of high-elevation vegetation, Wind River Mountains. In: *Arctic, Antarctic and Alpine Research* (34/4), p 365-376.
- Cole, D.N. (1995). Experimental trampling of vegetation. I. Relationship between trampling intensity and vegetation response. In: *Journal of Applied Ecology* (32), p 203-214.
- Liddle, M.J. (1988). Recreation and the environment: The ecology of recreation impacts. Section 2. Vegetation and wear. AES Working Paper 1/88. Griffith University.

Protected Areas and New Paradigms  
of Regional Development

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Ingo Mose (Chair)

## **Integrated Conservation Processes – A Tool for Reducing Conflicts in Area Conservation Processes**

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### **Introduction**

In the field of area management, controversies and conflicts appear according to different interests, values, rights and facts. A wide range of stakeholders, like commercial interests, property owners, indigenous people, environmentalists, hikers, authorities at different levels and sectors, as well as the local community, promote strong rights and interests according to area resources along the Norwegian coastline as well as the mountain landscapes and rural regions. In addition, disputes regarding local vs. national governance and management of common lands, amenities and biodiversity have a long history. The governance and management of protected areas hence suffer from conflicts occurring at different levels, i.e.:

- Interests, i.e. commercial vs. non-commercial interests
- Fundamental values from which area planning and management should be outlined.
- Different right holders (property owners, vs. public right to access) and undefined *prima-facie* rights.
- Factual contradictions.
- Sectoral planning, including contradictive national authorities (i.e. land use, vs environment, vs. fisheries/aquaculture, vs. rural and local development), and regulatives (Plan and Building Act vs. Nature conservation act).

The different conflicts can be divided into use-protection conflicts, which mostly occur between local communities and municipalities on the one side, and centralized environmental authorities and environmental organisations on the other, and conflicts between traditional and new utilisation of protected outfields and common land (use-use conflicts).

Whereas the former has long history and is well-known (and established) the latter one is expected to increase over the next decade as commercialization of the outfields, including protected areas, was politically agreed upon in 2003 [St.prp.65 2002-2003]. In that sense, new actors as well as new ways of commercial exploitation of area resources are being introduced on land and shorelines all over Norway. Authorities responsible for area management as well as coastal and rural develop-

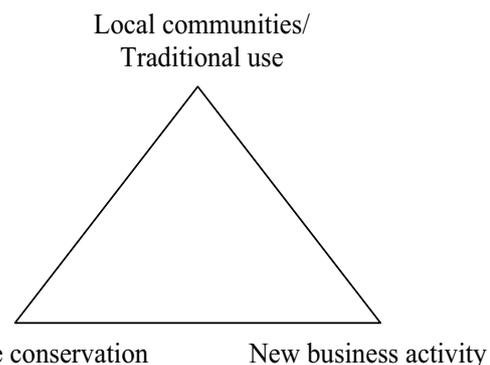


Figure 1: Different interacting interests in protected areas.

ment should be aware of the changing dynamics between i.e. different economical agents and the local communities, as well as between protection authorities and different user interests.

As figure 1 shows, there are reasons to believe that, due to an expected increase in both conservation and commercial activities, future conflicts may appear between the three different parties: traditional users, conservation interests and new business.

Here we would focus on a particular approach within area planning, namely integrated conservation and county planning processes, and the way that this approach seems to facilitate both nature protection as well as coastal and rural development. IUCN (International Union for Conservation of Nature) has emphasized the need for partnerships between local communities and conservation authorities. We believe that approaches like this will both strengthen the relationship between conservation and user interest, and reduce the conflicts that may appear in conservation processes. We will also present an ongoing project, which greatly will emphasize this integrated approach.

## **Traditional conflicts both in conservation processes and in protected areas**

### **Use-protection conflicts**

Conflicts regarding protection of nature have long traditions in Norway. For many rural and coastal communities it is perceived as a paradox that area protection, which excludes the locals from exploiting the areas, should be the sufficient tool for preservation, since careful use of the areas in many occasions is the reason for why the site has become worthy of protection. Clearly, many of the protection-use conflicts express concern over economical loss and ability to govern private property or commonly used land. For two of the municipalities taking part in the integrated plan processes, more than 50 and 75 per cent of the area will be protected according to the Nature Conservation Act. This may clearly represent a heavy burden for sparsely populated communities fighting against decreasing population and a scarce labour market. When establishing national parks or “the 100m protec-

tion zone” along the shoreline, property owners have to withhold large areas for collective purposes like ecosystem preservation, outdoor life and recreation.

In addition to economical and household interests, conservation conflicts may also reflect a more fundamental and value-laden disparity connected to the value of nature. According to environmental ethics nature may be of instrumental, inherent or intrinsic value for people. Whereas nature is conceptualised as something of inherent value by the international environmental community [UN 1992] like i.e. biodiversity, nature clearly also is considered as something of instrumental value, that is, valuable because it supports people. Hence area management may suffer from dissension according to what values or ends are at stake; is it the cultural landscape or wilderness? Is it the ecological mechanisms or the maximisation of yield? Both local communities and private property owners are provoked by central government and NGOs that do impose negative impacts on them (i.e. restrictions on land use), in order to realise their particular visions for nature use and management, without taking into account that their visions not necessarily correspond to local values. Moreover, the values protected by international environmental conventions are sometimes expressed as absolute values in the sense that they are “right” and/or true.

Authorities at different levels (local, regional and national) may also be considered as stakeholders in these processes as they have duties they aim to fulfil through area planning. Area protection is the main tool for the Ministry of Environment to fulfil national and international obligations regarding i.e. protections of biodiversity and natural heritage for future generations. At the same time, the Ministry of Agriculture or Ministry of Fishing may have strong interests in the area, resulting in clash of national interests and regulations at a local level. The regional and local potential to plan holistically is therefore constrained by national sectoral planning.

Finally, concepts of knowledge and unsettled judicial regimes also complicate the picture. For example, people may disagree according to the factual basis onto which protection measures are decided, like the number of predators or fish, the calculated

probability for species extinction, or the environmental impact from increased traffic or physical installations. This brings into account differences between local and scientific knowledge. Unsettled regulations may also represent a problem for use of area resources. In Sámi regions this is of fundamental concern, like i.e. Tysfjord municipality where Sámi people claim their rights to land and waters on the basis of ILO convention 169. The County Governor on the other hand, pursues the Nature Conservation Act as the tool to regulate areas of conservation interests.

### **Use-use conflicts**

Even though protective measures may hinder economical development and local management of area resources, there is not necessarily a contradiction between business activity and nature preservation. Area protection may be of great benefit to both traditional businesses and new, innovative activities. For example, will area intensive businesses like reindeer herding, rough grazing, and ecotourism welcome regulations that prevent technical interventions and fragmentation of landscapes (roads, installations etc). Protection may also be beneficial to businesses in coastal and marine areas, i.e. for the fishing industry (spawning ground), fishing tourism, and aquaculture. “National parks” are being marketed worldwide and have become important branding for the tourist industry as well as i.e. different niche-products.

However, a peaceful relationship between authorities and commercial agents does not seem to be sufficient for economical development to take place, as economical actors also need to relate to other right-holders, including other businessmen and -women. In Norwegian mountain National parks a considerable amount of economical activity is taking place, and particularly tourist businesses are accelerating. However, conflicts appear, both among different tourist operators in the same area, and between the tourist industry and local community.

### **An integrated approach**

Area management encompasses different priorities of different parties. Additionally, it seems clear that both business interests and conser-

vation interests need local legitimacy for fulfilling their aims. This confirms the need for a participatory and integrated approach within area management, that is suited to resolve disputes and conflicts, not only between conservation regimes and local communities, but also between new innovative business approaches and traditional ways of exploiting coastal and mountain areas.

In Northern Norway several conservation processes emphasizing local participation and public partnership are taking place at present. During the last five years, the County Governor in Nordland (CGN) has established three partnerships with regional/local authorities (county municipality and/or municipality). These processes combine conservation and county area planning into one process, and aim at developing sustainable, holistic area plans that benefit both conservation and user interests. While the CGN has the over-all responsibility for the development of conservation regulations, the county municipality is supposed to promote business interests during the planning process. Additionally, all stakeholders are invited to join different fora, i.e. working groups on business activity, outdoor-life, culture, history and the like. Property owners are asked to register any use- or spatial preference they may have in the particular area. Compared to conventional conservation processes, these integrated approaches clearly undertake a new design for area conservation as it includes a wide range of stakeholders. County plans on the other hand, have longer traditions for including stakeholders i.e. throughout the implementation of the Norwegian Plan- and Building Act among others.

Preliminary results stemming from follow research and evaluations of the three plan processes indicates that the level of conflicts between national authorities and local community is lowered, and that confidence between the conservation and user interests has increased. This might have connection to other results like i.e:

1. A wide range of stakeholders take part in the combined processes.

2. A lot of information about the areas has been possessed through impact assessments and inclusion of local knowledge.

3. The stakeholders have increased their knowledge about one another; their views, interests, rights etc.

4. The processes have worked out as meeting places and facilitated the exchange of information; facts about the area, commercial ideas, planning traditions within different legal frameworks etc.

5. A list of initiatives for facilitating economical development has been developed.

6. Financial funds for realising business projects have been established.

The processes in Nordland aim at highlighting new commercial possibilities connected to protected areas and opens up for regulative adjustments so that conservation instructions do not restrict economical actors unnecessarily. Though conflicts between different user interests, in particular between reindeer husbandry and hiking/outdoor-life, have been excessively debated, it seems as though the processes in general stimulate cognitive and normative matters, like understanding and confidence, as well as economical and instrumental factors like financial funding and concrete innovative measures.

The partnerships between the two authoritative bodies at the regional level have clearly balanced the planning processes according to the many user interests (i.e. economical and private interests) as these have been represented at the uppermost level of the planning process by the municipality and county municipality. Moreover, the deliberative approach, including the many stakeholders in the area, has facilitated meeting places where conflicting issues as well as common interests have been debated. Exclusion and closed decision making fora may effectively promote speculations and misunderstandings in situations where parties suffer from lack of trust and confidence. On the other hand, a robust and reliable relationship between the governing and governed parties is not automatically gained simply by gathering people in a meeting. To attain a compromising and flexible dialogue, the many issues at stake need to be articulated and debated. It seems as though this has been the case for

the three processes in Nordland, and that the processes have contributed to both procedural legitimacy, as well as several benefits in the meaning of increased knowledge (in a broad sense), less time and resource-demanding conflicts, entrepreneurial and innovative measures, as well as improved infrastructure at the regional level.

PROBUS – Protected areas as resources for coastal and rural business development:

The facilitating efforts made (i.e. projects on infrastructure and innovation policies) have not yet led to concrete results, probably due to scarce traditions and knowledge in the local community, about developing new niches like ecotourism. This indicates that a judicial framework for commercialisation is not enough for entrepreneurial performance to take place, and that innovative aims also depend upon viable ideas and entrepreneurial abilities and performance.

Integrated conservation processes and their implication on business development in protected areas will be evaluated through the PROBUS – project. Questions remaining to answer are, amongst others:

- Can deliberative processes serve as a tool for resolving area conflicts and conflicts due to social and institutional features?
- How do business actors participate in the conservation processes, and what do they do to affect decisions?

Looking upon the integrated conservation processes is only one of four main goals with the project. The others are linked to gaining knowledge of commercial activity in relation to protected areas, evaluating formal and informal institutions and their role in business development, and obtaining knowledge on area-conflicts between nature conservation, traditional use and new business development.

The project aims will be fulfilled with the combination of several methodologies, both qualitative and quantitative approaches: case studies, follow-studies, surveys, interviews, investigation of sources and GPS-monitoring. The project has chosen four cases, representing all the three northernmost counties in Norway. The cases vary in size

and how developed the conservation process is, and they also vary in conservation status. By follow-up studies it is possible to evaluate the integrated processes and include observations in conservation processes: meetings and the role of business actors. In monitoring the business activities in these areas, the project will use surveys to measure the legitimacy of new businesses or protective regulations. Interviews will be used to get a deeper and more complete understanding, and of main interest here are reindeer herders, farmers, public agencies and the established fora in the on-going planning processes. The investigation of sources will mainly focus on the process documents from the conservation planning procedures. These documents are kept by the county governor in each county. GPS-monitoring will be used to log the movements of reindeer, hikers/tourists, hunters, boats etc.

The project's main objective is to improve the level of knowledge on how different factors influence the possibilities for business development in the protected areas. We expect the results to contribute to an integrated model for future area management, encompassing commercial development in protected areas. The time period for the project is from 2006 to 2009.

# Visitor Management and Destination Management as Tools for Sustainable Regional Development

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*Keywords: Visitor management, local community, sustainable regional development, sustainable tourism development, destination management, supply chains, biodiversity, conservation.*

## Introduction

This paper explores the interdependency between protected areas (PA's) and the regions in which they are located. Processes of change in the rural world are not only a threat to the sustainability of the economy and the quality of life of communities that live from agriculture, forestry or fishing, but equally jeopardize biodiversity and affect protected areas. Rural areas, their communities and nature conservation could have a common stake in finding models of sustainable development.

Tourism is gaining acceptance as a tool for sustainable development. Visitors to protected areas could contribute significantly to support the economy of PA's and rural communities. The challenge is to define the role of visitor management (VM) in sustainable regional (tourism) development and to come to a strategic approach to implement this role successfully. The possibility to connect visitor management to the innovative concept of Tourism Destination Management is explored.

In order to understand the mutual dependency between successful conservation management and sustainable rural tourism development, a closer look at the challenges that rural areas and PA's have in common can be useful. Areas with high ecological values are often located in relatively remote rural areas. Many traditional and natural landscapes survived mainly due to their remoteness. Unfavorable conditions for modern farming and forestry have been able to sustain only a limited local population, for whom traditional land use was not so much a choice, but a necessity. Those isolated areas also have never been able to create attractive

conditions for investments in other sectors. That leads to a situation where the desire of rural communities to have access to modern life standards could easily be neglected. Rural areas are confronted with an exodus, because the traditional agricultural activities were no longer competitive on globalizing markets and because the quality of life was no longer attractive to young and talented people. Land abandonment seems to go side by side with intensification of farming and forestry. The remaining farmers are forced to comply with modern efficiency standards that require an increased use of herbicides, pesticides and heavy machinery, which in their turn require bigger plots of land, that are not compatible with the small scaled character of the landscape that biodiversity requires. Forestry and other rural activities face similar processes of intensification. If unemployment rates and poverty are growing, the pressure of the local population on the natural resources will only increase.

While the establishment of a protected area is a great step forward from the conservation point of view, it deprives the local population of a part of its resources and sets limits to traditional activities with an important economic and social function (hunting, grazing, logging). PA's that were not successful in accommodating communities interests by creating economic alternatives tend to suffer from practices that under the new regime have become illegal: hunters become poachers and conflicts arise.

Although tradition is not always a guarantee for ecological sustainability, traditional land use forms part of the conservation of biodiversity. The lack

of economic sustainability of this land use has become a common threat to protected areas and rural communities.

If areas are sparsely populated and their economic value decreases, the temptation to use them for high impact activities like construction of tourism resorts and ski slopes, infrastructure, storage of nuclear waste, mining, logging or hydro-energy projects increases. Although these developments in big part take place outside the protected area boundaries, their impact on conservation can be huge. At the same time these activities are usually not under the control of communities and do not sustain the rural economy.

Biodiversity does not stop at the boundaries of protected areas: many species depend on a healthy, natural environment and ecological corridors. The future of nature conservation is connected to the future of the countryside. Conservation depends on conservation of a rural way of life and on a healthy rural economy. The insight that protected area management should be based on good, pro-active relationships with its environment is gaining ground<sup>1</sup>. Stakeholder involvement and community involvement have become new standards in conservation.

Protected areas often share with rural communities a need to enhance economic sustainability. New models for sustainable regional development should be based on establishing economic and social links between PA and environment. Given the limitations for economic activities that sensitive landscapes and protected areas offer, sustainable tourism development has become an accepted strategy for conservation<sup>2</sup>, although there still is limited empirical evidence of its effectiveness<sup>3</sup>.

This paper advocates an approach in which a protected area could be a catalyst for regional development. Tourism can only play a role in this process if the region has sufficient potential to

become a successful tourism destination. Visitor management can be an important tool to maximize the contribution of tourism/ visitor flows to sustainable development and conservation. In order to play that role effectively, a strategic approach is required.

## Methods

This paper is based on the experiences of the author as a consultant in the field of sustainable tourism development in protected areas and in rural areas and on desk research.

Before the role of visitor management can be assessed and a strategic approach to this new role can be presented, some major challenges for sustainable tourism development are identified:

1. From the perspective of regional development, tourism is in the first place an economic activity that has to meet criteria of feasibility, strategic planning, successful marketing, business development and proper management.
2. Tourism development will have to be integrated in an overall perspective of sustainable development. Integration of tourism in the local economic and social structures requires due attention.
3. Sustainable Tourism Development requires a highly professional approach. Rural communities, PA management, NGO's and other stakeholders often lack the expertise and resources to develop and manage a successful tourism destination.
4. Expectations about the feasibility of tourism development have to be based on an objective assessment of tourism potential, human resources and stakeholder support.
5. Although PA's can be considered to be a crucial part of the tourism potential of destinations, few protected areas can be considered to be a "stand alone" destination. The success of tourism depends on the ability of the wider region to develop into a competitive destination.
6. Tourism consists of many different markets that share one characteristic: they are highly competitive. Tourism will only be able to generate the expected benefits if the right market segments are targeted. Expected benefits are high, while the car-

<sup>1</sup> E.g.: Arthur and Mc Hall, Integrated Heritage Management; Denman, R., The Tourism Company, WWF Guidelines for Community-based Eco-tourism Development, 2001. <http://assets.panda.org/downloads/guidelinesen.pdf>.

<sup>2</sup> E.g.: WWF, IUCN, Europarcs, EU.

<sup>3</sup> Tourism according to definitions includes staying overnight and thus requires a more complex infrastructure than visitor management. Its economic impacts and benefits are also bigger, since staying overnight includes a higher spending. Every tourist is a visitor once entering the PA, but not every visitor is a tourist.

rying capacity is usually fairly low. Unfortunately protected areas attract a variety of market segments and some protected areas have to deal with mass tourism and with negative tourism impacts. An example: the eco-tourism<sup>4</sup> market targets tourists with a specific interest in nature and culture. Yet this market is far from homogeneous: preferred activities range from bird watching to high risk adventure. There is a fierce competition between suppliers and between destinations. Increased mobility makes destinations in different countries and even different continents to direct competitors. Tropical rainforest experiences, for example, are offered in countless destinations worldwide.

7. Rural tourism destinations and eco-tourism destinations usually do not have a very pronounced tourism profile that distinguishes them from their competitors. Tourism accessibility is often low due to the remoteness. There is a dispersed, small scale supply of tourism products and services. Since the average professional expertise of suppliers is low it is hard to offer a quality product. Many different suppliers and stakeholders are involved and a good structure for co-operation and co-ordination is lacking.

These challenges make clear that only long term strategies, based on an integrated approach and proper management to implement these strategies, will generate the expected results. Without such a strategy tourism will have little chance to be a sustainable activity that generates the economic, social and ecological benefits expected. The role of local communities, craftsmen and entrepreneurs and the use of local resources seem to be underestimated.

Tourism Destination Management (TDM) is a comprehensive strategic approach to make a destination competitive and to manage and market it properly<sup>5</sup>. A tourism management organization with a clear mandate from all stakeholders should be set up in order to formulate and implement a sustainable tourism strategy. A ma-

ajor task is to turn the dispersed supply of tourism products and services into a coherent and attractive product. Engagement of PA management in TDM implies a proactive role of a protected area in destination development and a co-operation with tourism stakeholders. It gives management a say in decision making processes on tourism development and land use of the wider region. TDM offers new perspectives for the applications of visitor management systems at a larger scale, while enhancing the quality of the visitor experience, reducing negative impacts and planning the expected socio-economic benefits for conservation and local communities.

In this approach visitor management (VM) expands across the PA borders and aims at a structured co-operation with the wider region. Although the focus will be on the economic role of VM, benefits for more traditional functions like interpretation are obvious.

A VM plan should form part of the overall management plan and contribute significantly to its conservation objectives. If the PA assumes a role in regional sustainable development, this role will have to be specified in objectives.

As table 1 shows, visitor management consists of many possible products and services and yet the inventory is far from complete and not adapted to local conditions. Although from a management perspective these elements are likely to be perceived as tasks, they also can be perceived as services or 'products' to the visitor and to the destination. This prevents the situation where the PA is one of the core attractions of the destination and is investing heavily in quality services for visitors, but is not benefiting from tourism revenues. The question is, how these benefits can be made tangible and who is going to pay a fair price for these services. Tasks and responsibilities, costs and benefits have to be clearly defined.

These 'products' have to be integrated in a systematic way in the tourism products that the destination offers. Synergy with other suppliers and with the destination as a whole should be assessed. This leads to efficiency, cost reduc-

<sup>4</sup> Responsible travel to natural areas that conserves the environment and improves the well-being of local people (The Ecotourism Society, [www.ecotourism.org](http://www.ecotourism.org)).

<sup>5</sup> Beunders N. Framework for the development of a tourism destination management introduction training course for managers in the tourism industry, June 2004 (Unpublished document for the Slovene State Secretary of Tourism).

Table 1: An exploration of possible 'products' of visitor management.

<b>Visitor management Products/ services</b>	<b>Tourism Destination Benefits/ Community Benefits</b>
Information Education Interpretation	<ul style="list-style-type: none"> <li>• Linking protected area to region</li> <li>• Development of concepts, storylines, themes, trails, routes, information systems, signposting, providing information about local communities, their culture and tourism supply</li> <li>• Environmental education and training for community, schools etc.</li> <li>• Conservation of local culture (story lines, myths)</li> </ul>
Marketing Promotion	<ul style="list-style-type: none"> <li>• Marketing and promotion of destination (Protected area is core of identity/image of destination)</li> <li>• Website PA as marketing/ promotion/distribution channel</li> <li>• Concept and product development</li> <li>• Promotion of local products and services</li> </ul>
Merchandising Food and Beverage	<ul style="list-style-type: none"> <li>• Outlet for regional produce</li> <li>• Conservation of traditional handicrafts</li> <li>• Promotion of organic agriculture</li> <li>• Local enterprises for catering</li> </ul>
Activities & Experiences	<ul style="list-style-type: none"> <li>• Create activities/experiences with local providers/community</li> <li>• Local people work as guides, cultural brokers, animators</li> <li>• Events based on local culture</li> </ul>
Surveillance Safety	<ul style="list-style-type: none"> <li>• Local employment</li> <li>• Increase overall level of safety and medical care</li> <li>• Reduce illegal activities</li> <li>• Co-operation with local police</li> <li>• Inform tourists about hazard/health risks</li> </ul>
Infrastructure, Accommodation + Facilities	<ul style="list-style-type: none"> <li>• Improvement &amp; maintenance of roads, trails</li> <li>• PA facilities as local facilities (education, community centers, accommodation for school camps etc.)</li> <li>• Hire local enterprises for construction, maintenance</li> </ul>
Intact landscapes	<ul style="list-style-type: none"> <li>• Contribution to tourism potential of area</li> <li>• Contribution to conservation natural heritage of communities</li> <li>• Conservation of traditional land use</li> </ul>
Transportation	<ul style="list-style-type: none"> <li>• Improvement of local public transport</li> <li>• Sustainable transportation policy</li> </ul>
Etc.	

tion and a higher quality of products and services. Websites of protected areas have been increasingly used as a promotion and distribution

channel for local tourism products and services<sup>6</sup>.

<sup>6</sup> See for example [www.peakdistrict.org](http://www.peakdistrict.org), [www.nationalparknockberge.at](http://www.nationalparknockberge.at), [www.hogeveluwe.nl](http://www.hogeveluwe.nl), [www.hohetauern.at](http://www.hohetauern.at).

Maybe the most significant contribution of the PA to regional development is the development of new concepts, products and services. The PA has in the eye of the potential visitor and consumer a high brand value that represents intact nature, exciting nature based experiences, quality, reliability and safety. Some protected areas have turned their logo into a quality brand for local (tourism) products and services. The PAN Parks logo is being awarded to local businesses that have a partnership with the PA.

In order to maximize the benefits for the local economy, VM should make use of the concept of Local Supply Chains. A Supply Chain comprises the suppliers of all the goods and services that go into the delivery of tourism products to consumers<sup>7</sup>. A Local Supply Chain focuses on local suppliers. A methodology similar to quality certification systems could analyze the steps of the production process of all products to see if optimal use is made of local resources. Simultaneously other sustainability and quality criteria can be applied to make sure that production processes meet high standards.

If the use of local resources is limited, an analysis should be made of the local potential.

Training programs, business support and (micro) credits can help to increase local involvement.

## Results

Experiences in the field show a need for new and practical methods in the interfaces of visitor management, sustainable tourism development and destination management. The concepts mentioned lack consensus of definitions and a sound theoretical framework based on empirical research.

Emerging tourism destinations around protected areas have serious problems to formulate and implement integrated approaches. A lack of know how from PA management, staff, local communities, stakeholders and NGO's seems to be a major bottleneck.

Despite the need for further elaboration and empirical research, the benefits of the approach could be considerable:

- The tourism potential of protected areas will be more diverse. Even hard core eco-tourists can enjoy the charm of *couleur locale* and small heritage elements linked to their nature experience. The options for product diversification increase. Integration of protected area and environment increases the quality of the experience of the visitor. Authenticity is a prime motive for eco-tourists. Local people providing distinctive tourism services and products, are ambassadors of the local culture and have a value added for the tourism experience. The sense of place is enhanced by tasting of regional products, by following old trading routes, trails of shepherds and pilgrims, learning about survival skills and economies long gone.
- An attractive gamma of activities and facilities can increase the length of stay and the average spending per tourist/day. Visitors that stay overnight become tourists, according to definitions. They spend significantly more than day visitors; not only on accommodation, but also on food and beverage, souvenirs and local products. Increasing the length of stay reduces transportation, increases income and creates a more profound experience. Contacts with residents develop more spontaneously and tourists develop a sense of ownership to the area. This can also stimulate repeat visits and word to mouth publicity.
- Visitor management that makes use of the natural and cultural resources of the whole region makes zoning systems more efficient. Landscapes outside the PA can be very attractive to visitors, while being less sensitive to negative impacts.
- The cultural identity of local communities can be strengthened by linking their cultural heritage and their way of life to the site and the landscape. The community's stewardship to the landscape and its role in shaping and maintaining it should be emphasized. Storylines and themes can be developed based on community input. This will increase the community's sense of ownership for the PA.

<sup>7</sup> Tapper, R. & Font, X.: Tourism Supply chains, Report of a Desk Research Project for the Travel Foundation, Leeds, no date (www.leedsmet.ac.uk) p.3.

- This approach offers unique opportunities for interpretation: reading the landscape through the eyes of the community brings a landscape to life and creates a thorough understanding of the landscape, its ecology, its history and its cultural dimensions. The human dimension makes interpretation of natural values more accessible. Living landscapes have a higher tourism potential than landscapes that merely are open air museums.
- Communities can have an active role in visitor management. Community members, if properly trained, can be excellent guides, hosts in visitor centers, rangers, cooks, waiters and managers. Maintenance of facilities, landscape and visitor infrastructure offers another opportunity. Landscape elements like old paths can be conserved by proper tourism use. Conservation of natural and cultural heritage and income generation go hand in hand.
- Cultural events and festivals reflect and enhance the local identity, while at the same time they are unique tourism attractions. They facilitate spontaneous and real contacts between locals and visitors.
- Market access is a key problem for people in rural areas. Although local produce is often distinctive, of high quality and organic, local producers do not have the knowledge and means to get to the right markets. Visitor centers and websites seem to be good promotion- and distribution-channels for local products, but also for local accommodation and services like guiding, bike- and horse rent etc. Visitor management can bring the consumer to the producer, but also the producer to the consumer. Marked routes can include providers of local products and services and thus stimulate business development or sustain existing local businesses that are often vital to the quality of life of the community (pubs, shops). Direct sale brings producer and consumer in direct contact. Local traditions offer good interpretation tools. Craftsmen give demonstrations and sell their products. Products with a soul. Products for guests that have a great story to tell, because they discovered a very special place...

## References

- European Commission. Directorate-General for Enterprise, Tourism Unit. (2003). Using natural and cultural heritage to develop sustainable tourism in non-traditional tourist destinations. Luxemburg
- Bramwell, B. & Lane, B. (1993). Interpretation and Sustainable Tourism: The Potentials and Pitfalls. In: *Journal of Sustainable Tourism* (1/2).
- Hall, M. & McArthur, S. (2000). *Integrated Heritage Management*. London.
- Ritchie, J.R.B. & Crouch, G.I. (2003). *The Competitive Destination, A sustainable tourism perspective*. Oxon.
- Schouten, F., Beunders, N., Landre, M. & Barten, C. (2005). *Managing Visitors: helping the frail to prevail*. Breda.

# **Socio-Cultural Benefits of Pan Parks: Case Study at Bieszczady National Park, Poland**

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*Keywords: Sustainable development, dimensions, prism of sustainability, protected areas, PAN Parks.*

## **Introduction**

World Wildlife Fund's Protected Area Network (PAN Parks) aims to balance tourism and nature conservation via partnerships with conservation organizations, travel agencies, business communities and other groups on a local, national and international level. For PAN Park's verification, a protected area must meet five principles each with specific criteria (i.e., nature values, habitat management, visitor management, sustainable tourism development strategy, and business partnerships) (PAN Parks, 2005).

There are eight PAN Park locations including Russia, Finland, Sweden, eastern European countries and Italy with new parks targeted for verification in 2007. A sustainable tourism strategy is necessary to combine tourism's potential and socio-economic development with overall nature conservation goals of protected areas (Cottrell & Cutmisu, 2006). PAN Park's principles include guidelines to develop and implement a Sustainable Tourism Development Strategy. Bieszczady National Park (BNP) in Poland was verified as a PAN Park in 2002.

The goal of this pilot study was to develop monitoring of the socio-cultural benefits of PAN Park status for communities and tourism development at BNP. The central question was Does PAN Parks benefit socio-cultural development in PAN Park locations? A local PAN Park advisory group developed a sustainable tourism development strategy to link the park to tourism development in the region.

## **Methods**

Both qualitative and quantitative methods were used in the pilot-study conducted over a 5-day period in November, 2005. Eighteen semi-structured interviews were conducted among stakeholders representing BNP staff, local authorities, PAN Park business partners, tourism businesses, and NGOs to represent the PAN Parks region. Interviews explored tourism development, sustainability of tourism in the context of socio-cultural, economic, environmental and institutional capacity building and the role of PAN Parks on beliefs about sustainable tourism development. Interviews were conducted in Polish by an interpreter with translations made directly onsite. A five-page self-administered questionnaire with both English and Polish versions was administered among 36 stakeholders involved in tourism to solicit responses about familiarity with PAN Parks, PAN Parks status of BNP, participation in tourism planning, tourism to BNP, satisfaction with tourism development, and socio-demographics. Study participants were selected by the local PAN Parks coordinator via telephone a few days prior to the interview period to make an appointment.

Criteria for selection were based on sector representation (e.g, park employee, accommodation, tour operator, local government) and availability. The prism of sustainability, a holistic framework of sustainable development, was used as the theoretical lens to examine the economic, socio-cultural, environmental and institutional aspects of

tourism development (see Eden et al., 2000; Spangenberg & Valentin, 1999). As a pilot study, limitations were lack of representation of actors besides tourism or park related interests.

## Results

Results of both methods were compiled to assess the socio-cultural benefits of PAN Parks. For the qualitative, a partnership for sustainable development among stakeholders was evident supporting an overall vision of sustainable tourism development. PAN Park certification contributed most to environmental protection and an improved community attitude toward nature conservation. Socio-cultural aspects for the community were noted as public outreach, environmental education, promotion of the arts, and sustainable development of the region. Open communication between the park and local communities received mixed reports indicating a need for further awareness building among local residents. From the quantitative survey, stakeholders familiar with PAN Parks gave higher satisfaction scores for the cultural, economic and environmental aspects of sustainability than did those who did not know about it. Respondents overall were not very happy with the quality of tourism development in the region with more than 50% not satisfied.

## Conclusion

PAN Parks with its sustainable tourism development strategy process is viewed as a driving force for sustainable development combining protected area concern for environmental protection with active involvement of tourism businesses. Although cause/effect (PAN Parks concept) cannot be claimed, perhaps those stakeholders familiar with the ideals supported by PAN Parks have a better understanding of what sustainable tourism involves; consequently they tend to value the importance of the various aspects of sustainability more than those people not informed about PAN Parks. The PAN Parks Foundation will begin the systematic monitoring of the socio-economic aspects of PAN Parks certification at verified national parks across the various protected area sites.

## References

- Cottrell, S.P. & Cutumisu, N. (In Press 2006). Sustainable tourism development strategy in WWF Pan Parks: Comparison between a Swedish and Romanian National Park. In: *Scandinavian Journal of Hospitality and Tourism* (6/2).
- Eden, M., Falkheden, L. & Malbert, B. (2000). Interface. The Built Environment and Sustainable Development: Research Meets Practice in a Scandinavian Context. In: *Planning Theory & Practice* (1/2), p 259- 284.
- PAN Parks (2005). <http://www.panparks.org>.
- Spangenberg, J.H. & Valentin, A. (1999). Indicators for Sustainable Communities. Wuppertal Institute for Climate, Environment and Energy. The Prism of sustainability. <http://www.foeeurope.org/sustainability/sustain/t-content-prism.htm>

# Fostering Sustainable Regional Development with Indicator Based Certification Procedures

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*Keywords: Sustainable regional development, indicators, certification procedure, Label region, check lists, Swiss Regional Dashboard.*

**Abstract:** Sustainable regional development is the long-term aim of alpine landscape and habitats. Therefore, areas with high ecological qualities and sufficient socio-cultural potential, but insufficient economical subsistence will have to develop into respective 'Label regions'. An adequate implementation strategy should be supported by a reliable indicator system, which finally will lead to certification procedures for regional management. With the certification, 'Label regions' are identified and gain an advantage on the market for sustainable tourism.

## Introduction

Sustainable development is rooted in Switzerland's Federal Constitution as one of the goals of public-sector action. Taking the 'Sustainable Development Strategy 2002' and the relevant legislation as specific points of reference, the Swiss Federal Office for Spatial Development (ARE) has put the importance of sustainability to spatial development in concrete terms. The ARE's thinking concentrates on key aspects of sustainable development: Socioeconomic elements, urban development, land usage and mobility. The assumption is that sustainable spatial development in this sense will have a positive knock-on effect on sustainability as it relates to other sectoral policies, such as the conservation of the countryside, areas of particular historical or cultural importance and biodiversity (ARE 2005).

Given the concept of sustainability as the relevant normative base of regional development, the value-reduction of traditional alpine landscapes in terms of production mode has to be seen as a possible negative impact on sustainability which finally will lead to new regional policy strategies.

Furthermore, state subsidies are continuously decreasing in Switzerland. That is why Boesch et al. (2003) proposed a new typology of alpine regions (Fig. 1) which enables a more efficient focussing of the scarce public funds. In this new typology, intensely used alpine regions should not get subsidies anymore, because their high value added enables them to survive in the market by themselves. On the other side, depleting regions characterised by decreasing value added and ongoing depopulation should not get subsidies anymore too, because for these problems subsidies are not an efficient instrument. Certified 'Label regions' (Fig. 1) may well be a solution in order to focus the scarce public funds to locations and activities with a maximum promotion of sustainable development. In addition, 'Label regions' will have a market advantage, e.g. in nature-based tourism or in quality agricultural products. Also, in the context of governmental sustainability strategies, they can obtain state transfer payments more easily due to the approved efforts for sustainable regional development.

In this context, the key question to be answered is: What would a future certification system for these Label regions look like?

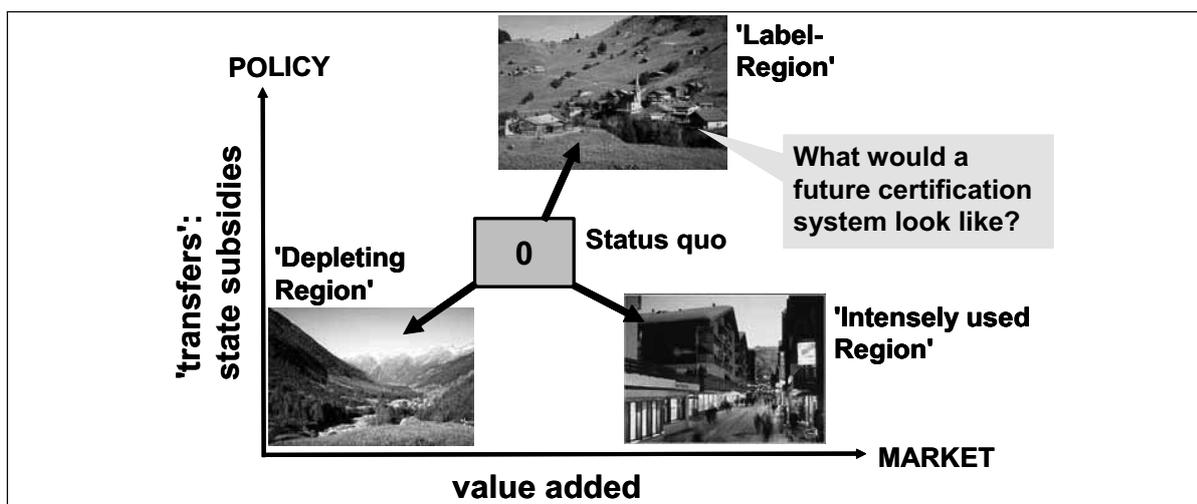


Figure 1: New typology of alpine regions (Boesch et al. 2003).

## Goals

The intended main result of this Swiss research project (Boesch et al. 2003) was to come up with regional policy recommendations, with the long-term objective of contributing to a sustainable development of alpine regions. The core element is outlining the concept of ‘Label region’, both in the context of justification (i.e. reasoning about trends, aims and goals) and in the context of operation (i.e. establishing operational tools, like indicator-based certification procedures).

## Implementation

Through a sustainability goal analysis and complementary Delphi-expert questioning an adequate set of indicators for sustainable regional development has been set up. From the plethora of certification systems a performance- and a process-oriented one have been selected as the most useful for the purpose of indicator-based sustainable regional development. With this selection not only the most important orientations (performance and process) of certification systems are covered but also the different ways of controlling quality (self-assessment and public control).

Statistical values for indicators are mostly not available or are only processed with difficulty. Normative values for indicators are often not readily at hand and cannot be ‘retrieved’ without difficulty (depending on the societal and political context). Should the availability of data actually advance to

the critical volume, then the enquiry into, and assessment of sustainable regional development by means of check lists (in which indicators are included in question form) would have to be taken into account, which would in turn be carried out by independent auditors.

An integral goal and indicator set for the three dimensions – society, environment, and economy – is particularly suited for the task of transferring the concept of sustainable development at regional level. Amongst other things, indicators are able to depict space-oriented and socio-economically relevant facts.

Depending upon the certification system that is finally adopted and the data situation on a regional level, sustainability indicators will have to be put into action in different ways.

- In a process-oriented certification system, the continual improvement of sustainable regional development will have to be verified. For self-declaration, check lists can be used to assess the indicators development.
- In a performance-oriented certification system, data for each single sustainability indicator will have to be retrieved for comparison with comparable regions, with a certain time frame and/or with the threshold value needed to keep.

A combination of the strengths of both certification systems is in our opinion the most suitable solution for the identification of ‘Label regions’ as thereby the participation of the concerned region as well as the accuracy of performance data are guaranteed.

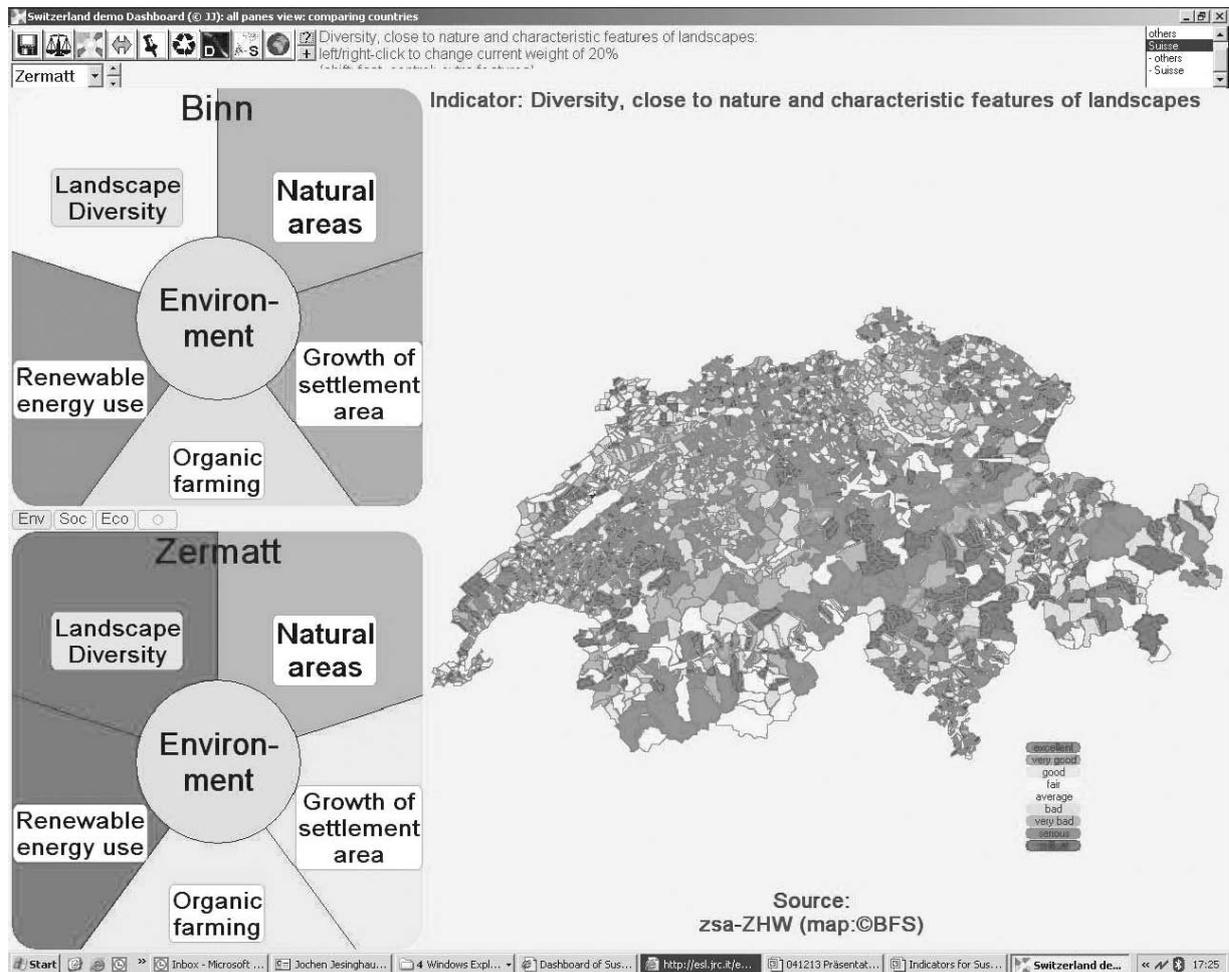


Figure 2: Swiss Regional Dashboard.

## Visualisation

Visualisation of indicator results with colour-coded pie charts and maps is suitable for decision-makers and others interested in sustainable regional development (Jesinghaus 1999). For this end, the Swiss Regional Dashboard (figure 2) has been developed, aggregating indicators and combining them with GIS maps. Benchmarking can guide the search for best practice. However, data availability is the limiting factor at local level for many of the core indicators selected within the case-studies.

## Acknowledgements

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## References

- ARE (2005). Spatial Development Report 2005, Bern.
- Boesch, M. et al. (2003). FUN-Alpin – New Types of Alpine Landscapes, Universität St. Gallen, <http://www.fwr.unisg.ch/> (Projekte: NFP48).
- Jesinghaus, J. (1999). Dashboard of Sustainability, IISD Consultative Group on Sustainable Development Indicators, <http://esl.jrc.it/envind/mdg.htm>.

## Large Scale Protected Areas + Tourism = Regional Development?

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*Keywords: Large Scale Protected Areas, regional economic impacts, value-added analysis.*

**Abstract:** The results of this research clearly indicate that tourism in Large Scale Protected Areas can generate considerable benefits for the regional economy, especially in peripheral and structurally disadvantaged regions. For instance, in Mueritz National Park it is estimated that guests whose key motivation for visiting was the brand 'National Park' (a share of nearly 44% of all 390 000 visitors in 2004) created the equivalent of 261 full time job equivalents. In Berchtesgaden National Park only about 10% of 1.13 million visitors in 2002 have been attracted by the Protected Area brand, generating about 206 jobs. In the regions of Hoher Flaeming and Altmuehltal 211 respectively 483 jobs were created by Nature Park related tourism. But in the latter cases these impacts are largely not ascribable to the status as a Protected Area.

As indicated by this research, more importance should be attached to the issue of tourism in Large Scale Protected Areas. Financial benefits of tourism in National Parks and Nature Parks may contribute to increasing acceptance of nature conservation. Therefore decision-making processes in nature protection and regional tourism policy need to more fully incorporate aspects of durable economic development. Therefore decision-making processes concerning nature protection and tourism policy need to more fully incorporate the concept of sustainability, whether with regard to nature-based and ecotourism in Protected Areas in general, or with specific regard to Nature Parks and conservation as well as development of cultural landscapes therein.

### Introduction

What kind of regional economic benefits can tourism induce in National Parks and other Protected Areas? This is the central question of our conference contribution.

On an international level Protected Areas have represented most important tourism destinations for a long time, notably the category of National Parks e.g. in North America, Africa or Australia. Only recently, in Central Europe Large Scale Protected Areas have been integrated into tourism planning strategies as part of a holistic approach that seeks to account for both economic and ecological well-being. The regional economic impacts on local communities as a result of tourism in Protected Areas are of particular importance, although they cannot be covered sufficiently because of data gen-

erating problems. So far this topic formed the focal point of interest of only a few research studies (Küpfer 2000, Job et al. 2003) which can hardly be compared because of their different methodological approaches. For this reason a Research and Development project funded by the German Federal Ministry of Environment was carried out in one National Park and two Nature Parks during 2004 in Germany. The target was to generate a standardized procedure for estimating the economic benefits of tourism in Large Scale Protected Areas. The introduced method of a value-added analysis could be a basis for future studies with respect to the comparability of their results.

This contribution is structured as follows: section II deals with the economic perspective on Large Scale Protected Areas in general, while section III explains the relationship between Large Scale Pro-

tected Areas and tourism in detail; section IV introduces the method used for estimating the economic impacts and section V then shows the results of the case studies; section VI discusses the outcomes and section VII finally gives a short summary and some reasoning for future research.

### **Large Scale Protected Areas in a Regional Economic Perspective**

In principle Large Scale Protected Areas are a kind of public good characterized by their non-excludability as well as their non-rivalness, i.e. it is not possible to exclude an individual from their consumption. Furthermore there does not exist any process of price-building in the market for these goods as it is common for private goods (e.g. clothing, furniture). Hence it is difficult to determine the financial value of public goods, e.g. of a National Park.

Economic values of Large Scale Protected Areas comprise different components: use values and non-use values. The latter are characterised by the dependency of their revenues on the direct 'utilisation' of the reserve like forestry. Use values can be further distinguished in three types of values: the so-called existence values are closely associated with the intrinsic significance of nature. They reflect the benefit of knowing that the Large Scale Protected Area exists even though the probability of visiting the Protected Area or getting direct use of it in another way is quite low. Rather similar are the intentions of the bequest values which refer to the will of some people to protect e.g. special natural phenomena for future generations. At last the option values are also related to the future possibilities of using Large Scale Protected Areas respectively their resources, e.g. because of its biodiversity as an untested gene pool for pharmaceutical or agricultural products (WCPA 1998).

Within the use values a distinction has to be made between direct and indirect ones: While the latter comprise primarily ecological functions like e.g. avalanche or watershed protection, which are usually unmeasured by any market, the former are of particular interest for a local economy. Amongst others they include activities such as agriculture, hunting, recreation and tourism – values derived

from the direct use of a Large Scale Protected Area. The focus of the following case study will be on this last issue, i.e. on the direct use values and especially the economic effects created by tourism investigated in terms of a value-added-analysis.

### **Large Scale Protected Areas and Tourism**

Large Scale Protected Areas are normally characterised by a size of more than 10 000 ha and an established full time management. Their primary function is the conservation of valuable nature landscapes, but also of man-made environments which are not in excessive use. In Germany there are three categories of Large Scale Protected Areas: National Parks (IUCN category II), Biosphere Reserves (VI) and Nature Parks (V). In principle Protected Areas categorised this way are provided with positive attitudes. Especially National Parks represent a well-known brand standing for intact nature landscapes, one of the most important unique selling propositions in tourism nowadays. That is why beside their original dedication nearly all Large Scale Protected Areas are used in a more or less touristic fashion.

In general the relationship between nature conservation and tourism can be seen as ambivalent: on the one hand tourism is often based on a sound environment, whereas on the other side unmanaged tourism may affect natural processes adversely. In spite of the numerous drawbacks, tourism can also have some positive effects on the nature. On the part of the local population missing acceptance for the goals of nature conservation often can be found. Many inhabitants of buffer zones of Large Scale Protected Areas feel that they are restricted in their private, but also job-related actions through the conservation restrictions. Positive economic impacts and possibilities to participate in tourism-related jobs and income help to show that regions with Large Scale Protected Areas do not necessarily end up as black holes of economic development. Therefore tourism represents an opportunity to conserve endangered ecosystems while it may also have positive effects on regional development. Because of their mostly peripheral position – mostly within economically laggard regions

– it is thought about Large Scale Protected Areas as a conscious instrument for sustainable development, even in Central Europe (e.g. Hammer 2001). For this reason the main emphasis of regional studies on the impacts of tourism are their effects on income and employment.

With a value-added analysis it is possible to estimate the effects, which emanate from special supplies – in our case: Large Scale Protected Areas. Added value thereby means the sum of wages, salaries and profits. For the calculation, results of visitor counts that comprise total number of visitors as well as structural data on visitors and interviews on expenditures of visitors have to be linked to the detailed analysis of selected companies. The latter is needed to reveal the cost structures of the businesses profiting from tourism demand and provides data on the amount of added value that is gained from touristic turnover. Additionally, to these first-round effects, it is accounted for effects in the second round when directly benefiting companies buy inputs from other businesses.

## Methods

The application of input-output analysis or similar advanced research methods fail as a result of non-existing appropriate premises like e.g. regionalised input-output-tables and the associated prohibitive expensive data gathering. For this reason one National Park and two Nature Parks were examined by a value-added analysis within the R&D project (see map 1). The thereby selected Mueritz National Park in the north-east of Germany represents the central tourist attraction of the region in the south of Mecklenburg-Western Pomerania. Such a dominant role of the Protected Area as a destination's highlight is rarely the case: for instance the alpine Berchtesgaden National Park is just one among several attractions in the region that is one of the oldest tourism destinations in Germany with a tradition over 150 years old. The situation in Berchtesgaden will also be considered in this paper because of a nearly identical pilot study conducted in 2003 (Job et al. 2003).

Because of the numerous Nature Parks in Germany (95) with their multifaceted structures it is hard to draw general conclusions about this category of

Large Scale Protected Areas. Several factors were included to select the two case study examples Altmuehltal in Bavaria and Hoher Flaeming in Brandenburg, e.g. the size of the conservation area or their spatial relation to more densely populated areas. The particular extent of the four investigation areas is defined by the community boundaries: They include all municipalities located within the conservation area and those which are intersected by the boundary of the Large Scale Protected Area. In the case of the National Parks also communities outside the conservation area will be included, if they are adjacent to the territory of the park.

One critical factor of the research is the total number of guests visiting the reservation (both day trippers and tourists). In Germany no access limitations for Protected Areas exist. Therefore reliable figures about visitor numbers are hard to assess. At the moment only unsatisfying approximate estimates can be obtained. Especially, for statistical purposes this fact aggravates sound analysis as the basic population is unknown. To solve this problem a random sample survey that is obtained by seasonally distributed counts and short interviews at different sites within the Large Scale Protected Area, accounting for possible activities is advocated. Moreover this method covers the ratio between day trippers and overnight staying tourists. The results of the counts in combination with the findings of the short interviews enable a reliable estimation of the touristic turnovers on the basis of the daily expenditures – surveyed in the long interviews – to all Park visitors. Basis for weighting of the results are temporal, spatial and structural factors as well as parameters caused by the weather.

Altogether eight steps are necessary to calculate the economic impact in terms of full time jobs with the findings of the different surveys: by multiplication of the visitor number and the average daily expenditures (differentiated by the varied target groups), the gross turnover of all park visitors can be calculated. Afterwards these total revenues are analysed by the different profiting sectors with their special VAT and value added rates. Thus it is possible to identify the importance of different visitor groups for a Large Scale Protected Area. The next step is to estimate the net turnover by subtraction of the VAT from the gross turnover. The direct

income of the region (i.e. wages, salaries and profits) derives from the multiplication of the net turnover and the respective value added rates. The indirect effects on income of preliminary businesses have also been calculated in a separate step. The sum of the direct and indirect income effects is the added value within a region and measures the total impact on regional income. At last to get the equivalent of full time jobs the total income effects have to be divided by the average regional social income per person. This results in an indicator describing the hypothetical number of individuals who could live on the basis of the income created by tourism in a Large Scale Protected Area.

## Results

### National Parks Mueritz/Berchtesgaden

For Mueritz National Park about 390 000 visitors could be estimated in 2004, while there were approximately 1.13 million visitors in Berchtesgaden National Park in 2002. The visitors of both reservations were divided into two groups with reference to the National Park as the decisive criterion to visit the region (Job et al. 2003). Using this procedure results in a proportion of 44% of National Park tourists in a narrower sense in the Mueritz region. The other 56% are designated as non-National Park tourists. 77% of all interviewed visitors in the National Park Mueritz knew the category of the Large Scale Protected Area correctly. Also the question about the role of the status as a Large Scale Protected Area can be assessed positively: for about 57% of the guests the status of a National Park affected their decision to visit the region to a high or very high degree. Rather different are the findings in this context for the National Park Berchtesgaden: just about 18% of the visitors answered that question in the same way described above. Nevertheless 57% of them knew the right category, although altogether just about 10% of all interviewed visitors could be designated as National Park tourists in a narrower sense. This severe discrepancy in the structure of the visitors can be explained by the different history of the National Parks, but also because of the very long tradition of Berchtesgaden as an alpine tourism destination where the Park only plays a subordinate role.

All visitors of the National Park Mueritz generate an annual gross turnover of approximately 13.4 million euros. The value added rate for day trippers was about 37%, for the overnight tourists of about 40%. Thus a sum of income (direct and indirect) of 6.9 million euros can be estimated that is caused by tourism in the National Park. About two-thirds of this sum account for the direct side and one-third for the indirect side of income. Taking into account only the National Park tourists in a narrower sense (generating an income of 2.9 million euros) and the average gross regional income per person in the Mueritz region (10 918 euro in 2004), the tourism originally induced by the Large Scale Protected Area creates 261 full time job equivalents. The results for the National Park Berchtesgaden are stated as follows: with a gross turnover of about 9.3 million euros and a total added value of 4.6 million euros as well as an average gross regional income per person of 22 500 euros (2002), 206 full time job equivalents are generated by the National Park tourists in a narrower sense. This less total effect – despite of the more than two-times higher attendance compared to the National Park Mueritz – reflects the rather low share of true National Park tourists in a clearer way.

### Nature Parks Altmuehltal/Hoher Flaeming

Approximately 300 000 guests visited Hoher Flaeming Nature Park in 2004, whereas this figure is more than three times higher in Altmuehltal (about 910 000 visitors). From a tourism perspective Hoher Flaeming Nature Park is characterized by its proximity to Berlin and therefore the majority of day trips (83% share of all trips) are mostly undertaken from there. With a share of 63% the day trippers in Nature Park Altmuehltal are also the dominant visitor group, but the overnight staying tourists have a greater effect than in Hoher Flaeming. Compared to the category of National Parks in the case of the Nature Parks there is no distinction between the ‘Nature Park tourists’ and ‘non-Nature Park tourists’ because the mostly diffuse border will pose problems in the operationalisation.

To estimate the equivalents of full time jobs created by the complete tourism in both cases, the average gross social income per person in Bavaria (21 214 euros) and Brandenburg (14 182 euros) have

	Altmuehltal	Hoher Flaeming	Berchtesgaden	Mueritz
Visitors	910 000	300 000	114 000* (1 129 000**)	167 000* (390 000**)
Ø Daily expenditures per person	EUR 22.80	EUR 20.60	EUR 44.27	EUR 33.80
Gross turnover	EUR 20.7 million	EUR 6.2 million	EUR 9.3 million	EUR 5.6 million
Direct income	EUR 6.9 million	EUR 2.0 million	EUR 3.1 million	EUR 1.9 million
Indirect income	EUR 3.4 million	EUR 1.0 million	EUR 1.5 million	EUR 0.9 million
Sum of direct/indirect income	EUR 10.3 million	EUR 3.0 million	EUR 4.6 million	EUR 2.9 million
Full time jobs	483 persons	211 persons	206 persons	261 persons
*National Park tourists in a closer sense				
**All National Park visitors				

Table 1: Economic effects of tourism in four Large Scale Protected Areas in Germany (Job et al. 2003; Job et al. 2005).

been applied. For the Nature Park Hoher Flaeming a total added value of 3.0 million euros can be derived from the gross turnover of about 6.2 million euros. This leads to approximately 211 full time job equivalents within the investigation area. In Nature Park Altmuehltal a gross turnover of 20.7 million euros causes a total added value of about 10.3 million euros and hence an equivalent of 483 job equivalents. A final overview of the founded estimates gives table 1.

## Discussion

As the results stated above show, primarily two variables influence the regional economic impacts significantly: firstly the total number of visitors and secondly the extent of their average daily expenditures during the stay. Especially the former should be estimated most accurately because deviations of this figure have a strong effect on the subsequent calculations. Furthermore the structure and the particular level of spending have to be surveyed separately for each region as it is not possible to generalise present findings at the moment. The surveys confirm previous studies in a way that tourists staying overnight – even when neglecting their expenditures on accommodation – cause a higher added value than day trippers.

For this reason overnight staying tourists seem to be the more worthwhile target group, especially because of their different spatial behaviour that agrees in a better way with the concern of conservation of a Large Scale Protected Area. This aspect implies two dimensions: first the absolute number of visitors could be diminished by a higher propor-

tion of this segment as a result of their longer duration of stay (quantitative dimension). To achieve this, it could be expedient to upgrade the existing supply and thereby make new sources of income accessible (qualitative dimension). Packages in the tourism sector normally consist of many actors which have to collaborate positively to submit their offers. That is why close partnerships between all actors including the tourism, but also the conservation sector are necessary and e.g. successfully implemented within the region of National Park Mueritz (Job et al. 2005).

## References

- Hammer, T. (ed.) (2003). *Großschutzgebiete – Instrumente nachhaltiger Entwicklung*. München.
- Job, H., Metzler, D. & Vogt, L. (2003). *Inwertsetzung alpiner Nationalparks. Eine regionalwirtschaftliche Analyse des Tourismus im Alpenpark Berchtesgaden*. In: *Münchener Studien zur Sozial- und Wirtschaftsgeographie* (43). Kallmünz.
- Job, H., Harrer, B., Metzler, D. & Hajizadeh-Alamdary, D. (2005). *Ökonomische Effekte von Großschutzgebieten. Untersuchung der Bedeutung von Großschutzgebieten für den Tourismus und die wirtschaftliche Entwicklung der Region*. In: *BfN-Skripten* (135). Bonn-Bad Godesberg.
- Küpfer, I. (2000). *Die regionalwirtschaftliche Bedeutung des Nationalparktourismus untersucht am Fallbeispiel des Schweizerischen Nationalparks*. In: *Nationalparkforschung in der Schweiz* (90). Zernezh.
- WCPA (World Commission on Protected Areas) (ed.) (1998). *Economic Values of Protected Areas: Guidelines for Protected Area Managers*. Gland.

# Key Success Factors for Nature-Based Tourism in Protected Areas of the Alps

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## Introduction

The role of parks in regional development varies widely across the Alps. In some regions, parks have truly become catalysts for economic development, while in others they struggle to make a substantial contribution (see Hammer 2003, 205). When discussing economic benefits created by protected areas, tourism is clearly one of the main branches where these benefits are being generated. Against this backdrop, the survey SUSTOURPARK gathers first-hand information from Alpine park managers and tourism representatives on successful park tourism.

## Methods

A pool of 78 relevant park managers and tourism representatives from Austrian, French, German, Italian, and Swiss protected areas was identified in cooperation with the Alpine Network of Protected Areas. These experts on park management and tourism in protected areas were then asked to participate in a two-round online-Delphi-survey. While the comparably small number of 27 returns does not allow representative conclusions, the survey succeeded in identifying important goals and framework conditions of park management schemes, trends and needs of park tourism, park-related management tools, and critical factors for success as perceived by experts working in the field.

## Results

In the eyes of park managers, the most important goals of park management in the Alps are currently and in the future the promotion of nature-based

tourism, environmental education, and the promotion of sustainable regional development (see figure 1). Traditional core objectives of protected areas such as habitat and species protection are rated as being of secondary importance, which is due to the perception that these goals are safeguarded under current circumstances.

In the future, the experts consider scenic landscape, good accommodation facilities at fair prices, guest-houses featuring regional products and good service to be crucial factors in visitors' decision making processes. In the context of a much voiced call for upgrading tourism facilities in the Alpine region, it is interesting to note that participants of the survey considered park tourism to be mostly directed towards simple and middle standard accommodations.

Park representatives are calling on the tourism industry to actively develop products that are tailored to the specific needs of certain target groups. Protected areas, in their eyes, need to be incorporated even more into the regional chain of tourist services and experiences.

However, one still needs to keep in mind that successful tourism in protected areas is not so much defined by increasing visitor arrivals as by ecological and socio-cultural impact mitigation. The quality of the visitor experience thus remains the only unique selling proposition for protected areas in a competitive tourism market, while aiming at price competitiveness would jeopardize their ecological and sociocultural basis.

For implementing these park objectives and resolving conflicts between conservation and tourism, managers have a variety of instruments at their

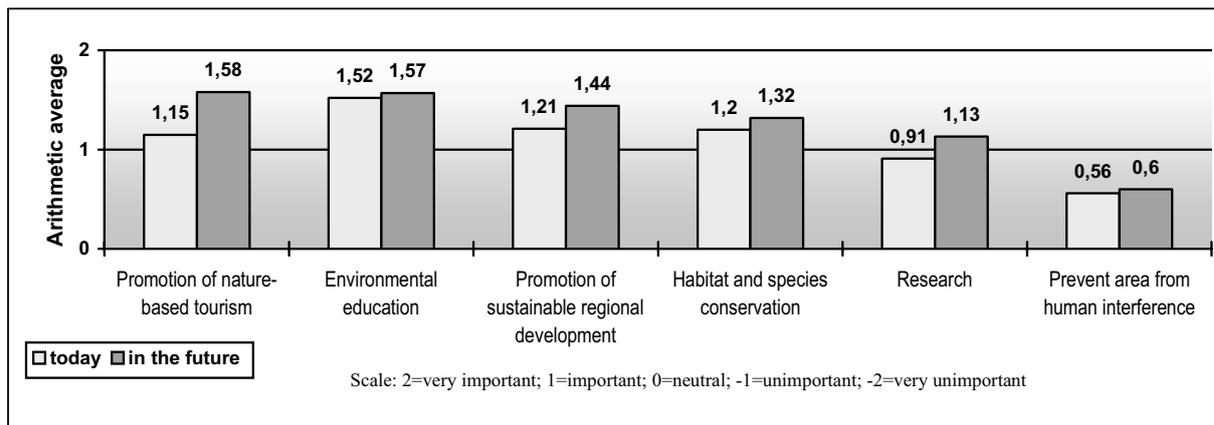


Figure 1: Current and future objectives of protected area management.

disposal, ranging from ‘soft’ tools such as environmental information, cooperative agreements between interest groups and economic incentives to ‘hard’ tools such as management of visitor flows and legal restrictions and regulations. In general, park managers opted for a mixed approach with an emphasis on ‘soft’ instruments, while still acknowledging the usefulness of top-down-instruments for certain conflict areas.

On a regional scale, one single park manager obviously is not capable of covering all aspects of park management in-depth. Therefore, the role of park management in regional governance needs to be interpreted as a platform for exchange of conservation expertise and experience (see Mose & Weixlbaumer 2003, 88). In view of international cooperation and exchange of experience, networks like the Alpine Network of Protected Areas or those affiliated with EU-programs such as INTERREG or LEADER seem to be firmly established and well used; more than 70% of park managers claim to have benefited from one of these networks.

Five success factors for regional cooperation between park management, other stakeholders and the public have been identified, including:

- participation and representativeness,
- open-mindedness of key actors,
- balance of top-down- and bottom-up-processes,
- cooperation of different interest groups in joint projects,
- and the establishment of a park supervisory board involving a broad range of local stakeholders.

SUSTOURPARK shows that park managers of the Alpine region are very well aware of the contribution to regional development that is being expected from their protected areas. In the future, park and tourism authorities will need to combine efforts to be able to tap the full potential of these protected areas. For the parks, this means to appropriately address problems of visitor impacts and to support tourism stakeholders in creating nature-based activities and packages. For the regional tourism industry, it means to increasingly incorporate protected areas in their range of offers. Due to their positive image and high profile among park representatives, transnational networks pose potential platforms for mutual exchange and capacity building.

## References

- Crompton, J. L. (2001). *Parks and Economic Development*. Washington D.C.
- Eagles, P. F. J. & McCool, S. F. (2002). *Tourism in National Parks and Protected Areas – Planning and Management*. Oxfordshire.
- Mose, I. & Weixlbaumer, N. (2003). *Grossschutzgebiete als Motoren einer nachhaltigen Regionalentwicklung? – Erfahrungen mit ausgewählten Schutzgebieten in Europa*. In: Hammer, T. (Hrsg.) (2003). *Grossschutzgebiete – Instrumente nachhaltiger Regionalentwicklung*, p 35-95. München.

## **Walking towards Concerted Management of Hiking-Path Networks: A Well Engaged but Tricky Challenge for French Alpine Protected Areas**

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### **Introduction**

Hiking-path networks are intimately related to the rural areas they cross. They are also used by the managers of nature reserves to enhance their acceptance by, and co-operation with, the local and mainly rural areas within which they have been established. The managerial approach of such networks is currently based on continual consultation with stakeholders and can be considered as a means of mediating in local-area issues.

The encouragement of collective action is part of an effort to establish co-operation between local areas. This should enable unilateral, fragmented, area-based approaches to be transformed into global, interconnected, negotiated ones in which local areas develop in conjunction with one another.

Nevertheless, whereas different original and successful initiatives have been set up in many French alpine protected areas, the definition of common objectives regarding the accessibility and the maintenance of these networks is still delicate to implement.

Besides, the different types of concrete interventions and strategies developed by protected areas managers and local stakeholders directly concern the visitors of such areas. Actually, these operations influence the way that hikers, climbers, farmers, hunters, etc. use the networks while the combination of these operations also contribute to build global monitoring tools like the observatory of the natural reserves of Haute-Savoie (France). This observatory is supplied with many data produced by several surveys addressed to visitors.

The stake of the management of visitors' flows thus can not be separate from one of the most important goal of protected areas: their integration in the local areas within which they have been created and their participation to local dynamics (social, cultural, economical, etc.).

Then, the basic but complex question we want to develop here is the following one:

Can hiking path networks contribute to local development and to enhance local acceptance of protected areas, when these networks form the subject of collective management strategies?

The main objective of this proposition is thus to go through concerted initiatives about hiking-path networks in protected areas and visitor monitoring operations, in order to bring into light some major methodological trends which may improve the management of protected areas within a local and sustainable development perspective.

### **Methods and Results**

This paper first considers the emergence of participation and collective action issues in the French territorial planning policy and more precisely in regard to the management of natural protected areas. It implies a brief historical overview of procedures and measures adopted and applied both by French institutions and natural protected areas.

These contextual elements introduce the presentation of some strategies developed by protected areas (Natural Reserves of Haute-Savoie, National Park les Ecrins). We will particularly focus on the original and complex device elaborated in the Nat-

ural Reserves of Haute-Savoie. This tool contributes to a global monitoring of the different users of hiking-paths and more generally of the whole protected areas. Our observations are essentially based on textual analysis of discourse obtained from local actors during personal interviews. We also explored the constitution and functioning of management processes and tools by the mean of an active collaboration with managers of protected areas, and thanks to regular participations to field sessions and meetings with technicians and members of the administrative staff of protected areas.

Finally, this communication reconsiders the efficiency of these strategies and interventions aimed at the improvement of the local acceptance of protected areas. It also underlines the importance of a global and regulated management of hiking-path networks, which have to be thought as a major heritage for local inhabitants as for all types of visitors.

## References

- Beuret, J.-E. (1999). Petits arrangements entre acteurs: les voies d'une gestion concertée de l'espace rural. In: *Nature, Sciences, Sociétés* (7/1).
- Kalaora, B. (2003). Concertation, outil ou art de vivre ensemble? In : *Montagnes Méditerranéennes* (18).
- Mermet, L. (1992). *Stratégies pour la gestion de l'environnement. La nature comme jeu de société?* Paris.
- Mignotte, A. (2004). *Entre fragmentation et interconnexion territoriale. La gestion des réseaux de sentiers en espaces naturels protégés rhône-alpins (Réserves Naturelles de Haute-Savoie, Parc National des Ecrins, Réserve Naturelle des Gorges de l'Ardèche)*. Doctoral thesis Joseph Fourier University, Grenoble.
- Mignotte, A. & Vodinh, J. (2003). *Quelle démarche globale de suivi pour les réserves naturelles de Haute-Savoie? Réflexions autour de la construction d'un observatoire*. In: *Actes du 9ème Forum des gestionnaires. Les suivis scientifiques pour la gestion des espaces naturels*, Paris, 26/03/2003. Quétigny.

## Protected Areas as a Tool for Regional Development?

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*Keywords: Protected areas, paradigm shift, integrated nature conservation, regional development.*

**Abstract:** The last decades have witnessed significant changes in protected area policies in Europe as well as throughout the world. As a result, the total area set aside has more than quadrupled, and today almost 14 percent of the world's ecosystems are protected compared with only about 3 percent in 1970. In Europe, first and foremost, large protected areas with an integrative character gain importance increasingly. Based against this background, this paper on the one hand deals with the multifunctionality of post modern large protected areas as well as with the paradigm shift in protected area policies in Europe. On the other hand this paper analyses the advancement and future perspectives of these policies, and reflects upon the current use of protected areas as tools for a sustainable regional development.

### Introduction

In the course of the global debate on sustainability large protected areas with an integrative character are becoming increasingly significant. The expectations on protected areas are outgrowing the mere species and area protection functions. The current paradigm shift according to the Durban Accord (2003) demands the simultaneous satisfaction of diverse functions. This change in area protection policy – often seen as progress – bears however a multitude of dangers and unresolved questions respectively: Are all types of natural and cultural landscape represented? Are they adequately protected? Are those that claim to be a model landscape for sustainable regional development living up to their promise? Are there too many protected areas that exist merely on paper?

What are the formulas to meet these dangers and to find the answers to the unresolved questions respectively? In other words, keeping in mind the innovative paradigm of area protection and regional development, where does the potential of large protected areas lie?

The goal of this paper is to lead to this set of questions and issues. From a theoretical perspective of the paradigm shift this paper should further estab-

lish the basis for discussing the practical examples laid out in the consecutive papers treating area protection policy.

Multi-functionality as a basis for the continued paradigmatic advancement

Large protected areas based on current scientific knowledge are rarely mono-functionally oriented, but rather often fulfill a multitude of different tasks simultaneously. Today the general consensus is that the following goals and functions, which leave the traditional nature protection paradigm behind, are the center of attention:

- Preservation and advancement of biodiversity – regulatory function
- Regional and supra-regional welfare-effects – habitat function
- Gene pool as well as natural disaster-prevention – support function
- Sustainable regional development – development function
- Environmental education and training – information function

The multi-functional orientation of large protected areas bears in equal measure enormous challenges and substantial conflict-potential. The multitude

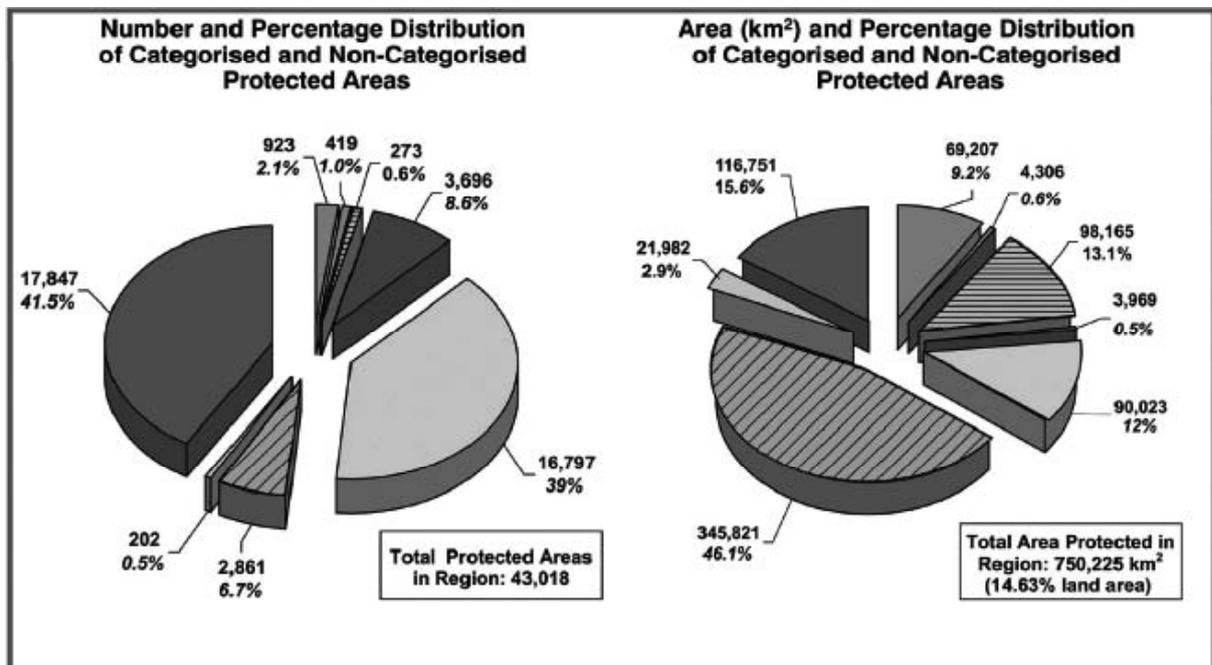
of diverse expectations for these protected areas has great potential to create conflict about the very purpose of beneficial use of the area. This conflict can break out because of opposing interests between the protected area and its surroundings or even due to clashing interests within a protected area. The spatial overlapping of nature protection and tourism or of nature protection and agriculture exemplifies this issue. Today, it is therefore all the more important to spatially coordinate and steer the diverse goals and functions with all of the different available tools. This is particularly important when it comes to defining and designating different categories of protected areas.

### International and national categories of protected areas – the IUCN category V

Throughout the world the role of protected areas is covered by very diverse nationally and regionally protected area concepts. Europe on its

own is covered with protected areas of great – oftentimes confusing – diversity. In Germany there are for instance eleven different types of protected areas (cf. Büchter & Leiner 2000), in Austria there are twelve (cf. ÖROK 1997, 18). In order to increase internationally the transparency and at the same time the comparability of protected areas with regards to their goals, the IUCN developed a worldwide category-system of protected areas.

If one examines the spatial dimension of each category in Europe, the significant predominance of Category V becomes a striking fact (protected landscapes) by taking up the largest surface ratio by far (cf. figure 1). Even if, according to the official IUCN-diction, all six categories are considered to be of equal relevance, one cannot deny a certain image-hierarchy between the different categories. In contrast to the prestigious and financially lucrative Category II (national park), the Cate-



Region contains: Albania, Andorra, Austria, Belgium, Bulgaria, Bosnia and Herzegovina, Croatia, Czech Republic, Denmark, Estonia, Faroe Islands, Federal Republic of Germany, Finland, France, Gibraltar, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Macedonia, Malta, Monaco, Netherlands, Norway, Poland, Portugal, Romania, San Marino, Slovakia, Slovenia, Spain, Svalbard and Jan Mayen Islands, Sweden, Switzerland, United Kingdom, Vatican City State (Holy See), Yugoslavia,



Figure 1: Distribution of the IUCN categories of protected areas in Europe (Chape et al. 2003, 40).

gory V (protected landscape) receives only little attention (the reasons for this see: Mose & Weixlbaumer 2006).

The ‘lack of clarity’ with regard to the national and international categories of protected areas can be especially well exemplified with the Category V. According to the IUCN this category describes a protected area, “the management of which is mainly oriented towards the protection of a landscape or a marine area and also serves recreation” (EUROPARC & IUCN 1999, 30). It is an area, “where the interaction of man and nature has formed a landscape of a particular character over the course of time, with outstanding aesthetical, ecological and/or cultural values and oftentimes exceptional biological diversity. The undisturbed continuation of this traditional interaction is vital for the protection, conservation and enhancement of the area” (ibid.).

The disparity of large protected areas that fall into Category V is substantial. The classifications according to national law include Parco Naturale Regionale (Italy), Parc Naturel Régional (France), Parc Natural (Spain), Parque Natural (Portugal), Naturpark (Austria and Germany), Regionaler Naturpark und Naturerlebnispark (Switzerland), Area of Outstanding Natural Beauty und National Park (Great Britain). Lastly, cross-nationally the category of the biosphere reserve is also part of Category V. Thereby the multitude of terms does not just reflect different linguistic views, but also cultural, legal and most of all, conceptual views. For comparison purposes in literature cf. Henderson 1992, Schmidt 1995, Weixlbaumer 1998, 2001, Mose & Weixlbaumer 2002, Hammer 2003.

The large protected areas that fall into Category V of the IUCN, are not just of interest because of their large surface ratio, but also due to their underlying conceptual views. It is widely recognized that biosphere reserves, nature parks, regional parks etc. are considered to be the essential category of the dynamic-innovation paradigm. This paradigm is characterized by a moderate anthropocentrism, where man plays an essential integrative role.

## Paradigm shift in protected area policy

Depending on the latest trend of the understanding of nature and the zeitgeist respectively, different basic principles in area protection policy have developed within Europe and beyond (e.g. North America). Taking national park policy as an example, Henderson (1992) analyzed substantial characteristic differences between the United States and Canada as well as Great Britain. Referring to the 19th century he basically distinguishes between the preservationist-movement “protection without use” in the United States and the conservationist-movement “protection through use” in Canada and Great Britain. On the one hand wilderness was conserved, and on the other hand natural landscape was cultivated and value was added by tourism. Preservation and protection with little understanding for integration, i.e. without seriously thinking beyond the boundaries of the protected area, were the basic elements of the concepts of protected areas until the middle of the 20th century. By the end of the 20th century things had changed, at least in the United States and Canada, decisively. Today the trend in both countries is headed towards ecosystem-based management (Slocome & Dearden 2002, 297ff.), even though this term is not always explicitly used. The ecosystem-based management approach replaces the isolated nature protection aspect with an integrative approach, which was also expressed in the Durban Accord (2003).

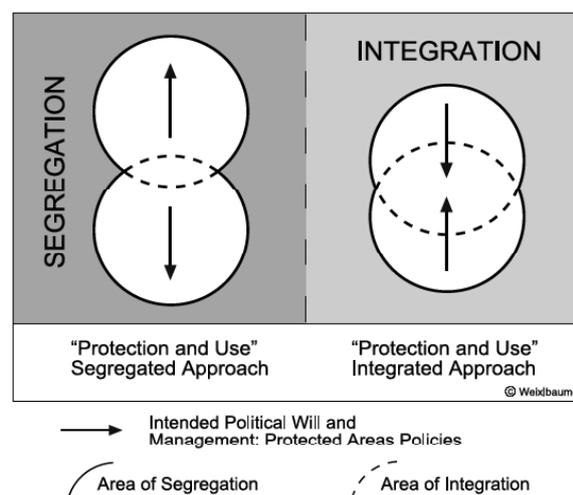


Figure 2: The main paradigm strands in area protection policy.

Based on this background, one has to conclude that there are essentially two different concepts of area protection that can clearly be separated: On the one hand is the paradigm of the static-preservation approach (segregation approach) and on the other hand the paradigm of the dynamic-innovation approach (integration protection) (cf. figure 2, Weixlbaumer 2005).

The following attributes characterize the static-preservation approach:

- Based on the dichotomy of “protection- and pollution area,” nature protection and business areas are spatially separated i.e. bell jar and reservation policy respectively: Protected areas have only little contact with the outside world.
- It is a matter of sectoral protection that only targets certain species and is, subsequently, area-oriented. The two main tools of classical nature protection are species and area protection. The mechanistic worldview is the ideological basis of this approach.
- The basic principle of species and area protection is often pursued with a rather rudimentary management structure, that oftentimes is situated only on a supra-regional level (e.g. NGO or national government office). Furthermore the management frequently has no choice but to view this task as one of many others. Norms exist – management however plays no essential role with the exception of national parks of the Category Ia and Ib. Nature protection happens through idealizing – primarily to preserve the subjects of protection.
- The shaping of norms and the designation of protected areas happens top-down. It is a sort of “sovereign” nature protection, mostly prohibitive in nature.
- The acceptance of all interested parties (e.g. abutters to the protected area) is not scrutinized in this normatively driven approach.
- Nature protection is a spatially and temporally basic principle that attempts to overcome the “protection and pollution area” dichotomy.
- The basic principle of sustainable development is expressed by turning from pure area protection towards procedural protection. Beyond that the principle is expressed by the aimed model effect for areas and procedures outside the protected areas. The transactionistic world view is the ideological basis of this approach.
- Integrative protection and landscape development measures are usually achieved by an adequate management structure (on location and oftentimes additionally by a supra-regional alliance or a governmental office). Nature protection becomes more and more professional.
- Nature protection by using a policy-mix is considered to be a societal task (top-down and bottom-up approaches are intertwined). Therefore measures are less normative, instead they build on a high degree of voluntariness.
- The acceptance of all relevant people is essential. In general it is the result of a cooperative effort of all parties involved.

Then again the paradigm of the dynamic-innovation approach (integration approach) is characterized by the following basic principles and attributes:

The background to this dynamic-innovation approach, as opposed to the static-preservation approach, is the thought of “Mitwelt” (in the sense of Meyer-Abich 1990). A moderate anthropocentrism, declining any radical forms, has priority over a non-anthropocentric view. Nature can only be protected and advanced by man in a sustainable way if mankind considers itself to be a part of nature. In this way, mankind takes on the inside perspective to its protected areas. Therefore the criticism of “science-obsessed nature protection” does not apply to this approach (cf. Plachter 1991). In fact, research and management have to be oriented in an inter- and transdisciplinary way in order to give enough consideration to integrative basic principles and attributes. A stronger recognition of the human science component is explicitly required (cf. Erdmann 2000).

The outcome of this is the notion of area protection, which in Europe is above all oriented towards the sustainable development of strongly-affected landscapes, with an explicit innovation

element. The main tool of this approach is in many cases the large family of “nature parks” (and the IUCN-Category V respectively), that experienced a boom Europe-wide from the 1960’s onward.

Even if in reality this generalized polarization is not all that black and white, one can more or less describe the traditional area protection policy as being a “protection and pollution area ideology”. Due to an increase in knowledge in the nature protection realm, the dynamic-innovation approach has been established in Europe in recent years. The challenge of this approach is to make the integration of different interests (in use) possible. This approach attempts to satisfy the interests of protection and use on the “experimental ground” nature park in a socially, economically and environmentally sound way. In other words it is the goal to conserve and form the regulatory, habitat, support, development and information functions of protected areas, while simultaneously using large protected areas beyond their boundaries as tools of sustainable regional development.

In the practical everyday world of area protection, the strategic measures and main paradigm strands presented in this paper interact in a complementary way. Depending on the requirements of nature protection and the regional situation, both approaches can be legitimately used.

Based on its basic principles, attributes and “background-philosophies”, Europe’s booming landscape, nature, regional and biosphere parks, as well as numerous national parks (that are not part of the IUCN-Category II) of the past decades have to be attributed to the dynamic-innovation approach. If one excludes national parks, there are roughly 600 managed protected areas that fall into the IUCN-Category V in Europe alone.

## Outlook

In the last two decades large protected areas have increased their importance within Europe. This is not just true because of the substantial surface ratio in various European countries, but is also true with regard to the diverse functions of large protected areas. In connection with the above is the obvious paradigm shift, which is in a strict sense a paradigm complement. Accordingly the advancement

function of protected areas has received an increasingly significant importance as opposed to the protection function. An immediate expression of this fact is the downright boom of protected areas of the IUCN-Category V, which are all oriented towards the integration of protection and use functions. In Europe this is on a regional level particularly the very heterogeneous nature and regional park setting. On an international level one has to mention the prestigious biosphere concept. Examining its functions of (according to UNESCO) development, conservation, as well as logistical support, one can see that it represents the implementation of the sustainability notion into practice (cf. ÖAW 2005).

For the future advancement of protected area policy it will be important to primarily pursue the path of stronger integration of protection and use in the years to come. In addition, large protected areas ought to be used consistently (also) as tools for a sustainable regional development. As the previous practical experience shows, the approach of a dynamic-innovation area protection seems to be an increasingly suitable conceptual framework which can highlight practicable models for mankind to treat the landscape that we live in and that we use, be it as an individual or be it as a society. In short this framework should enable us to try out sustainable ways to live and do business.

## References

- Büchter, C. & Leiner, C. (2000). Schutzkategorien im Naturschutzrecht. Systematische und kritische Übersicht. Kassel.
- Chape S. et al. (comp.) (2003). 2003 United Nations List of Protected Areas. Cambridge.
- Erdmann, K.-H. (2000). Naturschutz – quo vadis? Anregungen zu einer Neuausrichtung. In: PGM (143), p 80-85.
- EUROPARC & IUCN (1999). Richtlinien für Management-Kategorien von Schutzgebieten. Interpretation und Anwendung der Management-Kategorien für Schutzgebiete in Europa. Grafenau.
- Hammer, T. (Hrsg.) 2003. Großschutzgebiete – Instrumente nachhaltiger Entwicklung. München.
- Henderson, N. (1992). Wilderness and the Nature Conservation Ideal: Britain, Canada and the United States Contrasted. In: AMBIO (21/6), p 394-399.
- Meyer-Abich, K. M. (1990). Aufstand für die Natur. Von der Umwelt zur Mitwelt. München.

- Mose, I. & Weixlbaumer, N. (Hrsg.) (2002). Naturschutz: Großschutzgebiete und Regionalentwicklung In: Naturschutz und Freizeitgesellschaft (5). Sankt Augustin.
- Mose, I. & Weixlbaumer, N. (2006). A New Paradigm for Protected Areas in Europe? In: Mose, I. (ed.). Protected Areas and Regional Development in Europe. Towards a New Model for the 21st Century? London. (forthcoming).
- ÖAW (Österreichische Akademie der Wissenschaften) (Hrsg.) (2005). Leben in Vielfalt. UNESCO-Biosphärenreservate als Modellregionen für ein Miteinander von Mensch und Natur. Wien.
- ÖROK (Österreichische Raumordnungskonferenz) (Hrsg.) (1997). Naturschutzrechtliche Festlegungen in Österreich (135). Wien.
- Plachter, H. (1991). Naturschutz. Stuttgart.
- Schmidt G. (1995). Naturschutzplanung in Spanien. Verbindung zwischen Naturschutz und umweltverträglicher Entwicklung – ein Modell für die ländlichen Räume Europas? In: Naturschutz und Landschaftsplanung (27), p 69-75.
- Slocombe S., Dearden Ph. (2002). Protected Areas and Ecosystem-Based Management. In: Dearden & Rollins (eds.). Parks and Protected Areas in Canada. Planning and Management, p 295-320. Oxford-N.Y.
- Weixlbaumer, N. (1998). Gebietsschutz in Europa: Konzeption – Perzeption – Akzeptanz. In: Beiträge zur Bevölkerungs- und Sozialgeographie (8). Wien.
- Weixlbaumer N. (2001). Gebietsschutzpolitik in Italien und Frankreich – Welcher Umgang mit welcher Natur? In: Berliner Geographische Arbeiten (91), p 97-105.
- Weixlbaumer, N. (2005). „Naturparke“ – Sensible Instrumente nachhaltiger Landschaftsentwicklung. Eine Gegenüberstellung der Gebietsschutzpolitik Österreichs und Kanadas. In: Mitteilungen der Österreichischen Geographischen Gesellschaft (147), p 67-100.

## **Overcoming National Park Conflicts by Regional Development: Experiences from the Doñana Area in Southern Spain**

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*Keywords: Land use conflicts, regional development, Doñana National Park, Spain.*

**Abstract:** The number of protected areas in Spain has increased considerably in the last two decades. The country's membership in the European Union favoured an important economic growth and social change and was also fundamental for the evolution of environmental policies and the exchange of management concepts for protected areas. The intensive use of natural resources was followed by a growing awareness of land use conflicts and the necessity of nature conservation. The area around the National Park of Doñana in Andalusia, presented in this contribution, is an outstanding example of a long history of competing land use interests and recent efforts to overcome conflicts introducing new concepts of regional development based on the principals of sustainability and participation. A regional label highlights the national park image to stimulate environmental sensibility and marketing. The local population increasingly perceives a new consciousness of their common problems, opportunities and responsibility.

### **Introduction: The protected areas policy in Spain**

Since the adherence of Spain to the European Union, a significant consolidation and regionalization of the country's environmental policy takes place and is reflected by an amazing proliferation of protected areas of different categories. The localization of most areas with some kind of protection in disfavoured rural districts requires a progressive transition from traditional policies of passive conservation to new approaches of active conservation, integrating the local population and surrounding territories and converting the protected areas into instruments of sustainable development (Troitiño et al., 2005). A recent shift of paradigm can be observed in protection policies in Spain towards new instruments of environmental planning and management taking into account the close interrelations between protected natural areas and their social and economic environment. Even the national parks are no longer seen as areas isolated from the rest of the territory, and their peripheral protection zone is increasingly regarded as part of a surrounding area of socioeconomic influence offering opportunities for the promotion of sustainable development.

The beginning processes of democratization, social and economic change and the political status of Autonomous Communities granted to the regions gave a fresh impetus to the amplification and declaration of national parks and to the diffusion of other categories of protected areas. The transfer of responsibilities for environmental legislation to the regional level caused a real boom of protected areas and also a change of their objectives and tasks. The priorities shifted gradually from landscape and ecosystem conservation to regional development. The regionalization process has not only led to an institutional change of the Spanish Network of National Parks, but also to a parallel evolution of regional networks and innovative types of protected areas characterized by an increasing integration of development functions. The case of Andalusia demonstrates the enormous expansion of the protected areas based on the own legal framework of 1989. The National Park of Doñana in the Guadalquivir river marshlands at the Atlantic coast is surrounded by nature parks and becomes incorporated into the Network of Protected Areas of Andalusia (RENPA).

The Action Plan published by Europarc-Spain (2002) provides orientations and recommendations on different planning and management processes in the protected areas and seeks to increase citizens'

awareness and participation concerning conservation and development decisions. In this document, protected areas are regarded as basic instruments for territorial planning and as diffusion centres of new sustainable development strategies. The Spanish Action Plan assesses that the switch towards the planning of protected areas integrated into a wider territorial framework is still very limited and more conceptual than real, so that a specific document about the present difficulties and opportunities to integrate protected natural areas in regional planning has been elaborated recently (Europarc-Spain, 2005). Environmental and regional planning legislation are responsibility of the autonomous regions. For some protected areas, the sub-regional planning level has gained greater importance. This is the case in the area of socioeconomic influence of the Doñana National Park, where a specific document for regional planning (Junta de Andalucía, 2004) was designed to adjust a previous document to the changing legislation in Andalusia and to take up the recommendations elaborated by an International Commission of Experts concerning the severe land and water use conflicts and development opportunities (Comisión Internacional de Expertos, 1992). The new legal framework for planning and sustainable development in the Doñana area is based on a detailed characterization and analysis of present uses, infrastructure and demands around the national park and contains ambitious objectives and action lines to make nature conservation and different economic uses and opportunities compatible.

## Methods

The study of land use conflicts and regional development in the Doñana area forms part of a long term research line of the author about concepts of economic upgrading of natural and cultural heritage in Europe, especially in Spain. The objectives are also combined with own recent analysis about the role of regional products in processes of regional development. Experiences and results of earlier studies dealing with problems of intensive agriculture in the Doñana area (Voth 1998 2004a) were of great importance for the ongoing research activities around the National Park. The evaluation of publications and planning documents, as well

as interviews with regional experts are the main methods used. A long term field observation and documentation in the park area and frequent personal contacts with local actors are essential for the application of qualitative research methods focussed on the area's evolution in time.

## Land use conflicts around the Doñana National Park

The Doñana area is certainly one of the best studied and documented territories in Spain, and the large National Park has become the country's most famous protected area on the international level, but also the most conflictive and difficult to manage. First initiatives to protect part of the Guadalquivir river marshlands were directly related to the foundation of the World Wildlife Fund (WWF) in 1961. The wetlands, pine forest and coastal dune ecosystems are of vital importance for many migrating birds and for the survival of the Iberian Lynx. Thanks to international pressure and financing, a growing area could be protected, leading to the declaration of almost 35,000 hectares of Doñana as a national park in 1969, amplified to more than 50,000 hectares in 1978. The protection initiatives have saved an important part of Doñana from being transformed for intensive agriculture, mass tourism, urbanization and traffic infrastructure, but nature conservation was not compatible with the dominating economic development policy of that time. The marshlands in the triangle between Sevilla, Huelva and Cádiz were an objective of several development plans competing directly with the conservation interests. Intensive irrigation and the modernization of rice growing in the Northeast part of the marshlands (Voth 1998) as well as the massive groundwater extraction for an agricultural colonization scheme at the Northern park border threatened the complex ecosystem. The deforestation caused by the dynamic expansion of export-oriented strawberry growing on the coastal plains also affected the Doñana area (Voth 2004a). The implementation of the industrial growth pole in Huelva and new seaside urbanizations called for the construction of a road connecting the cities of Huelva and Cádiz, but these plans were never put into practice. The renouncement of

this road and of other large infrastructure projects in the park area is still used by local interest groups as an argument for claiming a continuous reception of different kinds of compensation.

The parallel but uncoordinated promotion of the National Park, intensive agriculture and mass tourism in neighbouring or even overlapping areas caused serious problems still not fully resolved. Traditional activities, an increasing number of modern land use interests and external impacts put the Park under pressure (figure 1). Severe land use conflicts characterized the relationship between the Park and the local population and have led to an unsustainable situation requiring new development concepts and institutions (Voth 2004b). In 1998, a mining accident caused a destructive contamination of the Guadiamar River, an important catchment area of the Doñana wetlands, and demonstrated the vulnerability of the National Park.

Nevertheless, this threat once again directed the political and scientific attention on Doñana and attracted new funds for conservation and development.

Even substantial compensations could not guarantee the acceptance of the protected area, and traditional concepts based on the conciliatory effects of subsidies turned out to be inadequate as a long-term solution. Some authors denounce not only the lack of information and participation of locals in planning processes, but also the 'culture of assistance' becoming firmly fixed in the population living around protected areas (Troitiño et al. 2005). In the case of Doñana, a compensation policy attempted to overcome the long lasting conflicts between nature conservation and economic interests, and people continuously expected the arrival of new 'development plans' to generate a new economic upturn, as Ojeda (1993) demonstrated in his

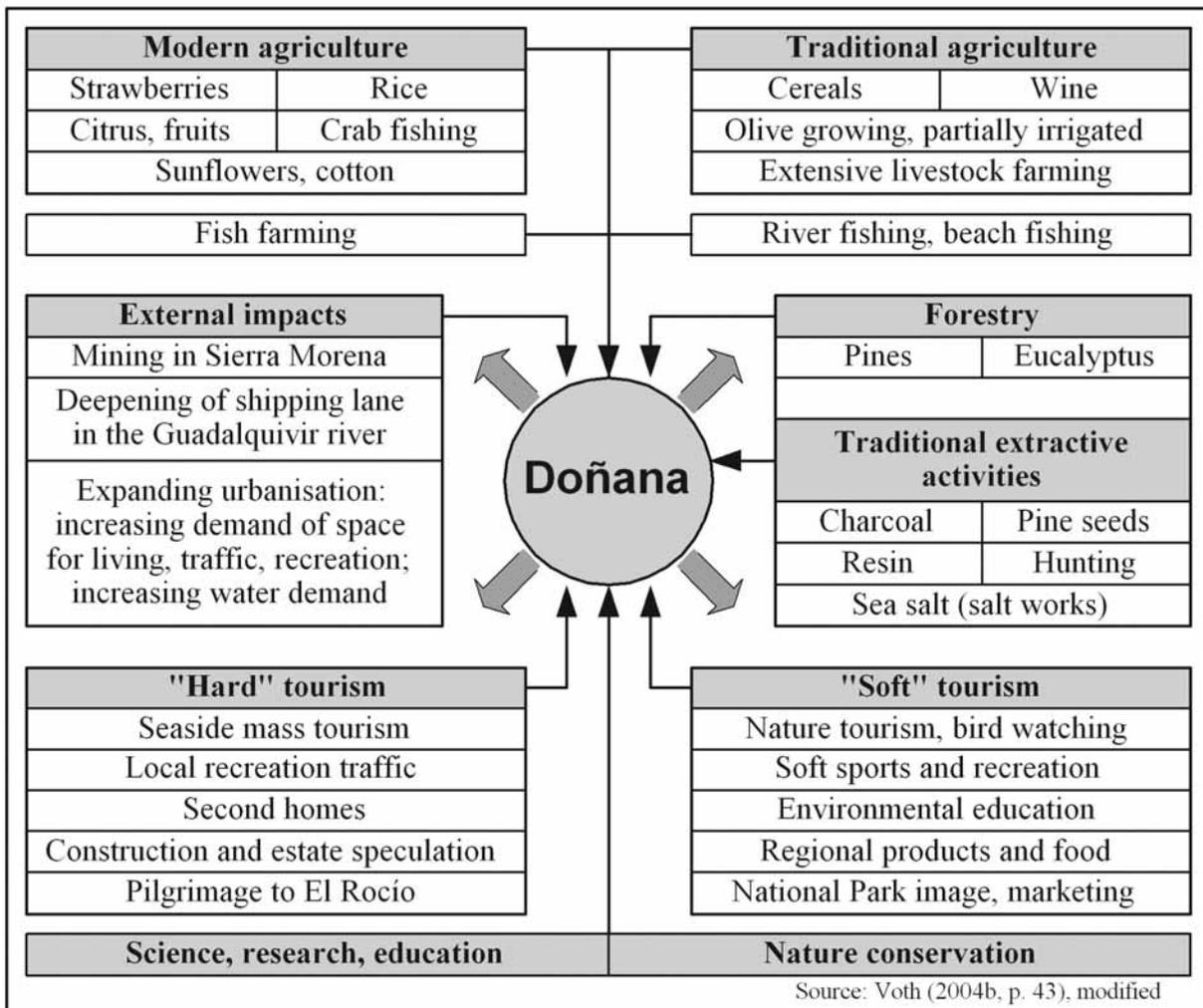


Figure 1: The diversity and interrelationship of land use interests in the Doñana area.

detailed analysis. Decades of uncoordinated sector policies strengthened the deep rooted idea of local communities to have a legitimate claim to compensation for renouncing a complete transformation of the area for intensive agriculture and tourism development. New concepts were needed.

### **New concepts of sustainable development in the Doñana area**

Increasing land use conflicts forced the regional administration to look for an alternative way of development for the Doñana area. The judgement of the International Commission of Experts (1992) in charge of an independent evaluation study tried 'to make compatible the justifiable aspirations of the inhabitants in municipalities surrounding Doñana for a better life with an integral conservation of Doñana's ecosystems, from a perspective of sustainable development. The experts were convinced that the conservation of the Park could represent a comparative advantage for the area regarding the expanding market of nature tourism and the market segments for agricultural products with a quality label or a denomination of origin. To achieve this goal, they also recommended a general improvement of the infrastructure in the area and the realization of an ambitious programme of education and professional training. The start of a Plan for Sustainable Development (PDS) in 1993 was the logical consequence of the analysis of problems and opportunities. With the financial support of EU funds, the regional administration implemented the plan and created the Foundation 'Doñana 21' to promote social participation and public and private actions for the sustainable development of Doñana and its area of socioeconomic influence. Taking the role of a new development agency for the 14 municipalities constituting the area of Doñana, the Foundation supports coordination and cooperation among different entities and social agents and stimulates the participation and own initiatives of the local population.

In a workshop organized by the Foundation 'Doñana 21' in 1997, local experts and the mayors of all municipalities within the socioeconomic influence area approved a 'Doñana Local Charter for Sustainable Tourism', considering that "the present

trend in tourist demand, in accordance with the notion of sustainable development, requires a product which is integrated into the particular characteristics of the area." The existence of the protected area is promising a life quality of great attractiveness for new seasonal or permanent residents, so that nature conservation is not only perceived yet as an obstacle to economic development (Elbersen & Prados 1999). Also the tourist flows have grown considerably, and the National Park receives more than 400,000 visitors annually, although less than 20% of them participate in paid tours inside the Park. Analysis of visitor statistics show a significant seasonality and spatial concentration of visitor flows on the mayor visitor centres (Litago et al. 2003). Public relations of the park administration are directed to tourists as well as to residents. Great efforts of environmental education are made to improve people's comprehension and estimation of their park. Recent problems like the introduction and diffusion of exotic species (e.g. American tortoises) and of new aggressive sports (e.g. quads) demonstrate the necessity of innovative approaches in the management of visitor flows and public information. Originally, the primary objective of public use concepts was to offer facilities of environmental interpretation and education, but the increasing demand for other recreational activities and additional services requires a change in public use planning and gives private enterprises new opportunities. The number of visitor centres and information points has increased drastically in recent years, most of them managed by the park administration, but also through service concessions. Doñana already shows a certain saturation of this type of infrastructure and a great variety of other tourist attractions and facilities (figure 2). Recently emerging centres of rural tourism indicate an alternative way outside the traditional seaside urbanizations. Tourism in and around the protected areas offers news opportunities of economic development and plays an important role in the diffusion of the regional image. Of all thirteen Parks composing the Spanish Network of National Parks, Doñana is the only one possessing the entire collection of protection titles: after its important enlargement of 1978, the Doñana was recognized as Biosphere Reserve in 1981, Wetland of International Importance in 1982, Protected Area with European Di-

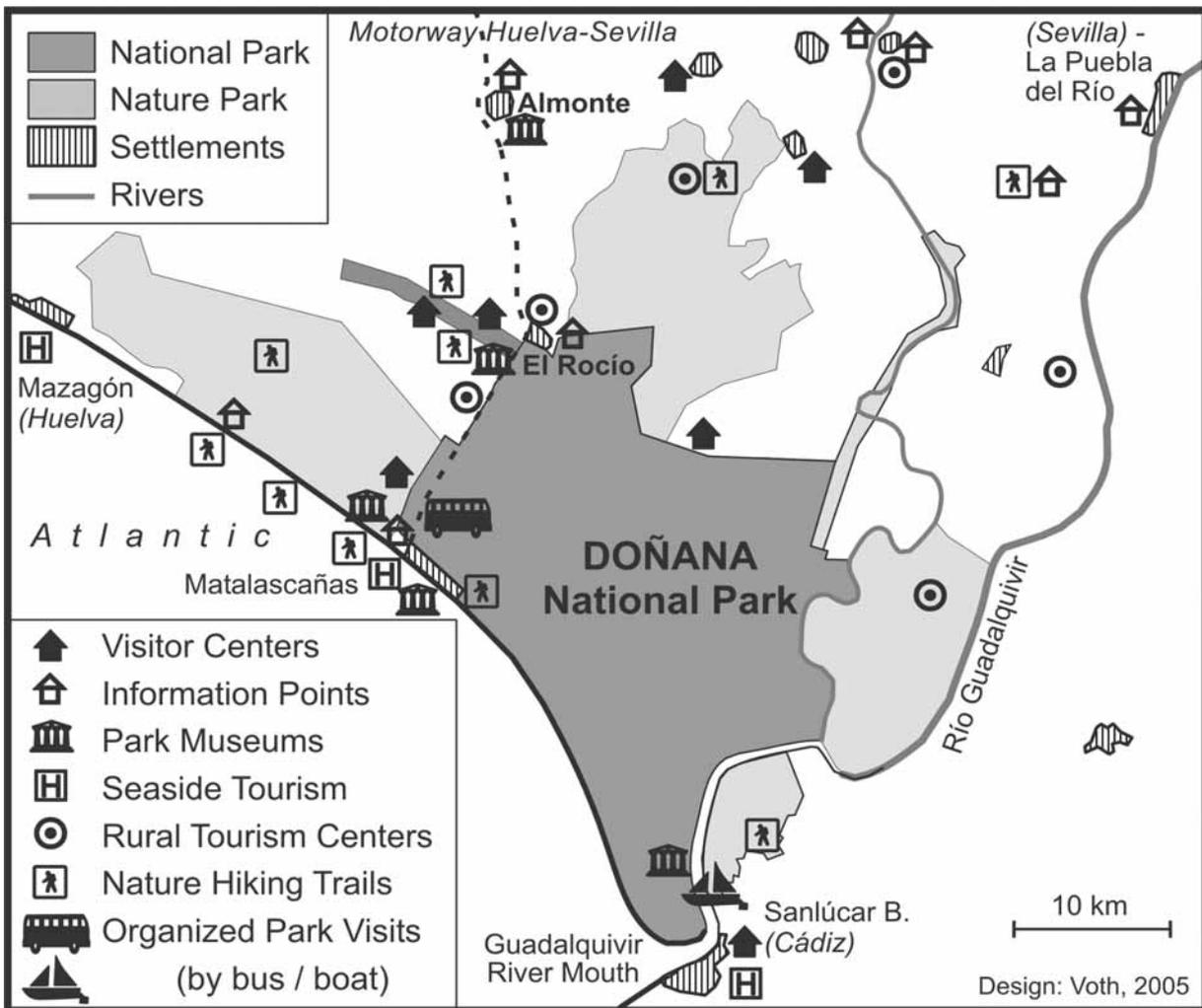


Figure 2: Tourism infrastructure around the Doñana National Park.

ploma since 1985, Special Protection Area for Birds in 1988 and UNESCO World Heritage Site in 1994. The outstanding international prestige of the protected areas offers best opportunities for establishing a concept of regional marketing using the name of Doñana. Therefore, one of the innovative initiatives carried out in the framework of the Plan of Sustainable Development (PDS) is the quality label 'Etiqueta Doñana 21' created by the Foundation in 1998 to enhance the differential values that the companies of the Doñana area offer. This sign of environmental respect and prestige is expected to improve the external image of Doñana and the companies' competitiveness and market access for their products and services. The distinctive label is granted only to local companies that incorporate and combine systems of quality and environmental management and fulfil detailed requisites for certification. Enterprises that like to obtain the label

have to adopt ISO regulations and to demonstrate a continuous improvement of their environmental behaviour in a process evaluated by external certification. Up to 2005, seventeen enterprises and institutions already received the certification, and forty others have started the evaluation process to obtain it. Most of these enterprises are dedicated to agricultural production and marketing (35%), services related to tourism (32%) and to handcraft and industrial activities (12%). The regional name of Doñana also is presented as a quality label on different international tourist fairs and used for destination marketing.

The introduction of the Etiqueta Doñana 21 label is only one piece in a wide set of measures covered by the PDS that consists of several programmes: the improvement of the water management, the structures in agriculture and the sustainable use of natural resources are specific objectives of the Plan, as

well as fomenting tourism and other economic activities and infrastructure compatible with environmental conservation. The recommendations of the International Group of Experts and main objectives of the first PDS are put into practice with the assistance innovative concepts and important financial funds. The considerable economic change that can be observed in the park region improves the conditions for a change of attitudes towards the protected area. After a successful realization and evaluation, a second PDS for the Doñana area is being elaborated in 2006 and based on the local Agenda 21 process. The PDS must integrate all territorial and sector policies related with the park area. The participation of local actors and rural development groups in the elaboration process and management of the plan is of fundamental importance in order to overcome persisting land use conflicts by regional development. The complex interrelationship between different actors and the recent experiences with new concepts of park management and marketing are of significant interest for further studies and a potential application in other regions with protected areas.

## References

- Comisión Internacional de Expertos sobre el Entorno de Doñana (1992). Dictamen sobre estrategias para el desarrollo socioeconómico sostenible del Entorno de Doñana. Sevilla.
- Elberson, B. & Prados, M.J. (1999). Desarrollo rural y calidad de vida en el entorno del Parque Nacional de Doñana. In: *Revista de Estudios Regionales* (55), p 47-76.
- Europarc-Spain. (ed.) (2002). Action Plan for the Protected Natural Areas of the Spanish State. Madrid.
- Europarc-Spain. (ed.) (2005). Integración de los espacios naturales protegidos en la ordenación del territorio. Madrid.
- Fernández, J. & Pradas, R. (2000). Historia de los Parques Nacionales españoles. Vol. 1. Madrid.
- Fundación Doñana 21. (ed.) (1998). Foundations for a Model of Sustainable Tourism in Doñana. Huelva.
- Junta de Andalucía. (ed.) (2004). Plan de Ordenación del Territorio del Ambito de Doñana. Sevilla.
- Litago, J., Moral, M. & Marquiegui, I. (2003). Evolución del número de visitas al Parque Nacional de Doñana. In: L. Júdez Asensio et al. (eds.): Valoración del uso recreativo del Parque Nacional de Doñana, p 7-30. Madrid.
- Ojeda Rivera, J.F. (1993). Doñana: Esperando a Godot. Sevilla.
- Troitiño Vinuesa, M.A. et al. (2005). Los espacios protegidos en España: significación e incidencia socioterritorial. In: *Boletín de la A.G.E* (39), p 227-265.
- Voth, A. (1998). Die Industrialisierung der Reiswirtschaft in den Marismas des Guadalquivir in Spanien. In: *Europa Regional* (6/4), p 35-43.
- Voth, A. (2004a). Erdbeeren aus Andalusien. Dynamik und Probleme eines jungen Intensivgebietes. In: *Praxis Geographie* (34)(3/2004), p 12-16.
- Voth, A. (2004b). Nationalpark Doñana – Nutzungskonflikte und Ansätze nachhaltiger Entwicklung. In: *Geographie heute* (25/225), p 42-47.



Relevance and a Sense of Connection  
in Canada's National Parks

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Steve Whittingham (Chair)

# Parks Canada's Framework for Recreational Activities

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*Keywords: Recreational activities, assessment, national parks, integration, involvement.*

## Introduction

Parks Canada is mandated – through national policy – to assess the recreational activities that take place in national parks, national historic sites, national marine conservation areas and historic canals.

Parks Canada is committed to providing visitors with opportunities to participate in recreational activities that will allow them to experience and connect with Canada's national parks, national historic sites, national marine conservation areas and historic canals. Working with our partners and the public, Parks Canada needs to provide high quality recreational opportunities in ways that offer visitors opportunities to learn, experience and connect with these special places while, at the same time, protecting the natural and cultural resources that make them special.

To do this, Parks Canada is developing a new way to make decisions about recreational activities. It is agreed that the process to make these decisions needs to be nationally consistent, transparent and open to the public and that it should be adaptable and flexible enough to allow decisions to reflect the local context. In addition, the new decision framework needs to help managers make decisions about new or changing activities.

## Methods

The following five principles provide the context and vision for the assessment of recreational activities in national marine conservation areas, national parks and national historic sites managed by

Parks Canada. These principles aim to promote decision-making that is nationally consistent, transparent and open to the public and reflects the local context.

### **Parks Canada's core principles for assessing recreational activities are...**

#### Respect for natural and cultural resources

The activity supports and contributes to the protection, maintenance and enhancement of ecological integrity of national parks, commemorative integrity of national historic sites or sustainable use of national marine conservation areas. Parks Canada and its partners continue to seek innovative solutions to mitigate or avoid undesirable environmental, social or cultural impacts.

#### Promote and enhance public understanding, appreciation and enjoyment

The activity enriches understanding and appreciation by providing engaging opportunities for visitors to connect with Canada's natural and cultural heritage. The activity enhances public enjoyment and negative impacts on the experience of other visitors. The activity fosters support, involvement and further discovery of natural and cultural resources and their associated heritage areas.

#### Value and involve local communities

The activity respects the rights and values of local communities, property owners and Aboriginal peoples. The activity supports the long-term economic, social, cultural and environmental benefits to these groups, as well as the Parks Canada mandate. Opportunities for recreational activi-

ties in national parks, national historic sites, national marine conservation areas and historic canals will complement those offered by local and regional industries, interests and groups.

#### Evoked a sense of place

The activity evokes a sense of place. It provides visitors with the opportunity to discover what makes the national park, national historic site, national marine conservation area or historic canal unique. It respects the importance that Canadians place on these special places. When visitors learn about and experience these activities, they believe them to be consistent with their view of Canada's national parks, national historic sites, national marine conservation areas and historic canals.

### Results

The Recreational Activities Assessment Framework was developed as a tool to help managers make better decisions about recreational activities. It can be used in one of two situations:

#### Management Planning Processes

The first situation is during the management planning process. Using the Framework in this context provides an opportunity to assess the suite of recreational activities offered and how they work together. It also provides an opportunity to improve overall performance of the three core elements of the mandate in relation to recreational activities.

When, a planning team identifies an area of concern related to a recreational activity, that activity should be assessed during the planning process. The Recreational Activities Assessment Framework should be used and stakeholders (from the protection, tourism and education sectors) should be involved. The planning team does not need to assess every recreational activity occurring at a site during management planning, but must give consideration to the entire context in which recreational activities occur to ensure that all areas of concern are addressed.

#### Single Activity Assessments

The second situation is between planning cycles (which occur every 5 years). This may be required if: (a) managers are approached about a new activ-

ity; (b) an activity changes significantly and new concerns emerge; or, (c) new concerns about an existing activity emerge that are significant enough to be addressed immediately. In this situation, the Recreational Activities Assessment Framework should be used to assess and make a decision about the activity. Key stakeholders should be involved in this application of the Framework.

Communicating about decisions related to recreational activities assessments is an important part of their success. As a rule of thumb, people who have an interest should have an opportunity to be involved in assessing the activity. The broader public should have an opportunity to provide input to the process during existing public forums (e.g. management planning, annual planning forum, etc.).

## Healthy Parks for People

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*Keywords: National parks, visitor experience, health, sustainability, community involvement.*

### Introduction

This project is a three-year initiative at Prince Edward Island National Park, which engages a range of local, national and international interest groups and partners in the development of new options for memorable visitor experiences that contribute to improved health of the park ecosystem and the visitor.

Prince Edward Island National Park is the 3rd smallest national park in Canada, yet it receives the highest national park visitation outside of the mountain parks in the Canadian Rockies. Its small land base, composed of spectacular beaches, dynamic coastal dunes, wetlands, salt marshes and forest habitat, is congested with more than 1,000,000 visitors annually.

Visitor use is focused on swimming, camping and hiking. These activities are supported by extensive park infrastructure and facilities, which have been developed over the last 70 years. Access for visitor use is via the Gulf Shore Parkway, a two-lane highway which extends along the Park shoreline, a distance of 28 kilometers. Constructed in the 1950s, this highway guides visitors to expansive parking areas, beach facilities, beach access points, trailheads and campgrounds. Its use as a transportation corridor for vehicles has encouraged access by family vehicles and has contributed to the establishment of visitor use patterns that are threatening the ecological integrity of the Park ecosystem and limiting options in terms of quality visitor experience, not to mention the negative impact the highway has had on the use of alternative means of transportation.

In addition, over the past 35 years the Park has acquired a large buffer land base adjacent to the Park boundary (Crown Land holdings). While these

lands are not yet gazetted as part of the National Park boundary, they do present an opportunity to eliminate parking infrastructure and facilities inside the Park boundary by relocating them to the adjacent Crown lands. The elimination of parking areas would result in restored habitat and enhanced ecological integrity inside the National Park. The relocation would also provide an opportunity to address patterns of visitor use that are negatively impacting on the Park's ecological integrity.

Given that the natural processes of land and sea are continuing to erode the shoreline and threaten facilities and infrastructure, the timing is right to address negative effects in patterns of visitor use. By introducing changes to the Gulf Shore Parkway that support the reduction of parking, active transportation and habitat improvement, Parks Canada will foster a culture of use that results in mass public contribution to the health and stewardship of the environment. The changes will create new options and activities for the healthy enjoyment of truly memorable visitor experiences.

This project will engage non-traditional sectors such as consumer businesses, health sector, athletes, the performing arts, permanent and seasonal residents, aboriginals, seniors and youth. They will contribute, together with visitors, tourism operators and government, to the work of creating and sustaining a healthy park for people

### Methods

The project vision is for park visitors to enjoy memorable experiences in ways that enhance the Park's ecological integrity and its surrounding environment, while offering them new and healthy ways to experience and learn from the Park. Visi-

tors' experiences will lead to a sense of attachment to the national park, to an interest in learning more about its natural resources and to a commitment to their on-going protection.

**Objectives of the project are:**

- To enhance the protection and sustainability of the National Park ecosystems.
- To promote the role and involvement of the general public, Park users and collaborators in protecting and sustaining the environment.
- To create new, high quality visitor experience options that promote and support healthy lifestyles and a healthy environment.
- To reduce visitor parking inside the National Park, and
- to increase public awareness, understanding and support for Parks Canada's role and leadership in developing sustainable tourism initiatives.

**Criteria for Success include:**

Multi-use corridor is constructed and available for public use.

Number of people using the corridor by activity.

Number of vehicles entering and traveling in the National Park.

Percentage of visitor satisfaction with the transportation options.

Level of comprehension by visitors of messages conveyed by Park interpretive programs.

Community and visitor attitudes toward changes to the visitor experience approach as measured by frequency of positive media statements.

Participation of communities and partners in delivery of Parks Canada project initiatives.

Indicators of improved ecological integrity of the Park's ecosystem, for example: number of asphalt parking spaces, area restored to natural state, number of wildlife mortalities etc.

Field Unit's revenue is not negatively impacted by implementation of this project and its associated options.

**Results**

Critical success factors include:

A communications strategy that builds local, provincial and national support for this project, and recognition of its goals as a healthy option for the visitor and a positive contribution to the Park's ecosystem.

Social science research information on current and potential visitors' interests and needs.

New and memorable visitor experience options that convey desired messages.

A new approach to moving visitors to and within the Park that promotes group and active transportation modes.

A revenue strategy that is supported by the local community and is consistent with Agency policy.

# Memorable Visitor Experiences Lead to Relevance and Sustainability

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*Keywords: Relevance, visitor experience, national parks, connection, sense of place.*

## Introduction

Parks Canada welcomes annually more than 22 million visitors to the national parks, national historic sites and national marine conservation areas of Canada. The Agency sets the stage for visitors to enjoy meaningful, high-quality experiences through the provision of information, infrastructure, facilities, programs, services and personnel. The visitor experience is the cumulative outcome of the individual's visit and their interactions with Parks Canada, and its partners. This includes pre and onsite trip planning information, reception and orientation services, interpretation programming, campgrounds, hiking trails and other recreational services, visitor safety programs, and ongoing post visit information.

Through the services, facilities, programs, personnel and infrastructure offered at national parks, national marine conservation areas and national historic sites; Parks Canada provides Canadians with opportunities to enjoy, understand and appreciate Canada's natural and cultural heritage and to create their own memories. Parks Canada aims to stage meaningful and exceptional experiences, making these special places important and relevant to Canadians. Visits to national parks, national historic sites and marine conservation areas help to foster a shared sense of responsibility for environmentally and culturally sound actions that will extend beyond their boundaries, and influence the values of Canadians as a whole. The experiences and knowledge gained through visits to national parks, national historic sites and national marine conservation areas will provide visitors with a clear and strong sense of Canada, adding to the well-being and health of all Canadians.

## Results

A visitor's experience at a national park, national historic site or national marine conservation area is unique and personal. It results from: purposeful and personal connections with the heritage resources and settings; personal interactions with Parks Canada's guides, storytellers and guardians; and the provision of information, facilities, infrastructure, services and programs designed to respond to visitor needs and expectations. Parks Canada will continue to provide opportunities to contribute to a visitor's personal growth and understanding, through explanation and connection with the authentic and nationally significant resources protected and presented in these places. These encounters will illustrate the relevance of the national parks, national marine conservation areas and national historic sites to Canadians and reinforce a sense of connection with this heritage. Programs, services and facilities will continue to be provided in a manner that respects the Agency's traditional high standards for quality, cleanliness and safety, and a commitment to the protection of the heritage values of these places.

Parks Canada has always provided high quality programs and services. The Agency is now refining its approach to better understand and subsequently meet the emerging interests of visitors through a wide spectrum of activities and programs. In consideration of their needs and expectations, the Agency is proactive in tailoring opportunities for visitors to experience Canada's natural and cultural wonders.

The travelling public is a dynamic entity; the cycle of change of their needs, expectations and behaviours is rapid and will require monitoring and anal-

ysis at both national and local levels. This will include monitoring of recreation, leisure and tourism trends, ongoing public opinion polling and ongoing analysis of other contemporary information.

Visitor feedback also will be actively sought by operational managers through tools such as comment cards and other real time methods as a way of monitoring visitor perceptions and responding through ongoing service improvements. This will provide staff with information that they can act upon quickly in direct response to visitors' needs.

To Canadians and people worldwide, national parks, national marine conservation areas and national historic sites represent the best of Canada. This image is founded on the attributes of authenticity, national significance, uniqueness, quality of service, sustainability and good value. Most importantly, national parks and national historic sites continue to be highly valued by visitors for the scope, variety and richness of the experiences they offer.

As the cornerstones behind quality natural and cultural tourism experiences, the national parks, national marine conservation areas and national historic sites of Canada can be positioned as the quintessential opportunities to experience Canada.

The visitor experience begins prior to arrival at a national heritage place. The provision of clear and easily accessible information helps to influence and respond to visitor expectations. Parks Canada will continue to provide pre-visit information via its expanded national toll-free telephone service, its tourism industry partners and its own Web site which will be improved to better serve potential visitors with their planning requirements. The improved campground reservation system addresses visitor expectations for advance trip planning and assurance of available campsites.

A key component of information provision is on-site welcoming and orientation. Providing visitors with the right information at this stage of their visit will ensure that visitors benefit fully and safely of all opportunities for enjoyable experiences. Over the next five years, Parks Canada will also enhance the quality and consistency of signage and other information services.

Key is the provision of a range or continuum of opportunities for visitors both at individual national parks and national historic sites and also through links between different heritage areas. Parks Canada will work to broaden the range of opportunities for visitors within the context of maintaining the ecological and commemorative integrity of these special places in order to reach both existing visitors and non-visitors with a menu of diverse and tailored experience opportunities.

While maintaining a core level of service for all potential visitors, the number and types of programs and activities and the related services offered will be developed with consideration of current and future market segments. The need to identify key markets through research and respond with desirable programs and activities is essential to increasing the relevance of the parks and sites to Canadians.

Parks Canada has long known that for many visitors, personal contact with friendly, knowledgeable and, engaging staff is a key element of a memorable experience. For this reason personal interpretation is at the core of many Parks Canada experience. Parks Canada will continue to work with partners to augment investments in the development and delivery of professional and authentic learning experiences.

Facilities such as day-use areas, trails, campgrounds, visitor centres, water and sewer systems, and roads afford onsite opportunities that optimise visitor understanding, enjoyment and appreciation. By the very nature of national parks, national marine conservation areas and national historic sites, services often vary by scope and scale and are dependent on the unique characteristics of each location, as well as the needs and expectations of different visitor markets.

Parks Canada will be renewing its visitor related assets strategically and seeking opportunities to make adjustments to its asset base by achieving a better understanding of how its facilities respond to visitor expectations and contribute to meaningful visitor experiences. The Agency will take advantage of opportunities, to right size, innovate and modernize infrastructure to realize improved efficiency, standards and levels of service. In cases

where facilities are no longer responding to visitor needs and expectations for environmentally or culturally sensitive experiences, they will be phased-out or decommissioned.

Finally, the Agency will involve and work closely with community and business stakeholders to design visitor experience opportunities that meet the needs of their shared markets while respecting the rights and values of host communities, neighboring property owners and Aboriginal peoples. Through partnerships and collaborative efforts, Parks Canada will advance visitor experiences opportunities offering economic, social, cultural and environmental benefits as well as create a sense of connection and attachment to Canada's heritage place for the visitors.

# Integration – Resource Protection and Memorable Visitor Experiences in the Lake Louise Community of Banff National Park

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*Keywords: Integration, protection, visitor experience, management plan, community plan.*

## Introduction

In the heart of the Canadian Rockies and Banff National Park, Lake Louise is an important international symbol of Canada and the national park system. It is part of the Canadian Rocky Mountain Parks World Heritage Site. Banff, like all national parks, is dedicated to preserving a special part of Canada's natural and cultural heritage for the benefit, education and enjoyment of present and future generations. One of the biggest questions for national parks is how to clearly state the direction national parks are taking in managing development, growth and use.

In Lake Louise, growth has been carefully controlled. However because of its remarkable combination of natural features, stunning scenery, important railway history, as well as its outstanding trail system, Lake Louise is a primary destination for many visitors to Banff National Park. This is cresting demands for expanded services, facilities and residential accommodation. The role of its plan is to guide change and ensure the national parks' mandate is supported for years to come.

## Results

The following principles and recommendations have been applied in the Lake Louise Community Plan as follows:

### 1. No Net Negative Environment Impact

The Lake Louise Community Plan enforces the principle of No Net negative Environmental Impact by reducing the hamlet boundary by approxi-

mately 37%, rehabilitating more than 40 hectares of disturbed lands inside and outside of hamlet, developing human use strategies for the area and placing rigid conditions on all implemented to gauge the health of the park in relation to the community.

The Canadian Environmental Assessment Act (CEAA) will be rigorously applied to new development proposals and any environmental issues will be mitigated to ensure the principle of No Net Negative Environmental Impact is maintained.

### 2. Appropriate Use Guidelines

The Lake Louise Community Plan identifies a Heritage Tourism Framework that reinforces national park values. It also defines principles and specific examples of basic and essential services. Only those proposals consistent with this framework will be approved. Social science data on visitor needs and expectations will guide the design and implementation of experience opportunities.

### 3. Responsible Growth Management

Fixed low growth and development guidelines for residential, visitor accommodation, institutional and commercial retail spaces have been identified in the plan. A modest increase in a range of commercial accommodation will help fill the demand for overnight services. The majority of this growth respects existing commitments. New expansion beyond these is limited and will be phased over time. Staff housing to address current problems is proceeding and must be in place prior to any commercial and institutional expansion. Infrastructure

issues and staff housing associated with commercial expansion must be addressed before occupancy permits are issued.

#### **4. Leadership in Environmental Stewardship and Heritage Conservation**

A landscape improvement strategy is a foundation of the *Lake Louise Community Plan*. This strategy will reduce non-native plant species and discourage large mammals from entering the community. A detailed environmental stewardship strategy is identified and will help the community reduce the impact of its operation.

Important heritage structures in the community have been identified. Strict architectural and redevelopment guidelines have been created to protect these structures and the heritage character of Lake Louise.

### **Conclusion**

In shaping the direction for Lake Louise, Parks Canada relied on public input and involvement of Lake Louise Advisory Board. The *Community Plan* is part of a sensitive, comprehensive and integrated management strategy for the Lake Louise area that began with the *Banff National Park Management Plan*. A transportation study, ski area guidelines and human use strategies for the park will provide additional direction.

The *Lake Louise Community Plan* is a tool that will help Parks Canada and the community makes decisions that are consistent with National Parks mandate and the vision for Banff National Park. The strategies outlined in this plan are basis for all decisions made within the community of Lake Louise ensuring the health of the park environmentally, socially and economically. By applying the principles in this plan, Lake Louise will continue to be a living example of national park values.

Sustainability and Carrying Capacity Studies  
in Recreational Settings

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Robert Manning (Chair)

# Sustainable Trail Management, Definitions and a Management Model

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*Keywords: Sustainable Trail Management, Indicators, Integrated Planning Frameworks, Local Community Participation.*

## Introduction

Apart from Hugo (1999), existing literature on “sustainable trail” development frequently emphasizes the importance of biodiversity conservation or physical trail surface management (Marion & Leung 2004). The extent to which the sustainability principles (Social, economic and environmental) have been developed, accepted and applied by trail management bodies and relevant stakeholders as the basis for ‘sustainable trail management’ is a paradigm that is explored in this research. The research sets out to establish a definition and model for sustainable management of trails.

## Methods

To do this three studies were carried out, and the first addressed the question “what is a sustainable trail?” This work was done through online debate discussion generated among a community of trail managers, users and researchers. The second part of the work examined current practices by trail managers in protected areas. The objective was to establish issues and practice related to trail management where conservation of the resource was also a priority. A questionnaire was distributed to managers in a network of designated areas identified through the International Union for the Conservation of Nature. In the third strand of the work the National Waymarked Ways Advisory Committee (NWWAC), a body charged with the management of long distance walking routes in Ireland, and the researchers examined how the current model of management of these routes could be

made sustainable through a process of consultation and discussion with local trail management committees. The key elements of each methodology are outlined in table 1.

## Results

### Study one: The sustainable trail defined

Sustainability indicators for trail settings were diverse and ranged from broad to specific levels of description of environmental, social and economic criteria (figure 1). Political indicators of sustainable trail development were less discernable within the debate contributions.

There was an overall consensus by the participants that the “sustainable trail” was a realistic concept. The basic premise for making the “sustainable trail” a reality included governmental support, ongoing stakeholder participation and commitment and multi-dimensional and long-term frameworks. Furthermore, emphasis was placed on the need for trail development activities to receive adequate and continuous funding, resource and personnel support and inputs from relevant sources.

### Study two: Trail management practice

The application and practice of environmental trail condition assessment and monitoring was limited. For managers that did attempt to assess environmental conditions, subjective assessments were employed and data was based mainly upon ad hoc personal observations or alerts from recreation users of signs of damage. Key indicators of trail damage were coarse and included general observations

Table 1: Overview of methodologies applied to address the three research themes defining sustainable trail management, management practice and development of a sustainable management model.

Overall Study Objective/Task	Core Objective	Define and examine the need for a sustainable trail management framework.		
	Core Tasks	Collaborative investigation and international review of ideal and current trail management frameworks. Changes needed to meet sustainability requirements at a national/regional level		
Characteristics	Method 1 International Debate	Method 2 International Management Questionnaire	Method 3 Management Workshop	
Target Population	Diverse/Multiple Targets Participants drawn from a variety of organizations internationally, directly or indirectly related to trail management	Specific Target Group IUCN- Members Participants are drawn from one organization that shares a specific management mandate globally	Specific Target Group NWWAC- Local committee members, Ireland Participants are drawn from one organization that shares a specific management mandate relating to trail development nationally	
Scale of study	International- Macro	International- Meso	National	
Research Strategy	Conceptual Design/ Visionary/ Scenario building using Grounded Theory Approach	Evaluative study and mapping of current management position	Case Study approach Consensus based study: Integrative study of current management practices, visionary goals and action plans	
Research Tool	Email/ Internet Survey	Postal Survey	Workshop series	
Sampling method (Non-probabilistic)	Snowball sampling Key informants from a range of organizations were identified as having suitable knowledge on the study themes or access to a database of suitable participants Key informants identify and recruit potential collaborators in target organizations	Purposive sampling Individual managers identified through an established database	Purposive sampling A specific number of known members of one organization selected to participate. In-depth exploration of one trail setting	
Key features	Open-ended narrative questions Unstructured format Exploratory approach that allows flexibility for respondents to explore in depth and qualify their answers on key concepts in unlimited ways.	Closed questions Structured format Consider predetermined specific issues relating to trail management Evidence of existing and future management actions relating to specific themes Answers are specific to selected management themes	Facilitated workshop series including presentations, surveys, group work and open feedback sessions Direct communications with key actors	
Outcome of Approach	Visionary/ New Concept development New Management Scenarios Ideal features of a sustainable trail management framework World position and identification of key issues, actors, indicators related to sustainable trail management	Current Position Management Trends Lay out the major positions taken, and not taken in relation to specific trail management activities Identify areas of concern around trail management issues	Applied Vision/Theory Application and evaluation of the sustainability theory in a specific management context	

of broad changes in bare ground relative to vegetative cover and large-scale erosion features rather than detailed analysis of specific vegetative species and soil properties. A limited number of managers used standard criteria or guidelines to assess the overall quality of trails and a minority of managers checked the accuracy and precision of the methods applied. Environmental trail condition data was considered most useful in aiding trail maintenance decisions and activities.

For managers who did not conduct environmental trail condition assessments reasons included lack of information, staff and resources to conduct such activities. Managers were not specifically qualified for undertaking issues directly related to trail management with a cross-section of managers indicating qualifications in administration, business, social sciences, arts as well as environmental sciences. Managers remit in conservation areas was generally not directly focused on trail

## Level I Long term development and wellbeing of the trail ecosystem

### Level II

#### Environmental

- Soil erosion
- Bare and trampled width
- Overall % cover
- Soil type, condition
- Landscapes the trail crosses
- Disruption to adjacent land
- Litter
- Solar aspect
- Scenic views
- Exposure
- Noise levels
- Effectiveness of maintenance

#### Political

- Legislation
- Government support

#### Social

- Access
- Accommodation
- Services
- Interest and variety levels
- User information
- Levels of use
- Conflict levels between user/owner groups
- Employment
- Level of volunteering
- Level of maintenance
- Safety
- Level of community involvement
- Level of monitoring

#### Economic

- Budgeting
- Financial backing
- Maintenance costs/year
- Revenues generated

Figure 1: Key indicators for a sustainable trail.

related issues. There was an absence of skilled and trained staff whose remit could address aspects of trail management. Most of the employees involved in trail management activities were permanent staff responsible for the management of the conservation areas as well as attending to a range of issues relating to trail planning, maintenance, assessment, information provision and administration. Additional support for trail maintenance was achieved through part-time, seasonal and casual volunteers. External contractors were used mainly for trail construction. There was limited training and assessment of work performance of staff in relation to trail-related responsibilities.

Despite the diversity of challenges in relation to recreation and other land use activities that can occur in conservation areas, very few managers had adopted integrative planning procedures such as the C-CAP, LAC and VIM frameworks, although there was a request for more information on the LAC model. Further information was also requested by managers on how to develop trail management plans.

### Study three: The NWWAC Visionary and Action Planning Exercise

The visioning and action planning process highlighted first the key management strengths, problems and challenges that existed in the national trail network. Key issues that required attention were the unsuitability of the long-distance concept as a basis for Waymarked Way design, poor trail planning, routing and maintenance, lack of linkage to surrounding facilities and accommodation, and lack of local awareness. The local committee members identified limitations such as fragmented and erratic funding, lack of local community involvement and long-term commitment, lack of young people represented in management activities and lack of group support and co-ordination.

On a consensus basis, the local committee members worked with the agreed set of issues and created a set of priority action goals for tackling the sustainable development of the network. In total, four key Waymarked Way vision areas for sustainable development were agreed upon by the executive and local management committee

members relating to the local community, land management, research and trail management. A total of twenty more specific actions or indicators for change were identified in order to achieve the four key visionary Waymarked Way goals.

Of priority, the local management committees throughout the national network agreed that the local community were the core focus of a sustainable vision. The sustainable development of the Waymarked Way network would require management activities that enhance local community involvement, use of trails and benefits from related trail developments, including enhanced accessibility and increased use of trails, employment opportunities, and education and health benefits.

The vision and action plan marked a sharp shift in values from the previously adopted long distance management model where tourists were the sole beneficiaries of trail developments to a sustainable management model that was based on local community input, commitment and benefits.

To support and help achieve the action plan, the local committee members identified an expansive and diverse set of potential national, regional and local stakeholders and governmental departments in the areas of agriculture, conservation, forestry, education, heritage and recreation.

## Conclusion

The key components for a sustainable trail were defined both at a theoretical level through the sustainable trail debate and in an applied context through the NWWAC visionary process. In both studies there was a shift from considering one aspect of sustainability to considering economic, social and environmental dimensions together. The sustainable trail debate depicted the “sustainable trail” as fundamentally a multi-dimensional construct that reflects broadly an overarching long-term and integrated consideration of social, environmental and economic trail issues.

The findings highlighted that maintenance of certain necessary or desired characteristics of trail management settings is central to a “sustainable trail”. However, the characteristics of a sustainable trail management setting are value-based and

scale-based and as a result there is no ideal set of trail features that depict a well-maintained “sustainable trail”. The submissions revealed that there are multiple definitions, scales, trail features, management settings, landscapes, social, environmental and economic issues that can contribute to the concept.

In practical application, the sustainable principles are more clearly understood at a national scale, as when applied to the National Waymarked Ways network. At this scale, the definition for a “sustainable trail” outlined issues that were at the heart of Waymarked Way management challenges and aspirations.

The vision that emerged from the NWWAC consultative process is:

“For local communities throughout Ireland to create, manage and use a network of scenic and diverse walking routes that are of a quality that:

- Makes the best use of local knowledge and awareness, facilities and available resources,
- Brings economic and social opportunities into the locality, and
- Protects our natural heritage and environment for future generations.”

The study also demonstrates that in a specific setting, the application of sustainable principles may result in tradeoffs between social, environmental and economic goals. Although all three sustainable goals were incorporated into the final shared NWWAC vision, not all three cornerstones were equally addressed in the action plan. Since the local community was identified as the key means for the NWWAC to achieve sustainability, most of the vision and action goals were related to ways of achieving local community involvement in trail management activities and increased participation and benefits in trail related activities. The local committee members anticipated that economic and environmental benefits would be achieved as a consequence of this social focus.

The sustainable trail concept developed sharply contrasts with the trends that emerged in the review of international trail management practices and challenges. In practice, there was no clear sense of trail development or management reflecting

an integrative approach towards environmental, social and economic issues. In particular, very few managers adopted recreation planning frameworks such as LAC which are considered as useful decision-making models for integrating multiple issues, activities and perspectives. Planning was solely addressed through physical trail design, construction and maintenance activities.

Achieving a sustainable trail is difficult where staffing and land use issues take priority over trail management. The manager survey results suggest that trail maintenance is more “wait and see” with focus on repair and recovery activities, rather than maintenance and improvement of the original conditions or setting. This contrasts with findings in the sustainable debate study and the planning approach taken by the NWWAC, which create a sense of overall concern about the future from the perspective of a trail organisation, a community or the environment. The studies emphasise that the time horizon of planning for sustainable trail development is long-term, and incorporates more than one phase of a trail life cycle such as trail construction or trail maintenance. It spans trail design and exploration through to closure or renewal of a site. Thus, short- and long-term concerns come into play.

### **What are the indicators for a sustainable trail?**

A suite of indicator levels and categories emerged as a result of the theoretical and applied studies, as follows:

#### **a. Core values**

There proved to be unshakable and absolute core of sustainability values common to both the debate study and the visionary exercise that were precursory to the process of identifying suitable and specific sustainable trail indicators. There was a mutual and accepted understanding that a sustainable trail process must reflect the three cornerstones of sustainable development that maintain and develop in parallel and together the environment and respects the livelihoods and needs of people in the setting. It follows that the “result” against which the success

of a trail development or trail management activity should be judged is the achievement of, or the contribution to, human and ecosystem well-being together.

Expanding from these findings there are two different ways of organizing possible sustainable indicators.

#### **b. Theoretical approach: Generic indicator groups**

In the debate, the participants were asked to theoretically recommend key indicators for a sustainable trail in general terms. The indicators were classified into four broad and generic environmental, social, economic and political sectors. The environmental cornerstone received the most diverse range of indicators and levels of detail. In particular, the participants elaborated upon specific features such as trail path width, amount and type of vegetation and soil condition. The remaining three areas of social, economic and political aspects yielded more general indicators.

#### **c. Applied approach: Visionary action plan**

The Waymarked Way study highlighted indicator requirements at a national scale and the findings suggest that a more comprehensive basis for indicator development could be achieved at this level. In total, four key Waymarked Way vision areas for sustainable development were agreed by the executive and local management committee members relating to the local community, land management, research and trail management. A total of twenty more specific actions or indicators for change were identified in order to achieve the four key visionary Waymarked Way goals. Although the action goals were qualitatively devised, there are signs in this first-step study of attempts to set measurable goals within a broad integrative planning framework. Management priorities and timescales were devised and understood by the group as a whole that were organised into short, medium and long term objectives. It also became clear, that for each of the actions under the four key management themes a range of partnerships and management bodies were responsible for supporting and achieving the action goals. The three different levels of indicator feedback that emerged in these studies suggest that indicator representation in the trail setting must be

wider than a consideration of ecological factors alone. Just as the NWWAC study emphasised the importance of the social dimension of trail development, this is further supported by the international survey of trail management trends in conservation areas where the ecological aspects of trail use were placed in context of the multiple land, recreation uses, diverse impacts and management issues to be addressed. With many issues to address it appeared that management had little time or resources to develop detailed trail deterioration assessment and monitoring protocols. Instead, managers adopted simple assessment procedures that used coarse environmental trail damage indicators that were measured subjectively and qualitatively. Very few managers assessed detailed aspects of environmental trail damage such as changes in vegetative structure but used other indicators mainly associated with user impacts such as litter, visual intrusion, overcrowding, noise and wildlife impacts to determine quality of the route.

With multiple physical, environmental and social indicators to consider on the immediate trail surface, it is clear that in a management setting where many responsibilities and issues are at play, that a broad set of indicators are more appropriate and can be assessed simply and efficiently.

### **How do you achieve a sustainable trail?**

There are no universally accepted indicators or examples of how to measure and achieve a sustainable trail.

In the sustainable debate study, a set of broad criteria were highlighted as significant in supporting the evolution of such a process including the long-term commitment and participation of the local community, support at a governmental level, integration of trail issues with wider policies such as the environment, health and the economy. In essence, trail settings require a broad and wider recognition and integration by multiple land use and development sectors so that they can be developed in a sustainable manner.

The three broad cornerstones of sustainable development that are recognised globally, together with Hugo's comprehensive trail management model (1999) are useful as a benchmark for managers to evaluate existing approaches towards trail management and development in diverse settings. The ho-

listic nature of the sustainable trail concept enables standards to be set that managers can measure with their own experiences and practices. In the management of trails in protected areas existing management practices contrasted sharply with the ideal of sustainable trail management. It was clear that managers were involved in a matrix of land use issues and associated management problems with little room for a detailed trail planning framework that could integrate specifically all aspects of social, environmental and economic trail development. Feedback from the international survey suggested that trail management was not a key area of concern and as a result there were limited resources, funding and personnel available to support trail development and management activities. Furthermore, there was limited awareness and knowledge of aspects of trail management such as trail degradation assessment, monitoring and maintenance.

With the experience gained from the sustainability debate study and the NWWAC case study, there is much scope for trail management settings to adopt planning frameworks that are rooted in the principles of sustainable development.

The NWWAC study demonstrated the need to plan sustainable trails at a national level so that the sustainability principles could be transferred to regional and local scales of application. The NWWAC study concluded with one mutually shared set of objectives within a network that reflected many different types of trails and issues as well as changes in user demands. This led to a transformation in the identity of the network from being solely a long distance route provider to a more expansive and diverse set of multiple short community-based recreation routes that reflected contemporary societal demands.

## **References**

- Hugo, M.L. (1999). A comprehensive approach towards the planning, grading and auditing of hiking trails as ecotourism products. In: *Current Issues in Tourism (2/2&3)*, p 138-173.
- Marion, J.L. & Leung, Y.-F. (2004). Environmentally sustainable trail management. In: Buckley, R. (ed.). *Environmental Impact of Tourism*, p 229-244. Cambridge.

# The Adoption of Social Carrying Capacity for the Management of Theme Park Settings

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*Keywords: Crowding norms, theme parks, Taiwan.*

**Abstract:** In order to manage the quality of visitor experience, social carrying capacity has been prevalently applied to the planning of contemporary parks and natural environments. The common underlying logic of the applications is that carrying capacity can be determined through the identification of management objectives and associated indicators and standards of quality. Indicators can be monitored over time and carrying capacity is reached once standards have been reached. In this study, visitors' "reported queuing time" for using their favorite facilities in theme parks was adopted as the indicator. Accordingly, visitors' crowding norms, the queuing-norm-crowding relationship, and the applicability of social carrying capacity to the management of theme park settings were analyzed and discussed respectively.

## Introduction

As applied to outdoor recreation from wild-life management, carrying capacity has evolved from a primary emphasis on ecological impacts to a dual focus which includes social considerations. The ecological aspect of concern refers to the integrity of the resource base which implies some threshold or tolerance level after which further exploitation or use may cause permanent damage to the natural ecosystem. From the social point of view, as more people visit a particular natural area, not only the environmental resources of the area are affected, but also the quality of the visitor experience. Accordingly, social carrying capacity has been prevalently applied to the planning of contemporary parks and to natural environments in the US. The common underlying logic of the applications is that carrying capacity can be determined through the identification of management objectives and associated indicators and standards of quality. Indicator variables can be monitored over time and once standards have been reached, carrying capacity has been reached as well. In order to manage the quality of visitor experience in a particular natural area, visitor's perceived crowding is usually used to represent

the magnitude of deterioration caused by the increasing number of visitors. As a result, the notion of social carrying capacity has become closely associated with the concept of crowding (Stankey & McCool 1989).

Crowding can be defined as a negative evaluation of a certain density level in a given area (Fleishman, Feitelson & Salomon 2004, Gramman 1982, Lee & Graefe 2003, Vaske, Shelby, Graefe & Heberlein 1986). The term "perceived crowding" is often used to emphasize the subjective or evaluative nature of the concept. Perceived crowding combines descriptive information (i.e. the density experienced by the individual) with evaluative information (i.e. the individual's evaluation of that density) (Vaske & Donnelly 2002). In this context, the density experienced by the visitors in a natural environment is represented by the indicator variable "reported encounter" and crowding is a negative evaluation of those encounters. In other words, visitors' perceived crowding involves a value judgment that the number of encounters they had exceeds their definition of an acceptable standard.

Norms are the standards that individuals use for evaluating the conditions they experienced as good or bad, better or worse (Vaske et al. 1986).

While social norms are those norms which are perceived by the individual to be shared by collective members in a society, personal norms arise from within the individual as feelings of moral obligation (Roggenbuck, Williams, Bange & Dean 1991). Since social norms are assessed by aggregating the personal norms, researchers (Donnelly, Vaske, Whittaker & Shelby 2000, Roggenbuck et al. 1991) have been interested in some characteristics of social norms, such as norm prevalence and crystallization of norms, derived from data at the individual level. In this context, norm prevalence refers to the percent of respondents giving a norm, and crystallization of norms refers to the level of collective consensus or agreement. In addition, researchers (Vaske & Donnelly 2002) have also been interested in the theoretical relationship between encounters, norm, and perceived crowding—when encounters exceed a visitor's norm for seeing others, perceived crowding will increase.

This study attempts to apply social carrying capacity to the management of theme parks—recreation settings that built in forms of artificial environments. Most early crowding studies focused primarily on wilderness areas (Manning 1999), recently, researchers have become interested in crowding issues within frontcountry settings (e.g. Kuentzel & Heberlein 2003; Manning, Lime, Freimund & Pitt 1996, Roggenbuck et al. 1991, Tarrant & English 1996, Vaske, Donnelly & Petruzzi 1996). While concepts derived from management of social carrying capacity have repeatedly been shown to be important for backcountry visitors, research that explores the types of norms and impact indicators appropriate for frontcountry settings would facilitate this understanding (Vaske & Donnelly 2002; Vaske, Donnelly & Whittaker 2000). Furthermore, Westover and Collins (1987) claim that the extension of crowding studies to urban settings has both theoretical and pragmatic significance. However, since the reported encounter is less useful in high density than in low density environments (Heywood 1993, Shelby & Vaske 1991), visitors' "reported queuing time" for using their favorite facilities in theme park settings was adopted as "impact indicator" to represent the magnitude of their experienced density. This study attempts not only to analyze prevalence and crystallization

of visitors' crowding norms and the queuing-norm-crowding relationship but also to discuss the applicability of the normative approach extending from natural to artificial environments and the marketing implications of the results of this study. Accordingly, the following six research questions were developed:

1. What is the respondents' prevalence of crowding norms for acceptable queuing time in theme park settings?
2. What is the respondents' level and crystallization of crowding norms in theme park settings?
3. Will respondents' perceived crowding increase when reported queuing time exceeds their norms for queuing? In other words, is the perceived crowding of respondents who reported that queuing time (T) exceeded their crowding norms (N) different from those who reported that T did not exceed their N?
4. Is there a significant linear correlation between respondents' reported queuing time (T), crowding norms (N), and perceived crowding?
5. Are there differences or similarities in the corresponding findings derived from natural and artificial environments?

## Methods

The target population for this study was visitors to the five leading theme parks in Taiwan (i.e. Jenfusan, Lefoo, Yamay, Formosan Aboriginal Culture Village, and Window on China). A quota sampling technique was employed to select elements of the research sample from the sampling population based on the official report (Tourism Bureau 2004) on annual attendance to domestic theme parks in Taiwan in 2003. The field survey for data collection was conducted between April and June of 2004. Junior students from a local university were trained as interviewers for data collection. Interviewers stationed near the exit gates of the five parks invited departing visitors to participate in this study. All subjects were selected based on their willingness to volunteer their personal information on site. For all analyses, a significance level of  $p < 0.05$  was used.

1	2	3	4	5	6	7	8	9
Not at all Crowded		Slightly Crowded		Moderately Crowded			Extremely Crowded	

Figure 1: Standardized measure of perceived crowding.

In order to contrast the results of this study with the results obtained from the natural environments, the single-item scale (shown in Figure 1) developed by Heberlein and Vaske (1977) was adopted in this study. Since findings using this measure of crowding have been compiled from 35 studies addressing 59 different natural areas and more than 17,000 visitors, this diversity of applications suggests that investigators have found this single item measure of crowding to be universally useful (Shelby, Vaske, & Heberlein 1989). In this single-item scale (ranging from 1 to 9), the first two points label the situation as uncrowded, and the remaining seven points label it as crowded to some degree.

In this study, there is also a question for measuring crowding norms that asks respondents to give the longest queuing time they would tolerate for their favorite facilities, with a response of “makes no difference to me.” Some researchers (Hall & Shelby 1996; Hall, Shelby & Rolloff 1996; Manning et al. 1996; Roggenbuck et al. 1991) have included a third response category “makes a difference but can’t give a number.” Although the three-choice option provides respondents with a more exhaustive set of response categories, this study did not include the third response category because the derived findings may have less managerial relevance (Donnelly et al. 2000).

## Results

By using quota sampling technique, a research sample consisting of 1,440 respondents was obtained from visitors to the five leading theme parks. The result shows that the distribution patterns of the respondents’ demographics were consistent with the practical observation of theme park visitors’ characteristics in the real world.

Donnelly et al. (2000) reviewed 30 different crowding studies, representing 56 norm evaluation contexts in natural environments (26 in backcountry and 30 in frontcountry settings) from 20 years of research. The results of their analysis showed

that the average norm prevalence was 70%, the median was 71%, and the standard deviation was 18%. In detail, norm prevalence in backcountry (mean = 81.2%, SD = 15.9) was significantly higher than in frontcountry (mean = 60.7%, SD = 13.8) evaluation contexts in terms of reported encounters. The result of this study shows that 63.4 % of the respondents in theme park settings specified their crowding norms in terms of queuing time for using their favorite facilities. By comparison, prevalence of theme park visitors’ crowding norms was lower than the mean of all crowding studies conducted in natural environments as a whole, but higher than the average norm prevalence in frontcountry evaluation contexts specifically.

The 913 respondents who indicated specific acceptable queuing time for using their favorite facilities in theme park settings demonstrate highly crystallized consensus or shared agreement. Roggenbuck et al. (1991) suggest that crystallization (or dispersion) can be portrayed by both the coefficient of variation and the range of maximum acceptable queuing time between the first and the third quartiles of respondents. Table 1 lists the median, the maximum acceptable queuing time for the first and the third quartile of respondents with the most restrictive norms, mode, mean, standard deviation, the range, and coefficient of variation for the distribution of the 913 respondents’ norms for queuing (i.e. the upper limit of acceptable queuing time). Since this study used different impact indicator (i.e. queuing time) from the indicator (i.e. encounters) widely adopted in other crowding studies, in order to compare results derived from different scales, coefficient of variation becomes the most appropriate measure representing level of norm crystallization. Accordingly, the level of crystallization found in this study (C.V. = 0.6358) is much more significant than the levels found in previous crowding studies (e.g. C.V. ranges from 0.94 to 1.74 in Roggenbuck et al. 1991) which have been conducted in natural environments. In addition, the median (15 minutes) represents the length of queuing time which 50% of the

Table 1: Level and Crystallization of Crowding Norms in Theme Parks.

Median	1 <sup>st</sup> Quart	Mode	Mean	S.D.	Minimum	Maximum	C.V.
15 mins	10 mins	10 mins	17.9 mins	11.38	0 mins	60 mins	.6358

N = 913

Table 2: Relationship between Reported Queuing Time (T), Norms (N), and Perceived Crowding.

	Mean	S.D.	Pearson's <i>r</i>	Significance
<i>T-N</i> (minutes)	-8.12	12.21	.237	<b>.000</b>
Perceived crowding*	3.81	1.83		

N = 895

respondents would find unacceptable. Since the norms are highly crystallized, 75% of the respondents would find acceptable if the length of queuing time could be lowered slightly to 10 minutes.

A statistical relationship of queuing—norm—crowding was observed that when respondents' reported queuing time exceeded their normative limits of tolerance, their perceived crowding increased significantly. The result shows that 88.2% of the respondents reported shorter queuing time than their norms, while 11.8% reported longer queuing time than their norms. Mean perceived crowding were significantly higher for respondents reporting longer queuing than their norms ( $t = 6.397$ ,  $p < 0.000$ ). When the reported queuing time was shorter than the norm, respondents felt "slightly" crowded with an average score of 3.67. On the contrary, when reported queuing time exceeded the norm, respondents felt "slightly" to "moderately" crowded with an average score of 4.85.

Table 2 shows the correlation between those who reported longer or shorter queuing time than their norm tolerance and perceived crowding across all evaluation contexts. Since a statistical relationship was observed across all theme park evaluation contexts, only the strength (effect size) of the relationship in sum was examined in this study. Across all 5 evaluation contexts, the average correlation was 0.237 with significance at a 0.001 alpha level. According to Malhotra (1999), this result suggests that the strength of the queuing—norm—crowding relationship can be characterized as "small" to "medium."

## Discussion and conclusion

Since the relatively importance of encounters decreases in situations where visitors expect numerous others to be present, Donnelly et al. (2000) suggest that researchers should identify which impacts are important to the setting being studied and measure not only encounters but other impact indicators. According to the results of this study, visitors' queuing time for using their favorite facilities seems to be an appropriate impact indicator representing negative impacts of the density in artificial environments such as theme park settings. By adopting the impact indicator, the results of this study consistent with previous findings in Donnelly et al. (2000) that evaluation contexts with norm prevalence scores lower than the median score (71%) of all crowding studies are more often higher density settings.

## References

- Donnelly, M.P., Vaske, J.J., Whittaker, D. & Shelby, B. (2000). Toward an understanding of norm prevalence: A comparative analysis of 20 years of research. In: *Environmental Management* (25/4), p 403-414.
- Heberlein, T.A. & Vaske, J.J. (1977). Crowding and visitor conflict on the Bois Brule River (report WISC WRC 77-04). University of Wisconsin Water Resources Center.
- Manning, R.E. (1999). *Studies in outdoor recreation: Search and research for satisfaction*. Oregon State University Press.
- Roggenbuck, J.W., Williams, D.R., Bange, S.P. & Dean, D.J. (1991). River float trip encounter norms: Questioning the use of the social norms concept. In: *Journal of Leisure Research* (23/2), p 133-153.
- Shelby, B., Vaske, J.J., & Heberlein, T.A. (1989). Comparative analysis of crowding in multiple locations: Results from fifteen years of research. In: *Leisure Science*.

## **Recreation Carrying Capacity Analysis at Khao Leam Ya – Mu Ko Samed National Park, Thailand**

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**Abstract:** The objective of this research was to determine recreation capacity at Khao Leam Ya - Mu Ko Samed National Park (LY-KS NP). The study investigated the existing capacity of recreation resources by analyzing four capacity types: ecological (ECC), physical (PCC), facility (FCC), and social (SCC). This paper presented the findings on 3 main islands: Ko Samed, Ko Kudee, Ko Talu, and some snorkeling sites. The results found the ECC, PCC, and FCC exceeded at Ko Samed. At Ko Kudee, found the exceeded PCC while at Ko Talu found the exceeded PCC and FCC. One snorkeling site found FCC exceeded. The maximum carrying capacity at Ko Samed and Ko Kodee was 4,100 and 168 people per night respectively. Most ecological carrying capacities, however, have not yet determined since long term monitoring is needed.

### **Introduction**

Khao Leam Ya - Mu Ko Samed National Park (LY-KS NP) experiences high recreational use as a popular marine park near Bangkok. Visitors come to enjoy park scenery, snorkeling and beach activities. Annual visitor numbers have almost doubled from 265,248 to 437,017 from 2003 to 2005. The focus of this research was to establish a long term monitoring programme of recreational impacts and assess recreation capacity at LY-KS NP.

### **Methods**

The study followed Shelby and Herberlein's (1986) definition of recreation carrying capacity as "the level of use beyond which impacts exceed standards". The study investigated the existing capac-

ity of recreation resources in the study area by analyzing four capacity types: ecological, physical, facility, and social. The results presented here were from 2004-2005 with data collection carried out during high tourist season, October through May.

For the ecological carrying capacity (ECC), the researchers identified the national park conservation targets (CTs) to set up indicators for long term monitoring of recreation capacity analysis. They were water quality, percentage of root exposure and vegetation regeneration on trails, amount of garbage and visual quality related to garbage management and percentage of changes in live coral coverage at diving sites. Information on visitor use such as number of visitors and their behavior at each recreation site was related to the existing ecological impacts upon the CTs indicators. Two

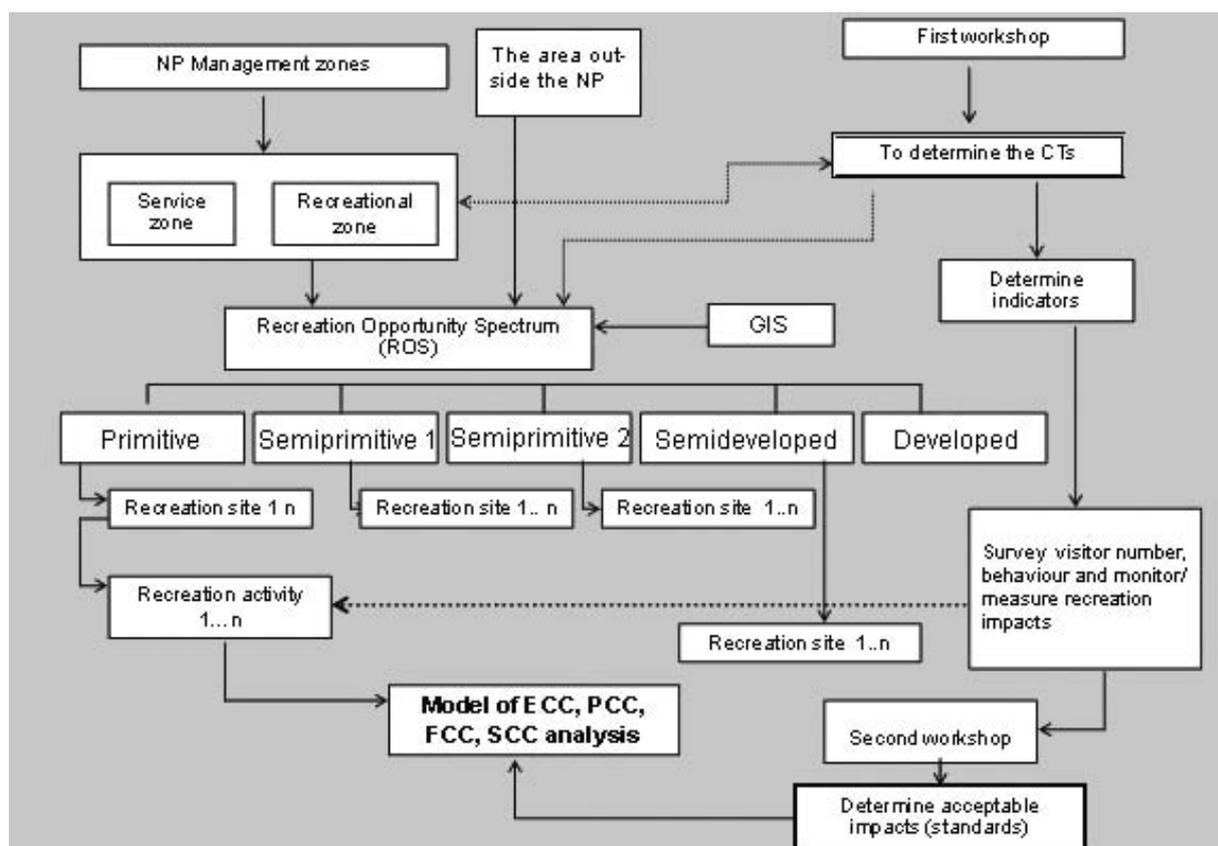


Figure 1: The overall research process of recreational capacity analysis at LY-KS NP.

workshops with park managers, ecologists, marine scientists, and the research team were held to set the acceptable impact levels for these indicators. Finally, the RCC analysis model was developed with 3 levels of impacts: exceeding capacity/extreme impacts, approaching or at capacity/moderate impacts, and below capacity/low impacts.

Physical carrying capacity (PCC) was determined by assessing the impact of available space on recreation. The researchers analyzed the Recreation Opportunity Spectrum (ROS) using GIS. Recreation space was measured together with the space required by a visitor for each recreation activity in different ROS zones. The visitor number at each recreation site was recorded to determine the impact of available space. The levels of impacts related to carrying capacity were classified into 3 levels: exceeding capacity/extreme impacts, approaching or at capacity/moderate impacts, and below capacity/low impacts with the acceptable impact of each level set at more than 80%, 50 to 80%, and less than 50% of maximum number of people at one time (PAOT) the space can accommodate, respectively.

Facility carrying capacity (FCC) examined whether facilities were able to accommodate existing visitor use and classified impacts into 3 levels: exceeding capacity/extreme impacts, approaching or at capacity/moderate impacts, and below capacity/low impacts with the acceptable impact of each level set at more than 80%, 50 to 80%, and less than 50% of maximum number of people at one time (PAOT) the facility can accommodate, respectively.

Finally, the social carrying capacity (SCC) was studied at selected recreation sites by a questionnaire survey of 342 respondents by opportunistic sampling. The crowding scale was set from 0 to 9 where 0 means not at all crowded and 9 means extremely crowded. The standard of visitor crowding impact was also set to determine the existing level of social impact. ROS was also employed here to identify the desired visitor experiences against their actual experiences. The levels of impacts related to social carrying capacity were classified into 3 levels: exceeding capacity/extreme impacts, approaching or at capacity/moderate impacts, and below capacity/low impacts which

Table 1: RCC indicators and acceptable impact levels for LY-KS NP.

Recreation capacity indicators	Recreational capacity Levels		
	Below capacity	At or Approaching capacity	Exceeding capacity
Impacts	Low or No concern	High to Moderate concern	Extreme concern
<b>Ecological Capacity</b>			
- Amount of soil loss from gully erosion on dirt road (ton/ha)	<25% of road area found soil erosion more than 31.25 ton/ha	25-50% of road area found soil erosion more than 31.25 ton/ha	>50% of road area found soil erosion more than > 31.25 ton/ha
- Root exposure (area in sq. m)	<25 % of the entire area of trail	25-50 % of the entire area of trail	> 50 % of the entire area of trail
- Sea water quality <ul style="list-style-type: none"> <li>▪ Temperature</li> <li>▪ Turbidity</li> <li>▪ pH</li> <li>▪ Salinity</li> <li>▪ DO</li> <li>▪ Total Fecal coliform</li> <li>▪ Oil film</li> </ul>	Reference from the water quality standard for coastal water (Office of Natural Resources and Environmental Policy and Planning,2004)		
- Fresh water quality <ul style="list-style-type: none"> <li>▪ Temperature</li> <li>▪ Turbidity</li> <li>▪ pH</li> <li>▪ Salinity</li> <li>▪ BOD</li> <li>▪ DO</li> <li>▪ Total Fecal coliform</li> <li>▪ Oil film</li> </ul>	Reference from the water quality standard for inland fresh water for recreation uses (Office of Natural Resources and Environmental Policy and Planning,2004)		
- Garbage <ul style="list-style-type: none"> <li>▪ Smell/ odor</li> </ul>	No smell within 20 meters	Slight to moderate smell within 20 meters	Severe or bad smell/odor within 20 meters
▪ Visual impact	No garbage/litter found outside garbage can	Found some garbage/litter outside garbage can causing moderate visual impact	Found a lot of garbage/ litters that cause high visual impact
▪ Garbage amount (kg/person/day)	<0.8	0.8-1.5	>1.5
- Plant regeneration (Difference in number of seedlings from 1x1 sq m permanent plots between disturbed area next to trail and undisturbed area) <ul style="list-style-type: none"> <li>▪ Important Species (CTs): <i>Mallotus floribundus</i> <i>Memecylon geddesianum</i> <i>Memecylon cyaneum</i> <i>Hydnocarpus ilicifolius</i></li> </ul>	<25% of Difference in No. of seedlings	25-50% of Difference in No. of seedlings	>50% of Difference in No. of seedlings
<b>Physical Capacity</b>			
- Number of People at One Time (PAOT) the space can accommodate	Less than 50% of the max. PAOT	50 to 80% of the max. PAOT	>80% of the max. PAOT
<b>Facility Capacity</b>			
- Number of People at One Time (PAOT) the facility can accommodate	Less than 50% of the max. PAOT	50 to 80% of the max. PAOT	>80% of the max. PAOT
<b>Social Capacity</b>			
- Perception of Crowding, scale from 0-9	0-3	>3-5	>5
- Decreased % of live coral reef coverage (before and after high season)	<25%	25-50%	>50%

Table 2: RCC analysis of root exposure at KBT and KKD trails.

Capacity Levels	Standard value (% root exposure density)	% of trail area where root exposure density found	
		KBT trail	KKD trail
Below CC (No/ Low impact)	<25	96.15	92.63
At and Approaching CC (Medium impact)	25-50	2.25	6.32
Exceeding CC (High impact)	>50	1.60	1.05
Total		100	100

Table 3: Water quality and recreational capacity analysis at LY-KS NP.

Data collection sites	Water quality indicators and capacity level 1/								Total CC Level
	Temperature 1/ °C	Turbidity 3/	pH 1/	Salinity 1/ (PP.)	DO 1/	BOD 3/	Total Fecal Coliform 2/ (MPN/10 0ml)	Oil film	
1. Reservoir Koh Samed	29.9	7.97	8.05	0.1	6.3	1.8	<2	No trace	Exceed
	Below	Exceed	Below	-	Below	Exceed	Below	Below	
2. Sai Keaw	29.5	1.50	8.13	28.5	6.1		<2	Seen some	Approach
	Below	Below	Below	Below	Below	-	Below	Approach	
3. Wong Deun	29.8	1.03	8.17	28.7	6.5		<2	No trace	Below
	Below	Below	Below	Below	Below	-	Below	Below	
4. Lung Dam	28.9	1.79	8.16	28.7	5.9		<2	No trace	Below
	Below	Below	Below	Below	Below	-	Below	Below	
5. Aao Kew Na Noak	29.1	1.98	8.21	28.7	6.2		<2	No trace	Below
	Below	Below	Below	Below	Below	-	Below	Below	
6. Aao Kew Na Nai	28.8	1.60	8.12	28.8	6.3		<2	No trace	Below
	Below	Below	Below	Below	Below	-	Below	Below	
7. Aao Praw	29.7	2.11	8.05	28.6	6.2		<2	No trace	Below
	Below	Below	Below	Below	Below	-	Below	Below	
8. Koh Kudee diving site	29.2	1.70	8.15	28.7	6.5		<2	No trace	Below
	Below	Below	Below	Below	Below	-	Below	Below	
9. Koh Talu diving site	28.9	1.62	7.70	28.7	5.8		<2	No trace	Below
	Below	Below	Below	Below	Below	-	Below	Below	
10. Koh Jan diving site	28.7	1.81	8.13	28.7	5.9		<2	No trace	Below
	Below	Below	Below	Below	Below	-	Below	Below	
11. Leam Rue Taek diving site	29.3	1.27	8.04	28.6	6.1		<2	No trace	Below
	Below	Below	Below	Below	Below	-	Below	Below	
12. Nuantip pier	29.9	8.7	7.93	28.7	5.1		350	Seen some	Exceed
	Below	Exceed	Below	Below	Below	-	Below	Approach	
13. Na Dan pier	29.2	2.92	8.26	28.7	5.2		27	Seen some	Approach
	Below	Below	Below	Below	Below	-	Below	Approach	

Table 4: RCC analysis on garbage and litter management at LY-KS NP.

Data collection sites	Impacts related to garbage management			
	Odor/smell	Visual impact	Garbage amount (kilogram/visitor/day)	Overall Capacity level
<b>Ko Samed</b>				
1. Garbage rest area / dumping field	Exceeding CC	Exceeding CC	2.54 kg/person/day Exceeding CC	Exceed
2. Garbage cans position (6 sites)	Below CC	Below CC		
3. Bo Thong Nature Trail	Exceeding CC	Exceeding CC		
<b>Ko Kudee and Ko Talu</b>				
4. Ko Kudee Nature Trail	Below CC	Below CC	No data	Below
5. Ko Talu	Below CC	Approaching CC	No data	Approach

Table 5: The recreation impacts on vegetation regeneration at KBT and KKD Nature Trails.

Levels of Impact and Capacity Levels	Standard value (%)	Decreased number of seedlings between disturbed and undisturbed areas (%)				
		KBT Trail (number of plots =20)		KKD (number of plots =10)		
		<i>Mallotus floribundus</i>	<i>Memecylon geddesia num</i>	<i>Mallotus floribundus</i>	<i>Memecylon cyaneum</i>	<i>Hydno Carpus- ilicifolius</i>
No/ Low impact (Below CC)	Less than 25%		- 24.4	+22.2	+73.3	
Medium impact (At and Approaching CC)	25-50%	- 33.7				
High impact (Exceeding CC)	> 50%					- 87.5

the acceptable impact of each level was set by the crowding scale of more than 5, 3 to 5, and 0-3, respectively. The social carrying capacity did not cover the study of perception of local people living nearby the national park.

After the four carrying capacities were investigated, the overall capacity of each recreational site was determined. The researchers identified what carrying capacity type limited the recreation use of each site by locating the highest impact found among the four carrying capacities. Figure 1 shows the overall research process and table 1 shows the recreational capacity analysis indicators and their acceptable impact levels. This paper presents the findings on 3 main islands: Ko Samed, Ko Kudee and Ko Talu.

## Results and Discussion

### Soil loss and root exposure

Only 5.92 % of the total dirt road area had soil loss >31.25 T/ha. The soil loss impact was still low and below capacity level. Impacts on root exposure at Khao Bo Thong (KBT) and Ko Kudee (KKD) nature trails were found to be minimal. Only 1.59 and 1.05 % of KBT and KKD trail areas had root exposure coverage more than 50 %, which is the highest root exposure density (table 2). The present recreation use levels at both trails did not exceed the recreation capacity regarding root exposure impact.

### Water quality

Water quality parameters with severe and moderate impacts were turbidity, BOD and oil film (table 3). Turbidity values were exceeded at Ko Samed reser-

voir and Nuantip pier. BOD capacity was also exceeded at Ko Samed reservoir. Several sites such as the popular Sai Keaw beach and Na Dan pier had excessively high oil films.

### Garbage and litter

Impact on garbage and litter was over capacity at Ko Samed (table 4). The garbage disposal system can not handle the large amount of garbage thus causing the garbage accumulation at the disposal site.

Table 6: Changes in percentage of live coral reef coverage before and after high season at snorkling sites in LY-KS NP.

Components of live corals	Live reef coverage (%)								
	Aao Kew Na Noak			Leam Reua Taek			Ko Talu		
	Dec. 2004	May 2005	Change	Dec. 2004	May 2005	Change	Dec. 2004	May 2005	Change
Massive Coral	16.8	19.9	+ 3.1	27.8	44.1	+ 16.3	23.4	26.0	+ 2.6
Submassive Coral	0.7	2.6	+ 1.9	19.1	15.7	- 3.4	2.9	2.8	- 0.1
Foliose Coral	7.0	3.5	- 3.5	0.2	1.1	+ 0.9	2.5	1.1	- 1.4
Encrusting Coral	0.4	0.2	- 0.2	0	0.2	+ 0.2	0.5	0.2	- 0.3
Table Coral	-	-	-	-	-	-	-	-	-
Branching Coral	0.1	3.4	+ 3.3	0	0.2	+ 0.3	1.2	1.0	- 0.2
Free – living	1.1	0.9	- 0.2	0	0.3	+ 0.3	0.1	0.6	+ 0.5

Table 7: Physical carrying capacity (PCC) of tourism sites in LY-KS NP.

Tourism sites	ROS	Max. PCC (PAOT)	Present use (PAOT)	Carrying capacity level
1. Sai Kaew beaches	SD	5,810	2,096	Below
2. Wongdeun beaches	SD	720	697	Exceed
3. Lung Dam, Aao Wai, Aao Kew, and Aao Pakarang beaches	SP-2 SP-1	338	236	Approach
4. Snorkeling sites		1,397	250	Below
4.1 Aao Kew Na Noak	SP-2	150	39	Below
4.2 Leam Reua Taek	SD	144	81	Approach
4.3 Koh Talu	SD	715	70	Below
5. Aao Praw beach	SD	509	253	Below
6. Ko Kudee	SP-2	282	111	Below
6.1 beach		120	97	Exceed
6.2 campground		138	14	Below
6.3 nature trail		23	15	Approach
7. Ko Talu beach	SP-1	116	412	Exceed

Note:

- P = Primitive area  
 SP-1 = Semi-primitive 1 area (non-motorized area)  
 SP-2 = Semi-primitive 2 area (Motorized area)  
 SD = Semi-developed area

### Vegetation seedlings

Results from the 1st year data showed only high impact on decreased number of seedlings between disturbed and undisturbed areas at KKD trail for *Hydnocarpus ilicifolius* which is considered an important species for Dry Dipterocarp forest at LY-KS NP (table 5). These figures however were only

from the first year measurement. Long term monitoring of this indicator is definitely needed for an accurate recreation capacity analysis.

Table 8: Summary of the ecological, social, physical, and facility carrying capacities of recreation sites in LY-KS NP.

Recreation sites/ data collection sites	Recreation carrying capacity					Recreation uses (persons)
	ECC	SCC	PCC	FCC	Total	
<b>Ko Samed Islands</b>						
1. Main dirt road	Below	-	-	-	Below	No Data
2. KBT nature trail	Exceed (garbage)	-	Below		Exceed	<10 persons/day <u>2/</u>
3. Reservoir and nearby dumping field	Exceed (garbage, water quality)	-	-	Exceed (Garbage)	Exceed	15,667 persons/month <u>1/</u>
4. Sai Keaw beaches	Approach (water quality)	Approach	Below	Approach	Approach	2,096 (PAOT) <u>2/</u>
5. Wong Deun beaches	Below	Approach	Exceed	Approach	Exceed	697 (PAOT) <u>2/</u>
6. Lung Dam beaches	Below	Below	Approach	Approach	Approach	236 (PAOT) <u>2/</u>
7. Aao Praw beach	Below	Approach	Below	Approach	Approach	236 (PAOT) <u>2/</u>
<b>Ko Kuddee Islands</b>						
8. KKD nature trail	Inconclusive (vegetation)	-	Approach	-	Approach	15 (PAOT)
9. Ko Kuddee beach	Below	Approach	Exceed	Approach	Exceed	97 (PAOT) <u>2/</u>
10. Campground	-	-	Below	-	Below	14 (PAOT) <u>2/</u>
<b>Ko Talu Islands</b>						
11. Ko Talu beach	-	Approach	Exceed	Exceed	Exceed	412 (PAOT) <u>2/</u>
<b>Snorkeling sites</b>						
12. Aao Kew Na Noak	Inconclusive (coral reef)	-	Below	Approach	Approach	39 (PAOT) <u>2/</u>
13. Leam Reua Taek	Inconclusive (coral reef)	-	Approach	Exceed	Exceed	81 (PAOT) <u>2/</u>
15. Ko Talu	Inconclusive (coral reef)		Below	Approach	Approach	70 (PAOT) <u>2/</u>
<b>Piers</b>					Exceed	
16. Nuantip	Exceed (Water quality)	-	-	Approach	Exceed	No Data
17. Na Dan	Approach (Water quality)	-	-	Approach	Approach	No Data

1/ Secondary data from high tourism season in 2001-2004

2/ PAOT = People at One Time during visitor survey on weekends and holidays at high tourism season

**Live coral reef coverage**

Data on the percentage of live coral reef coverage before and after high season is presented in table 6. Most sites experienced decreased coverage. However, at this early stage of our long term research, these figures were inconclusive for RCC analysis.

**Physical carrying capacity (PCC) and Social capacity (SCC)**

With respect to PCC for beach activities, Wongdeun was over capacity. Many private bungalows located in this area together with easy access brought quite a few people here. Ko Talu beach was also considered over capacity. It was designated as a SP-1 recreation opportunity for a quiet and remote experience and had limited beach area and therefore cannot accommodate very large numbers of visitors. However this island is now popular for most tour programs for lunch stops and afternoon relaxation. Ko Kudee is another site that exceeded physical capacity, especially for the beach area. For most snorkeling sites, the spaces are acceptable except at Leam Reua Taek where current numbers approach space capacity. Table 7 presents the analysis of PCC for several sites in the national park.

The over capacity of space for beach activities was consistent with the findings of the social carrying capacity measured at 4.2 from 9 for Ko Talu and Ko Kudee and 4.0 for Wong Deun beaches. Use levels at Ko Talu, Ko Kudee and Wongdeun beaches are over physical carrying capacity and approaching/at social capacity. The crowding scale at other tourism sites was 3.8 at Sai Keaw and 3.7 at Aao Praw beach, respectively.

**Facility Carrying Capacity (FCC)**

Most facilities for tourist services in LY-KS NP could accommodate current use levels. Only at the restroom at Ko Talu was over capacity. Since accommodation development at Ko Samed has been very demanding, park management has launched strict regulations for any new development in Ko Samed to cap the growth. It is expected that the number of overnight stays should not be more than the current figures of 4,100 people per night (inclusive of campgrounds) while Ko Kudee should not exceed 168 people per night.

**Overall Carrying Capacity**

After the four carrying capacity assessments were completed, the overall capacity was determined as shown in Table 8. At Ko Samed, the maximum carrying capacity for overnight use is now set at 4,100 people per night, with accommodation as the constraint. High impact on garbage management was also found at this level. However, national park management is trying to reduce garbage impact by launching a strategy on visitor management focusing on garbage reduction through interpretation and educational programs. Several aspects of the ecological impacts analysis for RCC cannot be completed at this time since long term monitoring is needed to obtain enough data for meaningful analysis on ecological carrying capacity especially at snorkeling sites.

**References**

- Shelby, B. & Hererlein, T. A. (1986). *Carrying Capacity in Recreation Settings*. Corvallis.
- Office of Natural Resources and Environmental Policy and Planning (2004). *Water Quality Standards*. Bangkok.

## **Beyond Carrying Capacity in Recreation Management: In Search of Alternatives**

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*Keywords: Camping capacity, concept, management tools, ecology.*

Carrying Capacity is a largely used concept in the field of recreation. While the notion originates in Pastoralist ecology, the concept has been adapted to various situations in recreation management, in both terrestrial, marine, and freshwater ecosystems and even in urban areas.

The original concept relied on a strong relationship between food resource and pastoral pressure; this link has disappeared in the field of recreation. The concept is largely used but in the meantime is subject to an important amount of criticism, shedding doubts on the concept's ability to be replicated in different situations. Many authors who use the concept are very critical when it comes to its field application. It is in fact very difficult to establish a mechanical relationship between the level of frequentation and the degree of impacts.

Despite these criticisms, the concept is still largely used and has been developed in different components, considering the ecological, economic, sociological and lastly perceptual aspects. (Briassoulis 2000, Papageorgiou et al. 1999, Buckley 1999). In a historical perspective the concept of carrying capacity has been regularly adapted and readapted to a more integrated ecosystem management approach encompassing social and biophysical dimensions. From pastoral ecology, where the concept estimates mostly biotic processes, its importation in recreation ecology meant transferring the specific notion of livestock pressure on pastures to evaluating impacts of a large diversity of tourism related activities on ecosystems defined as complex social and natural dynamics. This exten-

sion of the meaning jeopardizes the very relevance of the concept (Cole 2004). Indeed, these last developments have finally added more confusion to the debate, some authors accepting new components like "perceptual CC" or "sociological CC", which rely heavily on subjective appreciation regarding the state of a natural area, while others reject it massively. The development of alternatives to the model has never changed this attempt to establish a fixed relationship between degree of use and degree of impacts, not taking into account the limits outlined by Hughes (1999) regarding our limited understanding of ecological processes and through varying spatio-temporal scales.

It is indeed surprising to see that a concept that is so criticised remains largely used, and could more probably be explained by the absence of attractive alternatives. The present article intends to make a review of the current acceptation, use and criticisms of the concept and to seek for possible solutions of real alternatives in matter of management tools. The (legitimate) demand of managers of natural resources for estimations of measurable thresholds, beyond which ecosystem functions become irreversible, prevented some scientists from discarding the concept, even though it implies substantial uncertainty and complexity when applied to evaluating recreational pressures. The actors who most cling to the CC concept are managers and policy-makers who interpret it in normative terms. But even this normative use is a fallacy, because the effectiveness of the concept in convincing decision-makers to adjust recreation uses

- according to a presumed risk associated with recreation uses trespassing the CC limit - has barely been proven.

When it comes to management, decision making processes often define CC by considering site-specific objectives and related activities, which is indeed tautological and permits the legitimization of one sided interests, particularly if there is no real participatory strategy.

## References

- Buckley, R. (1999). An ecological perspective on carrying capacity. In: *Annals of Tourism Research* (26/3), p 705–708.
- Cole, D. N. (2004). Carrying capacity and visitor management: facts, values and the role of science. In: Harmon, D., Kilgore, B. M. & Vietzke, G. E. (eds.). *Protecting our diverse heritage: the role of parks, protected areas, and cultural sites*, p 43-46. Hancock.
- McCool, S. F. (1990). Limits of Acceptable Change: Evolution and Future. Graham, R. & Lawrence, R. (eds.). *Towards Serving Visitors and Managing Our Resources: Proceedings of a North America Workshop on Visitor Management in Parks and Protected Areas*.
- McCool, S.F. & Stankey, G.H. (1984). Carrying capacity in recreational settings: Evolution, appraisal and application. In: *Leisure Sciences* (6/4) p 453–473.
- Hughes, G. 2002. Environmental Indicators. *Annals of Tourism Research*, (29/2) p 457–477.

# Level of Sustainable Activity: Moving Visitor Simulation from Description to Management

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*Keywords: River traffic simulation, river traffic management, level of sustainable activity, RBSim, pattern of use simulation.*

## Introduction

Visitor pattern of use simulations are an effective tool for describing and quantifying the distribution, density, speed, and flow patterns of human movement in a variety of environments from wilderness back-country settings to highly urbanised high use settings (Cole 2005). The technical development of special purpose simulators for recreation environments continues using simulation paradigms including discrete-event simulation, cellular automata and multi-agent simulation. However, regardless of the methodology used to simulate visitor pattern of use, the outputs are always the same – a quantitative description of movement patterns. Whereas the quantitative analysis of visitor flows is fundamental to a better understanding of the complex interactions of human use, the impacts of these patterns on the quality of experience and behaviour can only be discovered through social science methods that elicit responses from users about their expectations, experiences, attitudes, preferences and behavioural responses to visitor densities, queuing times, flow rates, the distribution of destinations, and the capacity of facilities. Only by linking the social and environmental implications to the flow patterns generated by human pattern of use simulations can we begin to manage the quality of experience for visitors.

This issue is at the heart of a complex management problem in Melbourne, Victoria Australia. The Melbourne Waterways Committee commissioned a study to determine the traffic capacity of the Maribyrnong and Yarra Rivers (see figure 1) to develop a traffic management plan on the basis of the current level of river traffic and the projected

traffic for the next 5 and 10 year periods. The urgency for this study is prompted by existing conflicts between commercial passenger ferries and rowing and canoeing, and the increasing commercial and recreational traffic in the shipping zone. On top of this is the impending Melbourne Docklands development, which will create marinas for 700 to 1000 new private and public berths in the heart of the study area.

Earlier consultancies had established projected growth rates for commercial and recreational traffic, however a defensible method for determining river capacity for the various forms of traffic had not been determined. The underlying assumption had been that some single metric like “maximum number of vessels per hectare” could be established to determine the overall capacity of the river system. This definition, however does not recognize the very different physical operating characteristics of a rowing skull compared to a passenger ferry, or the quality of experience required for passive recreation versus competitive training. It is clear a robust defensible way of defining river capacity that takes into account river characteristics, competing users, vessel types, and physical infrastructure had to be developed.

## Level of Sustainable Activity

The Level of Sustainable Activity (LSA) concept is a generalisation of the Level of Service concept developed by the Transportation Research Board (2000). River capacity is different for each user group and varies in relation to river geometry, the provision of facilities, and the interaction with oth-



Figure 1: The "2 Rivers" study area – Port Phillip Bay to the south and the 7 river management zones.

er users. River traffic management must therefore be based on a comprehensive framework that integrates all the relevant factors in a format that is easy for users and decision makers to understand and that can be adapted to a wide range of environments and travel modes.

LSA can be thought of as a scale of end-user experience. Each river zone will have a range of service levels defined for each vessel type ranging from very low levels of use, with minimal environmental and social impacts to high-density use with high levels of user interaction, higher levels

of potential environmental and social impacts, and more intensive facility and management requirements (see Table 1).

The LSA concept integrates:

- Physical characteristics of the river, including navigable depth, width, and bank erosion potential.
- Physical characteristics of different vessel types, their stopping distance and safe passing distance and speed.
- User preferences for levels of use for specific activities in specific river zones.

Table 1: Level of Sustainable Activity vessel density definitions for Rowers/Canoeists and Motorised vessels. LSA level A is the lowest density and the highest quality of service. LSA level E is the highest density and lowest quality of service. This table allows the manager or analyst to link outputs from the river traffic simulation to quality of experience or river users.

<i>Level of Sustainable Activity</i>	<i>Rowers/Paddlers</i>		<i>Motorised Commercial and Recreational</i>		<i>Quality of Service</i>
	<i>Area/Boat</i>	<i>Boats/Ha</i>	<i>Area/Boat</i>	<i>Boats/Ha</i>	
A	10,000 m <sup>2</sup>	1	10,000 m <sup>2</sup>	1	Highest
B	5,000 m <sup>2</sup>	2	5,000 m <sup>2</sup>	2	
C	2,500 m <sup>2</sup>	4	2,500 m <sup>2</sup>	4	
D	769 m <sup>2</sup>	13	1,250 m <sup>2</sup>	8	
E	625 m <sup>2</sup>	16	714 m <sup>2</sup>	14	Lowest

- User attitudes toward competing traffic Safety, Environmental and Social risk factors relating to increasing use densities.
- Suggestions from users on management options for dealing with the above risks.

Each river user-type (rowers, commercial tour operators, water taxis, and ships) has different requirements in terms of safety, ability to perform their intended activity, and level of satisfaction based on the mix and density of vessels sharing the river zone. In the LSA framework two types of service are addressed:

- activity within a single user group (e.g. rowers in relationship to rowers or commercial vessels in relationship to other commercial vessels) and
- a level Sustainable Activity between different users (e.g. rowers in relationship to commercial vessels).

The presentation will discuss the use of focus groups and river traffic simulations using RBSim (Itami et al. 2004) of the LSA levels to generate river capacity definitions and management options for each river zone.

## References

- Cole, D.N., comp. (2005). Computer simulation modeling of recreation use: current status, case studies, and future directions. Gen. Tech. Rep. RMRS-GTR-143. Fort Collins.
- Itami, R., Raulings R., MacLaren G., Hirst K., Gimblett R., Zanon D. & Chladek P. (2004). RBSim 2: Simulating the complex interactions between human movement and the outdoor recreation environment. In: Journal of Nature Conservation.
- Transportation Research Board (2000). Highway Capacity Manual 2000. Washington D.C.

# A Study on Procedures to Establish Standards Concerning Trail Management in Sub-Alpine Zones of Protected Areas

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*Keywords:* Trail, management, procedure, protected area, sub-alpine, Japan, ecological, visual, Daisetsuzan.

## Introduction

Trails are considered necessary in protected areas to help people get about, to increase enjoyment, and to protect the environment by concentrating traffic on trail tracks. However, lack of management results in erosion and muddiness of trail tracks, and destruction of vegetation along the trails. Degraded trail conditions detract from their functional and recreational value. The level or type of the design and maintenance of the trails is not always consistent with the preferences of the visitors, which reduces the quality of the visitor experience.

The environmental impact of the trails, including the ecological and visual impact, should be minimised by a systematic management decision process to set the standards for trails. The difficult issue of balancing the dual objectives of visitor use and resource protection can be hard to address without a framework to structure and guide decision-making (McCool 1994). The purpose of this paper is to propose a procedure of standard of trail management in a fragile sub-alpine zone in a protected area and to assess visitor impact problems on trail tracks

## Methods

Most recreation management decisions have both a descriptive and an evaluative component (Cole 2004). These components are included in the process of identifying strategies for addressing visi-

tor-caused impact on trails, and selecting appropriate management actions to minimise or prevent unacceptable impacts.

Trail impact assessment studies have been frequent over the last 30 years (Hammit & Cole 1998). However, the issue hasn't been adequately discussed in order to set a standard for techniques for maintenance and construction that is suitable for the conditions from ecological, visual, and technical perspectives and their mutual relationship. It is necessary to classify the problem into a material phenomenon and a psychological phenomenon. The material phenomenon is grasped from an ecological viewpoint. The causal relationship changes are usually caught in the 101 m to 102 m and monthly range. On the other hand, the psychological phenomenon is grasped from a scenic viewpoint. The causal relationship changes are usually caught in the 102 m to 104 m and seasonal range. The scale of range between material and psychological change is different in time and space. We introduce two procedures into the model of "the standard of trail maintenance" according to the difference in scale of space and a distinction between a descriptive and an evaluative component. One procedure is based on the geographic distribution pattern of natural resources and use pattern at the area scale. Another procedure is to focus a maintenance technique based on scientific data to deal with ecological impact at the scale of the site.

Daisetsuzan National Park was chosen for this case study. Hokkaido nature conservation office under the Ministry of the Environment established a panel to identify management tactics for visitor impact problems, and to include an analysis step employing experts. Experts can include agency representatives, scientists, non-government organization staff who were nominated by the office for Hokkaido conservation of nature. The panel works with protected area managers and staff to analyse impact problems, select management actions.

## Results

Step 1 of 1st procedure: "Ranking for protection of visitor experience" was closely connected with the goal of Daisetsuzan National Park. This ranking was based on the scientific knowledge of the panel and the existing administrative plan and a desirable use condition referring to the concept VERP to identify protected area values, purposes, and management objectives. Step 2 of 1st procedure: "Ranking for conserving the trail condition" was settled in parallel based on the degree of necessity and urgency of countermeasures referring to ecological fragility through field investigations and previous research. Step 3 of 1st procedure: "Maintenance level of trail" was set up in nine categories that made the matrix of "Ranking for dealing with conserving a trail condition" and "Ranking for protection of visitor experience".

2nd procedure: At site scale, "Guidance of techniques for trail maintenance" was formed separately from the procedure of "Standard of trail maintenance". Step of "Guidance of techniques for trail maintenance" was composed of "Effectiveness of countermeasures", "Sampling damaged site", and "Understanding of impact causes". The contents of "Effectiveness of countermeasures" was to be adjusted to "Direction of countermeasures" of each trail section. "Direction of countermeasures" was set based on the comparison between "Current condition" and "Ideal condition". The matrix of factors of encouraging low visitor use and increasing the resistance of tracks showed a mutual balance sheet to examine the "Direction of counter measures".

But this has not yet been tested in the field. It would be useful to apply it in a variety of protected areas and to improve the framework.

## References

- Hammitt, W.E. & Cole, D.N. (1998). *Wildland Recreation: Ecology and Management* (2nd ed.). New York.
- Cole, D.N. (2004). *Monitoring and Management of Recreation in Protected Areas: the Contributions and Limitations of Science*. <http://www.metla.fi/julkaisut/workingpapers/2004/mwp002.htm>.
- McCool, S.F. (1994). Planning for sustainable nature dependent tourism development: The Limits of Acceptable Change system. In: *Tourism Recreation Research* (19/2), p 51–55.
- USDI National Park Service (1997). *VERP: A Summary of the Visitor Experience and Resource Protection (VERP) Framework*. Denver.

# Understanding and Managing Soundscapes in National Parks: Part 1- Indicators of Quality

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*Keywords: Natural sounds, perceptions, national parks, visitor experience.*

## Introduction

A growing body of research has documented the potential impacts of outdoor recreation in national parks and related areas. These impacts apply to multiple components of the landscape, including soil, vegetation, water, and wildlife. Moreover, there are often aesthetic implications of these impacts that can degrade the quality of the visitor experience. Research and management attention is now being extended to include aural impacts of outdoor recreation, and natural quiet – the sounds of nature undisturbed by human-caused noise – is now being recognized as an important and endangered resource in national parks and related areas. Moreover, recent policies by US National Park Service has made the protection, maintenance, and restoration of the natural soundscape a priority and consider natural quiet as a value and a resource in its own right.

Research related to sound and noise in national parks and related areas have traditionally given aircraft disturbances much attention. For example, Mace, Bell & Loomis (1999) questioned whether typical helicopter noise found in national parks would influence perceived aesthetic quality of landscapes and visitor's feelings of tranquility and solitude. They suggest that when sounds

are considered inappropriate for a specific area, the noise would become annoying and likely detract from other experiences such as enjoyment of nature (Mace et al. 1999). Noise was defined as unwanted sound, and affect was defined as emotion. Results suggest that even low levels of helicopter noise would affect visitor tranquility and solitude (Mace et al. 1999).

There is now a growing interest in how noise created by the increasing numbers of visitors to parks and related areas can mask the sounds of nature and detract from the quality of the visitor experience.

## Methods

Research conducted by Kariel (1990) suggested that simply investigating sound levels alone may not get at the true nature of annoyance with those sounds. Kariel suggested that understanding the physical characteristics and their socio-psychological characteristics along with sound levels may be a better way to predict whether sounds are deemed as annoying, pleasing, or acceptable. For example, high pitched sounds are usually deemed more annoying than low pitch sounds, and rhythmic sounds such as an engine are generally considered more annoying than continu-

ous sounds. However, because many sensory experiences occur along with sound, it is important to consider the larger context of the setting. Because many people tend to visit natural areas to get away, enjoy nature, and relax, sounds that interfere with these goals may also be deemed as annoying (Kariel 1990).

During the summer of 2005, a “listening exercise” was conducted at in Muir Woods National Monument. The purpose of this exercise was to 1) identify the natural and human-induced sounds that visitors heard most frequently, 2) distinguish the characteristics of sounds identified, and 3) understand how visitors perceived those sounds. From July 16th - 27th, 2005, visitors (n= 280) were asked to listen and then identify sounds on a checklist. Building on methods used by Kariel (1990), the checklists included possible physical characteristics of sounds, and allowed visitors to rate each sound on a scale of -4 (very annoying) to +4 (very pleasing).

**Results**

Figure 1 displays the median ratings of each sound heard by visitors (-4 through +4) and the percentage of visitors that heard the sounds. The results

are displayed using a concept similar to Importance/Performance (Hollenhorst & Gardner 1994). Importance/Performance provides a graphic representation of the relationship between importance and performance and provides information as to where management action should be directed. It is broken into four quadrants, with the percentage of people hearing sounds listed on the Y axis, and the median ratings of those sounds listed on the X axis. The upper left quadrant contains sounds that were rated negatively and heard frequently. More than 70% of visitors heard all of the following sounds: people (73%), water (81%), wind (74%), and groups talking (73%). These sounds should be considered as first priority for management consideration. The lower left quadrant contains sounds that were rated negatively, but were heard by less than 50% of the people; in most cases these sounds were heard by less than 25% of the people. These sounds should be monitored, but considered second priority for management. The upper right quadrant contains water, wind and bird song, sounds that visitors heard most often and found most pleasing. The lower right quadrant contains sounds that visitors found pleasing but did not hear as often.

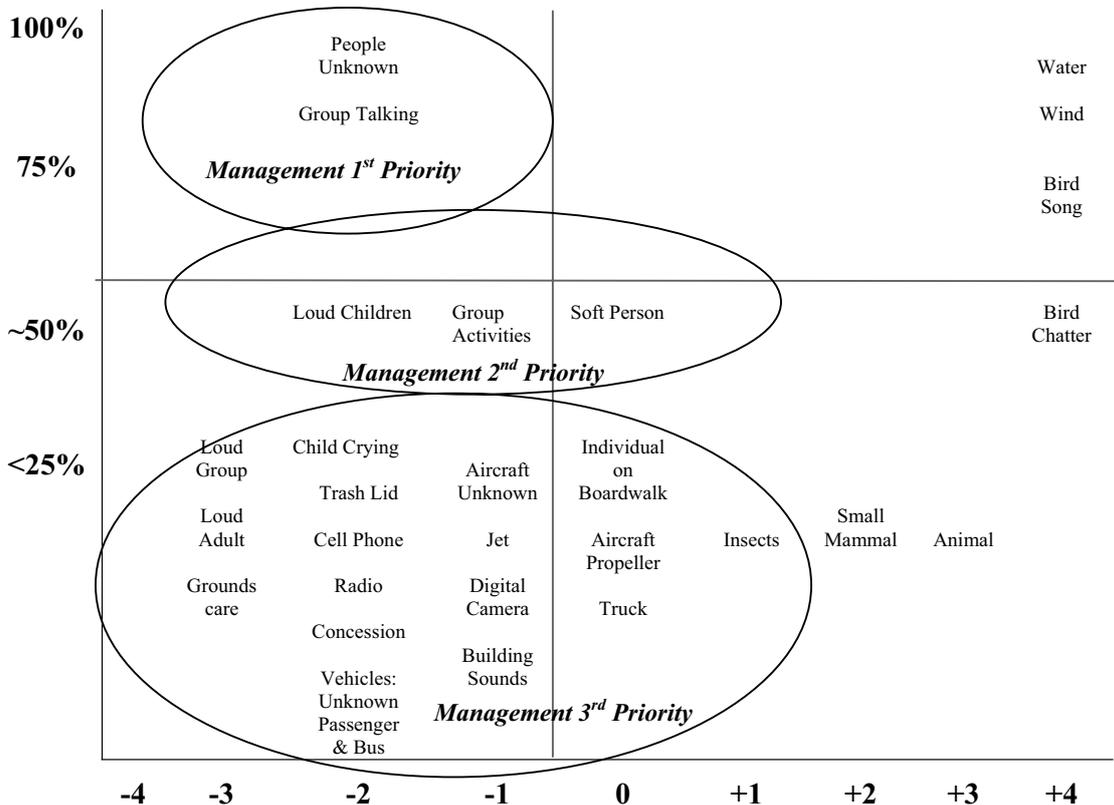


Figure 1: Median ratings of each sound heard by visitors (-4 through +4) by the percentage of visitors that heard the sounds.

## Conclusion

These data provide important management information and can inform the development of indicators of quality related to soundscapes. In addition to supplementing current sound monitoring and logging efforts in Muir Woods, this study helped with the development of a study instrument for a 2nd phase of research. Based on study findings, the second phase was designed and conducted to measure normative standards of quality for the soundscape of the park. This study is described in a companion abstracts by Manning et al. and will be followed up with a conceptual piece on computer simulation modeling proposed by Lawson and Plotkin.

## References

- Hollenhorst, S. & Gardner, L. (1994). The indicator performance estimator approach to determining acceptable wilderness conditions. *Environmental Management* (18), 901-906.
- Kariel, H.G. (1990) Factors affecting response to noise in outdoor recreational environments. In: *The Canadian Geographer* (34/2), p142-149.
- Mace, B.L., Bell, P.A., Loomis, R.J. & Haas, E.E. (2003). Source attribution of helicopter noise in pristine national park landscapes. In: *Journal of Park and Recreation Administration* (21/3), p 97-119.

## **Understanding and Managing Soundscapes in National Parks: Part 2 - Standards of Quality**

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*Keywords: Soundscapes, standards of quality, norms, park management, national parks.*

A growing body of research has documented the potential impacts of outdoor recreation in national parks and related areas. These impacts apply to multiple components of the landscape, including soil, vegetation, water, and wildlife. For example, visitors to parks can trample fragile soils and vegetation, erode soils, pollute waters, and disturb wildlife. Moreover, there are often aesthetic implications of these impacts that can degrade the quality of the visitor experience. Research and management attention is now being extended from conventional landscapes to “soundscapes” and includes aural impacts of outdoor recreation. “Natural quiet” – the sounds of nature undisturbed by human-caused noise – is now being recognized as an important and endangered resource in national parks and related areas. In particular, human-caused noise can mask the sounds of nature, disturb wildlife, and detract from the quality of the visitor experience.

Research at Muir Woods National Monument (California), a unit of the U.S. National Park System, was designed to enhance understanding and management of the park’s soundscape. An initial survey of visitors found that the park’s soundscape

was important to many respondents in determining the quality of the visitor experience. For example, some respondents reported that hearing the sounds of nature added to the quality of the visitor experience, while other respondents reported that human-caused noise detracted from the quality of the visitor experience. Based on these findings, two subsequent phases of research were designed and conducted. This research was designed using the framework of indicators and standards of quality as developed in contemporary park management and carrying capacity frameworks, including Limits of Acceptable Change and Visitor Experience and Resource Protection.

The first phase of research was conducted to measure and analyze the natural and human-caused sounds that visitors hear in the park. A representative sample of visitors participated in an “attending logging” exercise in which they recorded the sounds they heard in the park and their reactions to these sounds. Large percentages of visitors reported hearing the natural sounds of the park (e.g. rushing water of Redwood Creek, wind through the trees, birds calling and singing) as rated these types of sounds as “pleasant”. However, large per-

centages of visitors also reported hearing many human-caused sounds (e.g. visitors talking, boisterous behavior of children) and rated these types of sounds as “annoying”. This study is described in a companion abstract by Newman et al.

Based on resulting data, a second phase of research was designed to explore normative standards of quality for human-caused noise in the park. Five tape recordings were prepared that included an initial recording of natural quiet only and four recordings of increasing levels of human-caused noise. Metrics designed to construct these tapes and measure the visitor-caused noise included in the study tapes were 1) sound pressure level, 2) human noise-free interval, 3) percent of time natural sounds were audible, 4) percent of time human sounds were audible, and 5) number of human-caused sound events. These tapes were incorporated into a survey administered to a representative sample of park visitors. Respondents listened to each of the five study tapes and were asked to 1) rate the acceptability of each tape recording on a nine-point scale that ranged from -4 (“very unacceptable”) to +4 (“very acceptable”), 2) identify the types of sounds they found pleasing and annoying, and 3) identify the tape recording that best represented the conditions of the park during their visit. Aggregate respondent ratings of the acceptability of each of the five study tapes were plotted to form a social norm curve. Resulting data provide an empirical basis to help formulate standards of quality for the soundscape of the park.

# Understanding and Managing Soundscapes in National Parks: Part 3 – Computer Simulation

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*Keywords: Soundscapes, computer simulation, monitoring, park management, national parks.*

## Introduction

Natural sounds are increasingly being recognized both as a natural resource of national parks and related protected areas to be conserved, as well as an integral part of visitors' experiences of parks and protected areas. For example, in response to growing concern about the effects of scenic air tours on the "soundscapes" within national parks and visitors' enjoyment of natural sounds, the U.S. National Park Service established a Soundscapes Program Center to assist parks in developing air tour and soundscape management plans. Furthermore, recent studies of national park visitors have found that enjoyment of quiet, solitude, and natural sounds adds to the quality of the visitor experience, while human-caused noise can interfere with visitors' enjoyment.

Recent research at Muir Woods National Monument (California), a unit of the U.S. National Park System, was designed to enhance understanding and management of the park's soundscape. This research was designed using the framework of indicators and standards as developed in contemporary park management and carrying capacity frameworks, including Limits of Acceptable Change (LAC) and Visitor Experience and Resource Protection (VERP). The first phase of research was conducted to measure and analyze the natural and human-caused sounds that visitors hear in the park. A second phase of research was designed to explore normative standards of quality for human-caused noise in the park. Resulting data provide an empirical basis to help formulate indicators and

standards of quality for the soundscape of the park. These two phases of research are described in companion abstracts by Pilcher et al. and Manning et al., respectively.

Indicator-based frameworks like LAC and VERP are applied by monitoring the condition of indicator variables and initiating management responses if standards of quality are violated. However, due to the dispersed nature of recreation within national parks and related protected areas, it is often difficult to monitor indicators of quality through direct observation. For example, research at Muir Woods has been conducted to identify indicators and standards of quality related to visitors' experiences of the parks' soundscape, yet it is difficult to monitor on-the-ground whether those standards have been violated. Similarly, it is difficult and politically risky to test the effectiveness of alternative management practices through on-the-ground trial and error when standards are violated.

## Methods

Recent research suggests that computer simulation may be a useful tool to monitor "hard to measure" indicators. For example, computer simulation modeling has been used to monitor the number of people at one time at popular attractions sites within Arches National Park, USA (Lawson et al., 2003), the percentage of groups who must share backcountry campsites with other groups at Isle Royale National Park, USA (Lawson & Manning, 2003) and the number of hiking and camping encounters among groups in the John Muir Wil-

derness of the Inyo National Forest, USA (Lawson et al. in press). In addition, previous research has demonstrated the utility of computer simulation modeling to test the effectiveness of alternative management practices in a manner that is more comprehensive, less costly, and less politically risky than on-the-ground trial and error. For example, simulation modeling has been used to assess the effects of changes in infrastructure at Twelve Apostles National Park, Australia (Itami 2005); implementation of trailhead quotas in Yosemite National Park, USA (van Wagtenonk 2003); regulation of travel routes in Isle Royale National Park, USA (Lawson in press); and alternative transportation systems in Arches National Park, USA (Lawson et al. 2003) on crowding-related indicators of quality.

## Results

This paper will draw upon examples from the research reviewed above to demonstrate, conceptually, the potential utility of integrating data from simulation models of ambient sound in national parks into computer simulation models of visitor flows within the same areas to monitor sound-related indicators of quality. Further, this paper will explore the potential utility of computer simulation modeling to examine the effects of alternative management policies (e.g. air tour management alternatives, alternative transportation planning) on the soundscapes visitors experience within national parks and related protected areas.

## References

- Itami, R. (2005). Port Campbell National Park Australia: Predicting the Effects of Changes in Park Infrastructure and Increasing Use. In: Cole, D. (ed.). *Computer Simulation Modeling of Recreation Use: Current Status, Case Studies, and Future Directions*, RMRS-GTR-143, p 57-64.
- Lawson, S. (in press). Computer Simulation as a Tool for Planning and Management of Visitor Use in Protected Natural Areas. In: *Journal of Sustainable Tourism*.
- Lawson, S., Itami, B., Gimblett, R. & Manning, R. (in press). Benefits and challenges of computer simulation modeling of backcountry recreation use in the Inyo National Forest. In: *Journal of Leisure Research*.
- Lawson, S. & Manning, R. (2003). Research to inform management of wilderness camping at Isle Royale National Park: Part I – descriptive research. In: *Journal of Park and Recreation Administration* (21/3), p 22-42.
- Lawson, S., Manning, R., Valliere, W., & Wang, B. (2003). Proactive monitoring and adaptive management of social carrying capacity in Arches National Park: An application of computer simulation modeling. In: *Journal of Environmental Management* (68), p 305-313.
- Van Wagtenonk, J. (2003). The wilderness simulation model: A historical perspective. In: *International Journal of Wilderness* (9/2), p 9-13.

# Managing Sustainable Eco-Tourism in Van Vihar National Park

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*Key Words: Sustainable eco-tourism, tourism carrying capacity, physical carrying capacity, real carrying capacity, effective carrying capacity, management capacity.*

**Abstract:** Tourism Carrying Capacity determines as to what extent the influx of tourists may be allowed to manage the sustainable eco-tourism in a protected area. The concept of tourism carrying capacity is easy to perceive in theory, but in actual practice it is very difficult to quantify. Tourism carrying capacity is rarely estimated. Van Vihar is a unique combination of safari and zoological park. Its legal status is national park. White tiger and albino Sloth Bear are the main attraction to the tourists. In the winter season migratory water birds take refuge. It is situated at the bank of Upper Lake of Bhoj Wetland, The Ramsar Site; Wetlands of International Importance, in the Central Indian. More than 35 thousand tourists visit Van Vihar annually. The three levels of tourism carrying capacities i.e. physical carrying capacity, real carrying capacity, and effective carrying capacity were estimated and compared. Implications on management of eco-tourism were discussed.

## Introduction

Tourism Carrying capacity determines as to what extent the influx of tourists are allowed to manage the sustainable eco-tourism in a protected area. The concept of tourism carrying capacity is not very difficult to perceive in theory, but it is very difficult to quantify (Ceballes-Lascurain 1996). The National Wildlife Action Plan 2002-2016 recommends conducting tourism carrying capacity studies to gauge extent of tourism in most visited protected areas (Anon, n. d.). Tourism carrying capacity is rarely estimated. However Ceballes-Lascurain, (1996) has illustrated its calculations. Rajesh Gopal & Shukla (n. d.) estimated the tourism carrying capacity of Kanha Tiger Reserve. Bhattayachar (2005) presented an exhaustive documentation of the eco-tourism of Van Vihar National Park. Tourism carrying capacity of Van Vihar has not been worked out so far; therefore the author has attempted to quantify it and discussed implications of management of eco-tourism.

## Methods

General observations were made in the Van Vihar National Park for a week in June 2004. Available information and literatures were analysed. Tour-

ism carrying capacity of the Van Vihar was estimated by following the methodology as given by Cifuentest (1992) and illustrations given by Ceballes-Lascurain, (1996). Some criteria were established and assumptions were made based on the biophysical, ecological, social and climatic factors that influence the public use of the site. The three levels of tourism carrying capacities i.e. physical carrying capacity, real carrying capacity, and effective carrying capacity were estimated and compared. Implications of management of eco-tourism were discussed.

## Study site

Van Vihar National Park is spread over 445 hectares at the bank of Upper Lake of Bhoj Wetland more popularly called of "Bhopal Kaa Tal" in the rugged hilly terrain at the heart of the capital city Bhopal of Madhya Pradesh State in the Central India. The altitude varies from 450 meters to 650 meters above mean sea level in the Plateau of Vindhaychal Hill Ranges. It is situated at the 23° 13' 48" N latitude and 77° 23' 24" E longitude. Van Vihar is basically a combination of safari park as well as zoological park but it enjoys the legal status of a national park under

Wildlife (Protection) Act 1972. Intention notification was issued in 1983 and finally declared as a national park in 1984.

The committed conservation efforts rehabilitated the habitat with 12 species of mammals (table 1). The carnivores are kept in captivity in large enclosures in the natural environmental conditions whereas the herbivores are let free ranging in their natural habitat. The Marsh Crocodile *Crocodylus palustris* (Lesson) is reared in pools. The animals are fed in the evening.

White tiger and albino Sloth Bear are the main attraction to the tourists. Some ponds have been developed where water birds may be observed at close quarters. In the winter season migratory water birds take refuge there. The Bhoj Wetland is a Ramsar Site: a wetland of international importance. It is a unique, near natural, man-made wetland, representative of the Central Indian Plateau region. The Bhoj Wetland is spread over an area of 3201 hectares supports a wide variety of flora and fauna, including 160 species of birds, regularly supporting over 20,000 birds including migratory species in winter (Ramsar Sites Directory and Overview September 2005).

The park is equipped with a battery operated bus for tourists which provides an environmental friendly atmosphere. Excursion on the five kilometres long nature trail following the bank of the Bhoj Wetland in the early morning and late in the evening provides ample opportunities to witness the wild animals. The rising sun in the morning and setting sun in the evening behind the hills and its reflection on the lake is an unforgettable, delightful experience. The interpretation centre is a place to appreciate the value of the nature conservation.

Its superb natural environment and typical situation makes it a major tourist destination in India. About 35 thousand tourists visit Van Vihar National Park each year, <http://envfor.nic.in/cza/vanvihar.htm> (15 March, 2006).

## Results

Tourism carrying capacity is a specific type of carrying capacity and refers to the carrying capacity of the biophysical and social environment with re-

spect to tourist activity and development (Wolters 1991). It represents the maximum level of visitor use and related infrastructure that an area can accommodate. Following the methodology of Cifuentes (1992) and illustrations of Ceballes-Lascurain (1996), calculation of the various tourism carrying capacity of the Vanvihar National Park is as below.

Physical carrying capacity is defined as the maximum number of visitors that can physically fit into a defined space, over a particular time. It is given by the formula;

$$Pcc = A \times (V/a) \times Rf$$

Where Pcc = Physical Carrying Capacity,  
A = Length or Area of a nature trail,  
V/a = One visitor or group per unit length or area of nature  
Rf = Rotation factor (number of group of visitors per day).

The Rotation Factor is the number of permissible daily visitor to a site. It is given by the formula:

$$Rf = \text{Opening period} / \text{average time per visit.}$$

For the calculation of Physical Carrying Capacity the following basic information are used and assumptions are made:

1. Tourists are allowed to enter with all types of vehicle. They may move freely on the 5 km long all weather nature trail.
2. Tourists visit individually or in a group and the minimum distance between the individuals or groups may be 50 meters.
3. Average size of group is of 10 members.
4. Van Vihar National Park remains open throughout the year for tourists.
5. The visiting hours are as follows:

March to September	06.00 AM	to 10.30 PM
	03.30 PM	to 06.30 PM
October to February	06.30 AM	to 11.00 AM
	03.00 PM	to 06.00 PM

6. Minimum time required to visit the site is 1 hour and 30 minutes.

Here "A" is the total length of the nature trail which is 5 Km. or 5000 meter, where the tourists are allowed to make observations.

One visitor or group per unit length of nature trail  
 $V/a = 1 / 50$ .

Each day available visiting hours are 4.30 hours in the morning and 3.00 hours in the evening, the Rotation factor for morning and evening are calculated by dividing the available visitor hours by the time required for one visit.

Rotation factor in the morning hours:  $Rf = 4.30 \text{ hours} / 1.30 \text{ hours} = 3$

Rotation factor in the evening hours:  $Rf = 3.00 \text{ hours} / 1.30 \text{ hours} = 2$

Therefore the total rotation factor “Rf” is 5, three in the morning and two in the evening.

Now by using the formula of the Physical Carrying Capacity “Pcc” may be calculated as:

$Pcc = A \times (V/a) \times Rf$
or $Pcc = 5000 \text{ meter} \times (1/50\text{meter}) \times 5$
or $Pcc = 500$

The physical carrying capacity will be 500 groups visit per day or 5000 visitors a day with the average group size of 10 visitors.

Real carrying capacity is defined as the maximum number of visits to a site, once the correction factors or reduction factors derived from the particular characteristics of the site have been applied to the Physical Carrying Capacity (Pcc). The corrective factors are obtained by considering biophysical, environmental, ecological, social and management variables.

Real Carrying Capacity is given by the formula:

$Rcc =$	$Pcc \times$	$\frac{(100-Cf_1)}{100} \times$	$\frac{(100-Cf_2)}{100} \times$
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Where Rcc = Real Carrying Capacity,

Cf = Corrective factor.

Corrective factor are expressed in percentage, it is given by the formula:

$Cf =$	$\frac{M1 \times 100}{Mt}$
Where M1 =	Limiting magnitude of the variables,
Mt =	Total magnitude of the variables.

Consideration of the environmental, ecological, management social variables for the calculation of corrective factors:

(1) Excessive sunshine: Sunshine is intensive in the following periods making visits to the site uncomfortable during the opening hours.

March to September	09.00 AM	to 10.30 AM
	03.30 PM	to 05.00 PM
October to February	9.30 AM	to 11.00 AM
	03.00 PM	to 04.30 PM

Each day available visiting hours are 4.30 hours in the morning and 3.00 hours in the evening, thus total available visiting hours is 7.30 hours. Whereas each day excessive sunshine are 1.30 hours in the morning and 1.30 hours in the evening thus total excessive sunshine is 3.00 hours.

Corrective factor for excessive sunshine is calculated by using the formula:

$Cf_1 =$	$\frac{M1 \times 100}{Mt}$
=	$\frac{3.00 \times 100}{7.50}$
=	40%

(2) Rain fall: Rainy season is for 4 months from July to October and winter rain occurs in December and January. In the evening hours usually hail storm occurs in months of February and March, Pre-monsoon rain is experienced from 15th June. Thus there are 90 rainy days per year and rain fall may occur for one and half hours during visiting hours which may hinder the visitation. Thus the total rainy hours each year are  $90 \times 1.50$  and considering 360 days in a year visitation hours are  $360 \times 7.5$ .

Corrective factor for excessive rain fall is calculated by using the formula:

$Cf_2 =$	$\frac{M1 \times 100}{Mt}$
=	$\frac{90 \times 1.5 \times 100}{360 \times 7.50}$
=	5%

(3) Disturbance to wildlife: Migratory birds occur in the Bhoj Wetland and in ponds especially created for water birds and forests. The nature trail follows the bank of Bhoj Wetland and ponds in the Park, migratory birds may get disturbed for six months from October to March in the winter and spring

season. The wild animals may remain unaffected because the tourists are not allowed to leave the nature trail. Wild animals are provided with food close to the road side in the evening at the peak tourist hours. Tourists see the wild animals at close quarters. Wild animals are accustomed with the presence of visitors and do not scare or escape.

Corrective factor for disturbance to wildlife is calculated by using the formula:

Cf3 =	$\frac{M1 \times 100}{Mt}$
=	$\frac{6 \times 30 \times 100}{12 \times 30}$
=	50%

(4) Temporary closing of the site: Van Vihar National Park remains closed on Tuesday and certain holidays. There are 52 weeks in a year therefore there will be 52 Tuesdays and there are 8 holidays on religious festivals in a year. Thus there will be total 60 days in a year when the Van Vihar National Park is closed to the tourists.

Corrective factor for excessive rain fall is calculated by using the formula:

Cf4 =	$\frac{M1 \times 100}{Mt}$
=	$\frac{60 \times 100}{360}$
=	16.66%

(5) Erosion: Correction factor for soil erosion has not been taken in to account as the nature trail is all-weather road lined with bitumen, waterproof and resistant to soil erosion. Tourists are not allowed to drive off the road.

(6) Accessibility: It is the measure of the difficulty due to slope of the trail experienced by visitor in moving about freely. The entire length of the nature trail is easily accessible therefore accessibility factor has not been taken in to account.

Thus following corrective factors have been calculated:

- (1) Excessive sunshine: 40.0 %
- (2) Rainfall: 5.0 %

(3) Disturbance to wildlife: 50.0%

(4) Temporary closure of site: 16.6%

Now the Real Carrying Capacity “Rcc” may be calculated by using the various corrective factors in the formula as follows:

Rcc =	Pcc ×	$\frac{(100-Cf1) \times}{100}$	$\frac{(100-Cf2) \times}{100}$	-----	$\frac{(100-Cfn)}{100}$
=	Pcc ×	$\frac{(100-Cf1) \times}{100}$	$\frac{(100-Cf2) \times}{100}$	$\frac{(100-Cf3) \times}{100}$	$\frac{(100-Cf4)}{100}$
=	500 ×	$\frac{(100-40) \times}{100}$	$\frac{(100-5) \times}{100}$	$\frac{(100-50) \times}{100}$	$\frac{(100-16.66)}{100}$
=	118.275				

The physical carrying capacity estimated to be 500 groups visit per day or 5000 visitors a day, whereas the real carrying capacity is 118.275 group visits per day or 1183 individual visitors per day.

Effective carrying capacity is defined as the maximum number of visitors that a site can sustain, given the management capacity available with the administration. Management Capacity is the sum of conditions that the protected area administration requires if it is to carry out its function and objectives. Effective carrying capacity is obtained by comparing real carrying capacity with the management capacity.

Van Vihar National Park does not have sufficient infrastructure and adequate number of efficient personnel or guide to handle large number of visitors. A large array of tourists arrive here on Sunday and holidays, it becomes over crowded in the evening and very difficult to manage. Tourists congregate in large number to observe the tigers at the time of feeding in the evening. Ninety percent of visitors could not get a guide for escorting and remain unattended to get any information about flora and fauna of the Park (Bhattacharya 2005). The management capacity would be only 10 % therefore the effective permissible carrying capacity would be only 12 group visits at a time and 120 individual visitors at a time. Limitations in management capacity constitute one of the most serious problems confronting protected areas in developing countries (Ceballos-Lascurain 1996).

Seventy five percent visitors are willing to pay a fee for the guides during their visit (Bhattacharya 2005). Forest guards or personnel for security purpose may be deployed at strategic point to keep

regular vigil over the activities of tourists. Eighty percent of visitors showed interest in the park management if they are given a chance to do so, 10 % of local people visit more than 10 times year (Bhattacharya 2005). Therefore, orientation programmes may be conducted for some visitors to train them as guides and may be given opportunities for their part time volunteer services to the park in the peak hours in the tourist seasons. Sixty percent of visitors do not know anything about code of conduct that is to be observed in the Vanvihar National Park (Bhattacharya 2005). Signposts carrying necessary information may be placed at vantage points and a brochure may be distributed. Very few visitors, only 4 %, liked the interpretation centre from where they could have obtained most of information about Vanvihar and wildlife (Bhattacharya 2005). Therefore the interpretation centre may be equipped with audio-visual aided models to make it more informative and attractive. Films on wildlife may be displaced in the evening. Diesel and petrol driven vehicles create noise and air pollution therefore only electric and bio-diesel driven vehicle may be allowed to enter. Tourists may also be allowed with the cycle rickshaw. A cycle rickshaw is a two seated manually operated vehicle. Training in eco-tourism may be imparted to the cycle rickshaw puller, they may be provided with a pair of binoculars and wild animal and bird indicator booklets. This will spread awareness for nature conservation to the common people and employment too.

The disturbances may be diminished by rigidly observing rules and regulations. Commitment to some restrictions and obligations may be taken from the

visitors before their entry into the park. Thus management capacity may be increased by employing adequate number of personnel and imparting environmental education to make the staff more efficient, and developing improved infrastructures.

Each subsequent level constitutes a corrected capacity level of the level which precedes. Physical Carrying Capacity is always greater than Real Carrying Capacity and Real Carrying Capacity is greater or equal to Effective Carrying Capacity. Anyhow, effective carrying capacity will never be greater than real carrying capacity even in the most favourable conditions (Ceballos-Lascurain 1996). If it is exceeded, deterioration of the areas resources, diminish visitor satisfaction and adverse impacts upon the society, economy and culture of the area can be expected to ensue (McIntyre & Hetherington 1991).

Carrying capacity depends on place, season and time, user's behaviour, facility design, pattern and level of management and the dynamic character of the environments (Ceballos-Lascurain 1996). Therefore estimation of carrying capacity may be revised from time to time with the changes in the factors that influence carrying capacity.

The physical carrying capacity gives the maximum number of visitors that can be physically accommodated, real carrying capacity gives the maximum number of visitors that can be permitted without causing loss or destruction to the ecosystem and effective carrying capacity gives the maximum number of visitors that can be sustained with the present management capacity. Eco-tourism is sustainable if the tourism activity is within the effective tourism carrying capacity. However

Table 1: Mammals of Van Vihar National Park.

S. N.	Common Name	Scientific Name	Habit
1	Spotted Deer	<i>Axix axix</i> (Erxleben)	Herbivores
2	Sambar	<i>Cervus unicolor</i> (Kerr),	
3	Blue Bull	<i>Boselaphus tragocamelus</i> (Pallas)	
4	Black Bock	<i>Antilope cervicapra</i> (Linnaeus)	
5	Four-horned Antelope	<i>tetracerus quadricornis</i> (Blainville),	
6	Wild Boar	<i>Sus scrofa</i> (Linnaeus)	
7	Common Languor	<i>Presbytis entellus</i> (Dufressne)	
8	Tiger	<i>Panthera tigris</i> (Linnaeus)	Carnivores
9	Panther	<i>Panthera pardus</i> (Linnaeus)	
10	Asiatic Lion	<i>Panthera leo persica</i> (Linnaeus),	
11	Sloth Bear	<i>Melursus ursinus</i> (Shaw),	
12	Hyena	<i>Hyaena hyaena</i> (Linnaeus)	

tourism activity should never be allowed to exceed the real carrying capacity. A ceiling on the number of tourists/tourist vehicles permitted to enter the protected area should be laid down, keeping in mind each protected area's individual characteristics (Anon, n. d.). Once the different levels of carrying capacities are estimated suitable strategies should be planned to increase the tourism carrying capacity. Otherwise the number of tourists may be restricted by increasing the entry fee and imposing strict rules and regulations.

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### **References**

- Anon (n. d.). National Wildlife Action Plan (2002-2016). New Delhi.
- Bhattacharya, A. K. (2005). Ecotourism and Livelihoods Capacity Building for Local Authorities. New Delhi.
- Ceballos-Lascurain, H. (1996). Tourism, Ecotourism and Protected Areas: The State of Nature- Based Tourism around the World and Guidelines for its Development. Gland and Cambridge
- Cifuentes, A. M. (1992). Determination de Capacidad de Carga Tourism en Areas Protegidas. Costa Rica.
- McIntyre, G. & A. Hetherington (1991). Sustainable Tourism Development: Guidelines for Local Planners. Madrid.
- Rajesh G. & Shukala R. (n. d.). Management Plan for Kanha Tiger Reserve for the Period 2001-02 to 2010-11 Vol. I Text. M. P. Forest Dept. Mimeo.
- Wolters, T. M. (1991). Tourism Carrying Capacity. Paris.

# Recreational Carrying Capacity Assessment in a Turkish National Park

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*Keywords: Recreational carrying capacity, social carrying capacity, Termessos National Park, Antalya, Turkey, protected areas.*

## Introduction

National parks and protected areas are favorite places for recreation activities. They are originally established to provide people with places for inspiration, recreation and spiritual renewal. Public visits to parks and protected areas continue to increase and may threaten the integrity of natural and cultural resources and the quality of the visitor experience (Lawson et al. 2003); consequently planning, management, and monitoring are developed as the steps of a system to establish a balanced level between conservation and recreational use.

Carrying capacity analysis in the wilderness provides a basis for recreational planning and management of protected areas in the visitor management context. Extensive human use and high visitor numbers could be a problem for such areas. The result is usually deterioration of natural and cultural resources and diminished visitor satisfaction. Carrying capacity analysis is the part of a framework which aims to protect the natural and cultural resources under human use and provides best social conditions for visitor experience.

Determination of carrying capacity for an outdoor recreation area requires information or data related with the resource, the visitor characteristics and the provided infrastructure which is specific to each protected area because of its unique natural and cultural characteristics, location, state of the public use and climatic conditions. Hence methods and parameters could change in different cases according to the concept and priorities of the framework.

The aim of this work is to estimate the recreational carrying capacity of Termessos National Park which is one of the important protected areas in the Mediterranean Region of Turkey. It is also aimed to provide a basis for the better management of visitors; consequently better protection of the biophysical and historical characteristics of the area in a sustainable way.

As being one of the five national parks in the Province of Antalya, Termessos is highly appreciated by foreign tourists. The Park is located 34 km to the northwest of Antalya City (figure 1). The surface area of the park is 6702 ha and situated in the altitude ranges from 250 to 1663 m from the sea level. Termessos is the name of ancient Roman city which once had been located within the national park borders.

Termessos National Park is a unique site to visit because of its richness both for natural and cultural resources. Cultural resources of the site focus on Termessos, the ancient Roman city itself. Flora and fauna of the Park are of high value. 680 plant species representing 92 families belonging

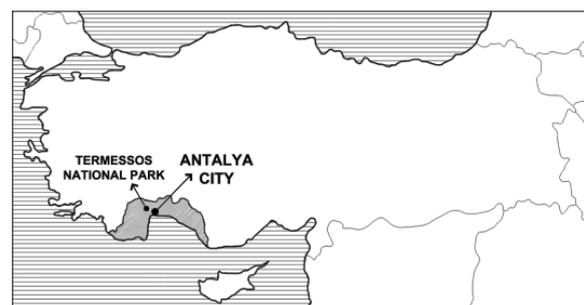


Figure 1: Location of Termessos National Park.

to 5 vegetation types namely maquis, forest, rock, hydrophilous and culture plants were identified in the Park area (Alçitepe 1998).

Among the major mammals in the National Park area are *Canis vulpes* (common fox), *Canis aures* (jackal), *Ursus arctos* (grizzly bear), *Capra aegagrus* (wild goat), *Mustela foina* (beech marten), *Meles meles* (Eurasian badger), *Sus scrofa* (wild boar), *Lepus europaeus* (European hare), *Dama dama* (dama gazelle), *Felis silvestris* (wild cat), *Lynx lynx* (European Lynx) and *Lutra lutra* (common otter). 113 bird species representing 32 families some of which are endangered live in Termessos. Protection of the habitats of following species is of particular importance: *Circateus gallicus* (short-toed eagle), *Strix aluco* (eurasian tawny owl), *Bubo bubo* (eurorasian eagle owl), *Accipiter nisus* (sparrow hawk), *Falco peregrinus* (pelegrine falcon), *Falco biarmicus* (lanner falcon), *Asio otus* (long-eared owl).

## Methods

Recreational carrying capacity of Termessos National Park was determined with the combination of two different methods. The Methodology for Estimating Protected Area Carrying Capacity by Cifuentes (1992), and the Carrying Capacity Assessment Process (C-CAP) by Shelby and Heberlein (1986) were used. Basically the first method provides the calculation of physical, real and effective carrying capacities by using environmental, ecological, climatic and managerial parameters in a formulation. The logic of this method depends on the factors which reduce the level of visitation for making carrying capacity estimations. The second method (C-CAP) provides the calculation of social carrying capacity. It makes possible to determine social norms and preferences of people (visitors) and provides to collect empirical data for the evaluative dimension of carrying capacity.

Three different types of carrying capacities are identified in the Methodology for Estimating Protected Area Carrying Capacity (Cifuentes, 1992). Physical carrying capacity (PCC) is the maximum number of visitors that can physically fit into a defined space, over a particular time, and expressed according to the following formula:

$$PCC = A \times V/a \times Rf$$

where A is the available area for public use, V/a is Visitor/area occupied, and Rf is the rotation factor (number of permissible visits per day). Rf is calculated as follows:

$$Rf = \text{opening period} / \text{average time of one visit}$$

Real carrying capacity (RCC) is the maximum permissible number of visits to a site, once the corrective (i.e. reductive) factors derived from the particular characteristics of the site have been applied to the PCC. These corrective factors are obtained by considering bio-physical, environmental, ecological, social and management variables. RCC is expressed by the following general formula where Cf is a corrective factor expressed as a percentage:

$$RCC = PCC - Cf1 - Cf2 - \dots - Cfn$$

Thus, the formula for measuring RCC is:

$$RCC = PCC \times (100 - Cf1 / 100) \times (100 - Cf2 / 100) \times \dots \times (100 - Cfn / 100)$$

Corrective factors are closely linked to the specific conditions and characteristics of each site. They are expressed in percentage terms, using the following formula:

$$Cf = MI / Mt \times 100$$

Where, Cf is the corrective factor, MI is the limiting magnitude of the variable, and Mt is the total magnitude of the variable.

Effective (or permissible) carrying capacity (ECC) is the maximum number of visits that a site can sustain, considering the management capacity (MC) of the site. ECC is obtained by comparing RCC with the MC of the corresponding protected area administration. It is expressed with the following formula:

$$ECC = RCC \times MC$$

Social carrying capacity (SCC) involves descriptive and evaluative components (Shelby and Heberlein, 1986). Descriptive data focuses on objective characteristics of recreation systems where the evaluative component critically considers the different objective impacts produced by management parameters in an effort to determine their relative merits. The C-CAP method does not contain formulas; it employs some methods to make estimations for the social capacity for example previous

Table 1: Characteristics of Trails in Termessos National Park.

Trail	Use level	Aspect	Trail section (m)			Trail length (m)
			Slope < 10 %	Slope 10–20 %	Slope > 20 %	
1	High	West	552	90	338	980
2	High–medium	South–east	60	183	600	843
3	Medium	East	140	238	95	473
4	Medium–low	South	134	280	282	696
5	Low	West	100	44	–	144
Total length of each slope category (m)			986	835	1315	
Grand total of trail lengths (m)						3136

data analysis, literature work, field work (counting, questionnaire surveys, observations, interviews, etc.). A formula is developed in accordance with the Methodology for Estimating Protected Area Carrying Capacity as follows:

$$SCC = G_s \times GP_n \times R_f$$

Where,  $G_s$  is the group size (mean value),  $GP_n$  is the group and/or number of people preferred to have been encountered by visitors (mean value), and  $R_f$  is the rotation factor (number of permissible visits per day). The unit of SCC is also accepted as “visitor/day”, because the concept is closely related with the people themselves.

## Results

Trails, main visitor points and the road from the main entrance to the parking area were taken with Global Positioning System (GPS) receiver. Five trails were classified based on their use levels. Characteristics of the trails were summarized in table 1.

Data related with visitors were collected through a questionnaire survey done in the randomly selected days of 2003 fall and 2004 spring seasons. The questionnaires were administrated on-site to a sample of 500 visitors with face-to-face interview method, after finishing their hike.

Four different types of carrying capacities were calculated with the use of parameters. PCC was calculated as follows:

$$R_f = \text{opening period} / \text{average time of one visit} = 9/3 = 3$$

31 groups each consisting of 50 visitors can fit into the Park's 3136 m total trail length with 50 m distance between each group  $[(31 \times 50) + (30 \times 50) =$

3050 m]. In PCC, theoretically, it is supposed that these 31 groups are simultaneously visiting the site. Therefore, available area for the public use becomes 1550 m  $(31 \times 50 = 1550 \text{ m})$ . Thus PCC is:

$$PCC = A \times V/a \times R_f = 1550 \times 1 \times 3 = 4650 \text{ visitors/day}$$

Factors affecting the RCC of Termessos National Park are mainly based on the climatic data for 21 year period data (1980-2000) for Antalya. Concerning the RCC a number of corrective factors are identified for the Park.

### Excessive sunshine

Particularly in the summer season excessive sunshine affects trekking on and climbing to the steep slope sections of trails. The number of days in which the temperature is equal or more than 25°C was considered and that is 168.4 days. Daily excessive sunny period is 4.5 hours in the 12 hours of total sunny period. Thus limiting magnitude (MI) and total magnitude (Mt) of excessive sunshine were calculated as 757.8 hours/year  $(168.4 \times 4.5)$  and 2020.8 hours/year  $(168.4 \times 12)$ , respectively. With these values, excessive sunshine corrective factor (Cfes) was calculated as:  $Cfes = MI / Mt \times 100 = 757.8 / 2020.8 \times 100 = 37.5 (37.5 \%)$

### Rainfall

In some sections of the trails of Termessos National Park are lots of broken ancient stones and ruins which are eroded by heavy use and can be slippery even in a light rain, so trekking can be dangerous. Also visibility decreases; pictures and films taken by camera and video camera are affected. Number of days in which rainfall is equal or more than 0.1 mm was taken as the climatic data and that is 74.8 days. Average rainfall period is 3.0

hours. Limiting magnitude of rainfall was calculated as 224.4 hours/year ( $74.8 \times 3$ ). Total magnitude of rainfall is related with the visiting hours of the park. Daily opening period is 9 hours and it is calculated as 3285 hours/year ( $9 \times 365$ ). Rainfall correction factor (Cfr) was calculated as:  $Cfr = MI / Mt \times 100 = 224.4 / 3285 \times 100 = 7.0$  (7 %)

### Storm

Winds with a speed of equal or more than 17.2 m/s are defined as “storms” (Anonymous 2004). Storms are effective on the recreational activities, thus considered as a corrective factor. Average number of stormy days is 12.5 and effective period is 7 hours. Limiting magnitude of storm was calculated as 87.5 hours ( $12.5 \times 7$ ) and total magnitude is the same as calculated in rainfall; 3285 hours/year. So, storm corrective factor (Cfs) is calculated as:  $Cfs = MI / Mt \times 100 = 87.5 / 3285 \times 100 = 3.0$  (3.0 %)

### Erosion

Intensive use of the trails causes erosion; therefore erosion was considered as a corrective factor. The relationship between slope ranges and soil types shown in the table 2 indicates the erodibility of any place under visitor use. Gravel, sand and clay soils on slopes of between 10 and 20 %, present a medium risk of erosion; lime soils on slopes between 10 and 20 %, present a high risk of erosion, as do all the soil types on slopes exceeding 20 %. Recreational activities in Termessos National Park are performed in the linear segments. Trails in the park have sections with medium and high erosion risk related with the slope range, and soil type is generally lime to sand. Total length of the trails is 3136 m of which 835 m present medium and 1315 high erosion risk. Limiting magnitude of erosion is 2150 m ( $835 + 1315$ ) and total magnitude 3136 m. Hence

erosion corrective factor (Cfe) is calculated as:  $Cfe = MI / Mt \times 100 = 2150 / 3136 \times 100 = 68.5$  (68.5 %)

### Accessibility

Accessibility is related with the degree of difficulty, due to the slope of the trail, experienced by visitors. Termessos National Park is situated generally a rough area having steep slopes. According to the table 1, first and second trail slope categories (categories: 10% and 10-20%) form the majority (58%) of the total trail length. So, a site-specific evaluative standard was considered for Termessos National Park for the trail slope. Trails with slopes less than 20 % were considered suitable for visitors. Slope range more than 20 % was used as the limiting magnitude (1315 m) for the accessibility correction factor. Thus accessibility corrective factor (Cfa) was calculated as:  $Cfa = MI / Mt \times 100 = 1315 / 3136 \times 100 = 42.0$  (42 %)

### Disturbance to Wildlife

Among the mammals *Capra aegagrus* (wild goat) has of particular importance for the Park. Also 7 birds of pray are endangered in the area. Therefore disturbance to wildlife was considered as a limiting factor in Termessos. Mating season for wild goat is between October 15 and November 15 (1 month) and for bird species April and May (2 months). Thus, limiting magnitude is 3 (1+2), and the total magnitude is 12 (12 months). Disturbance to wildlife corrective factor (Cfw) was calculated as:  $Cfw = MI / Mt \times 100 = 3 / 12 \times 100 = 25.0$  (25 %) After having calculated all corrective factors for Termessos National Park, RCC was calculated by converting the corrective factors in percents into coefficients. Thus RCC was calculated as follows:

Table 2: Erosion risks of soils in different slopes (Cifuentes 1992).

Soil type	Slope		
	< 10 %	10 % - 20 %	> 20 %
Gravel or Sand	low	medium	high
Lime	low	high	high
Clay	low	medium	high

$$RCC = PCC \times (100 - C_{fes} / 100) \times (100 - C_{fr} / 100) \times (100 - C_{fs} / 100) \times (100 - C_{fe} / 100) \times (100 - C_{fa} / 100) \times (100 - C_{fw} / 100)$$

$$RCC = 4650 \times (100 - 37.5 / 100) \times (100 - 7.0 / 100) \times (100 - 3.0 / 100) \times (100 - 68.5 / 100) \times (100 - 42.0 / 100) \times (100 - 25.0 / 100)$$

$$RCC = 4650 \times 0.625 \times 0.93 \times 0.97 \times 0.315 \times 0.58 \times 0.75 = 359 \text{ visitors/day}$$

Management capacity of Termessos National Park is derived from its administrative status. Facility conditions are thought to be sufficient. Long-term Management Plan (Anonymous 1969) considered the need for 26 personnel. However only 7 personnel (1 manager, 1 clerk, 1 forest ranger, 1 driver and 3 workers) are in charge at the moment. The management capacity (MC) for Termessos National Park was calculated as 27 % ( $7/26 \times 100$ ). Thus ECC was calculated as:  $ECC = RCC \times MC = 359 \times 0.27 = 97$  visitors/day

### Social Carrying Capacity (SCC)

SCC was calculated using the data obtained by questionnaire surveys. 67.8 % of the visitors come to Termessos National Park in groups. Rotation factor had been calculated as 3 before; thus SCC was calculated as:  $SCC = G_s \times G_{Pn} \times R_f = 12 \times 2.5 \times 3 = 90$  visitors/day. This value is the daily capacity. Theoretically SCC at one time has to be one third of this value because of the three rotations which was calculated for one day.

### Discussion and Conclusion

Termessos National Park is a place to be the home of an ancient Roman city and unspoiled habitat for most species of Mediterranean flora and fauna. In this study physical, real and effective carrying capacities of the Park were calculated through the formulas in the methodology by Cifuentes (1992).

Six corrective factors related with the bio-physical characteristics of the area were applied. Historical background could be another corrective factor on the recreational use of Termessos. However, inclusion of the visitor capacity regarding the ruins itself as a corrective factor needs comprehensive research. Determining a reasonable number of visits which aims the sustainability of the cultural resource needs the use of professional instruments

to measure the effects on the ruins; therefore ruins themselves were not considered as a corrective factor.

Species in the natural vegetation could also be another corrective factor. However no endemic species were encountered in the trails and nearby areas used by the visitors. Therefore a correction factor for the plant species was not applied.

ECC was calculated as 97 visitors per day which means 35.405 visitors per year. Total visitor number in the period 1995-2005 was 328.654 visitors which means an average of 29.878 visitors per year, and 82 visitors per day. So, actual visiting state of the Park is below the capacity that was calculated in this research. SCC which was integrated into the research was calculated separately from the previous three levels of carrying capacity. It was calculated 90 visitors per day which means an average of 32.400 visitors per year. It is interesting that the results of ECC and SCC are very close to each other although they were calculated separately. This is the original finding of this study, not been found in the previous studies.

Final numbers for recreational carrying capacity is 97 visitors/day, and for social carrying capacity 90 visitors/day. In the case of Termessos, it seems easier to establish a recreational carrying capacity for the National Park. Both visitor numbers are very close to each other and lower than the actual average visitor numbers; thus any of them can be used as the maximum visitor number. Actual visitor numbers are suitable for the site and current visitation conditions should be maintained. If the management system is improved, the recreational carrying capacity may be increased. Therefore a balanced management system is of importance for the sustainability of the natural resources; for the protection of cultural heritage and for the quality of recreation experience.

### References

- Alciteme, E. (1998). Termessos Milli Parki (Antalya) Florasi Uzerinde Bir Arastirma. Akdeniz Universitesi Fen Bilimleri Enstitusu Biyoloji Anabilim Dalı Y. L. Tezi, Antalya.
- Anonymous (1969). Termessos Milli Parki Uzun Devreli Gelisme Plani, T.C. Orman Bakanligi Orman Genel Mudurlugu Milli Parklar Dairesi, Ankara.

- Cifuentes, M. (1992). Determinacion de Capacidad de Carga Turistica en Areas Protegidas. Turrialba.
- Lawson, S.R., Manning, R.E., Valliere, W.A. & Wang, B. (2003). Proactive Monitoring and Adaptive Management of Social Carrying Capacity in Arches National Park: an Application of Computer Simulation Modeling. In: *Journal of Environmental Management* (68), p 305-313.
- Shelby, B. & Heberlein, T.A. (1986). *Carrying Capacity in Recreation Settings*. Corvallis.



Nature Tourism: Concepts and Experiences  
in Recreational and Protected Areas

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Yves Hausser & Dominik Siegrist (Chairs)

## Comparison of Forest Recreation and Nature Tourism in Hungary, Italy and Slovakia Based on the First Outputs of the COST E33 Action

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### Introduction

COST Action E33 'Forest Recreation and Nature Tourism' (FORREC) is a network of European researchers and practitioners who are involved in forestry, landscape architecture and tourism. The main objective of COST Action E33 is to improve the quality of information available to policy makers and forest managers on the recreation and tourism benefits of forestry.

The present paper attempts to review the first outcomes of the COST Action E33 to gain an overview of the major demands, conflicts and potentials of nature tourism and forest recreation in Hungary, Slovakia and Italy. On the basis of the overview, hypotheses are stated regarding the development of forest recreation and nature tourism in the investigated countries. These should build the basis of further and more detailed investigations.

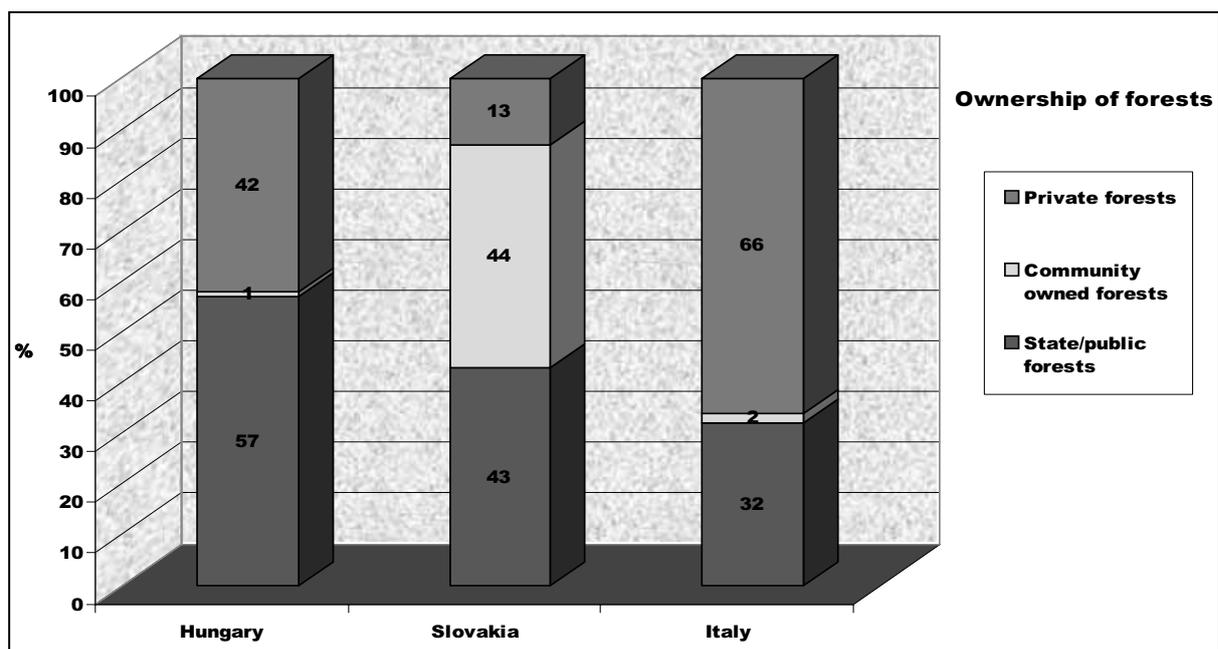


Figure 1: Ownership of the forests in Hungary, Slovakia and Italy.

## Methods

In COST Action E33 a questionnaire has been prepared to gather information about the general conditions, conflicts and approaches to the management of forest recreation and nature tourism in Europe (Wirth & Pröbstl 2005). The questionnaire has been filled out by experts in each participating country. The questionnaires were not statistically significant but aimed to draw a general picture of the countries.

The present paper is based on the data collected about the three mother-countries of the authors, delegates of COST Action E33. The topics of forest cover, ownership, legislation, forest functions and forest planning are discussed.

Forest cover varies in the examined countries. (Sk: 40,8%, I: 30%, H: 19,4%). The ownership patterns have radically changed in Hungary and Slovakia during the last 15 years. After 1990, woodlands have been returned to private owners. In Italy 2/3 of the forests ownership is private (figure 1).

16,1% of forests are designated for recreation in Slovakia. The forests with priority of health, social benefits, tourism, education and research enclose only 2% of forests in Hungary. In Italy forests are not classified by law as "recreational forests". Recreation is considered to be a major function of the greater part of the forests, so forest management plans include it as a driving aspect.

The proportion of timber production and protection functions show main aspects of forest utilization. Economic use predominates forests (Sk: 67%, H: 65%, I: 58%). The proportions of protected forests are also quite high (I: 34%, H: 20%, Sk: 16,9%). Protected forests play a significant role in forest recreation. In Italy the proportions of forest functions are changing because of the neglect of silvicultural activities in many mountainous zones and an increase of protection and tourist-recreational values.

Planning of recreation and nature tourism in forests is usually undertaken by foresters and forest service personnel, sometimes in collaboration with landscape architects, environmental educators and local administrators. Some more information about legislation and planning tools is shown in table 1.

## Hypotheses

Hungary and Slovakia need to develop and manage recreation and tourism in forests in light of the relatively new private land owning structures and market. The forest landscapes offer qualities unavailable in many more developed European countries. These are e.g. remoteness, quietness and the presence of wildlife as well as hunting prey. As a tool for rural development, forest recreation and nature tourism are likely to have an increasingly important role in these countries.

Despite the longstanding tradition of nature/mountain tourism in Italy, nowadays an increasing importance of new types of nature tourism can be found. The trend in delivering appropriate policies concerning forest recreation as well as providing skills for the operators of the sector is highly positive. Planning, design and management of forests with major recreation functions and nature tourism are particularly developed in publicly owned forests and protected areas, where the social and public issues are considered as driving forces. The private owners' interest is still low in investing and activating forms of recreation and nature tourism management in their forests.

Table 1: Comparison of Hungary, Slovakia and Italy regarding forest recreation and nature tourism.

Which categories of protected areas exist in your country?	HU	SK	I
Protected areas for landscape conservation	X	X	X
Nature parks	X	X	X
National parks	X	X	X
Other	Natural monuments, Natura 2000		Natural reserves, Natura 2000 sites, Wildlife oasis, Biogenetic reserves, Natural monuments
Is this planning a legal instrument or is it optional for forest owners?	HU	SK	I
Legal requirement		X	
Optional	X		X
Is there independent planning for recreation and nature tourism in forests?	HU	SK	I
Yes, at regular intervals			
Yes, in special cases	X	X	X
No			
Which data are available for recreational planning?	HU	SK	I
Data from national surveys	X		X
Data from regional surveys	X	X	X
Data collected by the forest administration	X	X	X
Data collected by others especially for the planning process	X		X
If there is public participation in the definition of visions and goals, which groups take regularly part	HU	SK	I
Land owners	X	X	X
Land users	X	X	X
Local residents / Other citizens	X	X	X
Hiking clubs and sport associations	X	X	X
Mushroom / Berry collectors			
Hunting and fishing representatives	X	X	X
Community representatives	X		X
Other	activists in nature protection		activists in nature protection
At what regular intervals is monitoring carried out?	HU	SK	I
Every 1 or 2 years			
Every 3 to 5			
Less than once in 5 years			
At irregular intervals, as necessary		X	X
Other	10-15 YEARS		
Are there regional differences in the treatment of forest based recreation and nature tourism?	HU	SK	I
There are very big differences	X	X	X
There are big differences			
There are some differences			
There are small differences			
There are no differences			
Overall how do you evaluate the consideration of forest based recreation and nature tourism in the forests of your country?	HU	SK	I
Excellent			
Good	X	X	
Sufficient			X
Satisfactory			
Unsatisfactory			

## References

- Cieszewska, A., Drexler, D., Bihuňová, M., Kalincsák, P. & Prochazka, J. (2005).  
Regional Report of Eastern European Countries. Czech Republic, Hungary, Latvia, Lithuania, Poland and Slovakia. COST Action E33 'FORREC' Forest Recreation and Nature Tourism. Working Group for Recreation Planning and Management.
- Ferenc, G. (1996). State Forest Management in the Transition Period from Planned Economy to Market Directed One. IUFRO-95 Papers and Abstracts. <http://www.metla.fi/iufro/iufro95abs/rsp14.htm>
- Pattichis, G., Kazafaniotis, S., Kazepi, M., Hatzistathis, A., Castro, J.M., Rubin G., Mariotti, B. & Comic, L. (2005). Planning and Management Practices in the Mediterranean Region. A Study Report for Cyprus, Greece, Croatia, Portugal, Italy and Serbia-Montenegro and Portugal. COST Action E33 'FORREC' Forest Recreation and Nature Tourism. Working Group for Recreation Planning and Management.
- Salbitano, F. (2005). I Boschi alla Porta di Casa: partecipazione e selvicoltura nei boschi urbani e periurbani. In Corona, P., Iovino, F., Maetzke, F., Menguzzato, G., Nocentini, S. & Portoghesi, L. (a cura di). *Foreste Ricerca Cultura. Scritti in onore di Orazio Ciancio*, p 457-475. Firenze.
- Wirth, V. & Pröbstl, U. (2005). Questionnaire for the COST Action E33 about Forest Recreation and Nature Tourism. COST Action E33 'FORREC' Forest Recreation and Nature Tourism. Working Group for Recreation Planning and Management.

## Birdwatching and Protected Areas of Georgia

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### Introduction

Birdwatching is a new type of nature based tourism for Georgia and little is done yet at national level for its development. The major reasons that are supportive for birdwatching development in Georgia are – diversity, rarity, endemism and important congregations of birds, globally recognized wetlands and Important Bird Areas, several wintering sites, existence of major bird migratory corridors and stopover or “refueling” areas, and all these in combination of unique cultural-historical attractions. Potential benefit of birdwatching

development to the national economy is estimated at about 40 million USD per year (Gavashelishvili et al. 2005).

One of the major strategic objectives for Georgia Protected Areas development is to promote nature tourism in these areas. This objective is declared by the government of Georgia and the Protected Areas authorities. Birdwatching, as part of nature based tourism, may significantly benefit Protected Areas of Georgia by increasing their incomes, and at the same time, by positively changing the public’s perceptions about nature resources. This pa-

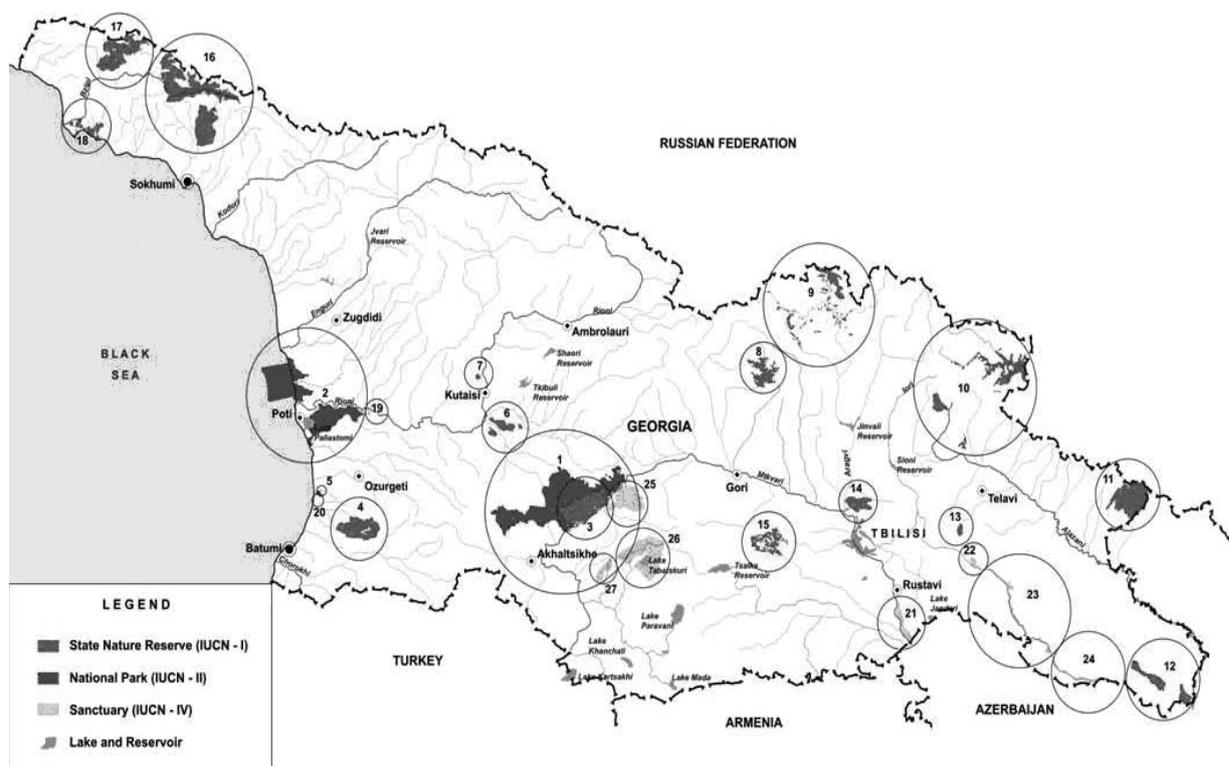


Figure 1: Protected Areas of Georgia.

per analyses the current situation of management of protected areas in Georgia to compare it with the declared objectives.

## Methods

The geographical distribution of Important Bird Areas and the range of the Caucasian Black Grouse (*Tetrao mlokosiewiczii*) were compared to the existing protected areas in Georgia using a GIS to examine system level planning results in contrast to the tourism development objectives. In addition, the current situation in existing protected areas was assessed by collecting and analyzing the following information for twenty randomly selected protected areas: biological importance (species richness, endemism, number of globally threatened species, etc.), socio-economic importance (provision of resources or services to surrounding settlements), vulnerability (existing and potential threats), management effectiveness (existence, quality and implementation status of management plans) and available funding (provided by both the national government and international donors).

## Results

The Protected Areas system of Georgia (figure 1) is comprised by 21 Nature Reserves (IUCN Category I), 4 National Parks (IUCN Category II), 3 Natural Monuments (IUCN Category III) and 11 Sanctuaries (IUCN Category IV). The major problems identified in protected areas of Georgia are: non-existence of management plans or low effectiveness of existing management plans; lack of marketing; very low capacities for tourism management.

The Important Bird Areas are the most attractive places for nature tourists, including birdwatchers, because they are identified and delineated with internationally approved and tested criteria and refer to the biologically richest sites (Gokhelaşvili et al. 2004). The Protected Areas System and the Important Bird Areas of Georgia (figure 2) are compared by overlaying these maps. It is found that only 15 % of Important Bird Areas fall within protected areas. Besides, the map of Caucasian Black Grouse, one of the most attractive species for birdwatchers (Gokhelaşvili et al. 2005), is overlaid to

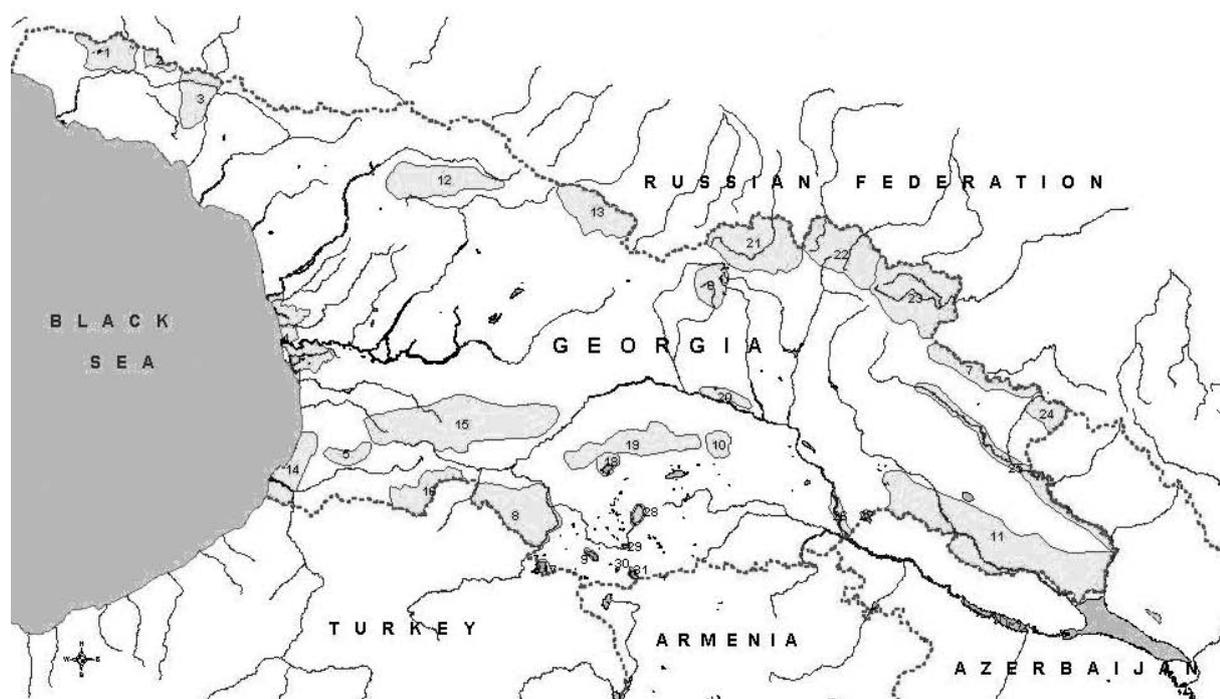


Figure 2: Important Bird Areas of Georgia.



Figure 3: Caucasian Black Grouse and Protected areas of Georgia.

the protected areas map (figure 3), which shows that only 4.5% of the Caucasian Black Grouse habitats are within current protected areas of Georgia.

## Conclusion

The conclusion is made that the current Protected Areas system of Georgia does not support one of its strategic objectives to develop nature based tourism. The recommendations are presented to make relevant changes both at system-level planning and at management planning of individual protected areas. Recommendations are grouped in four major categories: 1) Enlargement of protected areas - Tusheti, Kazbegi and Lagodekhi; 2) Establishment of new protected areas at key sites – Meskheta, Javakheti, Adjara and Racha-Svaneti; 3) Capacity building of existing protected areas to improve the management effectiveness - Borjomi-Kharagauli National Park, Tusheti National Park, Kolkheti National Park, Kazbegi Nature Reserve, Vashlovani National Park, Algeti Nature Reserve and Lagodekhi Nature Reserve, 4) Development of birdwatching guidelines for the protected areas – relevant infrastructure, training of guides, national and international marketing.

## References

- Gavashelishvili L., Gokhelasvili R., Javakhishvili Z. & Tarkhishvili D. (2005). A Birdwatching Guide to Georgia. Tbilisi.
- Gokhelasvili R., Gavashelishvili L. & Javakhishvili Z. (2005). Caucasian Black Grouse Action Plan. Tbilisi.
- Gokhelasvili R., Javakhishvili Z. & Azniashvili L. (2004). Important Bird Areas of Georgia. Tbilisi.

# Nature-Based Activities on Urban – Green Requirements of Nature-Based Activities in an Urban Environment

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*Keywords: Sport, nature sports, urban green, visitor employed photography.*

## Introduction

The exertion of nature-based activities is no longer related to rural or suburban spaces. Especially nature-based sport plays a major part in daily recreation and is requested within the communities. As an effect of growing demand for semi-natural areas in cities, a higher pressure on nature and conflicts between different user-groups has been recognized. These conflicts are a result of lack of practicable planning-guidelines for nature-based sport in an urban environment. In particular, sport-development-planning, the traditional instrument for planning activity-spaces, has fewer concepts to integrate urban green into their work. Planners have concentrated on building and managing facilities over the last 50 years and were not able to deal with nature-based activities.

## Methods

Until the late 1980s the Golden Plan was the main tool for planning sport facilities. The aim was a homogeneous supply of sport facilities on the basis of strict parameters as e. g. sport area in m<sup>2</sup> per capita. As a consequence, there is a stock of 170.000 facilities in Germany which are greatly subsidized up to a degree that is no longer acceptable. In that consequence it was necessary to change planning strategy. It switched from an area-wide supply of facilities to a demand-driven strategy. The result was two main concepts for planning sport facilities: “The Guideline for Sport-Facility-Management” (BISP 2000) and “The Integrated Planning” (Rütten, Schröder & Ziemainz 2003). Both strategies start with a sur-

vey to identify the sport behaviour of the local population. Afterwards it is possible to calculate the needed facilities with a statistical procedure by using “The Guideline”. “The Integrated Planning” analyses the results of the survey in a “round-table-discussion” with all participants of the sport system. Then the participants work out a sport-development-concept in a dialogue-process.

However, both methods focus on built sport facilities. The importance of active outdoor-recreation is mentioned in both, but with no relevance for practical planning.

## Results

It is important to integrate nature-based activities into planning strategies because general developments in society have affected sport and lead to massive changes in exertion sport (Wopp 2005). The changes with main effects are individualisation and excess of ageing. As a result competitive sports are demanded less while there’s a higher request for endurance sports. Being fit and healthy are the most named motives for doing sport. Nature-based activities such as running, walking and cycling are always among the top 5 activities in surveys about favourite sports within the communities (Hübner 2004, Kirschbaum 2002).

Regarding these developments it seems to be necessary to expand current planning-strategies through concepts for nature-based activities.

## Conclusion

The project “nature-based activities in urban areas” wants to do basic research for a development of planning-guidelines. The aim of the project is to create a model of an ideal space for nature-based activities in urban areas. Which image of nature do sportspeople have in mind when doing nature-based activities in an urban environment? Which elements of landscape are preferred and what infrastructure is needed?

The project started with monitoring an urban park with infrared-counters (trafX) in September 2005 to identify user-frequency during the course of a day. In combination with quantitative surveys it was possible to identify a peak of use in the late morning and one in the afternoon. It was also possible to detect preferred paths and areas of low interest within the park.

But fieldwork within the project has shown that monitoring of user-frequency and doing quantitative surveys are just the first step to improve urban green for nature-based activities. The results of the quantitative research allow no conclusions about the quality of the environment needed. To identify these needs it was necessary to operate with qualitative methods in addition to the quantitative research. A photo assisted method, the visitor employed photography (VEP), has been adapted to the urban environment and the researched activities get and categorize information about the quality of preferred landscapes. Corresponding to the categories, different types of spaces are developed.

The presentation will discuss the latest results of the project and give an outline of the question of ideal activity space.

## References

- Hübner, H. & Kirschbaum, B. (2004). Sporttreiben in Münster 2003. Ergebnisse der Einwohnerbefragung 2003 und Trends im Sportverhalten der Münsteraner seit 1991. Münster.
- Kirschbaum, B. (2003). Sporttreiben und Sportverhalten in der Kommune. Möglichkeiten der empirischen Erfassung des lokalen Sportverhaltens als Basis kommunaler Sportstättenentwicklungsplanung. Münster.
- Bundesinstitut für Sportwissenschaft. (2000). Leitfaden für die Sportstättenentwicklungsplanung. Schorndorf.
- Rütten, A., Schröder, J. & Ziemainz, H. (2003). Handbuch für die kommunale Sportentwicklungsplanung. Frankfurt am Main.
- Wopp, C (2005). Schrumpfende Städte, ältere Menschen, leere Kassen. Sport(stätten)entwicklungsplanung in Zeiten demografischen Wandels. Vortrag anlässlich der Jahrestagung der Arbeitsgemeinschaft Deutscher Sportämter am 21.04.2005. in Zwickau. In: Gemeinde und Sport (2/2005), p 8-18

# The Pan Parks Sustainable Tourism Strategy as a Tool for Nature-Based Tourism Development in and around Protected Areas

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## Introduction

Since 1997, the PAN Parks Foundation has been challenging European protected areas to meet higher management standards and to provide high quality tourism experiences. The key to the foundation's success has been the engagement of local businesses and local communities with protected area managers in the visitor management of protected areas. The foundation aims to combine high nature management standard of protected areas with quality tourism, bringing together several stakeholders and involving local communities. All stakeholders of PAN Park's regions have its role in contributing the development of the region's nature-based tourism package. The tool which guides them through this development process is called the Sustainable Tourism Development Strategy (STDS). This paper discusses this process and deals with the lessons learned from its implementation in 8 different European protected areas. The EU DG Environment, referred to PAN Parks as one of the most relevant initiatives to manage sustainable tourism in NATURA 2000 sites (European Commission DG Environment, 1999).



Figure 1: PAN Parks Logo.

## Methods

While working with protected area managers and local partners we recognised a serious lack of knowledge in relation to tourism development in rural regions. Therefore the foundation commissioned experts to design an easy process that guides its partners through the process of defining a Sustainable Tourism Development Strategy (STDS) which includes all major points mentioned in the CBD Guidelines. When preparing this strategy a wide range of experts of different fields have been consulted.

The foundation developed a third-party verification system, which includes three elements:

- 1) 5 Principles and criteria for sustainable management and tourism development (see table 1 for principle 4 which relates the STDS).
- 2) The verification manual.
- 3) Independent verification.

## Results

Since March 2006 eight national parks across Europe are certified by PAN Parks and are working on the implementation and development of the strategy (see figure 2). Many others throughout the continent have engaged in negotiations which may eventually lead to their joining the network. Although there is a growing network of PAN Parks, the benefits of the concept for both the local communities and biodiversity conservation should be

Table 1: Principle and criteria of STDS.

<p><b>Principles on the Sustainable Tourism Development Strategy</b></p> <p>4.1: A Local PAN Park Group is set up and assumes responsibility for formulating, implementing, and monitoring STDS and executes verification of the business partners. Stakeholders and potential PAN Parks partners formally confirm their support and commitment to the conservation goals of the protected area and PAN Parks Foundation.[1]</p> <p>4.2: The Local PAN Park Group formulates, implements, and monitors the STDS for the PAN Parks region.</p> <p>4.3: The PAN Parks region[17] has sufficient tourism potential and carrying capacity for sustainable tourism.[18]</p> <p>4.4: The Communications and Marketing Strategy of the STDS aims at informing all target groups.</p> <p>4.5: Planned tourism development and existing tourism activities are based on sustainable use of the ecological resources of the PAN Park region.</p> <p>4.6: Tourism development and existing tourism activities are based on sustainable use of the socio-economic resources of the PAN Park region, including minority and if appropriate indigenous people's issues.</p> <p>4.7: Planned tourism development and existing tourism activities are based on sustainable use of the cultural resources of the PAN Park region.</p>
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further studied. PAN Parks Foundation therefore developed a methodology of cost-benefit analysis, which can help measuring the socio-economic development of the regions. The network of certified PAN Parks presents a modern management practice, which involves communities more in nature conservation through visitor management. The protected areas joining the network act as role models in terms of ensuring long-term protection of biodiversity and adding economic value to nature. The network of certified PAN Parks presents a modern

management practice which acts as a kind of role model in terms of ensuring long-term protection of biodiversity and adding economic value to nature.

The development of the STDS has been experienced by most of the regions as one of the most difficult parts of the certification. Communication between the protected areas, the communities and the local entrepreneurs improves as a result of proper development of the STDS. Involving all stakeholders in the process involves effort and is a time consuming task, especially in those areas where large distances and the lack of modern communication technology make the situation more difficult. However, the efforts from the park management are highly appreciated by the local stakeholders. A study done in Bieszczady, Poland, showed that local partners and non partners value being involved and informed as a very positive effect of the PAN Parks project.

## References

European commission, DG Environment. (1999). Sustainable tourism and Natura 2000 Guidelines, initiatives and good practices in Europe. Montpellier.

[www.panparks.org](http://www.panparks.org)



Figure 2: Overview of certified PAN Parks.

## Management of Ecotourism in National Chambal Sanctuary, India

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*Keywords: Ecotourism, Chambal River, Crocodile Sanctuary, wilderness values, customer satisfaction.*

### Introduction

India is a major destination for International Tourists. During the last decade, a trend emerged in India for nature-based tourism and ecotourism. In Central India there are many wildlife sanctuaries, particularly areas like National Chambal Sanctuary in Gwalior region have large attractions for Eco-tourism. This paper is the result of a study conducted in the National Chambal Sanctuary to investigate the potential for integrating crocodile conservation with ecotourism. Its main objective is to identify and where possible assess the potential long-term benefits and opportuni-

ties of strategically integrating crocodile conservation requirements with the future needs of ecotourism industry.

### Methods

A survey of ecotourism operators was conducted to know the interests of tourists visiting the Chambal Sanctuary. Interviews were taken with ecotourists at different years while studying the ecology of aquatic animals in the Chambal River. Students were requested to fill the interview schedules on their interests, facilities available for ecotourism and conservation programmes of

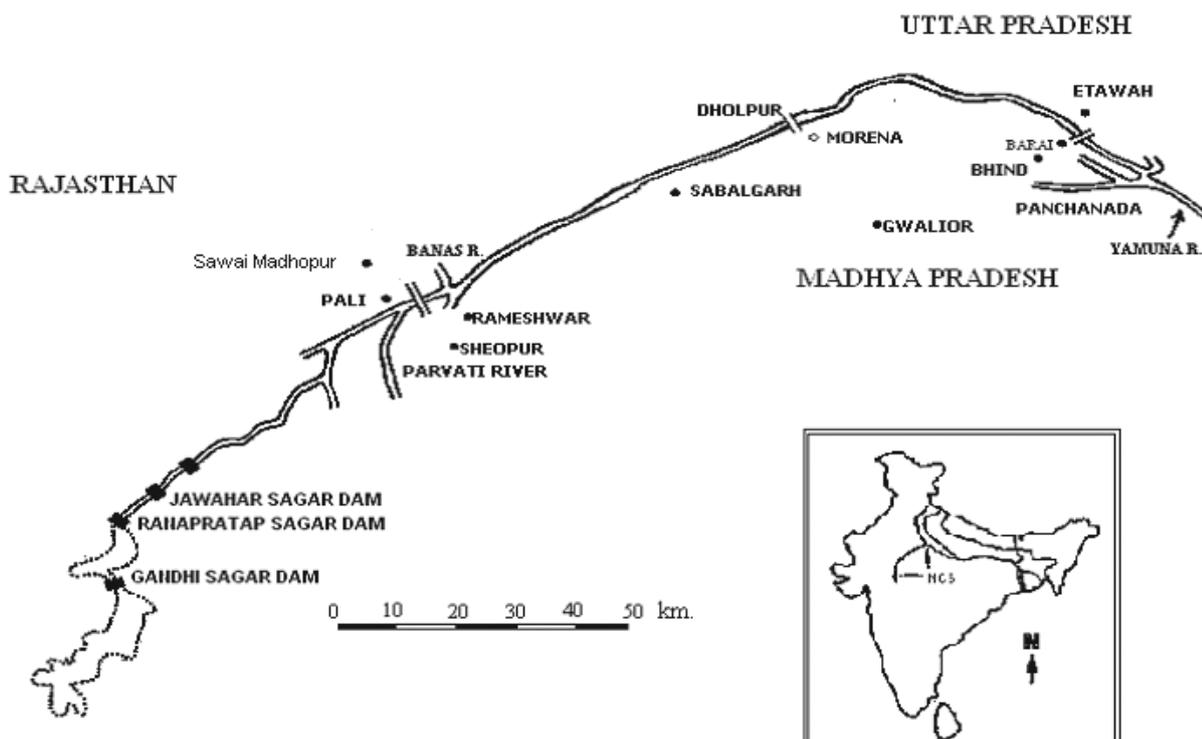


Figure 1: Map of National Chambal Sanctuary showing three entry points (Pali, Dholpur and Etawah) for ecotourism.



Figure 2: Wildlife in the National Chambal Sanctuary, India.



Figure 3: Ecotourism in the National Chambal Sanctuary, India

endangered species in the Sanctuary. Impact of ecotourism on the sanctuary has been assessed using the data on ecotourists and the management programmes of the Sanctuary.

## Results

The National Chambal Sanctuary is one of the best-managed wildlife sanctuaries specially created for conservation of Gharial crocodile and other wildlife species like dolphin, otter, freshwater turtles, migratory birds etc. A large population of crocodiles is naturally breeding in the wild. Large numbers of domestic and international tourists visit the sanctuary during peak tourist season from October to April. The sanctuary is quite suitable for wildlife tourism, river rafting, canoeing, adventure tourism, religious tourism, and cultural tourism. A crocodile rehabilitation centre, head-quarters of the Sanctuary is located near the Chambal River to view the crocodiles and turtles in captive condition. The values of wilderness of the National Chambal Sanctuary are: good water quality, safe wildlife habitat, protecting rare and endangered species, providing scenic beauty, recreation opportunities, conserving natural areas for educational and scientific study, providing income for tourist industry. The NCS has all three important values like aesthetic, education and recreation.

Ecotourism in the Chambal Sanctuary is often associated with small group activities. Larger-scale tourism operations include day tours to Nadagaon in Uttar Pradesh sector from Agra, day trips at Rajghat in Rajasthan and Madhya Pradesh sector, boat trips up to Gharial nesting sites at Tigri-rethoura, or visits to view large numbers of migratory birds on the beach. All these tours provide an educational program for tourists as well as direct experience.

Large numbers of scientists visited the sanctuary to study wildlife conservation on the river and also made educational films. In India Ranthambhore Tiger Reserve in Rajasthan, which is approximately 25 km north of the Chambal Sanctuary is a major wildlife tourist attraction. The Rajasthan Government has taken initiatives to promote tourism in the National Chambal Sanctuary, to attract tourists coming to Ranthambhore to visit the Chambal also.

There is a well organised tourism sector in Agra in Uttar Pradesh. Every year many tourists visit Agra to see the world famous Tajmahal. The travel agents in Agra developed a tourism package for the tourists from Agra to Chambal Sanctuary to view wild animals like dolphins, crocodiles, migratory waterfowl etc. including the crocodile rearing centre at Deori, Morena.

This study explored two research questions related to the nature of customer satisfaction among various segments of visitors at National Chambal Sanctuary. Research studies revealed that visitors to the Sanctuary were better educated, more friendly towards conservation organizations and more supportive of efforts to protect the wilderness characters of the area. The social change in the region, national focus on the region's natural resources and a growing urban population, as well as educational efforts contributed to the increased tourism in the Sanctuary.

## Conclusion

This paper argues for a detailed assessment of the ecological characteristics and natural features that attract tourists to the National Chambal Sanctuary. The studies revealed that people interested in seeing aquatic animals and birds visit the sanctuary regularly. The Government is interested to promote ecotourism in the sanctuary. However, better information is needed on tourists' desires, expectations and needs including tourist activity and fulfillment, across the tourism spectrum. It is recommended that the ecotourism in the National Chambal Sanctuary be ecologically sustainable, and for this to be successful that it contribute to the long-term maintenance of ecosystems and species in the Sanctuary. Major mechanisms for integrating biodiversity conservation and ecotourism and nature-based tourism in the National Chambal Sanctuary are explored in this study.

# Analysis of Nature-Based Tourism in the Sumava National Park, Czech Republic: 1997-2004

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*Keywords:* National parks, nature-based tourism, visitors, environmental pressure, CO2 emissions, monitoring.

## Introduction

The past decades have seen a pronounced increase in tourism, both domestically and internationally. Tourism is primarily based on mobility and the consumption of distances, places and visual images. Therefore, it has traditionally been regarded as an environmentally benign sector, with a positive economic impact on local, regional and national economies. However, since the mid-1970s, evidence of tourism's negative environmental, economic and social impacts has accumulated. Natural areas and protected areas are the most vulnerable. They are visited by a growing number of visitors, both in the Czech Republic and abroad. Travel defined by its principle aim – visiting natural areas – is called nature-based tourism.

On a global scale, nature-based tourism accounts for about 10% of international tourism and is often regarded as the fastest growing tourist sector, with annual growth rates of 15% (Gössling 1999). Official indicators of nature-based tourism's volume in the Czech Republic are not available; the only published expert study found nature-based destinations to have a 17% share among the "126 top tourist areas in the Czech Republic".

As tourism is probably the world's largest industry and nature-based tourism is becoming an increasingly important sector, the direct and indirect impacts on protected areas are on the rise (Gössling 1999). Therefore, a systematic research and monitoring of nature-based tourism

in protected areas is needed. In the Czech Republic, Sumava National Park was chosen as a study area for monitoring and assessing nature-based tourism development over a longer (eight year) period. It is the country's largest national park, visited by 1.1 to 1.3 million visitors annually.

## Methods

Results are based on annual surveys that were carried out in the high summer season over a nine day period at four monitoring points in the central part of the park, from 1997 to 2004. The survey's methods include interviewing a random sample of visitors, via an extensive questionnaire. The following number of questionnaires were collected:

$N_{1997} = 1,274$ ,  $N_{1998} = 1,020$ ,  $N_{1999} = 1126$ ,  $N_{2000} = 665$ ,  $N_{2001} = 959$ ,  $N_{2002} = 648$ ,  $N_{2003} = 900$ ,  $N_{2004} = 911$ .

The questionnaire was split into nine sections with 42 questions in total:

- Tourist socio-demographic characteristics (7 questions)
- Itineraries (5 questions)
- Modes of transport and types of accommodation (5 questions)
- Purpose of visit and role of the national park (5 questions)
- Environmental awareness of visitors (6 questions)

- Evaluation of conservation and tourism management in the park (4 questions)
- The park's carrying capacity in terms of visitor numbers (3 questions)
- Tourist activities and spending in the national park (7 questions)

Over the eight years of monitoring, 7,503 completed questionnaires were collected. The total number of records derived from these questionnaires was 450,000. The primary data were entered into an MS Access database and statistically processed in the NCSS program (Hintze 2001). In the next stage, the primary data were statistically treated using the  $\chi^2$  test for evaluating cases where results differed between different years of monitoring. In such cases, a modifier pair test, based on the Bonferroni Difference was used for identification of the particular year and sub-question where the difference occurred.

Further, the  $\chi^2$  test and Kruskal-Wallis one-way ANOVA were employed to determine differences between visitors' socio-demographic characteristics and their attitudes and opinions towards management of the park. CO<sub>2</sub> emissions related to the three tourism sub-sectors (travel to and from the park, travel within the park and visitor accommodation) were calculated for the years 2000-2004. Regarding transport, calculations were based on emission factors, occupancy (load) rates and travel distances both to the park and within the park. For accommodation, calculations were based on an estimation of energy use associated with various types of accommodation, as well as relevant emission factors.

Finally, total individual CO<sub>2</sub> emissions for each park visitor were calculated by adding up emissions from transport to/from the park, transport within the park and accommodation. Regression analyses were carried out to investigate the extent to which different factors determine the total emissions of CO<sub>2</sub> per person. Kruskal-Wallis one-way ANOVA was used to determine differences between visitor characteristics with regard to total emissions of CO<sub>2</sub>.

The calculation of CO<sub>2</sub> emissions was limited by several uncertainties and simplifications, e.g. the calculation of emission factors, the use of the na-

tional average load factors for busses and trains, the estimation of average distances travelled within the national park, the use of New Zealand's data on accommodation energy intensity and the omission of CO<sub>2</sub> produced by tourists' internal metabolisms. Combined, these errors and uncertainties may amount to 20-30% of the total results. The total margin of error is therefore 20-45% (a tentative and indicative estimate).

## Results

Comparing Sumava National Park's visitors with the population of the Czech Republic, we learned that the first group is better educated, higher in social status and more often male than female. Further, park visitors tend to be in the middle (25-39 years) and upper-middle (40-59 years) age groups. These findings correspond with many authors and institutions dealing with nature-based tourism and eco-tourism (e.g. Wight 1996).

### Positive trends

The results of monitoring show that nature-based tourism in Sumava National Park went through significant change over the eight years of study. From the point of view of regional sustainable development, some positive trends can be named, i.e. the regional, semi-autarkic character of tourism in the park; the fact that the distances travelled by tourists within the park have not increased; the fact that the costs of recreation have not grown faster than inflation; and the positive attitudes towards conservation management in the park.

The regional, semi-autarkic character of tourism in the park can be illustrated by two findings. Firstly, in the national make-up of respondents, there is a prevailing domination of Czech tourists. Over the eight-year period, an average of 93% of park visi-

Table 1: Travel distances to SNP (in km).

Year	1997	2000	2004
<i>N (number of respondents)</i>	1,122	557	795
Average distance	198	196	204
Median distance	160	160	170
Minimum	40	40	40
Maximum	625	676	626

tors were Czech. The share of foreign visitors has never exceeded 10%. If we focus in more detail on the Czech visitors, the highest proportion of tourists came from nearby districts. Prague and nine other nearby districts accounted for 55% of the Czech visitors.

The median travel distance by Czech tourists to the park increased only 10 km over the eight years. Average distances increased by 8 km (table 1). First-time visitors are mostly younger people and students, mostly from distant larger cities. Repeated visits to the park are mainly from nearby regions.

The distance travelled to the national park is an important indicator from the point of view of associated CO<sub>2</sub> emissions (see below) and for the estimation of the recreational value of the park using the travel costs method.

The median recreational costs per visit (costs spent by tourists for accommodation and food in the park) rose from 2,100 CZK (82 USD) in 1997 to 2,800 CZK (109 USD) in 2004. This represents an increase of 33%, which corresponds with inflation over the same period. Multiplying

the median recreation costs per tourist stay with the lower estimate of total annual visits to a broader region of Sumava (1.1 million) reveals a rough approximation of the total gross annual expenditures on recreation in Sumava National Park. For the year 2004, the result is 1.65-2.20 billion CZK (64-86 million USD), which is 9-12% of the total domestic expenditures on recreation.

Finally, tourists' attitudes towards conservation management can be regarded as positive. For example, if we use the eight-year average, 57% of those visitors polled declared their unwillingness to enter the forbidden Zone 1 of the park; 65% of visitors were able to cite specific ecological problems in the park; and only 17% suggested that the environmental quality in the park has declined over the past years. However, this was the highest share among the Czech national parks.

### Negative trends

On the other hand, significant negative trends were also identified, i.e. a growing dependence on car use, a reaching of the park's carrying capaci-

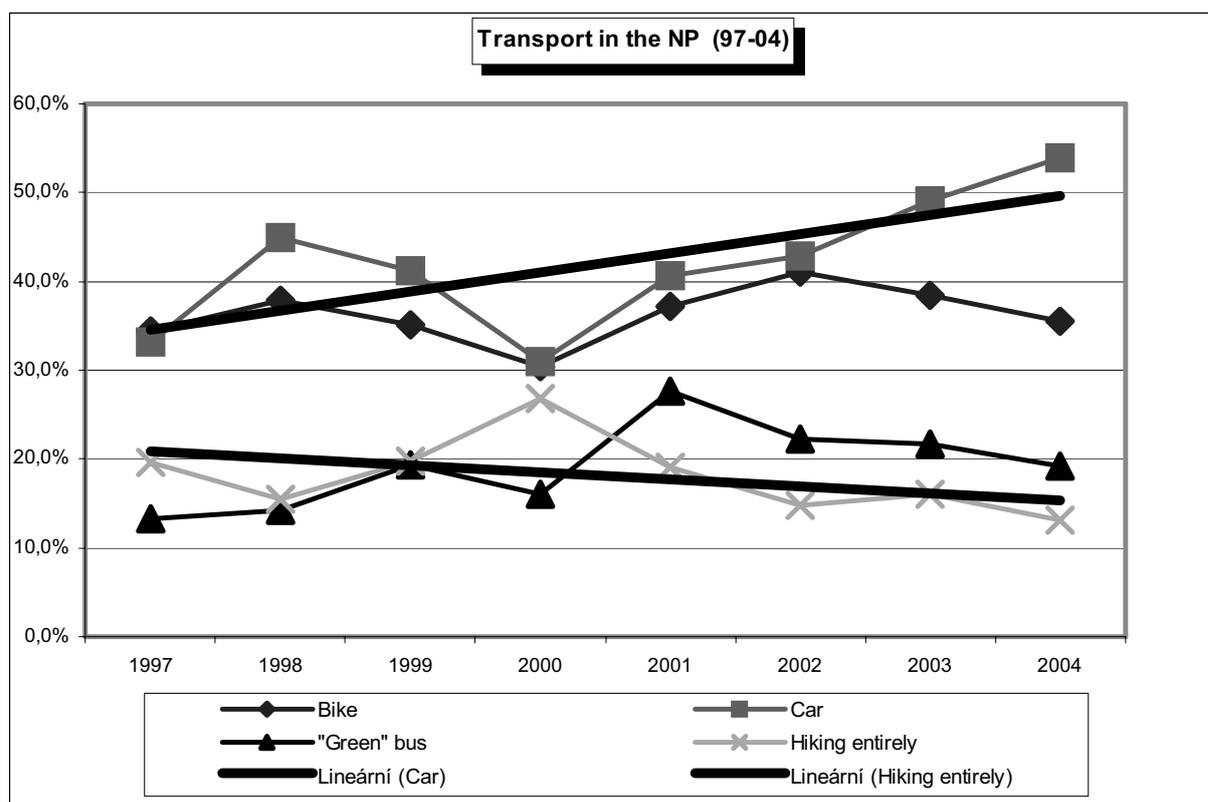


Figure 1: Transport modal split in the Sumava National Park (1997-2004).

ty in terms of visitor numbers, an increasing level of consumption among visitors, a passive form of tourism developing and a very small share of active ecotourists among park visitors.

The car dependence of travelling to and within the park increased over the monitoring period. On average, 82% of visitors travelled by car to the park. This share increased from 78% in 1997 to 85% in 2004. The bus was the second most popular travel mode, but its share of modal split was 10 times smaller. While travelling within the park, most visitors combine different travel modes. However, several important trends were identified, such as a decreasing share of people using entirely non-polluting modes of transport (walking or walking/cycling). From 2000 to 2004, their number decreased from 48% to 31%. Secondly, the share of car use in combination with other transport modes has grown proportionally (from 33% to 54% – see figure 1).

According to several authors (e.g. Hall 1999), transport for tourists is not just a means of getting from A to B, but can be an end in itself. Experience while in transport is then an essential part of the tourist experience (Hall 1999). In this context, transport to/from the Sumava National Park and

especially transport within the park is an important part of the nature-based tourism experience. To meet the objective of CO<sub>2</sub> emissions reduction associated with passenger transport, a modal shift away from cars is necessary. As our results illustrate, nevertheless, most of the people associate their nature-based tourism experience with using a car. Paradoxically, the nature-based tourism experience is to some extent a car-based experience and changing the modal choice of visitors would therefore require altering the way they experience nature. It is not surprising that policies aimed to reduce car dependence have so far had only minor influences on behaviour.

The carrying capacity of visitor numbers in the central areas of the park has nearly been reached. Only a small percentage of visitors (less than 5%) would not mind if the number of visitors increased further. The feeling that tourism is too concentrated is more widely held by tourists in the park's central areas than in the more peripheral areas (in 2004, 53% of visitors stated that the intensity of tourism is too high). The carrying capacity of visitor numbers has been reached or even exceeded in many protected areas worldwide (Gössling 1999).

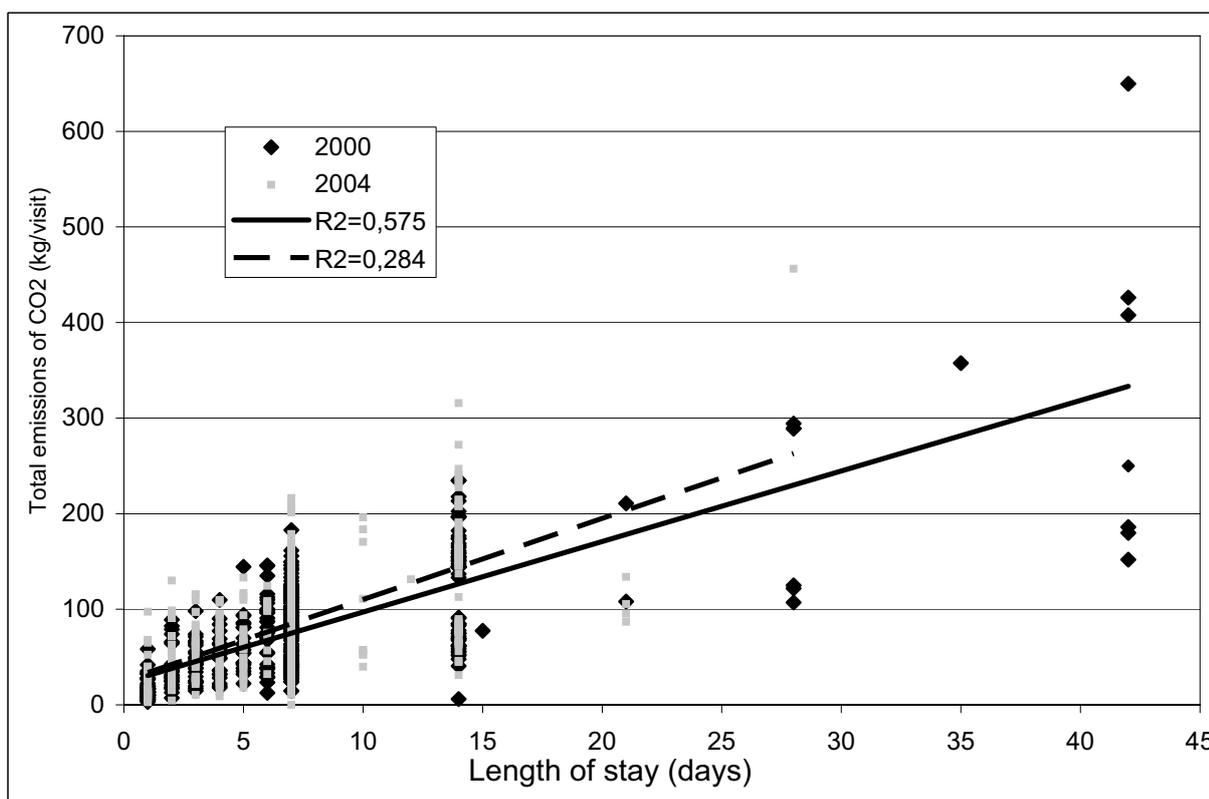


Figure 2: Regression analysis for length of stay and total emissions of CO<sub>2</sub> per visit for 2000 and 2004 data.

The most sensitive areas are protected areas in developing countries, which are exposed to an ever-growing number of visitors (Boo 1990).

Several trends have been identified suggesting a growth in consumption and a passive form of tourism in Sumava. The consumption patterns of park visitors were shifting towards less sustainable options – car dependence increased as well as the ‘pace of visit’ (preference of cycling over walking, etc.). Based on the results of the survey, we estimated the share of active eco-tourists among park visitors to be only 3-5%. The rest of the visitors may be categorised as passive eco-tourists.

Regarding visitors’ perceptions of Sumava National Park, we learned that it is to a large degree based on mental images of the Sumava (“clean, pristine, natural nature”). However, over the last years, this image contradicted reality in the park. The image didn’t inspire visitors to act accordingly – in a more environmental friendly way.

#### CO<sub>2</sub> emissions from nature-based tourism

Concerning the CO<sub>2</sub> emissions caused by nature-based tourism in Sumava National Park, expressed both per visit and per person, results reveal growing emissions (by 9% from 74.3 kg CO<sub>2</sub>/visit/person to 81.6 kg CO<sub>2</sub>/visit/person). The accommodation sector dominates total CO<sub>2</sub> production, with a 63% and 62% share in 2000 and 2004, respectively.

Regression analyses were carried out to investigate whether there is a linear relationship between the total emissions of CO<sub>2</sub> per person and two explanatory variables: length of stay and distances travelled to the park. The results show that there is a positive correlation between length of stay and emissions of CO<sub>2</sub> in 2000 ( $r^2 = 0.575$ ; correlation coefficient 0.7585;  $P = 0.000$ ). This relationship was weaker but still significant in 2004 ( $r^2 = 0.284$ ; correlation coefficient 0.533;  $P = 0.000$ ) – see figure 2.

In 2004, distance was also a significant factor ( $r^2 = 0.262$ ; correlation coefficient 0.512;  $P = 0.000$ ), which means that 26% of variations in total emissions of CO<sub>2</sub> per visit in 2004 can be explained by distance travelled to the park. In 2000, this relationship was weaker ( $r^2 = 0.077$ ; correlation coefficient = 0.278;  $P = 0.005$ ).

Several conclusions for the Park Administration and regional tourism management have been derived from the above-mentioned results. The Park Administration should be aware of temporary trends of nature-based tourism in Sumava and should actively prevent continuous attempts for ‘hard’, quantitative development of the tourism industry in the park. The environmental information system of the Park Administration has to be reconceptualised to meet the true mental images of the park. It should also try to highlight alternatives to the way that most people currently experience nature, which is based on car use. Moreover, it was suggested that the Park Administration conduct research based on the willingness-to-pay method to set the optimal level of the park entrance fee. If established, entrance fees can generate a significant amount of income to finance the Park Administration’s activities connected with tourism.

Finally, the biggest challenge for all ‘stakeholders’ is to change human behaviour patterns in the park. This will be a time-consuming process and both governmental and Park Administration actions are essential for the enforcement of appropriate measures. To provide valuable scientific arguments for such measures, further research is needed on the tourism-national parks interface, especially with regard to direct and indirect impacts of tourism.

## References

- Boo, E. (1990). *Ecotourism: The Potentials and Pitfalls*, vol. 1 and 2. Washington, DC.
- Gössling, S. (1999). Ecotourism - a means to safeguard biodiversity and ecosystem functions? In: *Ecological Economics* (29), p 303 - 320.
- Hall, D.R. (1999). Conceptualising tourism transport: inequality and externality issues. In: *Journal of Transport Geography* (7), p181 - 188.
- Hintze, J. (2001). *NCSS and PASS. Number Cruncher Statistical Systems*. Kaysville. [www.ncss.com](http://www.ncss.com).
- Wight, P.A. (1996). North American Ecotourists: Market Profile and Trip Characteristics. In: *Journal of Travel Research* (34/4), p 2-10.

Requirements for Recreation and their Integration  
into Landscape Planning

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Matthias Buchecker (Chair)

# Local Residents' Relationship towards their Nearby Outdoor Recreation Areas

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*Keywords: Outdoor recreation, quality of life, requirements, landscape management, survey.*

## Introduction

In the last decades, recreation has become a main aspect of people's quality of life (Müller 1999). It is assumed that especially opportunities for nearby outdoor recreation are of crucial significance for people's lives allowing them to regulate their physical and psychological resources (Hobfoll 2001, Fuhrer & Kaiser 1994). In contrast to residential areas, nearby recreation areas have so far been neglected in formal planning procedures. There is also only little empirically confirmed knowledge regarding the local residents' relationship towards their nearby recreation areas and the qualities people expect of such areas. To fill this gap we started a study aiming at answering the following questions:

- What are the expectations of the residents regarding their nearby recreation areas?
- Which factors influence the recreational use of specific areas
- Which actions regarding the improvement of recreation areas do the residents perceive as needed?
- In which form could the residents' requirements be best included in the planning of recreation areas?

## Methods

We conducted the study in a district at the Northern fringe of the city of Zürich using methods of quantitative social science research. Therefore we sent standardised questionnaires to a random sample of

1000 local residents. The return rate of this survey reached 32%, and the achieved sample proved to be balanced in terms of socio-demographic criteria. In the questionnaire questions on the perceived quality of the interviewees' residential area were combined with questions focussing on the specific quality of four nearby outdoor recreation areas (attractiveness, use intensity, activities, participation in decision making). This survey also serves as a basis for a landscape development planning for this district, which will be started in the next months.

## Results

The statistical analysis of the data revealed that the local residents of the investigated district generally appreciated their nearby outdoor recreation areas better than their more immediate residential areas. The proximity of the recreation areas proved to be more relevant for people's use of these areas than their attractiveness and explained a large amount of the variance of use. The requirements for attractive nearby recreation areas appeared to be highly diverse, and more determined by attracting than disturbing (i.e. urbanisation driven) characteristics. Astonishingly, considering the high use-density of these areas crowding did not appear to be a major challenge for attractiveness; much more disturbing revealed to be aspects such as littering or traffic noise. In spite of the high significance the recreation areas had for them, only a small part of the interviewees have so far participated in shaping their everyday surroundings. Interestingly,

most relevant for this abstinence was not the general disinterest in such activities, but people's reluctance to going out on a limb.

The results suggest that easy and quick access seems to be most important to maintain and improve the use and attractiveness of nearby outdoor recreation areas. Therefore measures to enhance nearby outdoor recreation should concentrate on improving the access opportunities from the residential areas to the closest recreation areas. To raise the attractiveness within the recreation areas, a better inclusion of the local residents into the planning of outdoor recreation areas is needed facing the diversity of requirements expressed. This can be reached best by offering them opportunities to express their wishes and ideas in a more private way, with interviews, questionnaires including spatial-explicit items (photos, maps) or discussions within "homogenous" groups (e.g. mothers, elderly people).

To base the so far neglected outdoor recreation planning on people's recreation needs, more research is required. In particular a better understanding of the function of nearby recreation areas for people's regulation of their physical and psychological resources is called for.

## References

- Fuhrer, U. & Kaiser, F. (1994). *Multilokales Wohnen*. Bern.
- Hobfoll, S.E. (2001). The influence of culture, community, and the nested-self in the stress process: advancing conservation of resources theory. In: *Stress, culture and community: The psychology and physiology of stress*, p 51-87. New York.
- Müller, H. (1999). *Freizeit und Tourismus. Eine Einführung in Theorie und Politik*. Bern.

# Landscape Planning for Nearby Outdoor Recreation – Implications from an Exploratory Interview Study

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*Keywords: Nearby outdoor recreation, recovery, work load, strain, motive, behavioural resource, landscape management, peri-urban.*

## Introduction

Environments that promote recovery and recreation are a fundamental resource of modern society. Empirical studies suggest that the experience of nature is an important motivation for outdoor recreation activities in general, as well as for nearby outdoor recreation. But this need for natural areas for recovery and recreation is in conflict with the current landscape development in peri-urban areas in Switzerland and in Western Europe in general. Competing forms of land use in these areas, such as settlement, road construction, and nature conservation increase the pressure on nearby recreational areas.

Most of the existing research, particularly in Switzerland, that has been done on nearby outdoor recreation behaviour focuses on forest recreation and neglects recreation in open country. However, recreation in open country, or in combination with forest recreation, seems to be of importance as well, especially if one considers that people practicing outdoor activities repeatedly mentioned landscape preferences for openness and diversification. Moreover, in most of the research, on-site visitor surveys using short and/or full-structured questionnaires have been preferred. These methods make it difficult to gain insight into less obvious, but also behaviour-relevant factors for nearby outdoor recreation and the relationships between those factors. To gain more insight into it, we explored the decision strategies of nearby outdoor recreationists.

## Methods

The city of Frauenfeld (22000 inhabitants) in the East of Switzerland was chosen as the case study area. Relying on a theoretical sampling strategy, in June/July 2005 we contacted, participators in the three most common outdoor recreation activities in Switzerland; namely walking/hiking, biking, and jogging. The sample included both men and women, from different age groups, who were contacted at three different sites in forest and open country during the week and at the weekend according to a time and place scheme. The response rate was 46 percent and 18 problem-focused interviews were conducted with 8 walkers/hikers, 6 bikers and 4 joggers.

The central questions of the interview guideline were: What causes people to use the nearby outdoor recreational area? With which aims do people use the area? What factors are relevant for which routes of the recreational area they use? When do they use it alone and when do they use it in company with other people? What are the relationships between those aspects? The interviews were analysed by qualitative content analysis using the software NVivo 2.0.

## Results

Five domains of factors were identified; namely loads, strains, motives, behavioural resources, and characteristics of the nearby outdoor recreational area.

Out of 25 loads, 21 related explicitly to the life domain of work, two loads to the private life domain, and another two to both domains. Loads were sub-classified into three dimensions. Firstly, demands related to the (work) activity itself such as concentration demands, or emotional work. Secondly, the loads of the social context in which the activity is embedded such as the type and quantity of social contacts. Thirdly, the loads related to the physical environment in which the activity has to be fulfilled such as the noise level at work.

The dimensions of strains were all related to personal strains and were further classified into psychological and physical strains. Psychological strains include cognitive capacity, emotional constitution, and psychological exhaustion. Physical strains include physical tension, pain, and depersonalisation.

The motives for using the nearby outdoor recreation in daily life also had a focus on personal, social, and environmental aspects. Mood-regulation, and personal growth are examples of the motives that relate to the persons themselves. The motives with a social focus include motives such as generativity and intimate communication. Motives related to the environmental aspects refer to, for example, the experiences of certain landscape elements.

Characteristics of the nearby outdoor recreational area that influence people's behaviour were classified into four types: 1) environmental characteristics with personal meaning such as places of biographical importance, 2) natural-geographical characteristics referring to, for example, flora, geographical features, and weather, 3) constructional characteristics such as intensity of development and infrastructure, and 4) social characteristics of the environment such as crowding, and noise level.

The behavioural resources that moderate the realisation of use motives were also classified into personal, social, and environmental conditions. Personal conditions relate to, for example, time, knowledge, and state of health. Social conditions refer to the availability of companions and the needs of their companions. Environmental conditions include amongst others factors of the inside

and outside living conditions, and characteristics of the access area. The focus of the presentation will be directed towards the different behavioural resources.

## **Outlook**

The results of this explorative research will provide a basis for the development of a questionnaire-based household survey and provide input data for the development of a GIS-based suitability map for the use of nearby outdoor recreational areas.

## Development of a Zoning Instrument for Visitor Management in Protected Areas

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*Keywords: Recreation, visitor, breeding birds, protected area, Natura 2000, disturbance, impact, zoning, nature management, PROGRESS.*

### Introduction

PROGRESS (PROmotion and Guidance for Recreation on Ecologically Sensitive Sites) is an initiative co-funded by the EU Interreg IIIB Program. It's a four-year international project between the Forestry Commission (UK), Office National des Forêts (Fr), Research Institute Alterra (NL), the Country site Agency (UK) and Tourisme Seine et Marne (Fr). The project aims to reduce the impacts arising from the increasing demands of recreation on protected conservation areas; in this case the New Forest in the UK and the Forêt de Fontainebleau in France. Besides their designation as Natura 2000 sites these areas have in common that they are situated within reach of large centres of population attracting millions of visitors each year. Due to their popularity, some parts of both sites are coming under increasing recreation pressure and action is needed to help protect the habitats and wildlife these sites have been designated for. One of the project's main objectives therefore is to develop a zoning instrument which can serve as a management tool for the redirection of visitor flows.

### Methods

The GIS-based models MASOOR and LARCH developed at Alterra are the basic elements of the zoning instrument. MASOOR stands for Multi Agent Simulation of Outdoor Recreation; agents being user-groups like walkers etc. MASOOR models the recreational use of a road/path network in an area.

Input for the model are GIS-maps of car parks as a visitor starting point and the network of roads/paths to move around on. Input on visitor densities has been derived from car park capacities, the estimated car park turn over rate and the results of year round traffic counters. Input on visitor characteristics has been derived from interviews like the type of user-groups; group size; duration of the visit; walking distance etc. (Visschedijk et al. 2002). Interviews have been carried out near car-parks on several days throughout the year, in order to verify seasonal differences. GPS's were handed out to visitors in order to analyse the actual use of the area, to compare it with the interviews and consequently to validate the output of the model. Due to the scale of both sites, MASOOR had to be extended with a separate tool to allow for a quick scan on potential problem locations; a common scale problem which has also been recognised by Gimblett (2005).

The model LARCH stands for Landscape Assessment using Rules for Configuration of Habitat. LARCH determines ecological networks for specific species in a patchy landscape and assesses the potential sustainability of these networks (Opdam et al. 2003, Verboom & Pouwels 2004). The results of LARCH may differ from the actual species distribution due to external factors like visitor disturbance which affect the ecological carrying capacity. An intensive literature research on dose-impact relations of recreation and breeding birds has been carried out (Henkens et al. 2003) and laid down in a database easily accessible for modelling purposes.

Further modelling input required were GIS vegetation maps as a basis for analysing the breeding bird habitats. These maps have been validated through ground true observations.

## Results

Figure 1 shows the vegetation map of the New Forest with an overlay by the MASOOR quick scan. The overlay shows different sized dots, encircled with bands. The dots represent car parks; the bigger the more visitors start from there. The bands represent the visitor density which generally decreases in relation to an increased distance from the car park.

Figure 1 among others shows that tarmac roads act as barriers to visitors, as can be seen from the triangular shaped structures (see arrow) which seem to be cut of by roads. The figure as well shows that the bands often seem to absorb a whole cluster of car parks (see oval), meaning that the impact of adding or closing car parks for nature management reasons within this cluster is disproportional to disturbance;

there always is the influence of other car parks nearby. Images like fig. 1 give a first indication of bottlenecks while it also indicates the management action required to solve it. For the nightjar this resulted in a statistically significant negative relationship between visitor densities -using the quick scan tool- and breeding densities.

Figure 2 Output MASOOR; The density of the lines represents the intensity of visitor use.

The first analysis on bottlenecks has been followed up by a more detailed MASOOR analysis. Figure 2 gives the MASOOR output near a certain car-park in the New Forest. The lines' thickness represents the intensity of visitor-use, while this is a measure for the (species specific) disturbance distance along the path.

In an interactive process between park authorities, user-groups and scientists a range of potential management actions at locations like fig. 2 have been analysed using the zoning instrument. This has lead to redirection of visitor flows mutually agreed by all stakeholders involved.

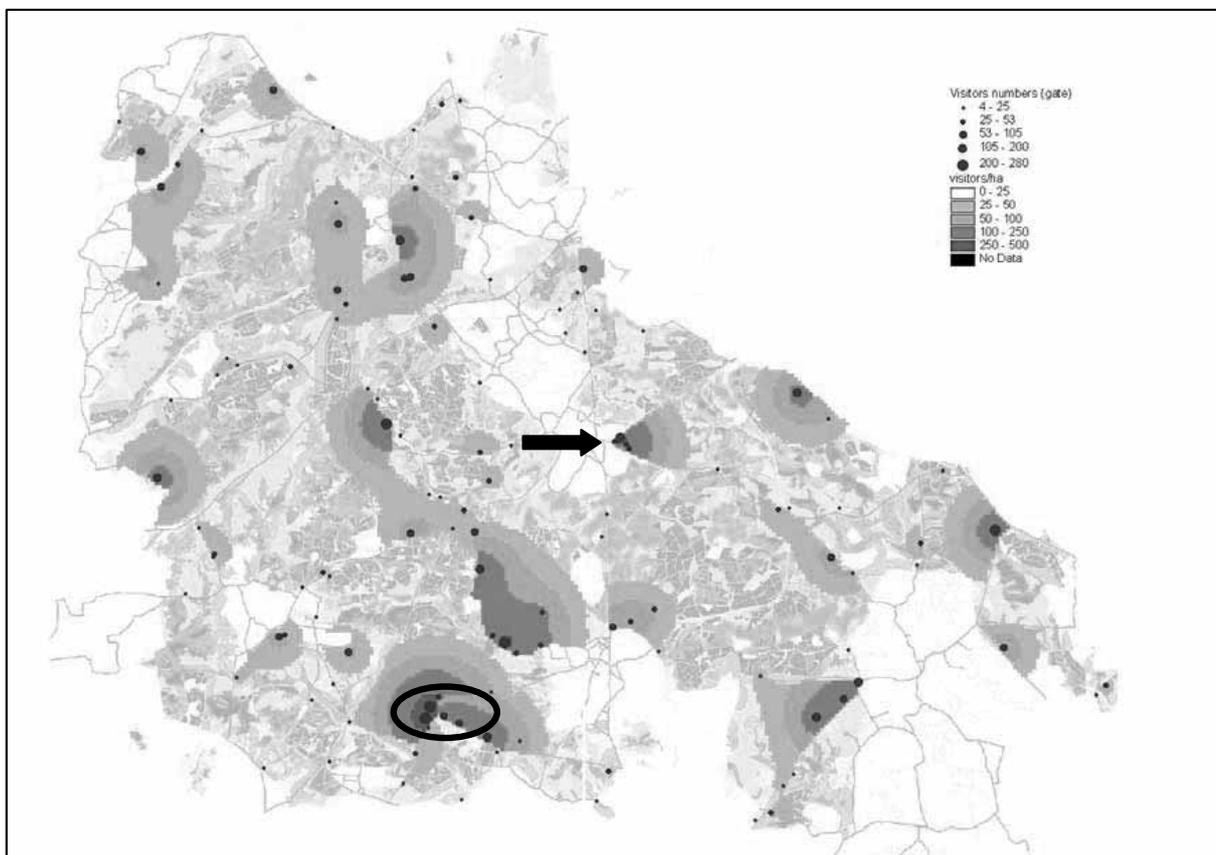


Figure 1: New forest vegetation map, road network and parking map with an overlay of the quick scan by MASOOR.

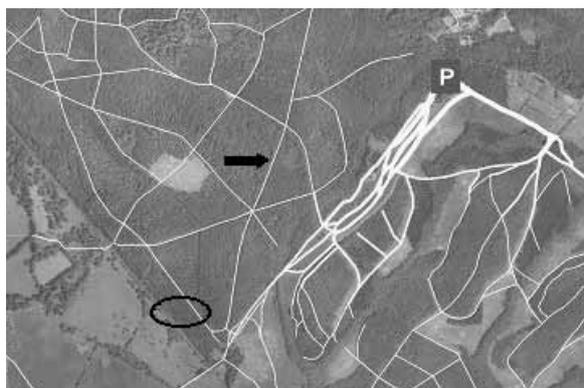


Figure 2: Output MASOOR; The density of the lines represents the intensity of visitor use.

Verboom, J. & Pouwels, R. (2004). Ecological functioning of ecological networks: a species perspective. In: Jongman, R.H.G. & Pungetti, G. (Eds.) *Ecological Networks and Greenways: Concepts, Design, Implementation* p 56-70. Cambridge.

Visschedijk, P.A.M. & R.J.H.G. Henkens (2002). Recreation monitoring at the Dutch Forest Service. In: Arnbjerg, A., Brandenburg, C., Muhar, A. (2002) (Eds.). *Monitoring and Management of Visitor Flows in Recreational and Protected Areas. Conference Proceedings*. Bodenkultur University Vienna, Austria, January 30 – February 02, 2002. Vienna.

## Conclusions

- The GIS based zoning instrument proved to be a handy decision support tool for nature managers to identify locations where visitor disturbance suppresses the quality of birds' breeding habitat beyond a certain threshold and to find best ways to redirect visitor flows.
- A statistically significant negative relationship has been found between visitor disturbance and breeding densities of the nightjar.
- The participatory GIS approach built trust among stakeholders about data and tools that were used, which increased the acceptance of proposed actions to redirect visitor flows.
- Further scientific research should among others focus on dose-impact relations between visitor pressure and the breeding success of birds, or other biodiversity features concerned.

## References

- Gimblett, H. R. (2005). *Modelling Human-Landscape Interactions in Spatially Complex Settings: Where are we and where are we going?* Paper presented at the MODSIM 2005 International Congress on Modelling and Simulation, Modelling and Simulation Society of Australia and New Zealand, December 2005.
- Henkens, R.J.H.G., Jochem, R., Jonkers, D.A., de Moleenaar, J.G., Pouwels, R., Reijnen, M.J.S.M., Visschedijk, P.A.M., & de Vries, S. (2003). *Analysis on the impact of recreation on breeding birds. Literature study and coupling of the models FORVISITS and LARCH (in Dutch)*. The Netherlands Environmental Assessment Office (MNP). Document 2003/29.
- Opdam, P.F.M., J. Verboom and R. Pouwels (2003). *Landscape cohesion: an index for the conservation potential of landscapes for biodiversity*. In: *Landscape Ecology* (18), p 113-126.

# Cederberg Environs Spatial Planning in the Western Cape, South Africa

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## Introduction

Since South Africa's democratic election in 1994, the country has been immersed in a profound change process, defined by the need to rebuild the foundations for international competitiveness while simultaneously providing real and immediate improvements in the living standards of all citizens. In the context of the country's economic and political transformation, tourism has been accepted by the Government as one of the key drivers. The Cederberg Environs Spatial Development Framework (CSDF), having been initiated in 1997, aims at developing a concept and a practical toolkit to assist protected and recreational areas in the Cederberg, Western Cape, providing valuable input into nature tourism. The CSDF is based on the West Coast Sub-Regional Structure Plan. This plan was drafted in 1988 to address the relationship between conservation and development along the West Coast. It puts forward a framework aimed at balancing environmental conservation with tourism development. The concept presented is intended to be a work-in-progress and fits into the integrated development planning fostered by the West Coast District Municipality for the period 2002-2006. It is envisaged that South Africa would prepare a national strategy for sustainable development in nature tourism and for monitoring and management of visitor flows in recreational and protected areas. Hence the involved local municipalities and the University of Stellenbosch invited international experts to co-operate with South Africa to provide encouraging opportunities and promote new strategies. Therefore the involved parties appointed experts to assist with the preparation of a spatial

development framework for the area in accordance with the Western Cape Planning and Development Act, 1989. Another important governmental statement is the White Paper on Environmental Management Policy for South Africa 1096/1997. This was the beginning of an interesting and fruitful scientific exchange bringing mutual benefit to all parties involved.

The idea behind this international co-operation was born at the UNESCO conference held in Seville, Spain during March 1995, where a new vision of planning and implementation of the MaB Programme (Man and the Biosphere Programme) was formulated for the 21st century. It was stated there that the global community needs working examples which include ideas for promoting both conservation and sustainable development in recreational and protected areas. In the Seville vision it is said of biosphere reserves that "rather than forming islands of an increasingly impoverished and chaotic world, they can become theatres for reconciling people and nature and they can bring knowledge of the past to the needs of the future...". UNESCO's MaB Programme and its Biosphere

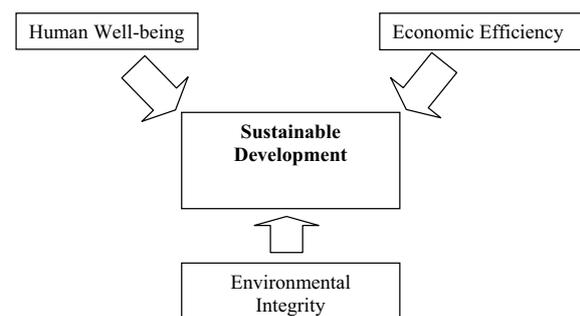


Figure 1: Three global imperatives to achieve sustainable development.

Reserve concept is a global programme of international scientific co-operation dealing with people-environment interactions.

In 1995 the International Institute for Sustainable Development (IISD) pointed out that sustainable development occurs at the intersection of three global imperatives shown in the figure above (figure 1). If these imperatives are not balanced sustainable development cannot be achieved. In the case of the Cederberg Environs, this equation largely hinges on environmental integrity.

### Study Area

The Cederberg Environs, a mountainous area of about 12700 km<sup>2</sup>, are situated within the southwestern part of South Africa and cover areas within the Western Cape Province and the Northern Cape Province. The Cederberg Environs offer a unique diversity of cultural and natural resources that have huge potential for nature tourism. Therefore it is of national and international importance due to its exceptional conservation value (table 1).

Currently 389 253 ha of the area studied has statutory conservation status. All my data presented refers to this area.

The Cederberg Environs and their proclaimed conservation areas have grown into a popular destination for tourists attracting more than 70000 visitors per annum. It is internationally known for its exceptional scenic beauty and unique flora. Many rare endemic fynbos species occur in the area studied with the Clanwilliam cedar (*Widdringtonia cedarbergensis*) probably being the most notable. Further more this area shows some important characteristics as follows:

- The Cederberg Environs comprise unique natural environmental attributes that justify their status as a national asset.
- The natural environment and its resources are susceptible to overexploitation or inappropriate use.
- The tourism sector depends on the environment.

Table 1: Statutory Conservation Area profile.

CONSERVATION STATUS	RESOURCE	AREA (HECTARES)
<i>Wilderness Area</i>	Cederberg	71 000
	Groot Winterhoek	24 000
<i>National Parks</i>	Tankwa Karoo	43 000
<i>Provincial Nature Reserves</i>	Cederberg	2 800
	Groot Winterhoek	5 500
	Matjiesrivier	13 000
	Oorlogskloof	5 570
<i>Mountain Catchment Areas</i>	Cederberg	59 000
	Koue Bokkeveld	96 000
<i>Private Nature Reserves</i>	Groenfontain	2 400
	Kagga Kamma	6 000
	Zuurfontain	12 000
<i>Local Nature Reserves</i>	Ramskop	50
	Akker-en-Dam	1 800
	Nieuwoudtville	115
<i>Natural Heritage Sites</i>	Bushman's Kloof	7 000
	Beaverlac	2 000
	Bo-Boschkloof	1 000
	Visgat	1 000
<i>National Monuments</i>	The Wuppertal Area	36 000
	<b>TOTAL</b>	<b>389 235</b>

- There is a substantial need for community development programmes.

Protected areas are of importance to all people of the world, and therefore international legal instruments give the opportunity to ensure that important sites are given appropriate recognition and support in the retention of their integrity. For example, biosphere reserves are such internationally designed protected areas, which are managed to demonstrate the value of conservation. This modern international concept of protected areas should be adopted for the Cederberg Environs.

The estimated total population of the area studied is 57000. The area is sparsely populated with 2,2 people/km<sup>2</sup>. It is described as primarily rural with 60% of the population living on farms or communal property – deriving more than 50% of their net profit from tourism.

## Methods

The CSDF was drafted in accordance with the basic vision and mission set down in the provincial growth and development strategy. Additional fundamental guidance was provided by the discussion document “Towards a New Environmental Policy for South Africa” by the Department of Environmental Affairs and Tourism, 1996 stating that:

“In the process of transforming the South African society, the South African Government states as one of its priorities, that the government must ensure that all South African citizens, present and future, have the right to a decent quality of life through the sustainable use of resources. It also states that environmental considerations must be built into every decision and that current legislation should be revised with a view to establishing an effective system of environmental management in South Africa. The underlying principle of sustainable development is not only recognised as a priority by the South African Government but also internationally in Agenda 21”. To balance the above aspirations with sustainable utilisation of the natural environment and its community supporting resources, this mission was applied as a guideline to the formulation of a specific vision and mission statement for the Cederberg Environs:

- Vision: creating a model of co-operative planning and management for human well-being and environmental sustainability;
- Mission: facilitating the management and monitoring of the Cederberg Environs in order to benefit the needs of the present without compromising the ability of future generations to meet their needs.

Spatial development generally implies certain dimensions or levels of change of environment. A certain degree of change has to be accepted. It is, however, important for inevitable change to provide certain limits to protect the “sense of place” of the affected environment. This requires planners, managers and decision-makers to define natural conditions and to undertake actions to maintain or achieve these conditions. Changes to the environment could be eliminated if all use was prohibited. Such prohibitions are, however, neither possible nor feasible. The challenge is therefore not one of how to prevent human-induced change, but rather one of deciding how much change will be allowed to occur, where it will be allowed and which actions are needed to control it. Therefore co-ordinated public participation was a fundamental principle of the planning process.

Biosphere reserves provide the building blocks for bioregional planning or spatial development in a bioregion. They are the most widely implemented and recognised of the various bioregional planning programmes existing worldwide. The management objectives of these sites are to conserve the diversity and integrity of biotic communities for present and future use. At these sites emphasis is given to the integration of functions such as research, resource management, monitoring, training and education in order to help solve problems locally, nationally and internationally. Therefore it should bring together all interested groups in a partnership approach both at site and network levels. And last but not least it should improve the understanding of the tourist’s relationship with the natural world through programmes of public awareness, information, formal and informal education.

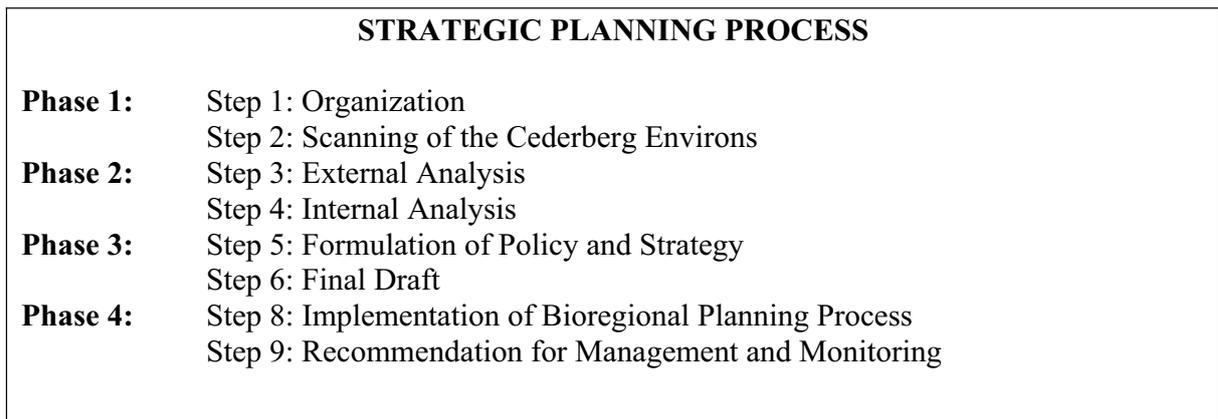


Figure 2: Three global imperatives to achieve sustainable development.

The biosphere reserve concept has been found an ideally suited mechanism to apply bioregional planning principles in an area where a variety of land uses and activities are found. Each biosphere reserve must be approved by Unesco’s Man and the Biosphere International Co-ordinating Council before it is officially designated. (South Africa’s first biosphere reserve, The Kogelberg Biosphere Reserve, was registered in 1998.) The biosphere reserve concept is based on a structure of inter-related zones, namely a core area, a buffer zone and transition zones. Appropriate conservation status and land use are assigned to each zone. The concept aims to ensure that all zones of a bioregion contribute appropriately to conservation and sustainable development. Furthermore human dimensions of a bioregion should be reflected in a more significant way.

The CSDF process was based on the following strategic planning process showing an iterative process (figure 2) that was based on active public participation at all levels of planning which started in 1997.

Currently the development is in phase 4. It is a process that concentrates on the selection of issues of strategic importance which have long term consequences. Emphasis is being put on practical results and it provides a mechanism for co-operation between all sectors, community groups and the general public.

**Results**

The project offers diverse and interesting outcomes. Some of which are being presented here having international relevance. Figure 3 gives an overview of the recommendations put forward by the CSDF.

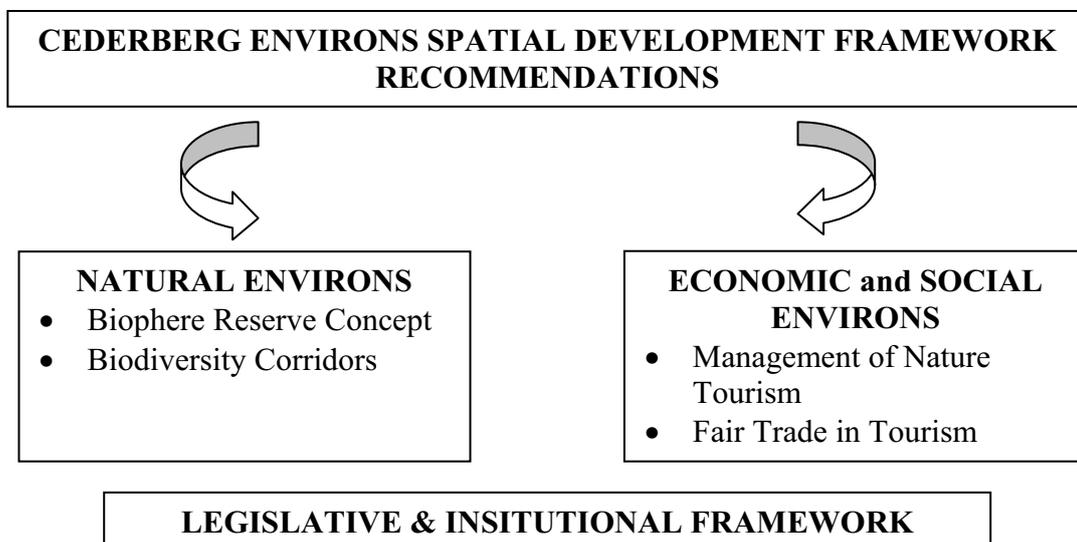


Figure 3: CSDF: Recommendations for sustainable development in the Cederbergs.

The CSDF aims at achieving strategic goals to promote equitable access to and sustainable use of natural and cultural resources and to promote environmentally sustainable lifestyles in the area studied. Therefore it is important to integrate environmental management with all economic and spatial development activities in order to satisfy basic needs of the local people and the tourists visiting this area.

Nature tourism has been identified as one of the sectors with the largest potential for growth and development in the Western Cape. It is a major driver of post-apartheid socioeconomic growth. Nature tourism in the Cederberg is very seasonal with the main concentration of tourists visiting the region during the spring flower season. The most important problems or limiting factors of monitoring nature tourism being analysed in this study are the following:

- Shortage of appropriate tourist accommodation for nature tourism;
- Inadequate road maintenance limiting access to recreational and protected areas;
- Lack of co-operation between community tourism structures;
- Lack of guidelines for developing tourist facilities;
- Lack of human resource management skills;

Nature based tourism is one of the key economic activities that can be developed in the region. To be effective such a strategy needs to identify the potential nature based tourism opportunities that exist and correlate these areas of key importance with biodiversity conservation areas.

In 2001 the innovative project “Fair Trade in Tourism Initiative” has been established to improve tourism. The so called Fair Trade in Tourism South Africa (FTTSA) advocates equity in tourism by promoting sanctioned fair trade in tourism principles – fair share, democracy, respect, reliability and transparency and sustainability by awarding a special label, the FTTSA trademark. FTTSA certification is based on a rigorous assessment process which tests the extent to which staff and other stakeholders benefit meaningfully from tourism activities. The trademark provides credibility while

simultaneously opening up access to niche markets. This fair trade concept has newly been adopted for the Cederberg Environs. The main results FTTSA expects to achieve over the next few years include: increased awareness about fair trade in tourism in the area studied, increased demand for other FTTSA projects in related areas.

Also the levels of social development of the people play an important role in the manner the natural environment and its resources are used. The intention would be to integrate such opportunities into a managed environment that is generating economic returns and creating jobs. It is one important goal of the study to develop human resources. The CSDF process provides guidelines to facilitate social development and economic empowerment in order to improve the well-being of the local people. Electronic medium was used to facilitate the public participation process and the collection of data. Relevant information has been put onto a geographical information system (GIS) so that information will be available for end users for different purpose (e.g. information, education, training). Further on such a system implies that information can be easily updated. Key issues within the area were photographed and video-taped. This material is used for diverse national training programmes: “Reach & Teach” is used in secondary schools newly having tourism as a subject in the syllabus; “Ubuntu-We Care” is a customer-training programme aimed at service providers. Capacity-building programmes for emerging entrepreneurs will be a specific focus of the training programmes in the next few years.

The final draft gives recommendations of scientists and practitioners from a series of workshops as well as analysis for the implementation of the biosphere concept in the Cederberg Environs as part of the Bioregional Planning Programme in the West Coast Region. The recommended zoning has been described and illustrated. A summary of the recommended land use in the respective zones is provided next. The basic principle is that the core areas have the highest conservation status and the lowest intensity land uses while transition zone 3, conversely, has the lowest conservation status and the highest intensity land uses. Conservation status decreases and land use intensity increases progressively moving away from the core area.

- The recommended core areas comprise the statutory conservation areas, namely statutory wilderness areas, national parks and provincial nature reserves. No development is allowed in these areas. It is important to know that “wilderness” represents the highest conservation status and serves as a benchmark for conservation management. The Cederberg Wilderness Area has been divided into three zones. A maximum of 50 people per day is permitted into each zone. The CSDF provides strategies for improving the core areas.
- The area comprises large tracts of proclaimed mountain catchment areas, sections of which are currently serving as unofficial buffer zones for the statutory wilderness areas and nature reserves. The purpose of buffer zones is to protect ecological and social integrity of the core area. They serve as natural corridors that are essential for the functioning of ecological systems. No large-scale development is to be allowed in the buffer zone. Any form of development must be planned by a multi-disciplinary forum to prevent environmental degradation. The CSDF provides spatial guidelines and strategies for consolidating and extending the buffer zones. The buffer zones are followed by three transition zones.
- The transition zone 1 surrounds the buffer zone and represents an area where the natural and cultural environment is of high value. Low impact land-uses are allowed (e.g. fynbos utilisation, ecotourism with small scale resort development). All development must be guided by a management plan and by regular environmental auditing in accordance with appropriate standards (refer to ISO 14001). In transition zone 2 activities that extract natural resources such as agriculture, forestry and mining are dominant activities. Small scale low impact urban development and tourism development (e.g. resorts) can be allowed. This zone has the additional role of protecting high potential agricultural areas from urban expansion. Environmental control must be exercised to regulate impacts of intensive development. In transition zone 3 large-scale urban and rural development can be accommodated. These zones were identi-

fied to control the negative impacts of major development (e.g. agricultural, industrial and urban development) by actively promoting co-operation between the key role players. Effective co-operation is a fundamental requirement there. Spatial guidelines and strategies for consolidating and extending transition zone 1-3 are given in the CSDF.

There are some other interesting results as shown in certain projects by various initiatives on different matters. Some of these initiatives of the CSDF are discussed as follows:

In 2004 Cape Nature Conservation in conjunction with the Cape Action for People and the Environment (CAPE) have been launching the Greater Cederberg Biodiversity Corridor (GCBC). CAPE realised that efforts to conserve life-supporting processes should include natural corridors that stretch across habitats. These would help ensure the conservation of critical habitat types and support the concepts of holistic conservation. This initiative places emphasis on the natural and cultural resources of the Cederberg Environs. As a rule it has been established to ensure the survival of specific species and their habitats and to survey visitor flows. Though the primary aim is conservation, the corridor provides opportunities for the social and the economic “upliftment” of local communities through tourism development. Some interesting projects supported by GCBC to control visitor flows are:

- The establishment of donkey cart treks by the Wuppertal Conservancy
- Surveys of the plant and animal life of the Tankwa Karoo.
- Capacity control of visitors in the Cederberg Wilderness Area.

## Conclusion

Pristine and unspoilt natural habitats supporting a diversity of plant and animal life in a landscape of scenic beauty must be considered a valuable resource for the present and even more for future generations. The conservation of the natural environment of the area studied is therefore paramount.

Environmental health is the key to sustainable development in the Cederberg Environs. The primary threat to environmental health is fragmentation of the community-supporting ecosystems. Therefore the CDSF addresses issues such as biodiversity conservation, visitor management and human resources development with the aim of breaking the cycle of environmental degradation and promoting well-being of all the people of the Cederberg Environs. Rather than forming islands in a world increasingly affected by human impacts, biosphere reserves can become examples for reconciling people and nature. The CSDF gives an example how to overcome the problems of isolated hot-spots of protected areas. All the participants of the CDSF hope to stimulate further activities in this planning process for the mutual benefit of all parties affected.

## References

- Fuggle, R. & Rabie, A. (1999). Environmental Management in South Africa. Wetton.
- Jordaan, M. (2000). Tourism in South Africa. Bloemfontein.
- Hunter, C. & Green, H. (1989). Tourism and Environment. A sustainable relationship? London, New York.
- Moss, D. (1999). Cederberg Environs, Spatial Development Framework. Moorreesburg.
- World Conservation Union (IUCN), National Nations Environment Programme (UNEP), World Wildlife Fund for Nature (WWF). (1991). Caring for the Earth: A Strategy for Sustainable Living. Gland.

# Local Recreational Areas: Accounting for Peoples' Needs in the Development and Selection of Planning Instruments

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*Keywords: Local recreation, leisure-trends, peri-urbanisation, planning instruments, landscape planning, landscape development concept, spatial planning, sustainable development.*

**Abstract:** The goal of the 'ANAP' research project is to indicate how peoples' needs for and expectations towards local recreation areas can be met by the means of employing different planning instruments.

An in-depth analysis of the available literature reveals what people actually require and expect and the functional capacity of the planning instruments is illustrated by four case studies. Evaluation of these case studies not only gives rise to recommendations concerning the future implementation of the various planning instruments, it also yields proposals for improving their performance in future development phases.

Peri-urbanisation leads to the rapid disappearance of attractive open landscapes in built-up areas. As a result, there is less space available for local recreational purposes, and people have to travel increasingly far to find the kind of landscape they are looking for. In order to tackle and hopefully improve this situation in the long term, adequate instruments for controlling the way landscapes are developed within built-up areas are absolutely essential.

This research project aims to show how the different planning instruments can be implemented to achieve best outcomes for people seeking decent recreational areas. The planning instruments selected and developed have to be aimed at preserving an attractive landscape. The insights gained from this research provide the basis for recommendations concerning the future implementation of planning instruments, as well as for their future development.

The project 'ANAP' is a cooperative project between the 'Research Centre for Leisure, Tourism and Landscape' (FTL) at the University of Applied Sciences in Rapperswil (HSR), and the 'Institute for Sustainable Development' (INE) at the University of Applied Sciences in Winterthur (ZHAW). Other project partners include the Federal Research Institute for Forestry, Snow and Landscape (WSL), Green City Zurich (GSZ), Cantonal Agency for Spatial Planning and Survey of Zurich (ARV), Cantonal Agency for Waste, Water, Energy and Air of the Canton of Zurich (AWEL), and the Cantonal Agency for Spatial Planning of the Canton of Basle. Activities have started in 2003 and will end in 2006.

## Research structure and methods

The project encompasses three main phases:

### 1. Analysis

In an extensive analysis of the literature on the subject, the needs of people looking for local recreation, and recent trends in the field of local recreation were identified and collected.

### 2. Evaluation

The planning instruments best suited to lead to the kind of local recreation facilities and landscapes that people want were evaluated. In addition, the usefulness of planning instruments for resolving potential conflicts between the interests of different stakeholders in the use of space was analysed. Towards this end, four projects in

which areas close to built-up areas have been re-developed were selected as case studies, and evaluated:

- a. Landscape-Development Concept (see Schubert 2000) 'Limmatraum Zürich'
- b. Land-use concept 'Allmend Brunau Zurich'
- c. Development planning Salina-Raurica (vicinity of Basle)
- d. Development and implementation concept Töss / Leisental (Winterthur)

The following methods were used in the evaluation phase:

- Analysis of existing studies
- Analysis of planning instruments
- Analysis of case studies
- Subject-specific interviews with experts

### 3. Conclusion

The insights gained from the research provide the basis for formulating recommendations for the implementation of selected planning instruments in order to ensure that peoples' needs in the field of local recreation can be taken into account more effectively.

This paper presents two partial project-results - an overview of current trends in leisure and recreation, the case study 'Töss/Leisental' (Winterthur) - and the conclusion.

### Overview of current trends in leisure and recreation

Table 1 presents the results of the analysis of the literature addressing current and future trends in leisure and recreation relevant for spatial planning in built-up areas. Trends indicate a continual, significant growth in both indoor and outdoor

Table 1: Leisure and recreational trends and their impacts.

Leisure and recreation trends		Current importance	Anticipated development over the next 10 to 20 years	Relevancy regarding recreation in agglomeration areas	
				Impact on the change of landscape (Quality)	Strain on landscape (Quantity)
Fitness sports, outdoor (Jogging)		●●●	→	●	●●●
Club sports, outdoor (football, tennis)		●●●	↘	●●●	●●
Indoor sports (badminton, volleyball, gymnastics, etc.)		●●●	↗	●	●●
Trend-sports	Soul sports (mountain biking, windsurfing, inline skating)	●●	→	●●●	●●●●
	Fun sports (para-sailing, verti-biking, bungee-jumping)	●	↗	●●	●●●
	Extreme sports (icefall-climbing, cave-diving)	●	→	●●	●
	Thrill sports (base-jumping, canyoning)	●	→	●●	●●
'Being out in the open air' (walking, hiking, biking)		●●●●●	↗	●●	●●●
Wellness		●●●	→	●	●
Event shopping		●●	↗	●	●
Amusement parks		●●	↗	●●	●
Mega events in sports and culture		●●	↗	●●	●
Virtual recreational offers (video games, play stations, virtual hotels)		●	→	-	-

Key:



low relevance  
high relevance

recreational activities, even with no population increase. This will inevitably lead to an increased use of open spaces in built-up areas.

The trend towards even more rapid sequencing of activities (recreation, sports, work, family), or towards the simultaneous practice of different activities ('multi tasking') will increase, and will become an important factor in the development of local recreation areas in European agglomerations.

However, the focus on trend sports should not be over estimated. Focussing on Germany, Opaschowski (2004) finds that only a small fraction of the population is attracted to 'trend sports' and that the demographic trends towards an ageing population will lead to an increase in more relaxing activities such as walking, hiking and cycling.

### **Evaluation of the Development and Implementation Concept Töss/Leisental (Winterthur)**

All case studies used a three level evaluation grid (figure 1) with only one adding a fourth level to evaluate the impact of the respective project on sustainable development. In addition to the in-

depth examination of the planning documentation, three to five expert interviews were carried out in all case studies.

By way of an example, the methodological concept and some of the results of the evaluation of the Development and Implementation Concept Töss / Leisental (Winterthur) are presented below.

The case study "Töss" investigates a small project whose aim it was to allow a river to re-find its natural course. At the end of the 1990's, a decision was taken to allow the river more freedom in certain sectors rather than to renovate existing dams. Up to the present, only a few interventions have been implemented. The development of the landscape is mainly left to the forces of the river itself.

During the compilation of the Development and Implementation Concept, several potential conflicts between goals such as groundwater supply, forest use, protection of nature, and research requirements were identified. Authorities managed to reduce the conflict potential by creating a trans-disciplinary 'core group'. As a result, it was possible to plan and implement the project comparatively quickly.

Levels of evaluation	
I	Evaluation of objectives
	<ul style="list-style-type: none"> <li>▪ Which objectives with respect to recreation were considered in the planning?</li> <li>▪ Have objectives been operationalized? What design features are planned for implementation?</li> <li>▪ Does the planning process include the expectations of relevant stakeholders?</li> </ul>
II	Evaluation "state of the art"
	<ul style="list-style-type: none"> <li>▪ To what extent are the requirements included from a professional point of view?</li> <li>▪ To what extent are the requirements of future users implemented?</li> <li>▪ To what extent should further aspects of recreational use of space be implemented?</li> </ul>
III	Evaluation of the Process
	<ul style="list-style-type: none"> <li>▪ What instruments have been implemented in order to assess future users' expectations?</li> <li>▪ How has the involvement, collaboration, participation of stakeholders been organised?</li> <li>▪ Has a solution been reached that gains wide acceptance among relevant stakeholders?</li> <li>▪ What conflict solving strategies are ready to be implemented?</li> </ul>
IV	Evaluation of the contribution to sustainable development (where available)
	<ul style="list-style-type: none"> <li>▪ Ecological dimension: to what extent has living space for people, animals and plants been preserved, and to what extent can natural resources be used, taking into account the quality of life of future generations?</li> <li>▪ Economic dimension: to what extent has the well-being and development capacity of the economy been considered?</li> <li>▪ Social dimension: to what extent has society (people, their lives and development, solidarity and well-being) been considered?</li> </ul>

Figure 1: Levels of evaluation (Source: Based on Mönnecke, 2000).

It is interesting to note that the interests of people looking for local recreation opportunities were only included marginally. Nevertheless, when questioned on the subject, comments made both by experts and by passers-by at the actual location of the project, indicate a high level of acceptance of the river project's goals. Future research will have to validate whether or not the following quote is universally applicable: "as long as we shape attractive river landscapes, people will come to see them".

## Conclusion

A comparison of the four case studies based on the dimensions presented in figure 1 lead to the following conclusions.

### Dimension I: Evaluation of objectives

The goals formulated in the planning documents are principally dedicated to aesthetics (e.g. within the context of rehabilitating river sections) and infrastructure (e.g. roads and pathways). The categories relating to the use of natural environments (e.g. the creation of natural areas requiring no maintenance suitable for children and young people), resolving conflicts (e.g. between various leisure activities such as cycling and walking, or between leisure activities and environmental protection), and the designation of areas for leisure (e.g. areas for peaceful, contemplative relaxation, fun and games etc.) are considered to a lesser degree.

### Dimension II: Evaluation "State of the Art"

All case studies concentrate on up-grading the leisure potential of less attractive areas – e.g. opening up streams, rehabilitating natural environments. Additional leisure-time opportunities will be created, such as skating and cycling facilities along the banks of the Sihl and the Limmat.

Only the implementation concept of the project "Allmend Brunau" systematically determined the needs of people seeking leisure and relaxation before the planning process.

The needs of future user groups – which should be taken into account - are not explicitly addressed in the case studies. The reason being that it is rather difficult to give substantial weight to potential fu-

ture user groups in the participation process since current users and inhabitants are generally not prepared to consider such needs when "their" local leisure facilities are at stake.

### Dimension III: Evaluation of the Process

All planning processes examined included some form of collaboration in different phases of the processes. However, the precise form of collaboration was different in each project. In all case studies, the participation process led to improved communication and collaboration between the various actors (authorities, politicians, citizens):

- Involvement of the local population
- Involvement of young people (e.g. skate-boarders and cyclists in the Allmend Brunau case)
- Improved exchange between cantonal, community and state authorities
- Focused public communication work involving experts (Töss/Leisental)

Thanks to close collaboration between different actors throughout the planning processes, various goals were achieved. However, the right selection of participants to involve is a key factor for success.

Participative processes lead to new expectations of those involved. It is important that the goals of collaboration, the possibility to influence participants and especially the relationship between collaboration and decision-making are clearly defined and communicated.

However, the analysis also revealed the limitations of participatory processes, especially when applied to events that target a very heterogeneous audience. Not all participants were able to accommodate the views of others, keeping strictly to their initial position. As a conclusion, participatory processes are instruments best used for the analysis of requirements, and needs, rather than for resolving conflicts.

It is safe to assume that participatory processes have led to a broader acceptance of the various projects within the relevant population. Most of the requirements and objections expressed could be accommodated in the design of the projects. In all the case studies, certain stakeholders felt they

had been inadequately included in the process. In such cases, it was found to be important to continue the dialogue with these groups, and to keep looking for potential solutions acceptable to all participants concerned. A suitable concept concerning information and communication, at both the planning and the implementation phases proved to encourage acceptance.

#### **Dimension IV: Evaluation "Sustainability"**

Only one case study (Töss) was evaluated relative to its contribution to sustainable development. Whether projects are really economically efficient, ecologically viable and socially acceptable can only be precisely evaluated when the initial steps towards transformation have been taken, and the consequences of the measures employed can be observed at least to some degree.

On the level of development and transfer concepts, it becomes clear that the main focus of the planned measures is seldom equally distributed between the three sustainability dimensions: economy, society, and environment. In the Töss case study, for example, the main focus clearly resided on the ecological dimension.

### **Recommendations**

The following recommendations are the result of the evaluation of both formal and informal planning instruments, and the analysis of the four case studies.

- Combination of formal and informal planning instruments: In order to implement goal- and result-oriented planning instruments, the following elements should be combined with a clear purpose in mind: formal instruments, such as general guidelines on spatial planning, usage planning and zone selection planning, are mainly suitable for ensuring and establishing leisure requirements. Informal instruments, such as landscape development concepts, forest development planning and Local Agenda 21 are especially suitable for dealing with the needs of individuals seeking leisure.
- Creation of "nature experience" as well as spaces to encourage learning about nature: Within the planning framework for the future, it is important to pay more attention to the needs of both children and young people. Natural areas requiring no maintenance (e.g. quarries, gravel pits, former fields, areas in the forest) which are left to themselves and which can be designed and changed have become rare in residential areas.
- Orientation on success factors: previously gathered experience and knowledge for identifying success factors shows that project results are not only influenced by the content structure of a project, but also by the procedural form, the way a project is carried out, and the behaviour of the participants. The studies undertaken by Wolf and Appel 2003, Stoll 1999, Brendle 1999, Wiener and Rihm 2002 offer an overview of success factors for the planning and transfer of projects within the fields of sport/leisure/tourism/mobility and nature protection.
- Equal and timely inclusion of all relevant actors: It is essential to ensure that all relevant actors are equally included in all phases of the planning process.
- Win-win situation for all participating actors: If the planning process is to succeed and be accepted, it is absolutely vital that it results in an improvement of all individual actors' situations (win-win situation).
- Speedy transfer of measures: A speedy transfer of measures encourages motivation and ensures that the same people can be involved at all stages, from conflict resolution to transformation.
- Monitoring and controlling: To ensure that the measures taken are effective, it is essential to ensure that both the measures and regulations are monitored and adhered to after implementation.

- Establishing a communication concept: Successful planning processes contain communication concepts, which describe how agreements, measures and regulations are communicated to all the relevant parties concerned.

### Further research requirements

The following areas require more research.

- Selecting participants to be included in the participation process: The evaluation of the four case studies revealed that the careful selection of participants is a major challenge. The difficulty resides in the necessity to identify all those persons who will be affected, either positively or negatively, by a specific project. At the same time a high number of participants is likely to substantially complicate the process.
- Significance of the soft location factor “local leisure”: Additional sound knowledge of the significance of the “soft” location factor ‘(local) leisure’ compared to the classical location factors is absolutely vital and necessary. This would provide planners and politicians with the necessary arguments to increasingly include leisure aspects into planning processes. Local leisure-time facilities are increasingly being seen as a relevant marketing factor for communities, towns and regions. The most immediate and nearest leisure facilities available play an increasingly important role when choosing either where to live or where to set up a business. However, the relative importance of the leisure factor compared to other classic location factors (e.g. availability of highly qualified employees, communication networks, taxation, etc.) remains unclear.
- Representative surveys on leisure-time needs outside the forests: In order to counteract the sometimes extremely high numbers of people who visit nearby forests, and the constantly diminishing proportion of open and green spaces, more effort should be put into making agricultural and cultural landscapes more attractive for leisure time activities.

### References

- Brendle, U. (1999). *Musterlösungen im Naturschutz – Politische Bausteine für erfolgreiches Handeln*. Münster.
- Mönnecke, M. (2000). *Evaluationsansätze für die örtliche Landschaftsplanung. Grundlegung, Konzipierung und Anwendung*. Dissertation am Fachbereich Landschaftsarchitektur und Umweltentwicklung der Universität Hannover. Hannover.
- Opaschowski, H.W. (2004). *Deutschland 2020: wie wir morgen leben - Prognosen der Wissenschaft*. Wiesbaden.
- Stoll, S. (1999). *Akzeptanzprobleme bei der Ausweisung von Grossschutzgebieten: Ursachenanalyse und Ansätze zu Handlungsstrategien*. Frankfurt/Main.
- Wiener, D. & Rihm, I. (2002). *Erfolgsfaktoren und Qualitätsstandards partizipativer Prozesse in Gemeinden, Quartieren, Städten und Regionen*. Vorstudie. Basel.
- Wolf, A. & Appel, E. (2003). *Wirksamkeit freiwilliger Vereinbarungen zwischen Natursport und Naturschutz*. Abschlussbericht. Universität Duisburg-Essen.



Participation Processes in Recreational  
and Protected Areas

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Ulrike Pröbstl (Chair)

## **Participatory Processes and Participatory Research – A Tool for Conflict Identification and Development of Management Decisions**

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*Keywords: Biosphere reserve, conflict management, stakeholder participation, participatory research, protected areas, sustainable use, wildlife management.*

### **Introduction**

The targeted and farsighted management of conflicts is a basic task of any protected area management. This holds particularly true for Biosphere Reserves, which – being a non-typical category of protected area serving both conservation and sustainable development objectives – are subject to a comparatively weak regulatory regime in terms of legal restrictions and prescriptions for land use management. Instead, management of Biosphere Reserves has to rely to a large extent on governing a complex network of stakeholders with competing interests and conflicting goals. That includes taking a pro-active role in conflict situations, negotiating trade-offs, and canalizing conflicts in a productive way that serves the obligations and objectives of the protected area. Approaches to effective management of land use-related conflicts under these conditions must be responsive to the inherent complexity of those conflicts (Daniels & Walker 1997). Successful reconciliation of conflicts, compliance with decisions, acceptance of management measures and active commitment to their implementation on part of the stakeholders inevitably requires participatory processes.

In response to these requirements, the Austrian three-year research project “Integrated Sustainable Wildlife Management in the Biosphere Reserve Wienerwald - ISWI-MAB” is based on a participatory and collaborative research approach (Cornwall & Jewkes 1995). The project area “Wienerwald” is a forest-dominated, multiple-use landscape characterized by overlapping of various land use interests, including intense recreational uses and hunting activities. This causes a variety of conflict situations that threaten sustainable development. Overarching objectives of our research project are the analysis of antagonistic and (potentially) synergistic interactions between wildlife, wildlife management and other relevant forms of land use (e. g. recreation, forestry, agriculture, transport system, land development, nature conservation) on a regional scale. Cross-sector, integrated approaches to land use management shall be developed, including tools for assessment and monitoring of sustainable use. Since humans are the key-factor in understanding and controlling the relationship between wildlife resources and society (Kellert & Brown 1985), these research objectives required involvement of stakeholders from the very beginning.

## Methods

Conflicts are defined by Conrad (1990) as “communicative interactions among people who are interdependent and who perceive that their interests are incompatible, inconsistent or in tension.” Participatory approaches provide an appropriate framework for identification and reduction of land use-related conflict potentials (Daniels & Walker 1997).

The project-related stakeholder process involves major stages of participation: (i) information, (ii) consultation, (iii) collaborative decision-making, and (iv) participation in implementation of actions (Umweltbundesamt 2006). Building on existent Biosphere Reserve-related consultancy fora and based on a social network analysis, relevant stakeholders were identified and a multi-sector and interdisciplinary stakeholder platform composed of representatives of different forms of land uses (hunting, recreation and tourism, forestry, etc.), landholders, local politicians, members of authorities, and NGOs was established (figure 2).

Different socio-empirical techniques were applied to gather information on regional wildlife-related conflicts and stakeholder opinions: in-depth expert interviews, questionnaires for key visitor and land user groups (mail survey, on site visitor interviews), and interactive discussions

within the participation panel. Data evaluation will be done by multivariate analysis. In parallel, a consultative technical work group representing a sub-set of the broader participation panel collaborated in development of an assessment set for sustainable hunting (practical field testing, interviews, review of draft products, workshops). Intermediate and final results are reviewed and discussed at regular meetings of the participation panel, which also provides guidance on further work steps. It is envisaged that the stakeholder process shall develop a self-sustaining dynamic and serve as a long-term panel for conflict management in the project follow-up phase.

## Results

The presentation will focus on methodological issues of participation processes in a sustainable use research project within a Biosphere Reserve setting. Drawing references also to experiences from previous projects, the theoretical considerations underlying the participatory project design will be outlined (Umweltbundesamt 2006). The structure, organisation and functioning of the participation process will be characterised, and the collaborative and consultative research methods will be described. Based on the lessons learnt, the benefits as well as the problems and limitations of participation processes will be discussed. Quality

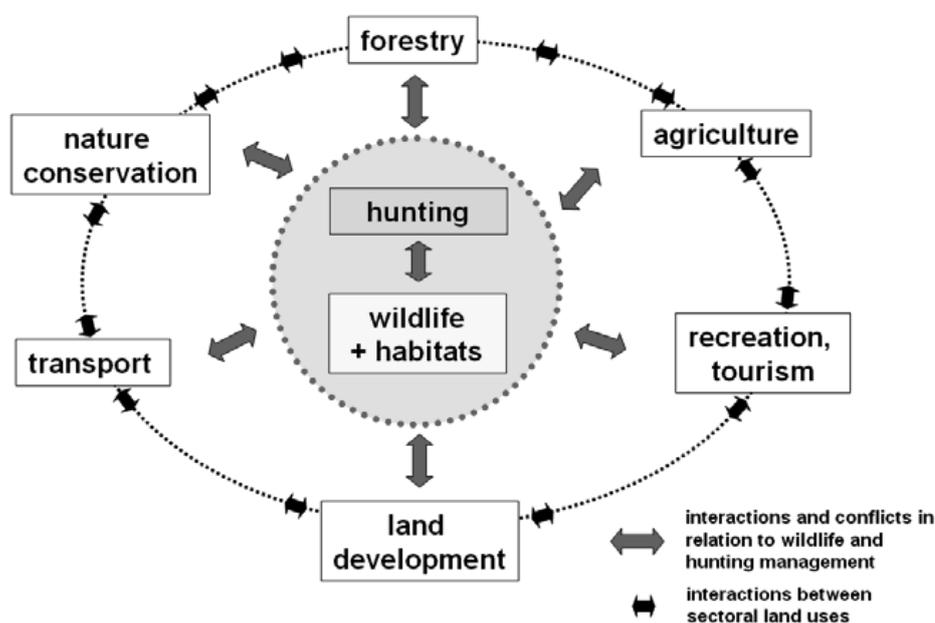


Figure 1: Simplified model of land use interactions and conflicts related to wildlife management.

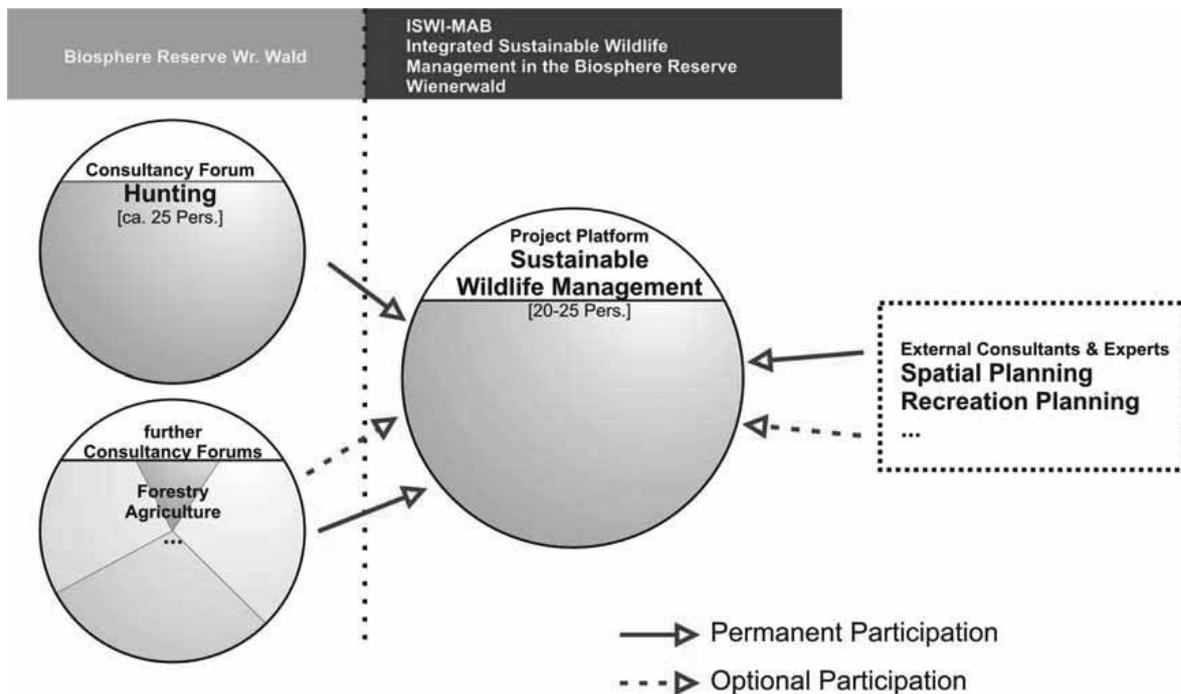


Figure 2: Organisation of the participation panel.

criteria for effective participation shall be identified, and selected key results of the expert and land user surveys will be presented.

## References

- Cornwall, A. & Jewkes, R. (1995). What is participatory research? Elsevier.
- Daniels, S.E. & Walker, G.B. (1997). Collaborative learning and land management conflict. In: Solberg, B. & Miina, S. (eds.), Conflict management and public participation in land management. Proceedings of the International Conference in Joensuu, Finland, 17 – 19 June 1996. EFI Proceedings No. 14, 1997. p 37-60.
- Umweltbundesamt (ed.)(2004). Vielfalt statt Zwiespalt. Begleitfaden zum Mitgestalten von Lebensräumen – ein Beitrag zur Umsetzung der Biodiversitätskonvention. Berlin.

# Tourism Development and Local Actors' Engagement for Sustaining Alpine Forests

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*Keywords: Participatory natural resources management, community forestry, sustainable tourism and rural development.*

## Introduction

Tourism development in alpine areas fosters a tertiarization of local economies, with a trend to diminished dynamism in the primary sector in general, and in forestry in particular. Besides the many causes eroding the primary sector, the fall in alpine timber production is also due to compressed prices in the context of a globalized timber market and to increasing costs of forest labor making mountain extraction even less competitive. These conditions prevailing now for over three decades, a substantial part of the alpine seasonal forestry work has shifted to the tourism sector and much of the alpine forests are no longer managed, are aging, remain untended and are no longer a resource for sustaining local livelihoods.

The goal of this paper is to compare alpine communes with varying forms and intensities of recreational and tourism development in order to identify how recreational values shape local actors' perceptions of alpine forests (inferring expressed forest related conflicts and values) and local actors' strategies of action, when participating in the management of these forests.

Based on research about local actors' participation in forestry in Alpine communes (Finger-Stich 2005), it seems that tourism development can induce local actors' disinterest in taking part in communal forestry. Based on a sample of six case studies of six alpine communes in the French (Haute-Savoie) and Swiss (cantons of Vaud and Valais) Alps, the results show that local actors' participation in communal forestry tends to decline with

the development of their commune's tourism sector. More precisely, this withdrawal in local actors' engagement is manifested in:

- Decreased municipal investment in the local forest
- Forest management delegated to the forest service
- Forest workers from private and community enterprises marginalized (economically and in their representation in local governance structures)
- Use conflicts between the agriculture and forestry sectors relatively high and unsolved.

The baseline study shows that resource as well as patrimonial, recreation and conservation values related with the local forest tend to be more often expressed by rural communities developing low impact recreation services, than by local actors residing in communes that have developed high impact tourism and recreational activities (skiing in particular).

Beyond the analysis of forest perceptions, the baseline study (Finger-Stich 2005) identifies the actors and places (communes) where collective social interactions promote more quality of life values (including patrimonial, recreational and conservation related forest values) and which aim more at enhancing livelihood or production functions of forests (i.e. the production of timber and fuelwood, the sustaining of forest related jobs and revenues). It distinguishes social interaction processes according to their capacity to more or less reproduce

resource management structures or change them. By differentiating results according to the types of actors interviewed, the analysis indicates that local actors working in tourism and involved in local governance, often try to integrate both livelihood and quality of life interests and are therefore key players fostering more multi-functional forestry. Multi-functional forestry being constitutive of definitions of “sustainable forestry”, in mountain regions in particular (OEFM 2000), an enhanced participation of the tourism sector in alpine forestry could be considered as conducive to sustainable alpine forestry.

## Methods

The present contribution focuses the analysis of the baseline study on the question of how tourism and recreational interests shape local actors' perceptions and involvement in collective actions related with communal forest management. It also inquires into an additional sample of alpine communes taking part in the elaboration of a Forest Charter in Haute-Savoie. The base-line research is based on social action theories and methodologies (Crozier & Friedberg 1977, Giddens 1987), on qualitative interview methods (open-ended and semi-structured) and on a grounded theory approach for analysing the data (Glaser 1992). Local actors' perceptions of forest values and conflicts were induced through a systematic and comparative text analysis, and so were the 21 collective actions identified in the initial sample of 6 communes. The dataset includes over 100 interviews conducted with local actors of various occupation, gender and age encountered in the communes, where the primary, secondary and tertiary sectors have more or less impact on local land uses and where geographic, demographic and accessibility conditions vary (Bätzing 1993).

## Results

The addition proposed by the present paper is to further discuss these results by focusing on recreational related conflicts and values and then challenges them by looking at an enlarged sample of communes. Indeed, preliminary research in a new sample of alpine communes indicates that some

communes that have invested in quite massive forms of winter and summer tourism development can also develop a dynamic communal forestry capacity by, for example:

- Valuing local forests as a resource for bio-energy (investment in communal fuelwood-run heating facility, etc.)
- Investing in local forest management planning, for instance, by developing a territorial Forest Charter
- Transmitting and upgrading local forestry know-how, forestry training for forest owners, organization of Forest Fairs, etc.
- Collection of taxes on overnights and recreational activities reinvested in local forestry.

## Conclusion

In a context of increasing forest related recreational values and decreasing financial and institutional capacities of forestry administrations (observed in Swiss and French alpine regions in particular), the paper helps forest and recreation managers consider local communities' recreational interests in relation with local forestry and to engage them accordingly in the management of their forests.

## References

- Bätzing, W. (1993). *Der Sozio-ökonomische Strukturwandel des Alpenraums im 20. Jahrhundert*. Bern.
- Crozier, M. & Friedberg, E. (1977). *L'Acteur et le Système*. Paris.
- Finger-Stich, A. (2005). *Social Agency in Alpine Communal Forests: Local Actors' Interactions with Communal Forests in the French and Swiss Alps*. Doctoral thesis, University of Albert-Ludwigs. <http://www.fredok.uni-freiburg.de>.
- Giddens, A. (1987). *Social Theory and Modern Sociology*. Cambridge.
- Glaser, B.G. (1992). *Basics of Grounded Theory Analysis*. Mill Valley.
- OEFM, European Observatory of Mountain Forests. (2000). *White Book 2000 on Mountain Forests in Europe*. Chambéry.

# Recreation Interests and Participation in River Restoration Projects

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## Introduction

Rivers and river spaces have become landscape elements with an ever widening spectrum of functions. They do not only fulfil drainage and ecological functions, but are also of high meaning for people as economical, social and recreational resources, i.e. as general living spaces.

Since 1991 the Swiss Federal Law on Hydraulic Engineering explicitly calls for combining all flood security measures with ecological revalorisations, i.e. restorations of the river spaces. Of such restoration projects large and numerous ones are currently carried out or are planned for the near future throughout Switzerland and Europe. But as experience has proven, they are often highly conflictual. The loss of economically used land accompanied by such restorations, the threatened status quo in the aesthetic and ecological quality of the locals' recreational and overall living space and the prevalent top-down planning in this field often arouse resistance. Therefore, suitable participation and communication strategies are key elements for the successful realization of restoration projects.

## Methods

This study presents the main results of two case studies on river restoration projects at the Swiss rivers Thur and Flaz. Both of these studies implemented a method triangulation including:

- a) qualitative interviews with the local population/recreational users, representatives of organised stakeholders groups as well as decision makers;
- b) standardised questionnaire surveys among the

local public and stakeholder groups and  
c) direct observation of the consensus-finding processes.

These two case studies served also as base for the subsequent design of a representative Swisswide survey by means of a standardised questionnaire. The survey included visualisations of differing states of river spaces varying in the depicted naturalness and usability for recreation/accessibility. The survey included also questions on the use of river spaces, on their meaning for the public, and on general attitudes of the Swiss population/recreational users towards river restorations.

## Results

The two case studies (Thur, Canton Thurgau, between Weinfelden and Bürglen; Rivers Flaz/Inn, Canton Grisons, project Samedan) showed that the public/recreational users primarily perceive attributes of rivers that characterise them as part of the local living space (recreation, nature experience, part of home). They perceive only marginally functional aspects of river uses (economic use, danger, channel).

A comparison between surveys of the general public/recreational users and representatives of stakeholder groups directly involved in the decision-making process at the River Thur project showed differing profiles of claims. In general, recreational users of both case studies regions had a more positive attitude towards restoration projects than the stakeholder groups directly involved in the decision-making process. Correspondingly, the stronger involvement of the public/recreational users

ers in the restoration project Flaz/Inn had the effect that essentially less resistance was raised against the project than against the restoration of the River Thur (Junker & Buchecker 2006). The public at the River Thur expressed in the survey the desire to become involved in the planning and decision making process. The majority would be ready to become active mainly by shipping in ideas and choosing from proposed project alternatives.

The Swiss-wide survey confirmed that the attitudes of the public as indicated in the case studies highly correspond with those of the Swiss public. An assessment of scenarios depicting different degrees of restoration showed that the Swiss public prefers the most restored scenario in regard to the river space (vegetation) as well as in regard to the river morphology (more space for the river, meandering, with gravel banks and creeks, etc.). Correspondingly, the public clearly supports river restorations in combination with flood protection measures. The desire of the Swiss public to participate in the restoration process is even greater than in the case study regions. Unexpectedly was also the result that the public perceives it as important to have a say in river restorations as in local land use planning (Junker & Buchecker, *subm.*).

A stronger consideration of the broader public and recreational users in the planning of river restoration projects would be favourable on the basis of these results.

## References

- Beierle, T.C. & Konisky, D.M. (2000). Values, conflict, and trust in participatory environmental planning. In: *Journal of Policy Analysis and Management* (19/4), p 587-602.
- Daniel, T. C. (2001). Whither scenic beauty? Visual landscape quality assessment in the 21st century. In: *Landscape and Urban Planning* (54), p 267-281.
- Gobster, P.H. & Hull, R. B. (ed.) (2000). *Restoring Nature. Perspectives from the Social Sciences and Humanities*. Washington D.C.
- Grimble R. & Wellard, K. (1997). Stakeholder methodologies in natural resources management: a review of principles, contexts, experiences and opportunities. In: *Agricultural Systems* (55/2), p 173-193.
- House, M. & Fordham, M. (1997). Public Perceptions of River Corridors and Attitudes towards River Works. In: *Landscape Research* (22/1), p 25-42.
- Jackson, L.S. (2002). Consensus processes in land use planning in British Columbia: the nature of success. In: *Progress in Planning* (57), 1-90.
- Linder, W. & Vatter, A. (1996). Kriterien zur Evaluation von Partizipationsverfahren. In: Selle, K. (ed.), *Planung und Kommunikation*, p 181-188. Wiesbaden.
- Luz, F. (1994). *Zur Akzeptanz landschaftsplanerischer Projekte*. Frankfurt.
- Morrison, K. (2003). Stakeholder participation in decision making – institutional forms. In: *Water Science and Technology* (47), p 167-169.
- Schenk, A. (2000). Relevante Faktoren der Akzeptanz von Natur- und Landschaftsschutzmassnahmen. Ergebnisse qualitativer Fallstudien. In: *Ostschweizerische Geographische Gesellschaft* (5). St. Gallen.
- Tunstall, S.A. & Tapsell S.M. (1999). How Stable are Public Responses to Changing Local Environments? A 'Before' and 'After' Case Study of River Restoration. In: *Journal of Environmental Planning and Management* (42/4), p 527-547.
- Webler, T., Tuler S. & Krueger R. (2001). What is a good public participation process? Five Perspectives from the public. In: *Environmental Management* (27/3), p 435-450.

# How Social 'Demand' Overlaps in Forest Management A Sociological Analysis of the Relation between Forest and Society in France (1960-2005)

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*Keywords: Forests, France, society, perception, attitudes, social dynamics, surveys.*

## Introduction

The 2001 French forest policy pointed out sustainable and multifunctional forest management: two catchwords in which appeal to society. The same law recognized the social value of forests for recreation and nature tourism: "to satisfy social requests related to the forest". However, what do we mean by 'social demand' related to the forest? Which place is really made for society, visitors and recreation in France? The role of the individuals, the importance of the forest for them, needs to be questioned. It is essential to approach the 'social' component in a comprehensive way.

This knowledge exists in France, but is often spread out and uncoordinated. The data are sparse and/or targeting very specific objectives. This paper wishes to present research started in 2003 at the request of the National Forestry Office (ONF).

We will focus here on the results of the first phase (a theoretical and analytical one), and also demonstrate how that analytical survey served thereafter to structure the national survey of 2004 and localise qualitative investigations. In analysing those various data, we wish to guide forest managers in their quest to understand and answer fine visitor perceptions, needs and expectations. Indirectly, in methodological terms, we want to map out relevant methodologies and remarks in order to strengthen our understanding of the forest-society relationship.

## Methods

For this study, we constituted an initial database of 215 documents that were analyzed according to a contents analysis scale. The 'state of the art' of the main surveys held between 1960 and

Table 1: Main French Survey related to the relation between forest and society since 1960.

Main French Survey related to the relation between <i>forest and society</i> since 1960		
1969	SARES	Regional (Ile-de-France)
1973	Ballion / INSEEs	France
1971-73	R. Ballion	Regional (Ile-de-France)
1973-79	INRA d'Orléans	Regional (Ile-de-France)
1991	BVA for ONF	France
1992	BVA for DERF	Urban Woods
1996	IFEN / CREDOC	France
1997-1998	Inra, Nancy	Regional (Lorraine)
1998-1999	CREDOC	Regional (Ile-de-France)
2000	SOFRES for La Collective du Bois et de la Forêt	France
2000	IFEN	France
2000	Forêt Méditerranéenne	Regional (PACA, Languedoc-Roussillon et Corse)
2001-2002	IFEN	France
2002	Laboratoire d'Économie forestière de Nancy	France
2004	ONF	France

Table 2: Selected results drawn from the latest survey related to forest and society (ONF, 2004).

<p><b><i>Selected results drawn from the latest survey related to forest and society (ONF, 2004):</i></b></p> <ul style="list-style-type: none"> <li>✓ One of the natural spaces most attended during free time and the holidays.</li> <li>✓ The frequentation still correlated with the socio-professional status + education level.</li> <li>✓ Walking remains the principal activity in forest, but followed closely by gathering.</li> <li>✓ Users are not willing to contribute financially for the costs of management... but seem ready to take part in voluntary actions.</li> <li>✓ Men's and women's forest attendance is considerably different (motivation, location within the forest space, activity...)</li> </ul>
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2003 shows two major moments: 1969-1980 period when the forest was apprehended as a consumer good, and the 1990s when, influenced by the raising of environmental concerns, the relationship to the forest became more individualized.

The forest, paradigm of nature, has become a symbol of frailty. The images of deforestation of Amazonian forests and forest fires become entangled with the local woods. The public opinion changed vis-à-vis the forest resource. Nevertheless, recent studies (ONF 2004) show that today practices remain sensibly the same ones as those observed in the 1960s.

Since 1960, the forest is a place 'out of the city' and is appraised as such by the urban population, which composed 62 % of the population in 1960 (76% in 2003). The compilation of data lets us understand what could appear paradoxical; one would hunt for the 'natural' aspect while at the same time seeking a certain infrastructure.

## Results

It is difficult to grasp roughly, what is hidden under the concept of 'social demand'. In analyzing chronologically the various results from the 1960-2004 investigations we observed – regardless of a new sensitivity to the environmental concerns – stability in forest activities and still a strong symbolic attachment to the forest.

Selected results drawn from the latest survey related to forest and society (ONF 2004):

- One of the natural spaces most attended during free time and the holidays.
- The frequentation still correlated with the socio-professional status and education level.

- Walking remains the principal activity in forest, but followed closely by gathering.
- Users are not willing to contribute financially for the costs of management... but seem ready to take part in voluntary actions.
- Men's and women's forest attendance is considerably different (motivation, location within the forest space, activity...)

Before considering the development of indicators and variables suitable for the measurement of behaviour evolution related to the forest, it appeared vital to understand the main social tendencies that had crossed that field. In France, in social sciences, this theme had been given a rather short-term and sparse scientific production.

In analysing what has been done since 40 years, in highlighting stable and changing behaviour, we will be able to formulate more accurate prospective lines for future forest management. Understanding 'social demand' is a work in progress mainly because 'society' is also in perpetual movement.

This type of results appears necessary in this period of 1) participative management, 2) forest demand for leisure, 3) critical reasoning by the population regarding forest exploitation. Today forest management is in transformation; forest actors must adapt themselves to new standards that are directly related to forest production, to environmental standards and to societal transformations. Today's new era brings in a multi-functional forest, a space in perpetual transformation.

## References

- Deuffic, P., Granet, A.-M. & Lewis, N. (2004). 1960 – 2003: évolution de la demande sociale face à la forêt. In: Rendez-Vous Techniques (5/été), p 10-14.
- Dobré M., Lewis, N., Deuffic, P. & Granet, A.-M. (2005). La fréquentation des forêts en France. In: Rendez-Vous techniques (9/été), p 49-57.
- Kalaora, B. (1993). Le musée vert: radiographie du loisir en forêt. Paris.
- Lewis, N. (2004). De 1960 à 2003 des enquêtes pour cerner le lien forêt et société. Working paper, Cemagref. Bordeaux.

# Local Participation in the Development of Tourist Centres in the Peripheral Regions of Finnish Lapland

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*Keywords: Local participation, planning, sustainable tourism, periphery, regional development.*

## Introduction

Tourism is regarded extremely important and often the only growing industry in peripheral regions. The municipalities that are engaged in tourism development and that have tourist centres in their areas have been winners in regional development in many ways (Hall & Boyd 2005). Thus, it is natural that the local and regional authorities are eager to enhance tourism development. For the local population, however, the growth of tourism is not only a positive circumstance. People in such areas as Finnish Lapland are bound to move from traditional natural resource based occupations at least in some extent to the field of tourism. Double occupation is often required: for example in Finnish Lapland such career combinations as reindeer herding and car testing are possible. Tourism also drastically changes the physical environment as well as the ways of using it. For example local inhabitants' traditional ways of using nature (berry picking, hunting, fishing) and areas available for them may be reduced or harmed due to growing demand of land use for tourism.

The ideal of socially sustainable tourism focuses on ensuring that the benefits of tourism are spread as widely as possible throughout the host community. Also, the local communities should be heard and taken into account when altering the places into tourist resorts (e.g. Swarbrooke 2002). However, the real growth of tourism centres has not followed the ideal. In Finnish Lapland, for example, the tourist centres have often been allowed to grow on the terms of the market demand and the planning has come far behind. In some cases, growth

expectations in tourism have been a dominating factor also in planning, and other needs and interests of the locals may have been forgotten. As a result, local economies may be too dependent on only one field of business, tourism. However, the other strong field of business is forestry, which mainly has controversial land-use interests with tourism. This can also sometimes cause problems.

## Methods

This presentation evaluates the planning processes from the viewpoint of local participation in two ski tourism centres in Finnish Lapland. The research has been done in the project "Tourist Destinations as Landscape Laboratories – Tools for Sustainable Tourism" (2004-2007) which is financed by EU Life Environment programme and coordinated by the Arctic Centre of the University of Lapland. The geographical objects of the project, tourist centres of Levi and Ylläs, are situated in areas with remarkable amenity values, and Ylläs is located beside the most visited national park in Finland. Both of the centres can accommodate around 20 000 tourists and both have a variety of tourist services from dog sledges and snow mobile safaris to ski slopes and cross-country-skiing facilities. The centres also have extensive plans for further growth in terms of customers, seasons, and areas required. A general problem is balancing the aims to promote economical and regional development through excessive tourism investments and the fragility of both the northern European nature and local communities (Hakkarainen 2005).

In this research the data has been collected by focus group interviews both among the local population and among authorities and such in-between groups as second home owners and recurrent seasonal workers. The total amount of the interviewees is about 70. The discussions have dealt especially with the possibilities of the local inhabitants and other actors to affect the development of the tourist resort in its different stages.

## Results and Discussion

There has been a major change in possibilities to participate in and affect the local development and land-use, as participative planning was implemented to Finnish legislation in 2000 partly due to the European Union. The new legislation demands that the “people involved” should be heard in every land-use situation that affects their environment (Leino 2006). This legislation has given more hope that the local opinions will be truly taken into account. Before, in the past decades, local inhabitants’ points of view were often neglected and left unheard in planning, as legislation did not require wide hearing of local inhabitants, but only of land owners. In both Levi and Ylläs tourist resorts, the first large planning process since the new legislation are going on as general plans are being made for both tourist centres. Local inhabitants have great expectations towards the projects. Among the biggest problems until now have been that local actors are still somewhat unfamiliar with the new kind of planning processes, which can lead to participating too late regarding the planning process, for example. The results also show that in addition to participating in official planning processes, local inhabitants have several ways of affecting their environment, such as pleas and initiatives, municipal democracy and cooperation in local associations.

## References

- Hakkarainen, M. (2005). Mapping of structural and demographic features of Levi and Ylläs. (In Finnish with English abstract.). Rovaniemi. <http://www.arcticcentre.org/?depid=21742>.
- Hall, C. M. & Boyd, S. (2005). *Nature-based Tourism in Peripheral Areas. Development or Disaster?* Clevedon.
- Leino, H. (2006) Citizen participation and the dynamics of urban planning. (In Finnish with English summary.). University of Tampere. <http://acta.uta.fi/pdf/951-44-6566-0.pdf>.
- Swarbrooke, J. (2002). *Sustainable Tourism Management*. Oxon.

# The Tourists' View on Protected Areas

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## Introduction

Due to the high biodiversity of the alpine space there is a high density of protected areas. Over the past few years, large areas of the Alps have been included in the Natura 2000 network. At the same time, the Alps are one of the most important leisure and tourism regions in Europe and tourism is one of the most important economic factors in the region. An instrument to manage the requirements of sensitive species and habitats and tourism use is the Natura 2000 management plan. The Interreg IIIB-Project AlpNaTour investigates how the concerns of recreation and tourism can be integrated in this process. This article focuses on the relevance of Natura 2000 for tourism marketing and branding.

## Methods

The study areas AlpNaTour investigates are alpine Natura 2000 sites<sup>1</sup> in Germany, Austria, Italy and Slovenia. This article focuses on Germany and Austria. The German test site "Falkenstein" is located in Allgäu, Bavaria. It is a rather small, sensitive area (987 ha) in one of the most famous alpine destinations in Germany. In peak days during summer there are more than 3,300 visitors in parts of the Natura 2000 site.

The Natura 2000 site "Nordöstliche Randalpen" in Lower Austria is a large area (64,066 ha) including the plateau of "Schneeberg", the easternmost peak of the Alps with 2,000 m of altitude. Sensitive habitats likely to be disturbed are alpine grass-

lands. The area is a typical day trip destination from Vienna mainly in autumn and summer. Standardised personal interviews have been conducted during summer and autumn of 2005, on six days in the "Falkenstein" on seven days in the "Schneeberg" areas. These days included both weekdays and weekends. There were 297 respondents on "Falkenstein" and 134 respondents on "Schneeberg". The refusal rate was low.

## Results

Asked for the main reason to visit the respective area the visitors gave "Nature and Landscape" clearly as the most important reason. Asked how important the existence of protected areas is for their destination choice, 48% of the interviewed visitors in the German test site stated that it is very important and 31% that it is rather important. In the Austrian test site for 34% of the interviewed visitors the existence of protected areas is very important and for 32% it is rather important for their destination choice.

The visitors were also asked about their recognition of different categories of protected areas. The best known categories turned out to be "Nature Reserve" ("Naturschutzgebiet"), which was recognized by 92% of the Falkenstein respondents and 89% of the Schneeberg respondents, and "National Park", which was recognized by 88% of the Falkenstein respondents and 90% of the Schneeberg respondents. The visitors were also fairly familiar with the categories "Protected Landscape" ("Landschaftsschutzgebiet") and "Natural Monument" ("Naturdenkmal"). The category "Natura-2000-Site", however, is unknown to the majority of the visitors. For

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<sup>1</sup> In this article all protected areas according to the Habitats Directive (Directive 92/43/EEC) and the Birds Directive (Directive 79/409/EEC) are subsumed as Natura-2000-sites.

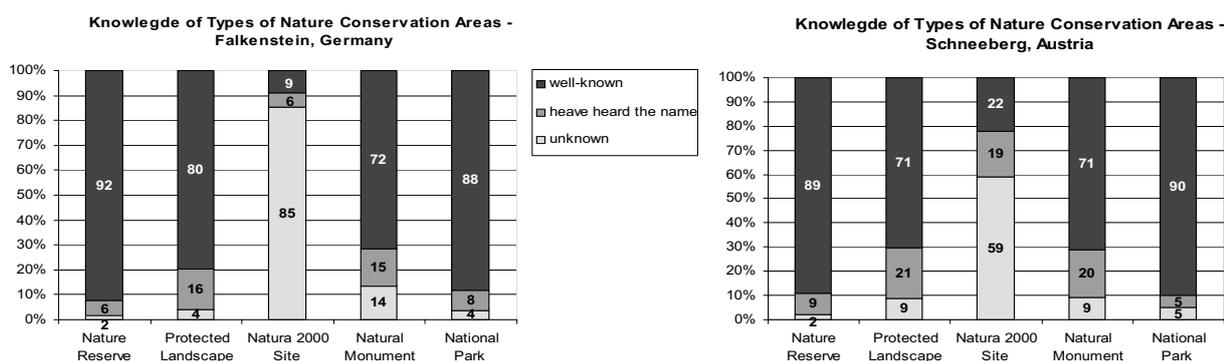


Figure 1: Knowledge of types of nature conservation areas: Falkenstein, Germany (n= 286) and Schneeberg, Austria (n=128).

85% of the respondents in the German test site and for 56% of the respondent in the Austrian test site this category is unknown (see figure 1).

The deficit of knowledge about Natura 2000 by the vast majority of respondents is absolutely striking, and documents a big information deficit among both tourists and local recreation seekers. Also striking is the different degree of familiarity with Natura 2000 in the German and the Austrian test site. The distinction of clientele might explain the higher recognition of Natura 2000 in Austria: visitors of “Schneeberg”, a higher alpine area, seem to be more interested in nature. Also, information policy seems to be better in Austria.

The results of this survey regarding the importance of protected areas in the destination choice correspond with earlier studies by WWF Germany (1999), Lebensministerium (2005), and others which consistently showed the decisive role protected areas played in the decision process.

The results show that at the moment Natura-2000-sites are not suitable as marketing instruments because of the lack of name recognition of tourists and recreation seekers (Pröbstl 2005). But as nature and landscape are very important motives for the destination choice and they are protected by the Natura 2000 network there is potential for improvement. There are even higher potentials for better known protected areas.

## References

Lebensministerium (Hg.). (2005). *Schutzgebietstourismus in Österreich, Ausgangssituation, Tendenzen, Effekte*. Wien.

Pröbstl, U. (2005). *Tourismusmarketing für und mit Schutzgebieten*. In: Pröbstl, U., Sterl, P. & Wirth, V. (Hg.). *Tourismus und Schutzgebiete - Hemmschuh oder Partner? Tagungsband*, p 16-17, Wien.

WWF-Deutschland (Hg.). (1999). *Nationalparke – Bundesweite EMNID-Umfrage Mai 1998*. In: Liebmann, F. & H.-U. Rösner (Hg.). *Die Bedeutung von Nationalparken für den Tourismus*. - Reihe Nationalparke der Umweltstiftung WWF-Deutschland (7).



Landscape and its Images

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Marcel Hunziker (Chair)

# What Does Sustainable Development Look Like? Visions of Two Swiss Unesco Regions

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*Keywords: Sustainable development, image analysis, conservation, participation, representation of space.*

## Introduction

The establishment of a nature reserve usually means a change of access to the area and its resources. Therefore, anticipated constraints for the use of resources can lead to opposition against nature conservation projects. Hence, bottom up initiated and broadly accepted conservation areas are rare, because different actors have different mental images about what their region should look like. Such images are expressed in written texts and visual publications (i.e. information brochures, newspaper articles). Visual images that have an influence on “images in the head” play an important role for the structuration of landscape and the potential of appropriation of space. This includes the landscape’s potential for tourism and formation as living space.

People’s actions are grounded in the meanings they attribute to things. These meanings are constructions and elements of social structures that are widely shared. The knowledge that these structures represent leaves its mark on all individual actions. This incorporated knowledge then shapes the way people comport themselves and how they interact with their environment. If a tourist finds out from a guide-book what the recognised sights in a region are, he or she can or will look out for these sights in a way that a tourist lacking the same knowledge would not think of doing (cf. Culler, 1988: 166). Knowledge feeds on experiences, especially on recurrent or intense ones. However, these experiences

are not simply stored away mentally but are actively absorbed on the basis of pre-existing mental images.

## Objective

In our research we analysed how images influence sustainable regional development, using two case studies in Switzerland: The Entlebuch (UBE) and the Jungfrau-Aletsch-Bietschhorn (JAB) regions that became, of their own initiative, so-called model regions for sustainable development. We learn much about how “image producers” imagine their regions’ sustainable development through the way they presented their region during the application process (viz. a UNESCO biosphere reserve or a UNESCO world heritage site). We subsequently asked “How did the project leaders present the concept of sustainability to the public?”, and “What potential appropriations of space are suggested by the images?”

Choosing a human geographical perspective we are particularly interested in how visual representations suggest certain interactions with space, i.e. how the space in each region can or should be appropriated during the process of becoming a biosphere reserve or a world heritage site and how its resources can be used. The published images convey notions about potential spatial relations that they can have within the predefined regions. They show the current land-use activities and those that are possible and desirable.

Behind this approach lies the notion that different social groups can imagine different kinds of spatial appropriation, and that these can result in diverging notions about their region's development and even to conflicts. If differing ideas of the same region develop further, into visions for its future development, conflicts are to be expected. These conflicts can be a consequence of unreflected reproductions of the social images inherent to each group. Therefore, it is an important precondition for sustainable development to take place that unquestioned social images be dealt with on a discursive level.

## Methods

The coverage of the process of becoming UNESCO-label regions in local and national newspapers, magazines and information brochures was analysed for the period of several years before the crucial polls and some time after it. We concentrated on the images and their surrounding text and made a quantitative content analysis. Despite the actual hype about "visual culture" and the "icon-

ic turn" (cf. Müller 2006a,b), there are only few studies that tackle a large number of pictures such as more than 500 like we did. Hence we had to develop a set of categories of potential spatial appropriations. We started with the rough division between "natural environment" and "cultural space" and further sub-divided these categories taking the size of images into account. Thus, we were able to produce condensed overviews of individual publications that could be compared with each other. A few selected images were analysed more thoroughly with a semiotic-hermeneutic approach (Müller-Doohm 1997). Moreover, the image producers were interviewed about their intentions regarding their selection of images for their publications.

## Results

Results show that the representations of the conservation areas are different depending on the "view" adopted in the publications and the audience that was addressed (inside-outside, before the poll and after etc.) as well as on the context in which they were produced. The analysed publications (see fig-

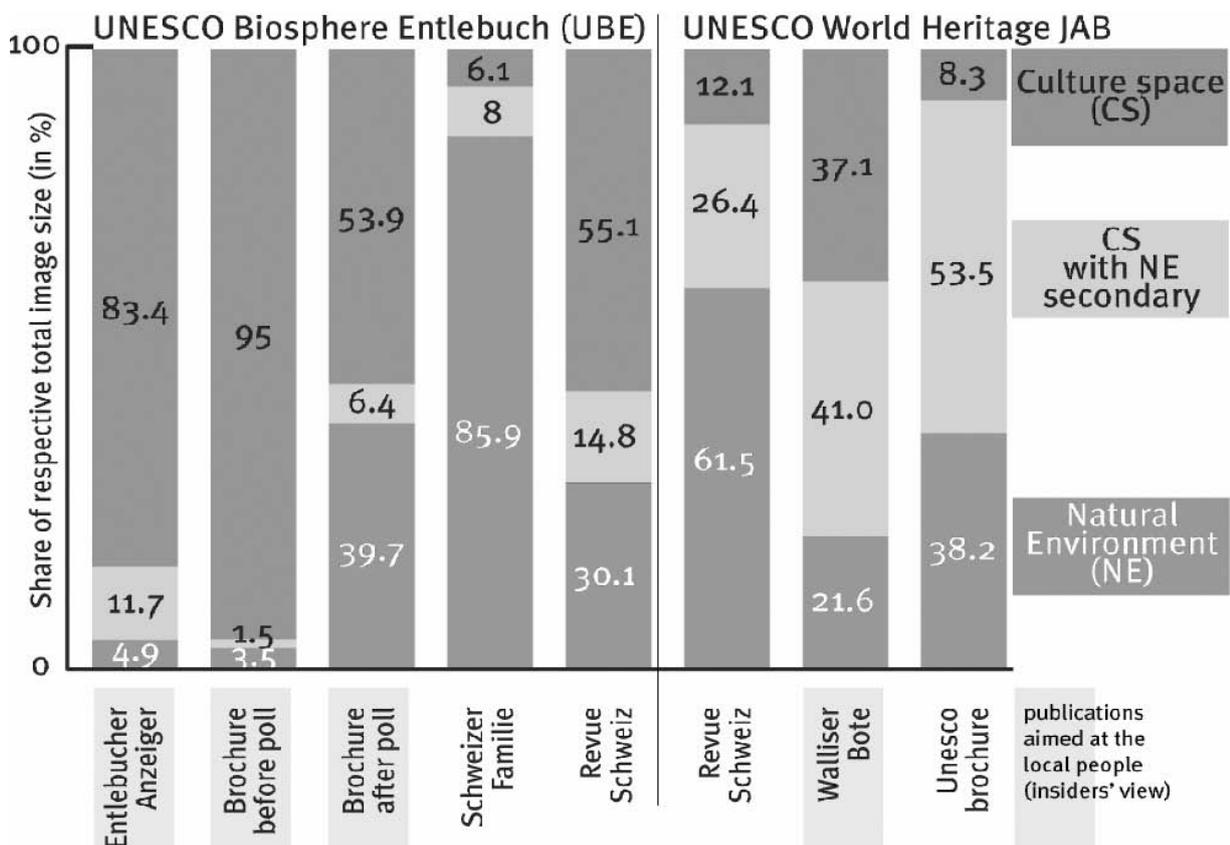


Figure 1: Proportions of culture space and natural environment (in%) of UNESCO Biosphere Entlebuch (UBE) and UNESCO World Heritage Jungfrau-Aletsch-Bietschhorn (JAB).

ure 1 for a selection) differed quite much according to these views. In the UBE the difference between inside and outside view was striking. While outsiders depicted UBE mainly as a nature space with little human presence (mostly in the form of traditional agriculture), the promoters of the UBE avoided to portray it that way and drew a contrasting image of a modern and diverse living space with a growing economy based on high-tech firms and many role models who stand for sustainable development. In the JAB this inside outside difference is not seen, in fact the region was also portrayed in the same way for the people living in the area as it was for (potential) tourists.

## Conclusions

The results have to be regarded in the light of the context of the case study areas. For instance, the avoidance of the UBE promoters of showing much natural environment is a result of a national protection scheme (regarding moors) that was opposed by the local people. Nevertheless, we can conclude that the image of a multioptional area with an emphasis on living space, that was created by the UBE promoters (and others such as the local paper) with their use of different image types, contributed positively to a participatory process that is still ongoing. In the JAB, where this was not done in the same way, this participatory process took not place and had to be initiated later with much difficulty. Thus, the choice of images that are published during a process involving sustainable development can have a furthering or hindering influence on participatory processes.

On first glance this has not much to do with visitor flows into and within regions. However, if the mental images of visitors (that are influenced by material images published in newspapers and magazines) differ greatly from those of the local people and if that difference is not acknowledged and discussed by the regions managers and to a certain extent by the local people, misinterpretations, misunderstandings and even conflicts can arise that are detrimental to a sustainable development and tourism in a protected area. Therefore, our recommendations – in a nutshell – of reflecting on ones routines when selecting images, using a multifaceted

range of images, asking role models to partake, not avoiding opposing images etc. lead to a more transparent (visual) communication that enhances participatory processes that includes the needs and wishes of visitors and at the same time is able to clarify impossible or unappropriate desires and notions.

## References

- Culler, J. (1988). *Semiotics of Tourism*. In: Culler, J. (ed.): *Framing the Sign: Criticism and Its Institutions*, University of Oklahoma Press, Norman and London, p 153-167.
- Müller-Doohm, S. (1997). *Bildinterpretation als strukturalhermeneutische Symbolanalyse*, Sozialwissenschaftliche Hermeneutik, p 81-108. Opladen.
- Müller, U. (2006). *Die Kraft der Bilder in der nachhaltigen Entwicklung - Die Fallbeispiele UNESCO Biosphäre Entlebuch und UNESCO Weltnaturerbe Jungfrau-Aletsch-Bietschhorn*. Dissertation zur Erlangung der naturwissenschaftlichen Doktorwürde, Universität Zürich.
- Müller, U. (2006). *Die Macht der Bilder in der nachhaltigen Entwicklung*, in: Backhaus, N., Buschle, M., Gorgus, N., Müller, U. & Moreno, T. (ed.): *Kraft der Bilder. Vorstellungen über Nachhaltigkeit – ein Entscheidungsspiel*, Schriftenreihe Humangeographie (21), p 21-49. Zürich.

# Experiencing Nature – The Recognition of the Symbolic Landscape within Research and Management of Visitor Flows

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## Introduction

Large visitor numbers in nature areas threaten the sustainability and create problems to the management of these areas. A comprehensive understanding of visitor use, including visitors' temporal and spatial distribution is fundamental for effective park management. Recent research presents computer-based modelling as an effective tool to manage visitor behaviour in natural environments (Cole et al. 2005, Gimblett et al. 2001, Lawson et al. 2003). The Dutch MASOOR (Multi Agent Simulation Of Outdoor Recreation) and the American/Australian RB-Sim (Recreational Behaviour SIMulator) are examples of models that are capable of modelling individual recreation needs. They offer multi-agent simulations with autonomous agents that can perform activities defined in behavioural rules. However, the theoretical foundations of recreation experiences and spatial behaviour is weak (Elands & Marwijk 2005) and the simulation of human-environment interactions is in its infancy (Gimblett 2005). The behavioural rules (and their validity) are often not explicitly indicated in simulation studies. Often, when agents do not behave as in observed reality, behavioural rules are adjusted to obtain the expected behaviour (ibid.). Why is it so difficult to design the 'right' behavioural rules? Recent research has even shown that it is not possible to define groups of visitors based on their spatial behaviour alone (O'Connor et al. 2005, Taczañowska et al. 2006). Our assumption is that up

to now, researchers have overlooked the fact that there is a difference between the physical (objectively measurable) environment and the symbolic (mental) environment.

In general, simulation models represent the physical environment (a system of trails, roads and/or facilities) and model the behaviour of visitors as they interact with the environment and with each other. In this paper we want to clarify that the physical environment is endowed with meaning, and that an understanding of the different meanings and values of the environment – the symbolic environment – is crucial for an understanding of visitor spatial behaviour and consequently for defining visitor groups.

Our specific research question is 'How can the symbolic environment be integrated in research and management of visitor flows?'<sup>1</sup> As a basic assumption we state that a visitor's time-spatial behaviour in nature areas is based on the meanings and values she or he ascribes to places.

## Multiple realities: environmental values

An environment may have different meanings to different persons. Reality cannot be objectively known and described; people ascribe certain experiences to an environment. Cultural codes and individual characteristics such as expertise

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<sup>1</sup> This paper is part of an ongoing PhD project that aims to theoretically and empirically find the values of landscape characteristics and the relation with visitor patterns of use, in order to improve a management tool (simulation model) for effective ecosystem management (2005-2009).

and education have a powerful role in this process (Nassauer 1995, Pennartz 1992). The physical environment can be relevant to its users in a variety of different ways. The types of relevance can be linked to four different values attributable to the surroundings. These values are useful to consider when describing the symbolic landscape as they are transactional: they reflect the interplay of human and environmental forces. Based on the values, an environment can acquire a number of totally different significances or meanings (Lengkeek et al. 1997).

The four values can be applied when developing visitor typologies and comprehend behaviour. Visitor typologies can help managers of leisure destinations with effective marketing, to adjust the physical environment and infrastructure to visitor behaviour, and to minimize negative social (e.g. crowding) and environmental impacts of visitor use. The four environmental values serve as tools in describing recreational behaviour characteristics. A semantic differential, a technique for measuring meaning, can be used for measuring the four values. This implies that visitors help to differentiate the meaning of the symbolic landscape by responding to several pairs of bipolar adjectives. The data from the semantic differentials can be analyzed with factor analysis. The factors help clarifying how sets of pairs define the multidimensional semantic space of the symbolic landscape. Furthermore, relationships can be found between different meanings of the symbolic landscape and time-spatial behaviour<sup>2</sup>.

## Visitor management

An implication of the introduction of the symbolic environment in recreation research and management is that visitor groups can be labelled according to their prevailing value. It is interesting to know which values – constituting the symbolic landscape – are related to spatial behaviour patterns. The symbolic landscape is not an independent ‘invention’ of the visitor; it is based on the physical landscape that is managed by forest services and nature organizations. This suggests that managers can influence visitors’ multiple symbol-

ic landscapes and consequent behaviours. However, planning for freedom is a rather paradoxical exercise.

## References

- Cole, D. N., et al. (2005). Chapter 1: Why Model Recreation Use? In D. N. Cole (Ed.), *Computer Simulation Modeling of Recreation Use: Current Status, Case Studies, and Future Directions* (pp. 1-2). Fort Collins.
- Elands, B. & Marwijk, R. v. (2005). Expressing recreation quality through simulation models: useful management tool or wishful thinking? (Paper presented at the 11th International Symposium on Society and Natural Resource Management, June 16-19, Östersund, Sweden ed.). Wageningen.
- Gimblett, H. R. (2005, December 2005). Modelling Human-Landscape Interactions in Spatially Complex Settings: Where are we and where are we going? Paper presented at the MODSIM 2005 International Congress on Modelling and Simulation, Modelling and Simulation Society of Australia and New Zealand, December 2005.
- Gimblett, H. R., et al. (2001). Geographic Simulation of Wilderness Recreation Behavior. In: *Journal of Forestry* (99), p 36-42.
- Lawson, S. R., et al. (2003). Proactive monitoring and adaptive management of social carrying capacity in Arches National Park: an application of computer simulation modeling. In: *Journal of Environmental Management* (68), p 305-313.
- Lengkeek, J. et al. (1997). The multiple realities of the rural environment. The significance of tourist images for the countryside. In: H. de Haan & N. Long (Eds.), *Images and realities of rural life, Wageningen perspectives on rural transformations*. Assen: Van Gorcum.
- Nassauer, J. I. (1995). Culture and changing landscape structure. In: *Landscape Ecology* (10/4), p 229-237.
- O'Connor, A., et al. (2005). Geo-temporal tracking and analysis of tourist movement. In: *Mathematics and Computers in Simulation* (69), p 135-150.
- Pennartz, P. J. J. (1992). The symbolic infrastructure of an environment art project. *Planning and Design* (19), 205-220.
- Taczanowska, K., et al. (2006). Exploring spatial behaviour of visitors in peri-urban recreational areas: multi-attribute analysis of individual route profiles. Paper presented at the CORP 2006: 11th International Conference on Urban Planning & Regional Development in the Information Society. February 13th - 16th 2006, Vienna, Austria.

<sup>2</sup> Time-spatial behaviour of visitors in nature areas can be recorded by GPS.

## Historic Landscapes in Urban Regions: Recreation and Use Conflicts in Mikhalkovo, Moscow

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*Keywords: Historic landscapes, informative tourism, urban regions.*

### Introduction

Historic landscapes are of great importance for development of recreation and informative nature tourism, especially within large urban areas, such as Moscow. We regard historic landscapes as natural and cultural landscapes combined with historic monuments. In other words, a historic landscape is nature combined with history. This landscape category can be added by a scene of a historical event or legend, a country estate or summer-residence of a famous historic person, historic parks, and other places of historic importance. These landscape's images attract visitors as unique areas and areas with "historic memories". Visitors can enjoy the beauties both of nature and architectural ensembles. Simultaneously they can learn from nature and receive historical information (figure 1). Historic landscapes often give visitors the only opportunity for contact with nature in urban regions. That is why recreation and tourism development based on historic landscapes can be a good part of ecological (nature) informative tourism development. Mikhalkovo is our research region. It is one of the historic landscapes at northwestern environs of Moscow. This cultural landscape was formed by country-seat (Russian: *usad'ba*), which was typical for Moscow suburbs in the eighteenth – nineteenth centuries.

### Methods

We tried to trace changes in these cultural landscapes during the last century, to study their potential for recreation and informative nature tourism goals, and to find out use conflicts at this area. The main methods of our research were collabo-

ration of historical and geographical approaches, including archive research, historic documents investigations as well as area exploration and maps comparison.



Figure 1: Historical information for visitors in Mikhalkovo park.

### Results

The historic landscapes of Mikhalkovo can be a good area for informative tourism development. It preserved many typical features of cultural landscapes in the urban suburbs. At the same time it has a very large, rich, and unique history. It was firstly mentioned in 1584 in documents as "a waste ground that was a village Mikhalkovo". The main popularity of this estate is connected with the names of Duchess Dashkova (a companion of the empress Katherine the Second) and – later – of Graf Panin. In the time of Panin (the eighteenth century) this landscape undergoes great changes. Here, the famous Russian architect Bazhenov built one of the most beautiful and original architectural ensembles in the Moscow province in the pseudo-Gothic style. A large beautiful landscape park with picturesque cascade-ponds on the river Golovinsky was also a part of the country-seat surrounded by a big forest. In the nineteenth century industrial

development of this region began. Many enterprises were springing up here and changed the landscapes greatly. In 1850 Wilhelm August Jokisch bought these grounds and buildings. He established a cloth-mill in the vicinity, but he also did very much for the preservation of the historic ensemble, which had been almost ruined in his time. In the beginning of the twentieth century the cloth-manufacture was enlarged, a railway was build not far from Mikhalkovo. However, the greatest change was brought by the October socialist revolution. In 1919 the cloth-manufacture, the architectural ensemble, and the park were nationalized. The country-seat was devastated. In the 1930th these grounds were annexed by the city. In course of time historic surroundings of Mikhalkovo were completely lost. This historic landscape exists now as a park in the middle of Moscow, as a “historic island” within a modern city (figure 2). Visitors have the possibility both for relaxation and acquiring of knowledge. They can find here the remains of the old forest with oaks that are 200 years old, and the remainder of the old landscape park with linden-walk and cascade-ponds. The Mikhalkovo ponds are ducks’ favorite places. We can see the famous Bazhenov’s tower (figure 3), house wings, and summer-houses in the park. The historic cloth-mill is also a part of these cultural landscapes. No wonder this area is a tidbit for many investors, who try to get hold of it. There are violent conflicts between nature and architecture protection on the one hand, and other use, such as non-ecological recreation, transport use (construction of garages), building, industry on the other hand, owing to shortage and high prices of land in this urban region. Therefore it is very important to protect these historic landscapes.



Figure 2: Cascade-ponds.



Figure 3: Bazhenov/s tower.

## Conclusion

In urban region of Moscow such landscapes as Mikhalkovo turn often into “green islands” or “oases in the industrial and transport desert”. However Mikhalkovo itself wasn’t destroyed during the last decades as were many other historic landscapes near Moscow. Informative nature tourism development based on historic landscapes can be a good solution for this landscape’s protection.

# Mapping the Attractiveness of the Dutch Landscape: A GIS-Based Landscape Appreciation Model (Glam-2)

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## Introduction

The main objective of Dutch nature policy is to make an essential contribution to a liveable and sustainable society through the conservation, restoration, development, and sustainable use of nature and landscape. One of the motives of the Dutch government behind this objective is that 'we want a beautiful country to live and work in' (LNV 2000). To accommodate this desire, it is necessary to know where people like the landscape in their environment and where they do not. It is also important to know which physical characteristics of the landscape contribute to this attractiveness. To provide such information in a cost-efficient way, a GIS-based model was developed to map, monitor, and simulate the attractiveness of the landscape in one's living environment. The first version of this model, entitled "GIS-based Landscape Appreciation Model (GLAM)", was strongly based on existing theoretical insights. However, it was only moderately successful, one of the problems being the overlap of the GIS-indicators for several of the theoretically important characteristics of the landscape (De Vries & Gerritsen 2003). The Netherlands Environmental Assessment Agency commissioned a second, improved version on the model. In this paper this second version is presented, as well as its validation.

## Model

The model predicts landscape attractiveness based solely on nationally available GIS-data on the landscape for each 250 x 250 meter cell. GLAM-2 distinguishes three positive GIS-indicators: Natural-

ness, Historical distinctiveness, Relief, and three negative ones: Skyline disturbance, Urbanisation, Noise level. Each indicator has five levels signifying how positive (or negative) the physical state of the landscape is thought to be evaluated by the average Dutch resident with regard to this aspect. The outcomes of a national survey among almost 3000 Dutch residents were used to determine the optimal weights for the different indicators (De Vries & Van Kralingen 2002). In the survey people were asked to rate the countryside surrounding their place of residence. To bring the GLAM-predictions at the same level as the rated surrounding countryside, an average predicted value was calculated over all cells within a five kilometre radius of the respondents' postcode. The six indicators 'explained' 36% of the variance in attractiveness scores (averaged over 3 or more respondents with the same postcode). Actually the regression analysis showed that only four of the six indicators were needed to achieve this result: Relief and Noise level had no added predictive value.

## Validation study

GLAM-2 has been validated using data from another, more recent survey on landscape attractiveness (SNM 2005). Almost 5000 people living in or nearby one of 52 delineated areas were asked to rate the landscape within this delineated area. Results showed that GLAM-2 explained 47% of the variance in the average attractiveness rating of the 52 areas. So, rather than shrinkage, an increase in explained variance was observed. This increase

is thought to be due to the averages per area being based on a larger number of people (between 42 and 142, rather than 3 or more). Also the fact that the area to be rated was clearly delineated may have helped. Of course the model (still) has its limitations. For example, we do not consider GLAM to be suited for use at a very detailed, local level. On the other hand, comparisons of GLAM-predictions and judgements made by landscape experts clearly show that landscape quality and its attractiveness to lay people are two separate things. All in all, although we intend to develop the model further, we think GLAM-2 already constitutes a useful tool for policy makers and spatial planners.

## References

- De Vries, S. & Gerritsen, E. (2003). Van fysieke kenmerken naar landschappelijke schoonheid; de voorspellende waarde van fysieke kenmerken, zoals vastgelegd in ruimtelijke bestanden, voor de schoonheidsbeleving van Nederlandse landschappen. In: Alterra-rapport 718/Reeks Belevingsonderzoek 7. Wageningen.
- De Vries, S. & Van Kralingen, R.B.A.S. (2002). De beleving van het Nederlandse landschap door haar bewoners; de geschiktheid van het SPEL-instrument voor monitoringsdoeleinden. In: Alterra-rapport 609. Wageningen.
- LNV. (2000). "Nature for people, people for nature", policy document on nature, forest and landscape in the 21<sup>st</sup> century. The Hague.
- Roos-Klein Lankhorst, J., De Vries, S., Buijs, A., Bloemen, M. & Schuiling, C. (2005). BelevingsGIS versie 2; waardering van het Nederlandse landschap door de bevolking op kaart. In: Alterra rapport 1138/Reeks Belevingsonderzoek 14. Wageningen.
- SNM. (2005). Nederland kan zo mooi zijn; onderzoek naar de beleving van 52 gebieden door omwonenden. Deel I: landelijke conclusies en resultaten. Utrecht.

# The Landscape Method of Analysis and Assessment of Ecotourism Destinations in the Republic of Kazakhstan

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*Keywords: Kazakhstan, ecotourism, landscape, ecotourism destinations, plains, mountains, natural territorial complex.*

## Introduction

Global environmental changes call for alternative solutions in natural resources management and for the development of ecologically safe industries for the global economy. These changes affect the tourism industry as well. Every year the growing number of tourists has an influence on natural environment. High concentrations of people in popular tourist attractions result in the destruction of landscapes, waste and noise pollution, and the contamination of the environment by transportation exhaust gases.

Mass tourism without consideration given to the ecological consequences has caused the gradual degradation of natural habitats and environments. One of the causes is high tourist demand which leads to overcrowding in popular tourist attractions. Considering these factors, planning of tourist flows and tourist load balancing can not be underestimated.

According to "Conception of the Development of Tourism in the Republic of Kazakhstan", the growth of the world-wide tourism industry will occur due to the appearance of new tourist attractions, since the traditional tourism markets have already reached their maximal capacity. For that reason Kazakhstan has a unique opportunity to occupy a niche in the global tourism industry.

Considering the fast and steady growth of tourism and its great influence on the environment, society, and all sectors of economy, the government of Kazakhstan has identified the tourism sector as one of the priorities of its long term development pro-

gramme. Therefore, the need for the scientific justification for tourism in Kazakhstan is vitally important in order to avoid irreversible consequences that could occur as a result of tourist impact (degradation of natural complexes or landscapes and their improper use).

Kazakhstan is the second largest territory in the Newly Independent States (after Russia) and the ninth largest territory in the world occupying 2.7 million m<sup>2</sup>. The country's landlocked location in the centre of Asia determines its physiographic characteristics, hydrographic features, soil and plant cover, fauna and landscapes.

Presently, the development of management techniques for tourist flows in protected areas in the Republic of Kazakhstan is not receiving adequate attention. This is due to the inadequacy in the existing regulating system, and the fact that the tourism market is at its early development stage. There is no well-defined solution to this problem because different types of landscapes from forest-steppe to glacial-nival have different degrees of stability.

## Methods

Standard methods of landscape analysis include: cartographical, cartometrical methods, methods of landscape profiling, landscape-indication methods, statistical methods, methods with the use of GIS and remote sensing.

The method of landscape analysis for scientifically based ecotourism planning is geared towards the complex evaluation of ecological conditions, and the recreational potential of landscapes. This is a

multiple-step method to the assessment of natural-territorial complexes that are linked by one main goal – the thorough assessment of characteristics of ecotourism destinations.

The diversity of landscapes of the plain and mountain areas of Kazakhstan and their use for recreational purposes determines the need of the strict following of landscape-ecological requirements for recreational reclamation. The management of tourist flows on protected territories must be done

according to the types of landscapes with the consideration of their spatial structure and with the use of coefficients. We propose a new method for research and management of tourist flows with the use of the landscape method for the preservation of the unique destinations of ecotourism and protected areas.

By landscape we understand a specific territory, homogeneous in origin and evolution of development and indivisible by zonal and azonal char-

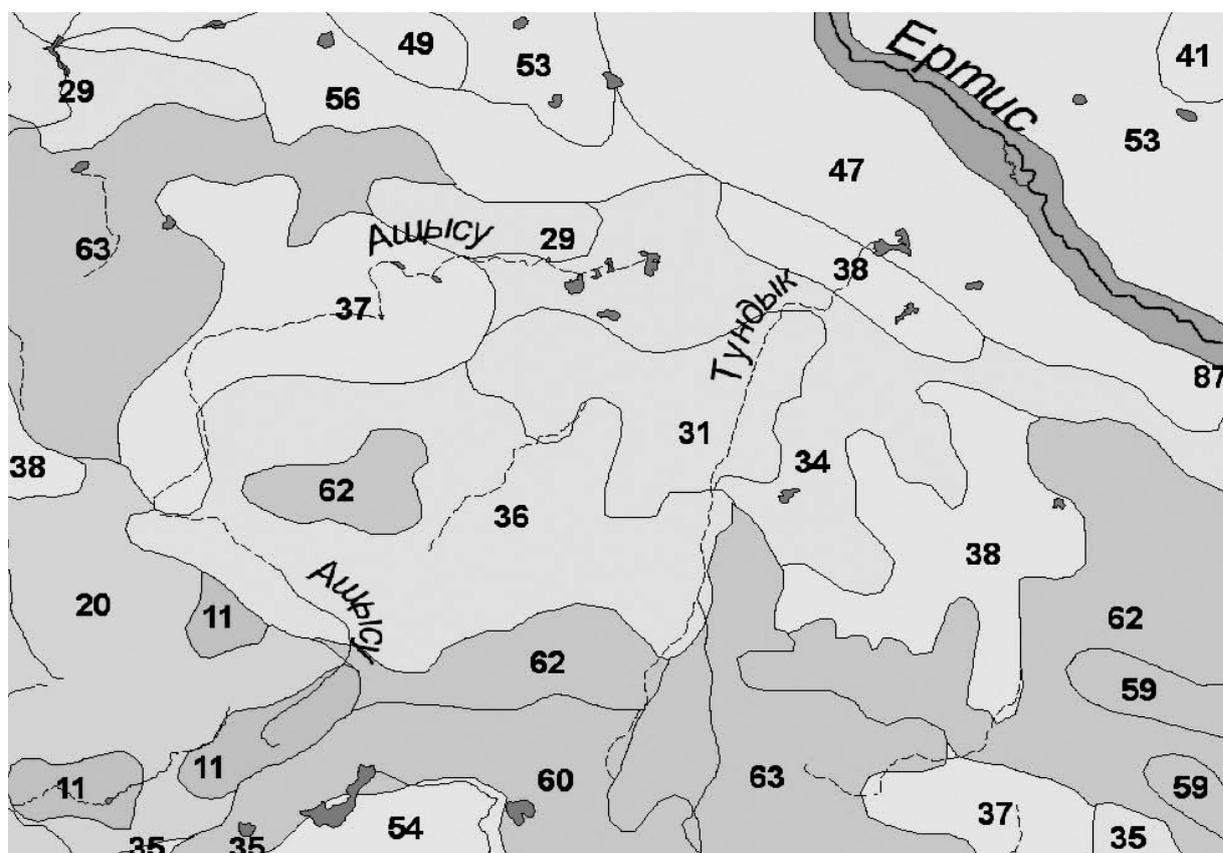


Figure 1: Fragment of Landscape Map of Kazakh SSR, scale 1 : 5 000 000, Edited by Chupakhin, special content by Veselova L.K., Geldyeva G.V. Bayan Aul National Park

#### 1 Legend

##### Landscapes of Plains

##### Steppes

- 11 Deluvial-proluvial plain in carbonate black earth soils
- 20 Hummocky topography in black southern carbonate black earth and dark-hazelnut solonetz soils
- 29 Peneplain in dark-hazelnut soils with solonetz
- 31 Denudation plain in hazelnut normal and underdeveloped soils
- 34 Denudation plain in hazelnut normal soils with solonetz
- 35 Denudation plain in dark-hazelnut solonetz soils
- 36 Denudation plain in dark-hazelnut underdeveloped soils
- 37 Deluvial-proluvial plain in dark-hazelnut soils with solonetz
- 38 Deluvial-proluvial plain in hazelnut normal soils
- 41 Deluvial-proluvial plain in dark-hazelnut carbonate soils and meadow-hazelnut with solonetz soils
- 47 Fluviolacustrine plain in dark-hazelnut soils with solonetz
- 49 Fluviolacustrine plain in meadow solonetz and solonchaks and dark-hazelnut soils
- 53 Fluviolacustrine plain in dark-hazelnut soils
- 54 Fluviolacustrine plain in dark-hazelnut soils
- 56 Aluvial-proluvial plain in dark-hazelnut and and meadow-hazelnut soils
- 59 Hummocky topography in dark-hazelnut soils
- 60 Hummocky topography in dark-hazelnut solonetz soils
- 62 Hummocky topography in hazelnut carbonate and underdeveloped soils
- 63 Hummocky topography in hazelnut normal soils
- Semi-deserts
- 87 Fluviolacustrine plain in light-hazelnut soils

acteristics. It has a united geological fundament, same-type relief, climate and uniform combination of hydrothermal condition, soils and biocenose and similar combination of geosystems.

Natural landscapes and ecotourism are closely interrelated. An analysis of landscape heterogeneity of ecotourism destinations is a required step of the development of tourism industry. The landscape-ecological approach to the planning of ecotourism routes includes the assessment of heterogeneity and stability of specific landscapes that are valuable tourists' destinations and allows the calculation of an optimal ratio between landscapes and tourist loads. Scientific and methodological bases of ecotourism include the analysis of the landscape structure of the territory and comprehensive characterization of natural and natural-anthropogenic landscapes. They differ from each other by zonal conditions and their recreational potential.

Specific landscape research that includes the assessment of natural territorial complexes and natural resources as ecotourism sites, takes into account the analysis of natural components (relief, climatic conditions, soil and vegetation cover etc.) in their interrelationships and complex consideration of landscape characteristics of the tourist destination. Therefore, an analysis of geological-geomorphologic, hydro-geologic, climatic, zonal soil and land conditions is essential for ecotourism planning and development. The landscape-ecological approach would also include the assessment of aesthetic attractiveness of the landscape and the carrying capacity of each individual landscape.

The issues of ecotourism planning and their solutions differ, depending on the native zones and physiographic regions. The main task of planning and designing the network of ecotourism routes is to obtain reliable data on landscape resource potential and thorough exploration of landscapes.

The analysis of natural settings of the Republic of Kazakhstan shows that all physiographic processes and phenomena in landscapes closely follow the general tendency of the evolution of modern landscapes. The regional structure of natural landscapes of Kazakhstan is represented by individual morphostructural elements: plains of the Western-Syberian platform, lowlands, plains and plateaus

of the Turan platform, high plains, plateaus, hummocky topography and insular mountains of the Kazakh sheet, and intermountain troughs and epiplatform mountain ranges of South-Eastern Kazakhstan.

Plain landscapes are found on a vast territory of the country and are represented by the following types and subtypes: forest-steppe region with subtypes of southern and atypical forest-steppe; steppe with subtypes of northern and southern steppes; semi-desert and desert. Mountain landscapes are represented by nival, mountain-meadow, forest, forest-steppe, steppe, semi-desert and desert types of landscapes. Each of the mentioned types of landscapes is an area with high tourism potential.

Local physiographic conditions and processes linked to the geological structuring and display of modern tectonic movements, features of relief, soil and vegetation cover determine the landscape kinds. The diversity of natural properties of the Republic of Kazakhstan is the cause for a great number of kinds of landscapes in plains as well as in mountains. There are 201 kinds of landscapes on the territory of the country with arid natural territorial complexes prevailing (more than 50%).

The modern landscape structure of Kazakhstan has a definite latitudinal differentiation of the types of landscapes due to the extension of the country in meridian direction. The amount of solar heat increases from north to south and the atmospheric pressure decreases, both factors affect the soil-vegetation cover. Close interrelationship of natural factors leads to the isolation of different types of landscapes – from forest-steppe landscapes in the North to steppe- and dry-steppe in the South.

Mountain type of landscape occupies 17% of the country and is highly diverse. The structure of mountain type of landscape is determined by the following factors: by the location of mountains in arid zone of intercontinental deserts, by absolute height of mountains (up to 7 000 m) and by latitudinal and longitudinal extension. These factors assisted the formation of the specific spectrum of altitudinal zonality of landscapes. Mountain types of landscapes also include the landscapes of mountain ridges, submontane and intermontane troughs. They were formed within the limits of orogen-

ic morphostructures that are drastically different from platform ones, and comprise a whole natural system equal to plain landscapes.

The issue of typological classification of landscapes by the degree of stability towards recreation loads is one of the most important issues among methodological approaches on analysis and assessment of landscapes.

The degree of impact of tourist loads on landscapes is an important index that can be used by ecotourism planners. The level and the depth of influence of tourist factor on landscapes is determined by: the primary characteristics of landscape (background and zonal), its age, its condition, its dynamics, its stability, its potential for adaptation and self-balancing, by the structure of tourist influence, by socio-economic aspects of tourism industry and by the duration of impact.

We distinguish five levels of landscape organization of the territory for tourism activity. The main criteria are:

- correlation between natural, background, zonal landscapes and anthropogenically disturbed complexes
- the degree of landscape modification within the limits of one invariant
- the structure and the condition of anthropogenically disturbed landscapes
- ecological changes in spatial-time aspect
- the degree of ability to stabilize at different tourist loads

The advantage of using the landscape approach to ecotourism planning is the provision of coordination and combination within the whole system of territorial structures of natural complexes. The study of the links between the structure of natural territorial complexes and the territorial organization of ecotourism assists in the right planning of projecting tourist destinations. The landscape approach has characteristics of regional approach and is valuable when used to research specific regions. The cartographic-mathematical method of landscape structure of physiographic regions is one of many methods used in landscape analysis. This method can be used to determine the different types of landscape structures of ecotourism desti-

nations, to conduct physiographic zoning and to assess the degree of complexity of landscape structure of the territory.

According to Nikolayev, cartographic-mathematical methods can assist in defining the many features of landscape structures and assess measures of their inner differentiation and connections.

The cartographic-mathematical analysis uses following indexes:

- coefficient of landscape fragmentation
- coefficient of landscape heterogeneity
- coefficient of landscape organization

Coefficient of landscape fragmentation ( $K_{\text{лр}}$ ) is a ratio of the mean of the area of individual landscapes to the area of physiographic region. It characterizes the measure of differentiation of landscape structure of the territory and depends on the number of individual landscapes in regional aspect. The coefficient of landscape fragmentation is calculated by the following formula:

$$K_{\text{лр}} = 1 - \frac{M}{P},$$

where  $M$  is the mean weighed area of landscape contour in the region and  $P$  is total area of the region.

The measure of differentiation is dependant, first of all, on the number of individual landscapes in the region, i.e. the number of "elements" and "system". If there is only one landscape in the region ( $P=1$ ), then the coefficient becomes zero, because landscape fragmentation is absent. When  $P$  increases, then  $M$  becomes smaller and smaller and coefficient of fragmentation comes close to 1, its maximum.

When we studied the correlation between the coefficient of landscape fragmentation and the area of physiographic region and the number of landscape contours, we found that when only the area changes and the number of landscape contours stays the same, the coefficient of landscape fragmentation stays constant. When we switch from physiographic region to the units of higher taxonomic unit, the degree of landscape fragmentation of the region increases. It is important to note that the coeffi-

cient of landscape fragmentation is not related to zonal differentiation of the territory but depends on the geologic-geomorphologic peculiarities.

An important characteristic of the structure of physiographic regions is the measure of their landscape heterogeneity. The following formula is used to calculate the coefficient of landscape heterogeneity:

$$K_{ЛЛ} = \frac{\sum_{i=1}^{i=n-1} i n j \sum_{j=1}^{j=n} i + 1 m^i m j}{C_n^2}$$

Where S is the area (%) of the particular group (kind) of landscapes in the region, n is the number of landscape groups,  $C_n^2$  is the number of combination of groups in two.

The coefficient of landscape heterogeneity shows not only the degree of the complexity of different kinds of landscapes that comprise the structure of the region, but also the correlation between their areas. The coefficient of landscape heterogeneity increases in those regions, where there is a great diversity of kinds of landscapes and a great number of landscape contours. The last characteristic is the most important element in landscape fragmentation of the region. Therefore, landscape heterogeneity correlates not only to the kinds of landscapes but to fragmentation of landscape structure as well.

When we analyzed the values of coefficients of landscape heterogeneity of physiographic regions, we found that their values somewhat increase during the transition from the units of low taxonomic rank to the units of high taxonomic rank. However, this increase is insignificant and therefore is not compared to the variations of the coefficient of landscape fragmentation.

Geographic variability of the coefficient of landscape heterogeneity of physiographic regions is an interesting one. The dependence of  $K_{ЛЛ}$  from vertical and horizontal partition of the relief, lithologic complexes of rocks and the degree of drainage of the territory was established. Maximal values of the coefficient are present in those regions of the Republic of Kazakhstan, where forest-steppe and steppe fractured natural complexes dominate. Low values of coefficients of landscape heteroge-

neity are found in regions with alluvial and aeolian plains. The heterogeneity of landscape structure usually increases where its fragmentation decreases and vice versa.

The coefficient of landscape organization enables us to analyze the inner regularity of the landscape structure of the region. It is calculated by comparison of  $K_{ЛЛП}$  and K and provides data on interrelationships of geosystem elements and structural order. The higher the landscape fragmentation of the region and lower landscape heterogeneity, the more regulated is its structure. On the other hand, when values of fragmentation and heterogeneity come close, the organization of landscape structure falls.

Conjugated analysis of values of landscape structure shows the degree of organization of natural-territorial complex. The experiments revealed that the lowest indexes of landscape organization are linked to rapprochement of values of landscape fragmentation and heterogeneity.

Cartographic-mathematical characteristics of landscape structure provide tools for comparative analysis and classification of physiographic regional units on their degree of complexity and zonal structure.

## Results

The issues of tourist flows regulations for different types of landscapes include a broad scope of ecological tasks for determining the carrying capacity limits. The management of tourist flows should be based on the precise carrying capacity numbers of the particular landscape. Our research showed that the least ecological tolerance to recreational loads have desert landscapes (for example Barsakelmes Reserve). The landscapes of insular low lands of the steppe zone of Kazakhstan are the most tolerant to tourist loads. (Bayan-Aul National Park, Kurgaldzhin State Reserve).

## **Conclusion**

The method of landscape analysis provides complex evaluation of ecological conditions of the area and the recreational potential of landscapes. This multiple-step method can be employed for ecotourism planning.

## **References**

- Kalesnik, S. (1968). Encyclopedic Dictionary of Geographic Terms. Soviet Encyclopedia. Moscow.
- Nikolayev, V. (1978). Classification and Small-scale Cartography of Landscapes. Moscow.
- Geldyeva, G. (2002). Landscape-ecological Foundations of Ecotourism Planning of Turkestan Region. Turkestan.
- Geldyeva, G. & Veselova, L. (1992). The Landscapes of Kazakhstan. Alma-Ata.
- Republic of Kazakhstan Government Decree. (2001). Conception of the Development of Tourism in the Republic of Kazakhstan. Almaty.

Good Solutions between Sports, Nature and Landscape

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Margit Mönnecke (Chair)

# Snowshoeing in Protected Areas: Bridging the Gap between Attitude and Behaviour

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*Keywords: Recreational conflicts, social influence, attitude-behaviour consistency, snowshoeing, protected areas, quasi-experimental design.*

## Introduction

The frequency and diversity of outdoor activities increased in the last years. New leisure activities such as snowshoeing are very popular and growing constantly, but they might affect sensitive wildlife habitats. Snowshoe walkers especially like half-open forests, which are at the same time the habitat of rare species. Efforts of recreation management tend to solve these conflicts not by means of strict regulations, but reducing disturbance by active steering through information and infrastructure.

For example, outdoor managers try to reduce recreational conflicts between snowshoeing and wildlife by defining a limited number of trails, to channel visitors. In a case study, we evaluate the impact of such steering efforts in a social psychological framework. We don't focus on the planning process or the ecological component, but on the influence of behaviour.

From a survey among Swiss snowshoe walkers, we know that they are willing to avoid protected areas if they are informed. Furthermore, they think that it makes sense to install signposts to inform and sensitise visitors. On the other hand our survey among more than 350 foresters showed that forest visitors often ignore behaviour appeals and that snowshoeing causes severe ecological problems especially in the subalpine area. Furthermore social psychological research indicates that self-reported behaviour and attitude are often inconsistent with observed behaviour.

Therefore we focus on the following questions in our case study:

- Can the behaviour of snowshoe walkers be influenced by steering efforts?
- Under which conditions are steering efforts successful in protecting wildlife?
- Are observed behaviour of snowshoe walkers and their self-reported behaviour and attitudes towards protected areas consistent, and if not, how can the consistency be increased?

## Methods

Contrary to many social psychological studies our data collection is not limited to self-reported behaviour or to an artificial setting, but we observe evident behaviour in a natural and applied setting. In cooperation with local authorities we planned and implemented several snowshoe trails in combination with a theory-based communication concept and a quasi-experimental research design. Our conceptualisation was based on previously conducted surveys among foresters and snowshoe walkers.

In a three-step design we analyzed how visitors reacted to steering efforts. First we marked trails and installed signposts at the starting points with basic trip information and maps with protected areas (setting A). During a second phase, we combined setting A with additional signposts which contained behaviour appeals (not to leave the trail),

ecological information (sensitivity of wildlife in winter) and information about the protected area and alternative trails (setting B). In a third step we additionally installed signposts at critical points, where snowshoe walkers tend to leave the trail (setting C).

In all of those three phases we assessed if people stayed on the trail and if the contingent of deviating snowshoe walkers changed depending on the setting.

## Results

Our preliminary results indicate that in setting A the influence on behaviour was rather weak. A lot of snowshoe walkers still left the marked trail and crossed the protected area, and only 30% stayed on the trail. So the contingent of visitors who respected the protected area was much lower, as could have been expected based on attitudes and self-reported behaviour assessed in previously conducted surveys. We registered a rather high inconsistency between reported and observed behaviour.

In setting B (additional signposts with appeals and information), the number of visitors who stayed on the trail and respected the protected area increased significantly to 80%. In setting C we assessed a declining level of people staying on the trail (50%), but it was still higher than in setting A.

## Conclusion

Our observations so far suggest that snowshoe walkers overrate their ecological attitudes and their self-reported ecological behaviour in questionnaires if we compare it to observed behaviour in the natural settings. However, the gap between attitude and behaviour can be bridged partly if snowshoe walkers are provided with appropriate information, ecological education, rationale and appeals. Additional signposts at critical deviation points don't increase the consistency between attitude and behaviour. It's necessary to combine on-site information with communication and education, which starts earlier, because snowshoe walkers hardly change their route once they started a trip. Moreover efforts must be reinforced continuously to avoid a decrease of achieved positive effects.

## References

- Manning, R. E. (2001). *Studies in Outdoor Recreation*. Oregon State University Press. Corvallis.
- Ingold, P. (2004). *Freizeitaktivitäten im Lebensraum der Alpentiere*. Bern.
- Radü, G. (2004). *Schneeschuhlaufen – Eine Trendsportart*. Zürich.
- Zeidenitz, C. (2005). *Freizeitaktivitäten in der Schweiz – wegen oder gegen Natur und Landschaft?* Birmensdorf.
- Zimbardo, P. G. & Leippe, M. R. (1991). *The psychology of attitude change and social influence*. New York.

# Outdoor Leisure Activities: Motivation, Attitudes and Strategies Promoting Responsible Behaviour towards Nature and Landscape

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*Keywords: Leisure, outdoor activities, motivations, attitudes, behaviour, social science, qualitative and quantitative methods, intervention experiments.*

## Introduction

Outdoor activities can have negative effects on nature and landscape. According to the "Swiss Landscape Concept", people should therefore be encouraged to behave responsibly towards nature and landscape. Authorities and sports associations have tried to reach this aim by giving advice, but their success has never been evaluated.

Thus, in order to provide scientific support to the Swiss authorities and NGOs, the three central aims of this project were:

- (1) to analyse the motivations for carrying out outdoor leisure activities and, in particular, to investigate the importance of the experience of nature and landscape as such motivation,
- (2) to identify the driving factors for responsible behaviour towards nature and landscape,
- (2) and to evaluate behaviour changing strategies, promoting responsible behaviour towards nature and landscape.

## Methods

To reach these aims, five methodical steps were undertaken:

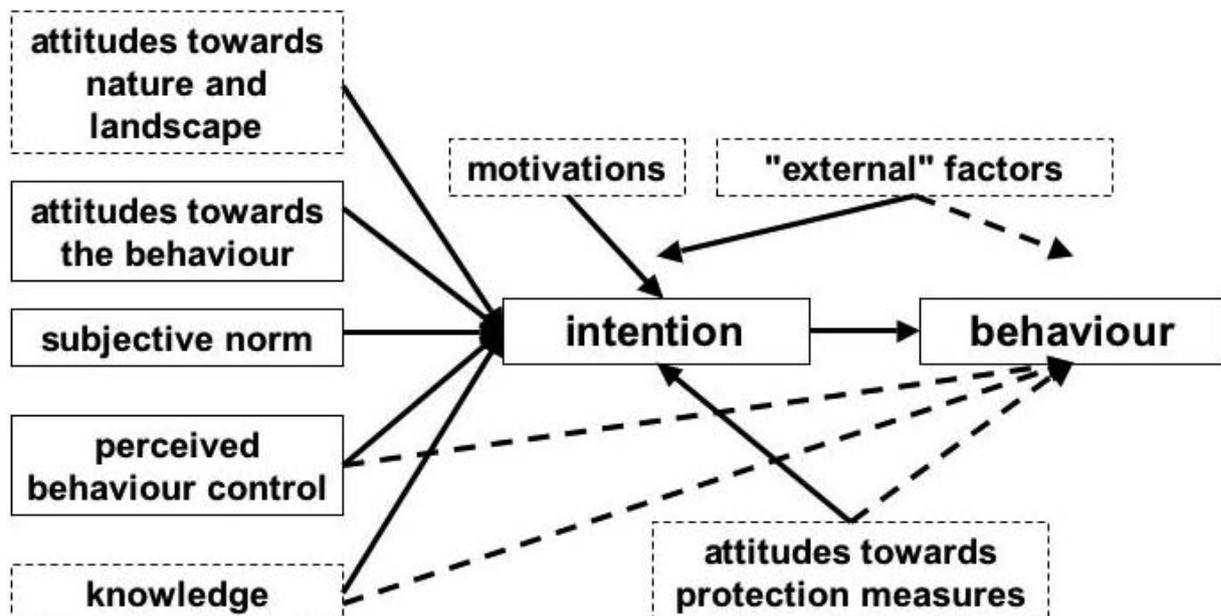


Figure 1: The extended theoretical model for responsible behaviour towards nature and landscape with the original „Ajzen-factors“ (boxes with continuous lines) and the inductively gained factors (boxes with broken lines).

(1) In the preparative part expert interviews were conducted in order to identify two outdoor leisure activities that are most problematic due to being frequent, having considerable impact on nature, being unorganised and thus difficult to steer, and representing different seasons (summer/winter) as well as two different main characteristics (trend-oriented/classic). These two were free riding (ski or snowboard) and picnicking.

(2) In the inductive part the analysis of qualitative data, collected by problem-centred interviews with individuals carrying out the before-selected outdoor activities, revealed deep insights into the different motivations for these activities and into the driving factors of responsible behaviour towards nature and landscape.

(3) Theory development: Based on the “theory of planned behavior” (Ajzen & Madden 1986) and the results of the inductive part – such as the extraction of initial factors like motivation (Rheinberg, 1993), attitude towards nature and landscape, perception of problems (Hunecke et al. 1999), acceptance of behaviour-strategies, knowledge and external factors – an extended theoretical model was developed to take a closer look at the underlying factors determining responsible behaviour towards nature and landscape (see figure 1).

(4) In the deductive part a representative nationwide postal survey was conducted in Switzerland (n=1340 German-Swiss and French-Swiss participants) to test the above-mentioned model and to provide representative quantitative data regarding the motivations and the importance of nature and landscape experience in this context.

(5) In the experimental part intervention experiments were undertaken in order to evaluate behaviour-changing strategies. For this purpose one experiment was conducted for each of the two above-mentioned selected outdoor leisure activities (free riding and picnicking). The effects were measured by an experimental design with control groups and surveys before and after the interventions.

## Results

The results of the nationwide survey showed that “closeness to nature” is one of the most important motivational factors whereas risk experience is not as important as is often assumed. Of course, there are considerable differences between the motivations for different activities such as picnicking and free riding (see figure 2). But nevertheless, nature and landscape experience are the most important motivations also for the trend activities such as free riding.

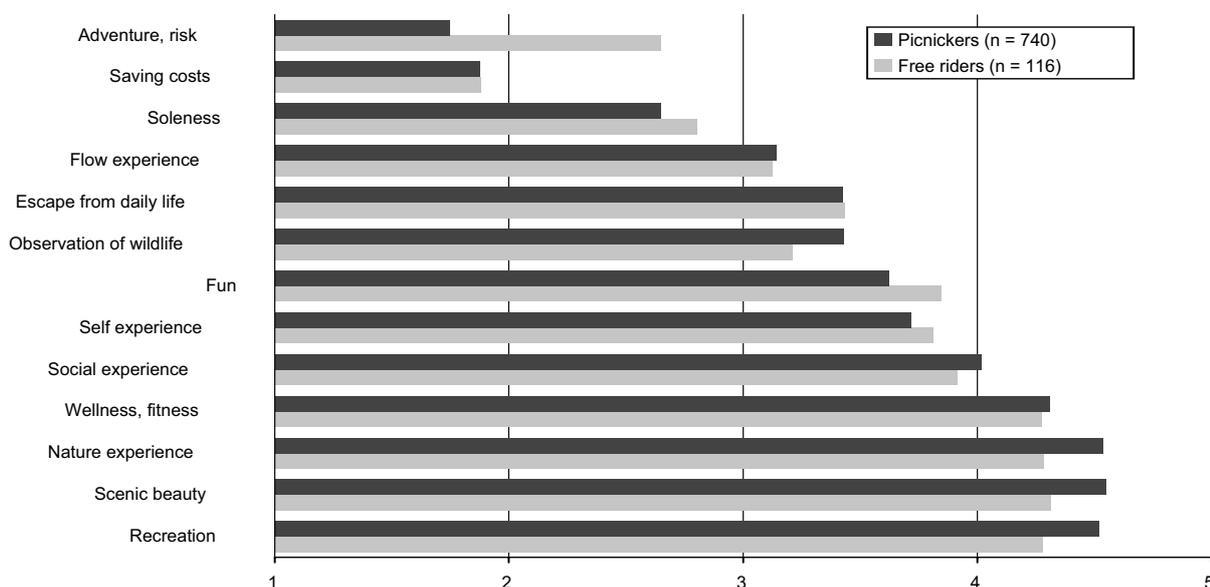


Figure 2: The motivations for carrying out the outdoor leisure activities free riding and picnicking.

Table 1: The predictors of the intention of nature/landscape responsible behaviour.

Predictors	B	S.E.B	$\beta$
Attitudes towards behaviour	.394	.035	.38***
Importance of scenic beauty	.060	.015	.13***
Subjective norms	.072	.021	.11***
Knowledge	.037	.013	.09**
Perceived behavioural control	.067	.024	.09**
External factors	.079	.031	.08*
Attitudes towards protection measures	.036	.015	.07*

Stepwise-Regression; n=1340;  $r^2 = .39^{***}$ ; \*:  $p < .05$  ; \*\*:  $p < .01$ ; \*\*\*:  $p < .001$

The extended theoretical model could be corroborated empirically: it was shown that responsible behaviour towards nature is often not only influenced by “Ajzen-factors” such as subjective norms or perceived behaviour control but also for example by landscape preferences (see table 1).

Table 2: The effect of infrastructure and prompt/information on the intention to behave ecologically responsibly (picnicking).

	infrastructure	control group	prompt/inform.
intention	3.8	3.8	4.4

(1= low; 5 = high)

Table 3: The effect of simple and differentiated information (both combined with a prompt) on reported behaviour (free riding).

prompt, simple information	1.8	1.2
prompt, differentiated information	1.7	1.6
control group	1.3	1.3

The intervention experiments showed that, among several intervention types, prompts seem to have an effect on attitude and behaviour, albeit only a minor one on behaviour. On the other hand, the offer of infrastructure has no effect on attitude but a significant effect on behaviour. In addition, it became clear that the amount of information provided to the people should be small and easy to understand.

## Conclusion

The results reveal the importance of the role of nature and landscape as a motivation for carrying out outdoor leisure activities and, thus, encourage public agencies and NGOs to build on this motivation in the further development of strategies that shall promote responsible behaviour towards nature and

landscape. Aiming at influencing people in this sense it is important to bear in mind that a combination of prompts, motivating to show the desired behaviour, and (little!) information, explaining the necessity of the behaviour, as well as providing infrastructure, enabling to show the desired behaviour, is most suitable.

## References

- Ajzen, I. & Madden, T. J. (1986). Prediction of Goal-Directed Behavior: Attitudes, Intentions, and Perceived Behavioral Control. In: *Journal of Experimental Social Psychology* (22), p 453-474.
- Rheinberg, F. (1993). Anreize engagiert betriebener Freizeitaktivitäten - ein Systematisierungsversuch. Vortrag im Rahmen der DGfP-Fachgruppe Pädagogische Psychologie, Mannheim, September 22-24, 1993.
- Hunecke, M., Matthies, E., Blöbaum, A. & Höger, R. (1999). Die Umsetzung einer persönlichen Norm in umweltverantwortliches Handeln- Ansätze zur Reduktion des motorisierten Individualverkehrs in einer Kleinstadt. In: *Umweltpsychologie* (3/2), p 10-22.

# An Improved Methodological Approach to Recreation Conflict Analysis in the Black Forest

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*Keywords: Conflict analysis, Black Forest recreation planning, methodological integration, triangulation, nature sport, user-group conflict, social world.*

## Introduction

Germany's recreation management is traditionally integrated into spatial planning systems oriented towards the protection of ecosystems. The scientific inputs to management have been largely determined by quantitative impact and conflict studies with an emphasis on nature protection (e.g. Schemel & Erbguth 2000). Conclusions of far most studies were that careful conflict and visitor flow management is needed for a sustainable landscape development. Today, however, Germany's recreational situation has changed: New activities and increased participation by people seeking different recreational experiences challenge management in many areas (Schmied et al. 2002; and others). Apart from ecological problems, social conflicts occur between and within user-groups and land management agencies (e.g. Pröbstl 2000). Because systematic sociological studies of Germany's natural resource management are rare, there is a lack of understanding of the leisure differences that might lead to conflict. In turn, this leads to incomplete management and, at times, wrong management decisions (e.g. Mann 2006).

This paper begins with a review of the scientific literature that underlies this situation and proposes a model, based on the methodological work of Mayring (2001) and others, that better integrates quantitative and qualitative approaches. While inductive and deductive approaches are often viewed as incompatible scientific approaches (Kelle & Erz-

berger 2000), new attempts combine the two methodological steps in order to evaluate the validity of results and to gain a greater ascertainment, description, and understanding of a subject (Flick 1998). To analyze user-groups' recreation conflict potentials, an integrated methodological design using a triangulation technique was chosen for this study.

## Methods

This study empirically tests a model derived from the work of numerous recreation and resource management authors (e.g. Jacob & Schreyer 1980; Graefe & Thapa 2004; and Opaschowski 1999). Possible impacts were evaluated with the addition of questions about the infrastructure, visitors encountered, forest management and experiential impacts.

These items originate from recent German and American recreation conflict literature. Additional questions of how impacts affect the individual satisfaction rate, visitor reactions and management preferences complete the model's explanatory power (figure 1).

The adequacy of the model to explain conflicts was tested with two key ideas:

- 1) The sensitivity to conflicts as described by a combination of factors and motives,
- 2) The ability of the model to better understand recreation conflicts through the user group's social world.

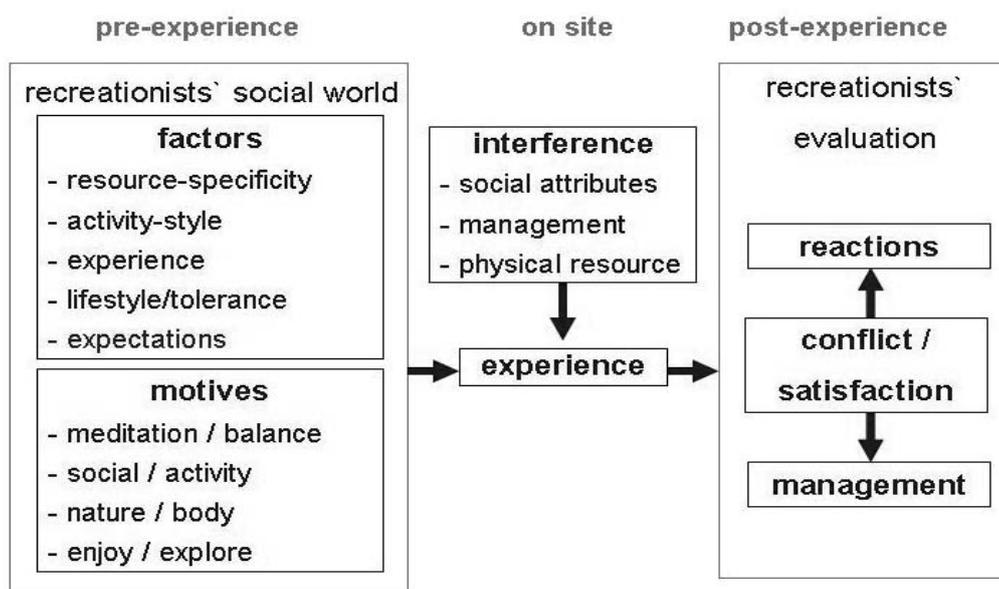


Figure 1: The conflict analysis model.

A purposive sample from six distinct nature sport organizations and 200 activity clubs was obtained. For the data collection, various methods were employed, dependent upon the activity's organization and the expected demography of the members. From the 845 returned questionnaires, 805 were useable. This was followed by 16 structured, validating interviews. Using data from the Black Forest nature sport groups, five activity factors and four motive groups were derived to encapsulate the recreationists' "social world" that exists independently of a recreational stay (pre-experience). This re-integration of social dimensions into planning processes and management concepts results in a new method for exploring visitor demands and conflict perceptions for forest-based recreation.

## Conclusion

The results from this study confirm the validity of this mixed-method, triangulation approach and suggest the importance of using it to enhance the accuracy of management decisions where conflicts may occur due to the differences in the interests and values of recreationists and on-going social development. Moreover, recognizing local social worlds and recreational needs and linking them in a directed fashion into the planning process should improve sustainable landscape management and protect nature from an uncontrolled use.

## References

- Flick, U. (1998). *Qualitative Forschung. Theorien, Methoden, Anwendung in Psychologie und Sozialwissenschaft*. Rowohlt.
- Graefe, A.R. & Thapa, B. (2004). Conflict in natural resource recreation. In: *Society and Natural Resources, a summary of knowledge*. 10th International Symposium on Society and Natural Resource Management.
- Jacob, G.R. & Schreyer, R. (1980). Conflict in outdoor recreation: a theoretical perspective. In: *Journal of Leisure Research* (12/4), p 368-380.
- Kelle, U. & Erzberger, C. (2000). Qualitative und quantitative Methoden: kein Gegensatz. In: Flick, U. (2000). *Qualitative Forschung – ein Handbuch*, p 299–309.
- Mann, C. (2006). Konflikte in Erholungsgebieten – Ursachen, Wirkungen und Lösungansätze. In: *Freiburger Schriften zur Forst- und Umweltpolitik*, (12).
- Mayring, P. (2001). Kombination und Integration qualitativer und quantitativer Analyse. In: *Forum Qualitative Sozialforschung* (2/1). <http://qualitative-research.net/fqs/fqs.htm>
- Opaschowski, H.W. (1999). *Umwelt, Freizeit, Mobilität. Konflikte und Konzepte*. Opladen.
- Pröbstl, U. (2000). Ökologische Skigebietsuntersuchungen als Beitrag zur Umsetzung der UVP-Änderungsrichtlinie in Bayern. In: *Aktuelle Forschungsberichte*, p 143–153.
- Schemel, H.-J. & Erbguth, W. (2000). *Handbuch Sport und Umwelt*. Aachen.
- Schmied, M, Buchert, M. & Hochfeld, C. & Schmitt, B. (2002). *Umwelt und Tourismus, Daten, Fakten, Perspektiven*. Forschungsbericht 200 87 112 (BMU). Berlin.

## Outdoor Activities in Nature and Landscape – Practice-Oriented Solutions

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*Keywords: Outdoor activities, nature sports, good practice examples, sensitisation, environmental communication, conflict resolution, success factors, toolbox.*

### Introduction

Outdoor activities belong to our everyday life. Although outdoor activities providing enjoyment of nature are in rising demand and have a positive influence on our health and well-being they can also lead to conflicts with nature and landscape. There is a lot of effort put into finding out how to perform outdoor activities and at the same time avoid or minimise negative impacts on nature and landscape.

There are different solutions and strategies available to resolve problems between outdoor activities and environmentally sensitive areas. They range from legal prohibitions, zoning, blocking sensitive areas, pleas, information strategies, incentive-based strategies up to voluntary agreements between sports associations and nature conservation. However, it has to be considered that these strategies often are of theoretical character. The question whether the strategies are well accepted by the outdoor activists and whether they lead to the intended effects often remains unanswered. Considering these facts the main objective of this project is to evaluate existing strategies and resolutions that have already been applied and tested on site. This will provide a basis for recommendations and indications on how to perform outdoor activities in accordance with the aims of nature and landscape conservation.

### Methods

To meet this objective six well-known case studies in Switzerland, applying different conflict resolution strategies, have been evaluated. The examples concerned outdoor activities such

as hiking, freeriding, snowshoeing, paragliding and river-rafting. The goal of the evaluations was to identify success factors and to develop solution-orientated tools and instruments.

The findings of the evaluation are presented in form of a toolbox containing conflict resolution strategies, good practice examples as well as success factors that have proven their usefulness in handling and resolving problems arising between outdoor activities and nature and landscape. The toolbox provides support for authorities, policy-makers and stakeholders dealing with conflicts in this field. The toolbox is part of the internet information system “NaturSportInfo” ([www.natursportinfo.de/ch](http://www.natursportinfo.de/ch)) of the Bundesamt für Naturschutz (Germany) and the Federal Office for the Environment FOEN (Switzerland) and is therefore accessible to a broad audience.

Besides good practice examples and the success factors of conflict resolution, the toolbox emphasizes the role of environmental communication. It points out vehicles and means of communication which can be used to reach target audiences and make sportsmen and -women environmentally conscious and informed. The so-called “communication paths” can be described as follows:

- Internal communication: This means the internal communication of associations or clubs. The target audience can for example be reached by club-journals, club-homepages, excursions for club-members, etc.

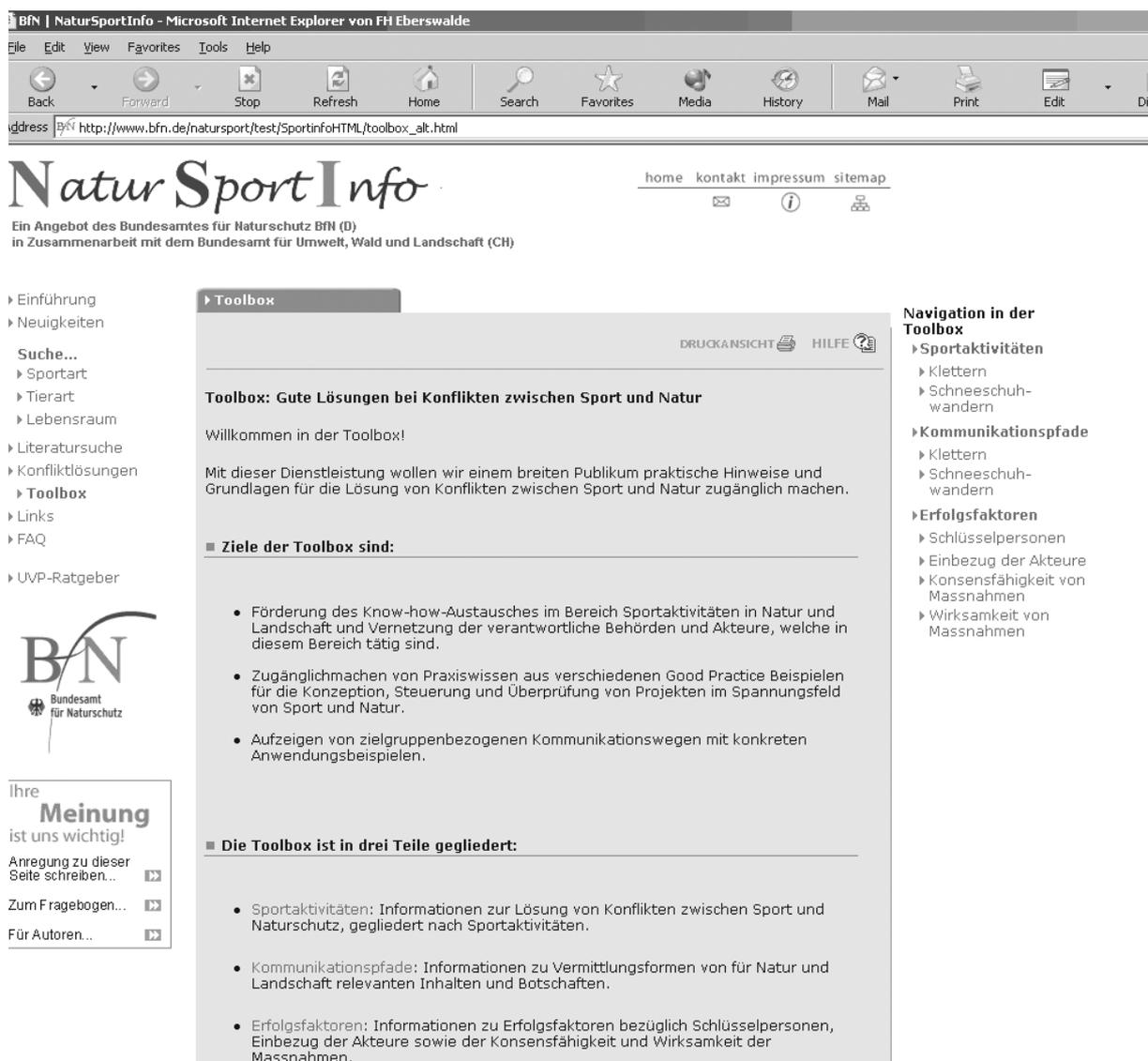


Figure 1: Entrance page to the „Toolbox“ within the website of the NaturSportInfo internet information system.

- Training and further education: Environmental communication can take place in training courses or further education courses for sportsmen and -women or sports-instructors. Furthermore, environmental topics can also be an obligatory part of an examination that is needed to obtain a licence or permission to perform sports activities (e.g. paragliding).
- Commercial events and outdoor trips: On the basis of commercial events and outdoor-trips (for example events or trips of outdoor-companies, sports schools, NGO's) participants can be sensitized to the environment and landscape on site.
- Communication gates: These are the gates that have to be passed by all those performing an outdoor activity. The gates refer to different stages of the activity and can be described as “prearrangement”, “equipment”, “journey and arrival”, “transport and sojourn in the area” as well as “performance of the outdoor activity”.

## Results and Discussion

With this project an important contribution has been made to the discussion on how to sensitize sportsmen and sports-women on environmental issues. Working with “communication paths” is a new and promising approach in this field of

research. By emphasizing the “communication gates” particular attention is drawn to athletes not organised in associations. The fact has become apparent that in practice as well as in practice-oriented research, common efforts should be made to improve the accessibility of this target group.

## References

- Beier, K. (2001). Anreizstrukturen im Outdoorsport. Schorndorf.
- Ingold, P. (2004). Freizeitaktivitäten im Lebensraum der Alpentiere. Konfliktbereiche zwischen Mensch und Tier – mit einem Ratgeber für die Praxis. Bern/Stuttgart/Wien.
- Schemel, H.-J. & Erbguth, W. (2000). Handbuch Sport und Umwelt: Ziele, Analysen, Bewertungen, Lösungsansätze, Rechtsfragen. Aachen.
- Wolf, A. & Appel E. (2003). Wirksamkeit freiwilliger Vereinbarungen zwischen Natursport und Naturschutz. Abschlussbericht. Universität Duisburg-Essen.



Simulating Recreational Behaviour –  
on Agents and Environment

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Andreas Muhar, Hans Skov-Petersen  
& Randy Gimblett (Chairs)

# Applying an Agent-Based Modelling Approach to Simulating Spring Black Bear Hunting Activities in Prince William Sound, Alaska

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*Keywords: Agent-based modeling, recreation, wilderness, monitoring, simulation, management, human-landscape interactions.*

## Introduction

Black bear harvest levels have increased rapidly during the past 10 years in Prince William Sound (PWS), Alaska. Alaska Department of Fish and Game (ADF&G) has found a 100% increase in reported bear harvest between 1995 and 2001. In regulatory year 2001/02, this area reached a record of 436 bears taken which was approximately 25% more than any other black bear harvest unit in Alaska. The Chugach National Forest (CNF) which manages the vast majority of the land surrounding PWS desired a tool with which to assess the spatiotemporal distribution of the spring black bear harvest with hopes of assessing its overlap with other recreational groups. This study combines Geographic Information Systems (GIS) with existing standardized harvest datasets and an agent based modeling approach to analyze complex, spatially dynamic patterns of black bear hunting in PWS. This study illustrates that human use simulation modeling, driven by a harvest record dataset, can inform decision making to positively and proactively manage human-landscape interactions and enhance long-term management of harvested wildlife populations.

## Methods

Black bear harvest season is open from September 1 – June 30, although the majority of harvest (~80%) occurs in during May and June. In this

six-week period, bear hunters likely become the most prevalent recreation use group on the shoreline of PWS. CNF has received several reports of user conflicts in the western Sound between bear hunting groups and other non-harvesting use of the shoreline during late May and early June. Using RBSim2 (Itami et al. 2003) in conjunction with a harvest database containing location information for bear kill sites in the area. A rule based simulation was constructed to develop a comprehensive understanding of the relationship between the spatial-temporal patterns of hunter use and bear harvest in PWS. The simulation outputs provided a direct method for integrating an understanding of the implications of visitor use on the management of biological systems and identify potential locations of user conflict.

## Results

There are several interesting findings from the simulation outputs based on the Bear harvest data, logical assumptions and rules derived from expert. Peak hunter use days ranged between 315 and 503 on the main travel routes to less than 26 days in remote areas. There was a cumulative use of routes over the nine year period ranges from 1015 to 2338 visitor hunter use days. While the average hunter use per day for each node was approximately 3.5, these averages generally fell below 2 per day for the nine years. However, over nine years

(1996-2004) the amount of hunter use days ranges widely from over 10,000 to less than 2,000, depending on the Capacity Area (CA). Not all CAs were used equally. Some hunting areas received considerable more use than others. For example, CAs such as 5 (6,000 – 10,000 hunter days), 12, 13, 16 and 17 (2,000- 6,000 hunter days) are the most heavily used in the study area. These same CAs consistently have the highest number of total visits and trends in bear habitat and overnight facilities. But CA 5 receives the most visitor use days and number of bear taken. Capacity entries 1 (CA 18), 13 (CA 52) reveal some commercial use but dominated mostly by non-commercial activity. Locale entries 12 (CA 49), 68 (CA 16), 71 (CA 17) & 78 (CA5), reveal equal if not dominant commercial versus non-commercial use. In other words in these four areas there is a significant amount of reported commercial activity. The later 3, 5, 16 & 17 in earlier analysis are not only the sites most frequently visited by commercial activity, but also are the most frequented overall, account a high percentage of the areas where the most bears are harvested and where the duration of stay and the most overnight activity occurs. Private boats accounted for approximately 75% of the travel use entering into the CAs and Water Taxis an additional 15%.

There is a growing body of research focused within the context of human-environment interactions. This work examines the need to develop a comprehensive and empirically based framework for linking the social, biophysical and geographic disciplines across space and time. While this prototype still requires further validation, it strongly illustrates the potential of human use simulation modeling to bridge a significant social science knowledge gap to improve the ability of decision making to positively and proactively manage human-landscape interactions and promote long-term protection of the landscape.

## References

- Itami, R., Raulings, R., MacLaren, G., Hirst, K., Gimblett, R., Zanon D. & Chladek P. (2003). RBSim 2: Simulating the complex interactions between human movement and the outdoor recreation environment. In: *Journal for Nature Conservation* (11), p 278-286.

## **Developing Agent-Based Models of Recreational Behaviours at a Landscape Scale: The Case of Recreational Fishing in Northern Ontario**

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*Keywords: Recreational fishing, agent-based model, landscape scale, repeated nested logit.*

Agent-based models depicting recreational behaviours are becoming an important tool used by researchers and resource managers. These models provide opportunities for individuals to learn about complex relationships that agents have with environs and other agents. Past agent-based models have taught managers much about recreational use and impacts at specific sites or small areas (e.g. Itami and Gimblett 2001). Researchers, however, have spent less effort to operationalize these models at a landscape scale.

Adopting a landscape scale for an agent-based model of recreational behaviours is important for at least two reasons. First, resource managers are increasingly using a landscape scale when managing resources upon which recreationists depend. Consequently, managers increasingly require information about how management and other changes to recreational sites are likely to impact recreational behaviours at many recreational sites. For example, if fishing quality declines at one popular fishing site, managers will require information about expected changes in fishing use at that site along with these expected changes in use at all other fishing sites.

Second, behavioural processes such as recreational site choice typically operate at a landscape scale. When an inappropriate scale for a recreational behaviour is used, one likely predicts biased behavioural responses since the recreationists may substitute their current site for a competing site. We showcase an agent based model of recreational fishing behaviours devel-

oped for residents of northern Ontario, Canada. Our application focuses on over 400 fishing sites in an area with hundreds of square kilometres. While developing an agent-based model at this landscape scale is daunting, we illustrate some benefits of this approach during the presentation.

The behavioural rules for the angling agents come from an econometric model estimated (i.e. calibrated) from observed trip timing and site choices of anglers (see figures 1 and 2). The repeated nested logit model (Morey, Rowe & Watson 1993) represents an effective method to link the amount, timing, and locations of fishing trips taken by anglers. Since this model is consistent with random utility theory, one can use the model for economic welfare assessments besides as a guide for the behaviours of angling agents. Our application extends the normal estimation of the repeated nested logit model in three important ways. First, we formally account for different patterns of substitution among the fishing sites that are available to anglers. Second, we account for various trip contexts that include trip duration (day versus multiple day trips) and trip type (public versus private accommodation trips). Finally, the models account for many details around the timing of recreational fishing trip behaviours. Trip timing decisions are related to calendar events (e.g. day of week, holidays), weather (e.g. precipitation), culturally defined dates (e.g. children returning to school in September), and others.

Table 1: Temporal pattern of daily fishing participation rates (%) for northern Ontario anglers.

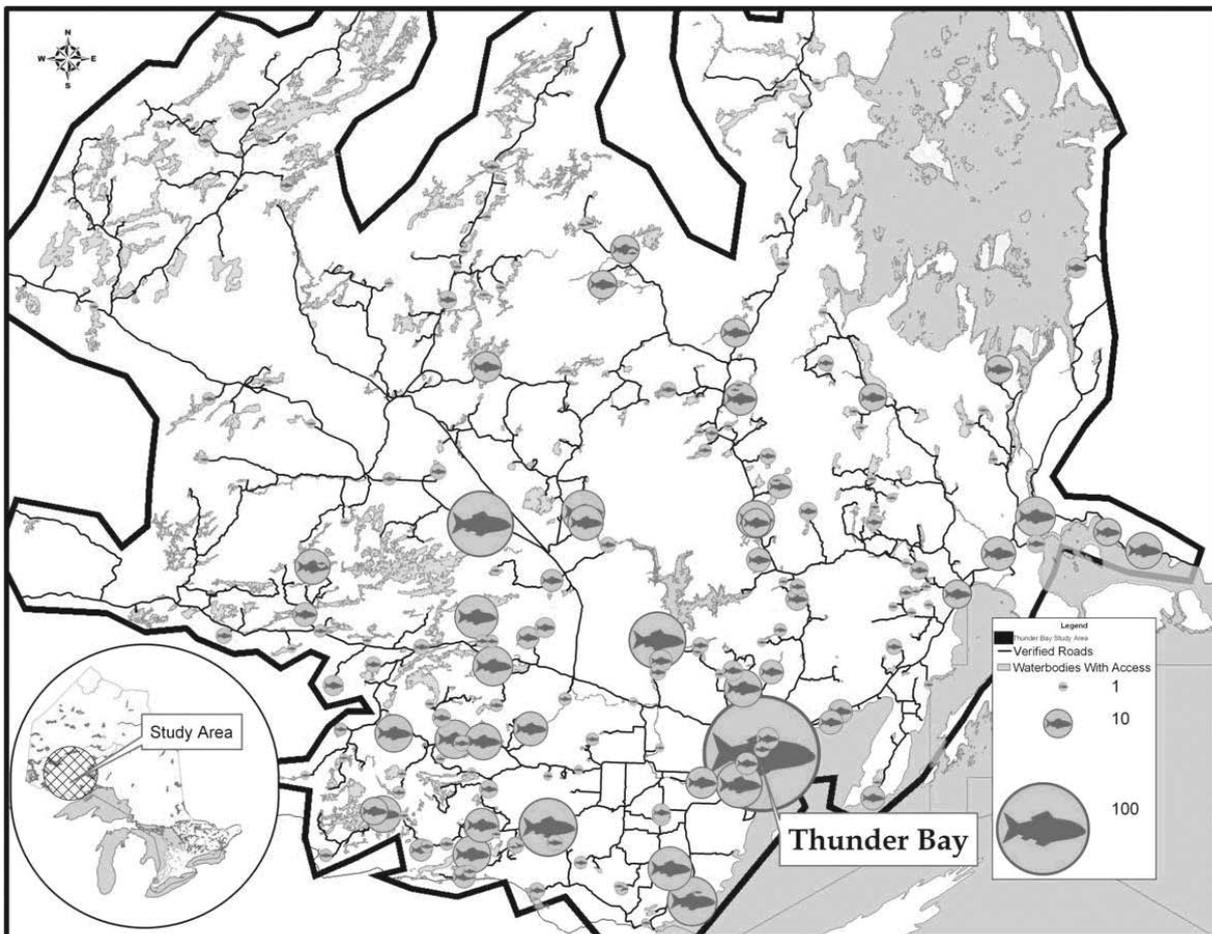
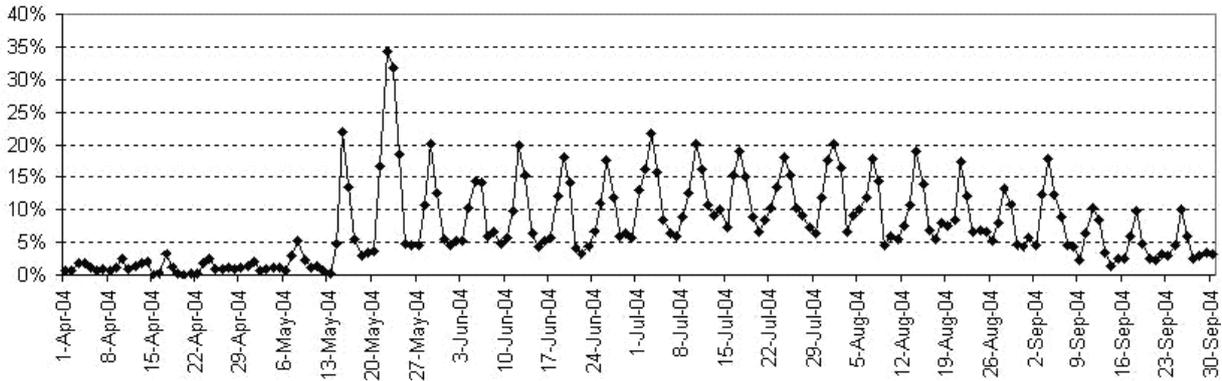


Figure 1: Spatial pattern of observed fishing site use for northern Ontario anglers.

Calibration of the agent-based model is on-going to ensure a good fit between monitored fishing site use and the use predicted by the model. Efforts are also underway to create a more dynamic agent-based model of recreational fishing. By programming fish as agents, we hope to provide a link to the impacts of angling behaviours on fisheries abundance. This model would allow us to predict longer-term effects of management decisions on recreational fishing.

## References

- Itami, R. M. & Gimblett, H. R. (2001). Intelligent recreation agents in a virtual GIS world. In: *Complexity International* (8), p 1-14.
- Morey, E. R., Rowe, R. D., & Watson, M. (1993). A repeated nested-logit model of Atlantic salmon fishing. In: *American Journal of Agricultural Economics* (75), p 578-592.

# Using Computer Simulation Modeling to Monitor the Multiple Dimensions of Wilderness Solitude in Great Smoky Mountains National Park

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*Keywords: Computer simulation, monitoring, wilderness, wilderness solitude, Great Smoky Mountains National Park.*

## Introduction

The Wilderness Act of 1964 requires that wilderness areas be managed to provide outstanding opportunities for solitude. Perhaps the most commonly used indicator to operationalize the concept of wilderness solitude has been the number of encounters visitors have with other groups (Dawson 2004, Stewart & Cole 2001). Findings from a recent study of wilderness hikers in Shenandoah National Park suggest that there may be multiple dimensions of encounters that influence the extent to which wilderness visitors experience solitude, and that indicators of wilderness solitude might include factors such as the timing and location of encounters (Hall 2001). Indicators of wilderness solitude might also include the number of encounters during different phases of the wilderness trip, for example, “entry”, “immersion”, and “exit” phases (Borrie & Roggenbuck 2001).

Monitoring encounters in wilderness and backcountry recreation areas through on-the-ground observation has proven to be difficult, given that visitor use tends to be dispersed over relatively large, remote areas that typically have multiple access points (Lawson, Itami, Gimblett & Manning, in press). Furthermore, obtaining visitor reported encounters after the fact may not be reliable due to the lack of precision in visitors’ recall process (Watson, Cole, Turner & Reynolds

2000). Using indicators of wilderness solitude that include spatial and temporal dimensions of encounters as described above presents an even greater challenge for monitoring.

Recent research suggests that computer simulation modeling may be a useful tool for monitoring “hard to measure” indicators of quality (Lawson, Manning, Valliere & Wang 2003). Computer simulation models can be developed from relatively easy to obtain information to generate spatially and temporally precise estimates of visitor use and inter-group encounters throughout a dispersed recreation area. The purpose of this study is to explore the potential utility of computer simulation modeling for assisting wilderness and backcountry managers in monitoring multiple dimensions of wilderness solitude. In particular, this study will examine the validity and reliability of computer simulation estimates of wilderness solitude indicators that account for the timing and location of hiking and camping encounters.

The study area is composed of a network of multi-use trails and backcountry campsites in the Cosby and Big Creek areas of Great Smoky Mountains National Park, USA. The Cosby and Big Creek areas are used by day use hikers, day and overnight horseback riders, and backpackers, including Appalachian Trail thru-hikers. Most of the trails and campsites in the study area fall with-

in the boundary of the park's proposed wilderness, which is managed as congressionally designated wilderness (National Park Service 1995).

## Methods

Several types of visitor use data will be collected during May 2006 and used as inputs into the computer simulation model developed in this study. Route surveys will be administered to day use hikers and horseback riders at trailheads as they exit the study area to gather information regarding group size, points and time of entry and departure from the study area, travel route, and location and duration of extended stops within the study area. Trip itineraries for overnight visitors, including campsite locations, will be obtained from mandatory backcountry camping permits. Mechanical trail-traffic counters placed at each trailhead in the study area will be used to obtain counts of the number of groups entering the study area per day. Data collectors will walk portions of the trails within the study area with GPS units to gather information used to calculate hiking speeds. Collection of validation data will include the number of other encounters randomly selected people have with other groups recorded through direct observation.

## Results

The data described above will be used to develop a computer simulation model of visitor use within the study area. A baseline simulation will be conducted with the model to estimate the current spatial and temporal distribution of day hiking, horseback riding, and backpacking use, as well as the multiple dimensions of inter-group encounters that account for the timing and location of interactions among visitor groups. Comparisons will be made between the results of the baseline simulation with observation data to assess the validity of model outputs. Additional simulations will be conducted to assess the effects of alternative management policies on a range of encounter-related indicators of wilderness solitude. Policy simulations might include tests of the effects of day use trailhead quotas, revised overnight permit quotas, and development of additional trails and/or campsites on indicators of wilderness solitude.

## Conclusion

This paper will provide insight into the reliability and validity of computer simulation model estimates of multiple dimensions of inter-group encounters in a backcountry recreation setting. This information will improve park managers' ability to assess the extent to which visitors have opportunities to experience wilderness solitude in the parks' backcountry and proposed wilderness.

## References

- Borrie, W. T. & Roggenbuck, J. W. (2001). The dynamic, emergent, and multi-phase nature of on-site wilderness experiences. In: *Journal of Leisure Research* (33/2), p 202-228.
- Dawson, C. P. (2004). Monitoring outstanding opportunities for solitude. In: *International Journal of Wilderness* (10/3), p 12-14, 29.
- Hall, T. E. (2001). Hikers' perspectives on solitude and wilderness. In: *International Journal of Wilderness* (7/2), p 20-24.
- Lawson, S. R., Itami, R., Gimblett, H. R. & Manning, R. E. (in press). Benefits and challenges of computer simulation modeling of backcountry recreation use in the Desolation Lake Area of the John Muir Wilderness. In: *Journal of Leisure Research*.
- Lawson, S. R., Manning, R. E., Valliere, W. A. & Wang, B. (2003). Proactive monitoring and adaptive management of social carrying capacity in Arches National Park: an application of computer simulation modeling. In: *Journal of Environmental Management* (68), p 305-313.
- National Park Service. (1995). A strategic plan for managing backcountry recreation: in Great Smoky Mountains National Park. USDI National Park Service.
- Stewart, W. P. & Cole, D. N. (2001). Number of encounters and experience quality in Grand Canyon backcountry: consistently negative and weak relationships. In: *Journal of Leisure Research* (33/1), p 106-120.
- Watson, A., Cole, D. N., Turner, R. & Reynolds, P. (2000). Wilderness recreation use estimation: a handbook of methods and systems. In: USDA Forest Service General Technical Report RMRS-GTR-56. Rocky Mountain Research Station.

# Evaluating Spatiotemporal Interactions between Winter Recreation and Wildlife Using Agent-Based Simulation Modeling on the Kenai Peninsula, Alaska

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*Keywords: Wilderness management, agent-based simulation, recreation behaviour, geographic information systems, spatial/temporal patterns.*

## Introduction

Concern has been expressed throughout North America regarding the potential for dispersed winter recreation activity, such as snowmobiling and helicopter skiing, to disturb wildlife species. Such disturbance occurs at a time when many animals have increased costs of mobility and decreased availability of forage resources, and may be especially detrimental to wildlife populations. At the same time, winter sports enthusiasts are increasing in number and dispersing great distances into natural areas. Throughout the Kenai Peninsula, Alaska, the most extensive dispersed recreation occurs in terrestrial habitats during winter (approximately December through April). Land within this area is managed almost exclusively by the Chugach National Forest (CNF). Dispersed winter recreational activities (e.g. snowmobile riding, heli-skiing, cross-country skiing, alpine skiing, snowboarding, and snow-shoeing) occur when deep snow and frozen bodies of water allow easier access to backcountry areas. Snowmobiles travel dozens of miles into the backcountry from road access points along the Seward and Sterling Highways. Additionally, aircraft supported activities now provide winter access to a number of remote locations. While some data have been collected at a few discrete locations that serve as access points for winter recre-

ation opportunities (e.g. parking lots), it is doubtful whether these data can be extrapolated to spatial scales meaningful for managing or evaluating potential impacts from dispersed winter recreation. While winter can be a stressful season for wildlife if forage resources or quality of thermal cover are reduced, these snow conditions may also restrict movement between habitat patches, increase movement costs and diminish the probability of escape from predators. This paper describes a novel technique to quantify the spatiotemporal intensity of human overlap with wildlife on winter landscapes. Recreation Behavior Simulator (RBSim) was used to model the spatiotemporal distribution of dispersed winter recreationists on the Kenai Peninsula and Upper Turnagain Arm area of Alaska. Simulation results were used to measure overlap with habitat for denning grizzly bears and mountain goats.

## Methods

Flight survey efforts completed during 1995-1996 estimated five wolverines per 100 km<sup>2</sup> for the Kenai Peninsula. Subsequent flight surveys, completed during April of 2004 documented wolverine presence throughout much of the KPT but results are neither spatially nor temporally explicit enough

to describe species distribution relative to winter recreation. Aside from mapping wildlife presence in KPT, spatial patterns of dispersed winter recreation also mapped using aerial surveys during the winters of 2004 and 2005. Data were collected by systematic aerial survey of 60 sub-watershed sample units, ranging from 40 to 160 km<sup>2</sup> in size. A stratified random selection of sample units and complete area search techniques were used. Pathways and destinations used by winter recreationists and locations of individual recreation parties (snowmobile, pedestrian, and aircraft supported) were mapped by user type. Survey flights occurred on randomly selected days, stratified by weekend vs. weekday, between mid-January and mid-April of 2004 and 2005. In addition, vehicle counts of the 42 plowed parking lots along the Seward highway system between Girdwood and Seward were conducted between mid-January and mid-April of 2004 and 2005. Each count enumerated the total number of vehicles and trailers per parking lot. Two hundred and seventy-eight recreation user interviews were conducted at 42 parking lots along the Seward and Sterling Highway corridor between Girdwood and Seward, Alaska. Surveys were conducted during three, 30-day periods beginning in mid-January and continuing through mid-April, 2005. Survey days and locations were selected by stratified random sample.

## Results

Using the aerial surveys, questionnaires and parking lot counts a model was developed to simulate the spatial and temporal distributions of winter recreationists in the Kenai Peninsula and Upper Turnagain Arm area (KPT) using RBSim (Itami 2003). Though RBSim has routinely been used to evaluate spatiotemporal patterns of recreation use along linear trail networks and their associated recreation facilities (Gimblett 2002) few attempts have been made to characterize recreation use of areal features at the landscape scale. Through the application of RBSim, the temporal nature of dispersed recreation is integrated with spatial pathways used by winter recreationists. Resulting distributions are compared to the spatial descriptions of habitats used by mountain goats, grizzly bears and wolves. This paper demonstrates the application of

RBSim for predicting the spatial distribution and intensity of winter recreation in an individual watershed within the KPT. It is hoped that the techniques used can be employed to evaluate winter recreation throughout the study area.

## References

- Gimblett, H.R. (2002). Integrating Geographic Information Systems and Agent-Based Modeling Techniques for Simulating Social and Ecological Processes. London.
- Itami, R., Raulings, R., MacLaren, G., Hirst, K., Gimblett, R., Zanon, D. & Chladek, P. (2003). RBSim 2: Simulating the complex interactions between human movement and the outdoor recreation environment. In: *Journal for Nature Conservation*, p 278-286.

# Exploring Spatial Behaviour of Individual Visitors as Background for Agent-Based Simulation

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## Introduction

Computational modelling and simulation gain increased importance as tools supporting planning and management of visitor flows in natural recreation sites. The agent-based approach focuses on modelling behaviour of individual artificial agents operating in a virtual environment. In order to set adequate model parameters and to produce reliable outputs, generic assumptions and theories concerning human spatial behaviour and recreational experience require validation against the real phenomena (Cole 2005, Elands & van Marwijk 2005, Gimblett et al. 1996, Skov-Petersen 2005). Within this context, the paper addresses the question of how individual visitors use recreational space. The aim of this study was to characterize spatial preferences of individual recreationists and to define visitor profiles corresponding to their spatially manifested acts. The case study area – the Lobau – is a heavily used, peri-urban recreational site, situated within the city borders of Vienna, Austria and is a part of the Danube Floodplains National Park.

## Methods

On-site visitors were interviewed about their outdoor activities, visiting motives, length of stay, local knowledge, etc., at main entrance or intersection points on randomly selected days. As part of the on-site interviews, respondents were asked to mark on a map (1:25.000) the route that they took on that day (Arnberger et al. 2000). The sample size was 532. Additionally, detailed data covering environmental features of the area were collected.

Following, numerous attributes of the routes were derived from the interrelated data. Those comprised physical features of the environment, route geometry and topology as well as spatial information provided on site. In the first step, the route attributes were explored using basic statistical methods. Next, cluster analysis was applied to identify groups of visitors with similar spatial behaviour. For data storage and analyses GIS, relational database management and statistics software packages were used. Figure 1 presents the methodology used in this study.

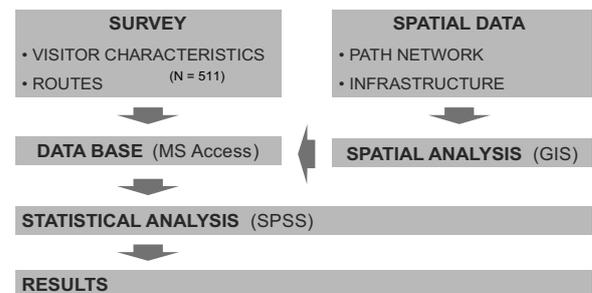


Figure 1: Methods used for analysing route profiles.

## Results

The results demonstrate the great diversity of routes respondents took or planned to take during their visit to the Lobau. Reported trips ranged from long-distance loops, following marked and well paved trails, up to the destination-oriented shortcuts leading from a parking place to the nearest picnic or swimming spot. Selected attributes of routes have been presented below, more details can be found in (Taczanowska et al. 2006). In terms

Table 1: Typology based on spatial behaviour of the Lobau visitors.

Selected attributes of routes	Classical visitors	Speedy visitors	Off-trail users
Share of the sample (N=532)	59 %	31 %	10%
Dominating trail surface	gravel	asphalt	unpaved
Dominating trail width	middle	wide	middle / narrow
Signage (mean value)	85.1 %	89.9 %	53.8 %
Length of route (mean value)	6.6 km	9.1 km	3.1 km

of distances travelled, the mean value of the route length was 7.0 km. The shortest distance reported in the Lobau was 163 meters long, the longest one: 25.7 km. Generally, two types of route shapes were distinguished: a loop and traverse. The large majority of the respondents finished their trips in starting locations, making loops (80%). More than a half of recreationists (52%) did not retrace their paths, however considerably large share of visitors partly (32%) or totally (16%) repeated the trail on their way back. In most cases (52%), the respondents followed exclusively the marked trails. About ten percent of the interviewees were predominantly off-trail users. The visitors tended to use prepared and well maintained paths. Gravel and asphalt surfaces were most willingly used among the Lobau visitors while performing different types of recreational activities. Three general types of spatial behaviour among the Lobau visitors were identified: classical visitors, speedy visitors and off-trail users (table 1). Table 1 presents selected characteristics of the defined types.

This study delivered practical information on how individuals use a recreational setting and contributed to better understanding the human-environment interactions. The analysis revealed that there was no straightforward way to derive information on spatial behaviour from the demographic characteristics. The findings of this research might be a valuable basis for creating, testing and calibrating computational models of recreational use.

## References

- Arnberger, A., Brandenburg, C., Cermak, P. & Hinterberger, B. (2000). Besucherstromanalyse für den Wiener Anteil am Nationalpark Donau-Auen, Bereich Lobau. Vienna.
- Cole, D. (2005). Future Directions for Simulation of Recreation Use. In: D. Cole (Editor), Computer simulation modeling of recreation use: current status, case studies, and future directions, p 3-9. Fort Collins.

Elands, B. & van Marwijk, R. (2005). Expressing recreation quality through simulation models: useful management tool or wishful thinking?

Gimblett, H.R., Durnota, B. & Itami, B. (1996). Spatially-Explicit Autonomous Agents for Modelling Recreation Use in Complex Wilderness Landscapes. In: Complexity International (3).

Skov-Petersen, H. (2005). Feeding the agents - collecting parameters for agent-based models. In: Batty, S.E. Computers in Urban Planning and Urban Management (60).

Taczanowska, K., Arnberger, A. and Muhar, A. (2006). Exploring Spatial Behaviour of Visitors in Peri-Urban Recreational Areas - Multi-attribute Analysis of Individual Route Profiles. In: Schrenk, M. CORP 2006 & Geomultimedia06, p 315-323.



Visitor Monitoring Methods, Modeling  
and Data Management

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Andreas Bernasconi & Michael J. Campbell (Chairs)

# Monitoring Trail Use with Digital Still Cameras: Strengths, Limitations and Proposed Resolutions

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*Keywords: Monitoring, digital camera, data management, activity identification.*

## Introduction

The monitoring of public use of natural areas has received increasing interest over the past 2 decades as managers of protected areas become concerned about visitor use types, levels, and intensity along with the accuracy and validity of their visitor use information. It has been suggested that this information is inadequate and often based upon the estimates or best guesses of area managers and park wardens. In order to deal with this lack of visitor use information a number of researchers have begun to examine and assess a variety of means of collecting visitor use data. Watson et al (2000) describe a range of approaches that have been employed to understand visitor use characteristics including estimation, visitor observation, registration, permits, surveys, mechanical counters, 35 mm camera triggered at intervals or by activity, and more recently video monitoring (Arnberger et al. 2003, 2005). Digital photography is another recent development that has seen little application in visitor monitoring but may hold promise to further the science of visitor monitoring in natural areas. Understanding the limits and benefits of the various methods is essential for informed management.

The changing structure of Canadian society and its influence on the use, appreciation and understanding of Canada's natural heritage presents a significant challenge to Parks Canada (Parks Canada 2005). In addition, there is little empirical data detailing the impacts these changes are having on the use of natural areas. Parks Canada has recognized these issues and is concerned that the changing cultural make-up of Canada

coupled with a decrease in visitation will result in reduced support for parks and protected areas (Parks Canada 2005). Given its mandate and the desire to facilitate visitor experience such that Canadians appreciate their natural heritage and develop a culture of conservation (Parks Canada 2005) it is imperative that Parks Canada understand the patterns of use in its various parks. Informal and anecdotal observations by researchers and managers suggest that day use of backcountry trails and facilities is increasing and may be placing unknown stress on park resources. Monitoring of visitor use of natural areas is essential for effective management of parks and natural areas and in many cases managers rely on best guesses to estimate use (Watson et al. 2000).

This project evolved from an impact monitoring study developed in response to concerns that increasing use of the backcountry trails and campsites in Riding Mountain National Park might be negatively affecting the parks ecological integrity. Working in consultation with the park, researchers at the University of Manitoba developed and implemented a backcountry impact-monitoring program during the summer of 2001 (Campbell & MacKay 2004, MacKay & Campbell 2004). In excess of 50% of all backcountry respondents to the monitoring survey were day users, despite the fact that overnight users were strategically sampled through the use of the backcountry reservation system (Campbell et al. 2001). This mirrored results from other Canadian National Parks that suggested overnight use of the backcountry had peaked in 1979 (the year the median baby boom was aged 21) and had declined slightly since (Page et al. 1996). Clear-

ly problems for managers of Canadian National Parks were different than those of their American counterparts where crowding and overuse are often significant issues<sup>1</sup>.

## Methods

Information regarding day use of backcountry trails can be difficult to capture as registration is not typically mandatory, voluntary registration boxes have unknown reliability, and intercept surveys are labour intensive and costly. Increasingly technology has been employed in an attempt to clarify use patterns in parks and natural areas. Infrared (IR) trail counters have had limited success as they do not differentiate between humans and wildlife, thus recording false readings. 35 mm cameras linked to IR sensors allow researchers to distinguish between wildlife and humans but film-based systems are limited to 36 exposures and therefore require significant maintenance. In addition, film based systems can incur significant costs for film and development. Digital cameras used in conjunction with IR sensors may be able to overcome some of these concerns but still remain a relatively untested technology in the field.

Over the course of the summer seasons in 2004 and 2005 several digital camera/passive infrared (IR) sensor units were installed along backcountry trails in Riding Mountain National Park in Canada. Each unit was self contained and enclosed in a waterproof housing. IR sensors were calibrated over the course of 48 hours by observers and set to low sensitivity to reduce the likelihood of being triggered by birds and small mammals. Digital cameras were set in standby mode to reduce battery drain and calendars and clocks set to the appropriate time. The cameras were also set to the lowest resolution possible to: 1) maximize the number of events that could be recorded; 2) speed the refresh rate of the camera and; 3) reduce the likelihood that individuals could be recognized in the resulting images. In addition, lenses were blurred to further reduce the likelihood of identification of individuals. Each digi-

tal camera contained a 512 MB or 1 GB memory card capable of storing 3346 or 6690 images respectively.

In the first year of the study cameras were placed on 3 backcountry trails. In the second year of the study cameras were placed on 4 backcountry trails and 2 interpretive trails (at the request of the park). Placement of the cameras was critical to their accuracy and effectiveness and represented the most challenging and time consuming component of unit setup.

## Results

A summary of the results of the monitoring program is presented in table 1 and is intended to be illustrative of the type of information that can be gleaned from the system employed here. As such, the significance of the results to park managers is not the focus of this discussion. The use of digital still cameras linked to passive infrared sensors can provide managers of parks and natural areas with a cost effective and accurate means of evaluating the spatial, temporal and activity type of use occurring on park trails.

The digital camera sensor units employed in the Riding Mountain Study allowed researchers to identify numbers of visitors, group size, direction of travel, the type of activity engaged in, day use vs. overnight use (evidence of backpacks) and in some cases the amount of time people spent on the trail. When compared to simple mechanical counters, combining the digital camera with the counter not only provides greater information and detail but also can be used to assess the accuracy of the counters. That is the image captured will indicate the size of the party or if there was indeed an event. When compared with counters or sensors linked to 35 mm camera advantages include ease of data management, lower maintenance costs in both time and money, and detailed information about trail use.

A primary benefit of digital cameras linked to passive infrared sensors lies in the attribute file associated with each digital still image. Using DOS, a directory file of the attributes is created and saved as an RTF file. The resulting RTF file is then imported into Excel where temporal data can be ma-

<sup>1</sup> Cole (1997) suggests that less attention be paid to already crowded sites and more attention should be focused upon less popular areas.

Table 1: Trail use counts, party size, type and timing based upon digital camera sensors.

Trail	Number of events*	Number of individuals	Average Party size	User type	Peak activity	% Day use
<b>North Escarp-Ment<sup>1</sup></b>	242	88	2.1	Hike 95% Bike 5%	60% 10:00 – 14:00	92
<b>Moon Lake<sup>2</sup></b>	88	49	2.5	Hike 90% Bike 10%	58% 10:00 – 14:00	100
<b>Brule</b>	542	266	2.0	Hike 92% Bike 8%	51% 10:00 – 14:00	100
<b>Grey owl</b>	117	19	1.9	Hike 70% Bike 30 %	55% 10:00 – 14:00	100
<b>Central<sup>2</sup></b>	1127	234	2.5	Hike 56% Bike 36% Horse 8%	60% 10:00 – 14:00	97
<b>Ominik<sup>2,3</sup></b>	622	888	2.3	Hike 99% Bike 1 %	52% 10:00 – 14:00	100%

<sup>1</sup> Monitor placed orthogonal to trail assumed many cyclists missed

<sup>2</sup> Monitor placement ideal and calibration suggests `98% accuracy

<sup>3</sup> Interpretive trail near townsite

\*Events refer to total number of times the camera was triggered, irrespective of whether there was activity captured or not. Note that in some situations (e.g. Central trail) individuals lingered in front of the camera for some time resulting in multiple counts. However the images allowed this to be easily rectified.

nipulated and analyzed. This tab-delimited file can then be exported to SPSS or other similar programs for further analysis. While 35 mm print film can also record time and date of events the data must be manually entered resulting in increased costs and time. Similarly, 35 mm cameras linked to trail counters do not provide a single merged file. In the case of digital images blank images can be eliminated from the database (stored for later review) and the data files remain associated with each image, greatly reducing the drudgery that is often associated with monitoring work (Gardner and Campbell 2002).

In addition to providing ease of manipulating time and date data, the addition of a digital camera to a passive sensor provides more information about the nature of trail activities. In the Riding Mountain study researchers were able to determine the ratio of, and type of activity (hike, bike, horse), the peak times of these activities and in some cases the length of time people spent on the trail. Some authors have suggested that Passive IR sensors can be triggered by non-human events such as snow,

cloud cover etc resulting in lower accuracy than for active IR or Radio frequencies (Swedish Environmental Protection Agency 2000). By adjusting the sensitivity of passive IR sensors and combining them with digital photos these limitations can be minimized. When positioned correctly, the resultant image provides evidence of whether the sensor was triggered by a trail event or other factors. Generally, however the effect of environmental triggers is evident in the images as fog, cloud etc and data sets are easily cleaned. In addition, this overcomes the most significant limitation of Radio and active IR Beams, that of hikers traveling side-by-side and resulting in only a single count.

Arnberger (2005) noted that at low use levels, counting (by researchers) was more accurate than video observation data. However, in very large low use areas with many entry and exit points such as Riding Mountain National Park (and many other Canadian National Parks) the use of personnel to perform counts is, except in rare cases, prohibitively expensive. As noted previously counters alone (whether, Passive IR, Active IR, radio beam, pneu-

matic or other) require delicate calibration to differentiate between user types (eg. horse, bike) and in many cases differentiation is impossible. Furthermore, in low use areas wildlife may be a significant portion of trail activity. Film based cameras linked to active IR sensors have been employed and shown to be very effective and highly accurate. However, the costs associated with purchasing and developing film can be significant and when coupled with the limited storage capacity and additional data management costs, make film based systems a poorer choice.

All trail monitors require some degree of maintenance. Maintenance includes ensuring the units are functioning properly, monitoring data capacity and ensuring adequate power (battery life). Containing the sensor and the camera in one sealed unit thus protecting the sensitive electronics from the elements minimized maintenance of the units employed in this study. In addition the single sealed unit ensured that there was no need to connect sensors to cameras with external cables<sup>2</sup>. Given the advances in digital storage media (512 MB up to 3000 images, 1 GB, up to 6000 images), the fact that images were collected at the lowest possible resolution, and the relatively low levels of use in RMNP, data capacity was not an issue. The number of events and to some degree ambient air temperature impacted battery life. However, even in the most extreme of cases (high use and low temperatures – a rare condition in RMNP) battery life averaged 5-6 weeks. As a result, when batteries were replaced every 3-4 weeks no data was lost. Finally, maintenance involved checking to ensure that vandals and or wildlife did not damage the units. Despite the fact that most of the units were in plain view, none were stolen, though some were moved and this resulted in lost data. In addition, several units were damaged by wildlife, and one irreparably so. This is discussed further in limitations below.

## Limitations

Despite the numerous advantages of using digital cameras linked to passive infrared sensors the system is not without its limitations. The most signifi-

cant challenge in employing the current generation of digital cameras and IR sensors is the time lag between the camera emerging from standby and the taking of the picture. The units employed in this study experience a nominal delay of between .8 and 1.5 seconds between the sensing of an event and the capture of an image. In a number of cases this meant that the camera was triggered but no image was captured thus resulting in decreased accuracy. In general, this type of underreporting was noted when cyclists moving at speed passed the camera before an image could be captured.

The simplest way of resolving this issue is to ensure that the camera unit is optimally placed. This involves ensuring the unit is placed at a bend in the trail on level ground and that the trail user is moving away from or towards the unit rather than orthogonal to it. This placement has the added advantage of being able to capture large groups strung out along the trail thus providing more accurate counts. The negative consequence of this solution is that it leaves the unit much more exposed and visible and therefore increases the potential for vandalism and theft. Given that the units were secured to trees with straps rather than some form of locking mechanism, this is a significant concern.

A second approach applied in 2004 is to separate the sensors from the camera unit so that the delay from sensor trigger to image capture can be accommodated for. This setup allows somewhat more flexibility and facilitates the concealment of the camera, however it also requires external wiring to connect the sensor to the camera and more time to setup and calibrate. Given there are now three pieces of equipment, it can be more difficult to conceal and maintain. External wiring should be avoided if at all possible as wildlife has a tendency to chew through the cables. Finally advances in digital photography may provide a solution. Digital SLR cameras are currently on the market featuring startup to image capture lags (from power off to shot) of less than .2 seconds and lower lags from standby. Unfortunately, at present these units are also quite expensive and require expensive proprietary batteries. In addition, the best cameras for these purposes tend to be simple with relatively few functions and the trend has been towards more complicated instruments.

<sup>2</sup> In comparative studies undertaken in 2004, active infrared sensors linked to 35mm cameras were frequently damaged by wildlife when connecting cables were chewed through. Cables were replaced 5 times over the course of 8 weeks and as a result very little data was collected.

While for the most part the units required maintenance checks every three weeks, on a few occasions the units were damaged or moved by wildlife and rendered ineffective for periods of time. Bears in particular were attracted to the units when new and would rub against them and occasionally chew on the housing. While only one unit was significantly damaged, the units were moved from their optimal position and as such failed to register trail events. It is worth noting that in the second year of the study the only units affected by wildlife were the new units indicating that, perhaps, there is some scent associated with the cases or electronics that is attractive to wildlife.

## Conclusion

Digital cameras linked to passive infrared sensors have the potential to provide managers of parks and natural areas with valuable and detailed information regarding visitor use of the areas in a manner that is both cost effective and facilitates ease of data management. In order to capitalize upon the potential benefits of this new technology it is imperative that the units be properly calibrated and more importantly properly positioned. Based upon two years of study in Riding Mountain National Park in Manitoba, Canada the most effective configuration is one that places the camera in an exposed location oriented parallel to visitor movements and as such it must be placed in secure housings and locked to posts or poles. The first iteration of this design is currently being employed in Riding Mountain National Park and to date has been effective in dealing with the limitations identified above. Less intrusive and more visually appealing installations are being designed for use in 2007, as is the possibility that linking digital cameras with radio beam may allow for a more concealed camera placement. Finally digital SLR cameras are being investigated as possible solutions to the issues of time lags between the sensing of an event and camera firing.

## References

- Amberger, A. & Hinterberger, B. (2003). Visitor monitoring methods for managing public use pressures in the Danube Floodplains National Park, Austria. In: *Journal for Nature Conservation* (11), p 260-267.
- Amberger, A., Haider, W. & Brandenburg, C. (2005). Evaluating visitor-monitoring techniques: a comparison of counting and video observation data. In: *Environmental Management* (35/4), p 1-12.
- Banff-Bow Valley Study (1996). Banff-Bow Valley Study: at the crossroads. Technical report of the Banff-Bow Valley Task Force. Ottawa.
- Campbell, J. M. & MacKay, K. J. (2004). The role of people, place and process in implementing a successful backcountry monitoring program: the case in Riding Mountain National Park. In: *Environments* (32/1), p 31-45.
- Campbell, J.M., MacKay, K.J. & Steiner, C. (2001). Recommendations for implementing an integrated backcountry monitoring strategy at Riding Mountain National Park, HLHPRI Technical Report HLHPRI091B.
- Cole, David N. (1997). Recreation management priorities are misplaced--allocate more resources to low-use wilderness. In: *International Journal of Wilderness* (3/4), p 4-8.
- Gardner, J. & Campbell, J.M. (2002). A century of research in Banff and surrounding national parks. Bondrup-Neilsen, S. & Munroe, N.W.P. (eds.) *Managing protected areas in a changing world. Proceedings of the 4th International Conference on Science and Management of Protected Areas (SAMPAA IV)*. Waterloo, ON. May 14-19, 2000. p 234-243.
- MacKay, K. J. & Campbell, J. M. (2004). An integrated approach for measuring environmental impacts in nature based tourism and outdoor recreation settings. In: *Journal of Tourism Analysis* (9/3), p 141-152.
- Parks Canada (1996). *Riding Mountain National Park Management Plan*. Ottawa.
- Parks Canada (2005). *Response of the Minister of the environment to the recommendations made at the third minister's roundtable on Parks Canada*. Ottawa.
- Watson, A.E., Cole, D.N., Turner, D.L. & Reynolds, P.S. (2000). *Wilderness recreation use estimation: a handbook of methods and systems*. USDA General Technical report RMRS-GTR-56.

# Going Ahead: From Visitor Monitoring to Recreational Use Monitoring – The Example of the EU Regional Recreation Area Berchtesgaden National Park / Salzburger Kalkhochalpen

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*Keywords: Visitor monitoring, visitor management, recreational use, stakeholder, nature and landscape compatible recreation activities, visitor counting, recreation infrastructure, large protected areas, national park regions, workflow.*

**Abstract:** Recreation is an important issue for protected areas and especially for national parks where visitor numbers are growing. This can be seen as a result of the increasing interest in nature- and landscape based recreation. Consequently, there is a rising demand to manage this kind of human use accordingly. Therefore, measures must be based on well-founded data as well as widespread knowledge and understanding of recreation. Associated investigations must not only focus on visitors. Interest must also inhere to infrastructure, nature- and landscape compatible activity forms, and stakeholders. Another aspect is the need to incorporate protected areas in a larger planning framework. All too often national parks are regarded as something apart from the adjacent lands. But particularly recreation in park areas cannot be seen separately from the surroundings. By integrating all data regarding to recreation in databases and GIS, persons responsible for management-decisions can gain a comprehensive impression of this object. An according monitoring-system considering feasibility and continuation as well as the (future) workflow is worked out in an exemplary manner within the scope of the InterReg-IIIa project “EuRegional Recreational Area Berchtesgaden National Park/Salzburger Kalkhochalpen”.

## Introduction

Recreation is one of the main purposes of national parks. Since years the interest in nature- and landscape based recreation increases. As a result visitor numbers are still growing, especially in Central European national parks. Consequently, a rising demand to manage this kind of human use accordingly can be observed in protected areas. To comply with this, adequate measures, concepts and guiding principles must be developed. They should be based on well-founded data and information as well as widespread knowledge and understanding about recreation, its dependencies and coherencies. However, corresponding studies of recreation focus mainly on visitors so far: Today investigations in form of visitor monitoring (e.g. numbers, characteristics, behaviour, and expectations) are an essential component of proactive and adaptive

park management. In order to support visitor management, which at present faces more and more visitors as well as an increasing number of forms of activity (e.g. ski-hiking, snowshoeing, nordic walking), it must be pointed out that not only visitors must be a matter of investigation, but also the whole object of recreation as a further comprehensive conception of park visits and visitors.

Even though, literature research clarifies the numerous different aspects of relevant data and information as well as methods (compare e.g. Muhar, Arnberger & Brandenberger 2002, Hennig & Laube 2005), unfortunately, recreation and recreational activities are generally poorly understood and poorly documented (see Payne et al. 2004). It is marked by estimations and the absence of reliable information. Furthermore, almost all aspects (e.g. methods, data, and concepts) relate to visitors and not to the abstract object of “Recreation”.

Moreover, data and information regarding to visitors or recreation are often not well integrated in existing information structures and systems like databases and GIS (Giles 2003). However the digital availability of data and information is an important issue. This facilitates a comprehensive insight into recreation to persons responsible for management-decisions.

In consequence, different demands result: First, nature and landscape compatible recreation in national parks must be analysed to crystallize and model its key-components. Second, an adequate information system must be designed, to integrate and bring together all relevant data and information. This is done in an exemplary manner for the German Berchtesgaden National Park. The main purpose is to end up with a recreational use monitoring system which can be seen as a more widespread visitor monitoring. This way, it should be possible to give answers continuously to different questions concerning recreational use within the park area.

### Study area focussing recreational use

Besides nature protection, research, and environmental education the opportunity to recreation is one main objective in the German Berchtesgaden

National Park. The Berchtesgaden National Park (IUCN-Category II) is the only German alpine national park. It borders by approximately 70 km (2/3 of its borderline) the Austrian federal state Salzburg. The Austrian - German region is also established as EuRegio Salzburg / Berchtesgadener Land / Traunstein. Figure 1 shows locality, regional context and bordering situation of the Berchtesgaden National Park and its surroundings.

In general, tourism and recreation are significant aspects in the region. Since the year 1880 the area can be characterized as a traditional holiday location. Consequently, recreation is also of major concern for the Berchtesgaden National Park. But right now the description and evaluation of recreational use inside the park is only based on little information (see Hennig & Laube 2005) and some (estimated) visitor numbers. For instance in 2002, the visitor number per year was calculated by chargeable public parkings located outside the park area and maintained by the municipalities bordering the protected area. The thus gained visitor number refers to about 1.2 million people per year visiting the Berchtesgaden National Park. Beside this number, there exists neither quantitative nor temporal (e.g. dependency on daytime or season, duration) or spatial (e.g. spatial distribution in the park

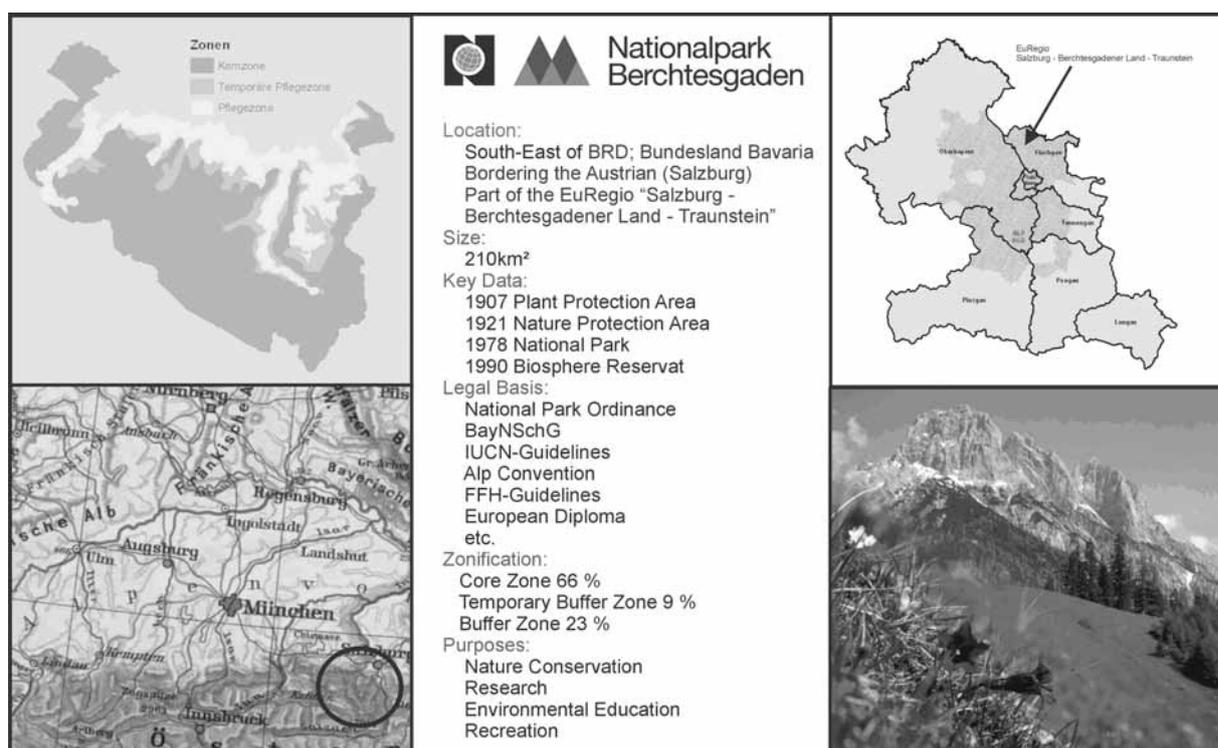


Figure 1: EuRegional Recreational Area Berchtesgaden National Park / Salzburger Kalkhochalpen.

area) information according to distinct recreation activities within the park area. Moreover visitors entering the German protected area from Austria are at present not registered at all. Even though infrastructure is an essential element to carry out the different forms of activity, except for some selective data about facilities sited inside the park area (e.g. trails, mountain huts), no data about infrastructure is available, especially in the directly bordering Austrian area. Thereby, it is difficult to get a realistic assessment about the status of recreation within the park area.

To meet demands concerning the survey of recreation mentioned above, much-needed data and information is collected and made available by a monitoring system particularly designed for the Berchtesgaden National Park. This happens by the InterReg-IIIa project “EuRegional Recreational Area Berchtesgaden National Park / Salzburger Kalkhochalpen” (duration: May 2005 - December 2006).

## Modelling recreational use

Usually, monitoring is defined as information or data sampling which is repeated in certain intervals of time and serves certain scientific and/or management purposes. It differs from pure observation or surveys due to its repeated and replicable character that enables comparison over time and the evaluation against a target. Definition of investigation purpose and object determines the monitoring system in proceeding and methods. The intention of the said project is to enable the persons responsible for the field of recreation within the park management to design and apply guiding principles, management concepts and measures. Hence, a fundamental understanding of nature and landscape based recreation in the Berchtesgaden National Park is essential. Besides the existing estimation of the visitor number per year this requires detailed data and information about recreation:

- What kind of summer und winter activities can be distinguished?
- How many visitors perform what kind of activity?

- Where do different activities take place?
- Which infrastructure is essential to perform the distinguished main summer and winter activities?
- What kind of infrastructure is available to guide or inform visitors?
- What kind of infrastructure categories can be distinguished in general?
- How many visitors use the different kinds of infrastructure elements?
- Is the infrastructure supply consistent to the visitor number and their activity forms?
- By which organisations or persons is the infrastructure supported and maintained?
- Which organisations or persons promote recreation activities within the park area?
- By which organisations or persons is what kind of visitor number and information available?
- Which infrastructure located outside the national park plays an important role to enable visits to it?
- etc.

To respond to the numerous dependencies and coherencies mentioned by these questions it gets obvious that one must focus not only on visitors but on the comprehensive object for analysis “Recreation”. Therefore, it is helpful and necessary to split the object into its relevant aspects: recreational use can be described by the number of persons executing different forms of activity depending on, and therefore using the available infrastructure within the scope of a certain spatial and temporal context. Furthermore, recreation depends on specific “rules” e.g. weather dependency, personal condition, and season. Finally, recreational activities and infrastructure must always be seen in the context of organisations or persons responsible for maintenance and support. By this assumption, a model of the abstract object for analysis “Recreation” is generated. It permits us to gain insight into structures and functions of recreation. Generally, the model is based on the entirety of identified, available and collectable information, dependencies and coherencies concerning recreation. To

model “Recreation” for the case of the Berchtesgaden National Park four information-components or categories were defined (see figure 2):

1. park visitors (e.g. numbers, characteristics, activities),
2. nature- and landscape compatible activities (e.g. spatial and temporal use patterns, demands on infrastructure),
3. infrastructure (e.g. depending on activities, responsibility to stakeholders),
4. stakeholder (e.g. infrastructure, offers).

Adequate methods of monitoring must be applied in an applicable way focussing on each singular “building-block” of the model “Recreation”. Data is collected regarding to the categories’ specific elements. All data – geodata as well as attribute data - is managed by the database RDBMS Oracle-XE and the GIS ArcGIS on the basis of individually implemented database structures. In the following sections the named categories will be examined more closely.

## Park visitors

A rising need for park management to know more about park visitors as key component of recreation is indisputable. Important are for example visitor number, undertaken activities, and temporal and spatial use patterns.

For the Berchtesgaden National Park visitor data is gathered by the standard methods of visitor monitoring listed for example by Muhar, Arnberger & Brandenburg (2002): cameras in combination with

time-lapse videos, personal counting and interviews etc. Data collection takes place inside and outside the park. All locations of data gathering are situated in exclusive positions characterized by its significance to recreation inside the protected area.

In addition, data related primarily to visitor numbers are available through countings by parking tickets, by ticket sales of the Jenner-Bergbahn (cable cars) and the Königssee-Schiffahrt (boat cruises) and by overnight stays at the numerous alpine huts like e.g. Carl-von-Stahlhaus, Kärlingerhaus, Watzmannhaus. Depending on the method and institution by which visitor data are collected, data are available by different levels of aggregation (e.g. time: hour, day, month, year; grouped by activity). As data management occurs by the RDBMS Oracle-XE, the differently aggregated data can be compiled and made comparable by adequate database structures (e.g. tables, constraints, views, references). Thus, it is possible to carry out statistical analysis to get a temporal overview. Further on, for a spatial survey the (statistically elaborated) data are linked to geodata representing the existing infrastructural elements using GIS.

## Nature and landscape compatible activities

In the Berchtesgaden National Park only forms of activity compatible with nature and landscape are tolerated. In the mountainous environment of the “EuRegional Recreation Area Berchtesgaden National Park / Salzburger Kalkhochalpen”, the main recreational activities are

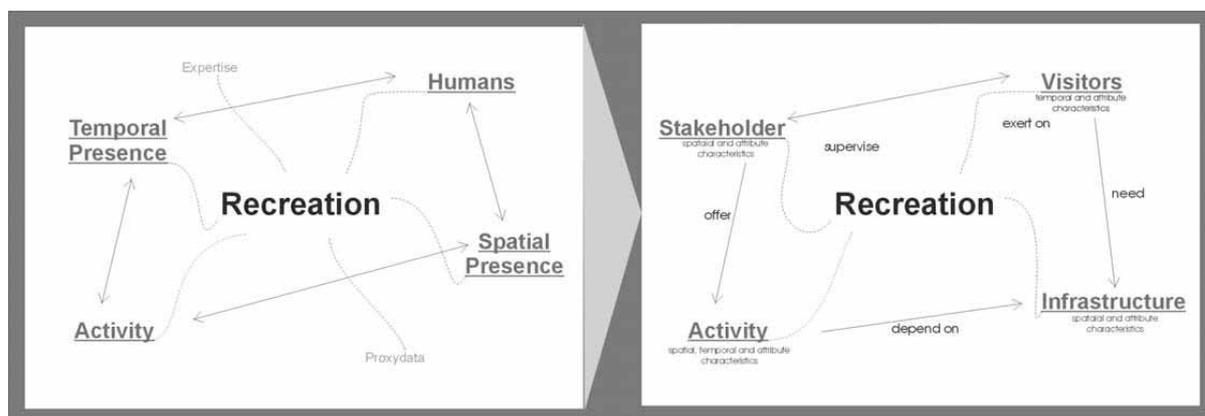


Figure 2: Aspects, components or respectively categories of the model “Recreation”.

- during the summer season: mountain biking, hiking, promenading;
- during the winter season: promenading, ski hiking, sledging and snowshoeing.

Literature research, expert interviews and observations provide insight into the forms of activity. Spatial requirements of the distinct outdoor activity focussing infrastructure, nature and landscape as well as temporal and social use patterns must be noticed. The corresponding information is included in the database linked to data of infrastructure and visitors. Especially for winter activities like ski hiking, and snowshoeing, temporal use patterns in the context of season and day-time are important (core-time of activities: midwinter - during noon, early spring – during morning hour) in respect e.g. to the mating-season of the grouse family.

## Infrastructure

The exercise of nature and landscape based recreation activities requires infrastructure. Only through infrastructure can recreation activities take place. Therefore, identification and characterisation of such elements is an important aspect to survey recreation. At present ten classes of infrastructural elements are defined for the study area:

- parking lots,
- trails (for hiking, biking, ski-hiking etc.),
- bus stops,
- visitor information centres,
- mountain pastures (with food and beverage service),
- mountain huts,
- guiding elements,
- environmental education elements,
- benches, tables, picnic-supply and
- natural phenomena like lookout points, “geotope”, cascades etc.

Not only infrastructure located inside the park area is relevant. To gain insight into recreational use in the national park, infrastructure situated outside the park area must also be considered: Most hiking, biking or skiing trails start from outside the pro-

tected area. The chargeable public parking lots are all located outside the park area. In most cases they are the starting point for park visits. Therefore, both - in the national park and in the surroundings - infrastructure elements get mapped by GPS and by the use of digital aerial photographs. The surveyed spatial data is managed by GIS (ArcGIS) together with the spatial dependencies between the infrastructure elements: e.g. parking as starting point of a trail; huts as end points of trails, information elements accompanying a trail. Relevant attributes to the different infrastructure elements in context with recreation activities (biking, skiing, hiking, snowshoeing etc.), the demands of usage (e.g. duration, weather, condition, opening time), the organisation responsible for maintenance (e.g. public parkings by municipalities, trails by alpine associations or the park administration) are managed by a database (RDBMS Oracle-XE). To handle the data accordingly a particularly database structure was designed. Visitor numbers and characteristics are - after being elaborated statistically - linked to the infrastructure elements.

## Stakeholders

Besides the state park administration, regional and local aspects affect the park area. Therefore, local and regional stakeholders are of importance: As mentioned before, stakeholders support and maintain infrastructure inside as well as outside the park. Also, numerous and various data and information relevant to tourism and recreation within the study area are available by different stakeholders (e.g. municipalities, alpine associations, and tourism agencies). But unfortunately, co-operation between individual stakeholders (including although the park administration) as well as communication or exchange regarding data and information, barely exist.

Following regional planning, land use planning, tourism concepts, nature conservation strategies etc. all stakeholders within the region and with relevance for recreational use in the park are identified and characterised. Their contact-information, field of activity (e.g. tourist offers, infrastructure), availability of visitor data (mainly visitor numbers), their (hierarchical) organisation and dependencies as well as their spatial activity area (e.g.

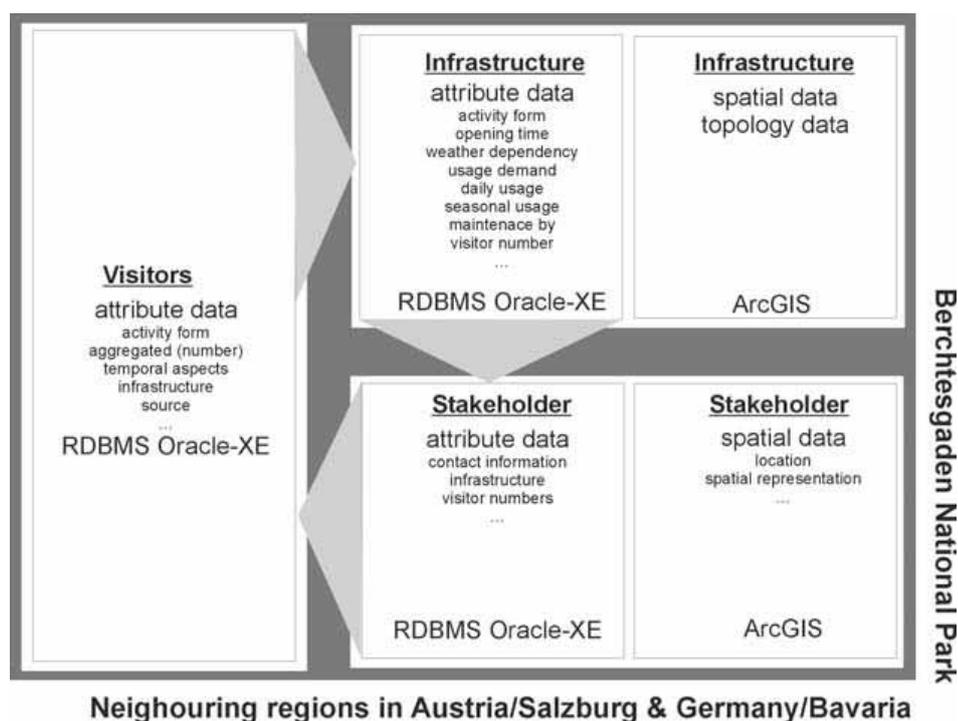


Figure 3: General database conception.

municipal area, planning area) etc. is held by particular tables in the database RDBMS Oracle-XE and GIS (ArcGIS).

Figure 3 illustrates the general conception of the (computer-based) integration of data and information according to the four “building-blocks” and categories of the model “Recreation” visitors, infrastructure, activities, and stakeholder.

## Conclusion and future prospects

Monitoring of recreation is more comprehensive than visitor monitoring and is more suitable to fulfil the present needs concerning the management of recreation within national parks. The combination of data according to visitors, infrastructure, activity forms, and stakeholders, its consequent ongoing observation as well as progressive data input in database and GIS provides a good basis for sustainable management measures. As nearby areas generally influence protected areas by their recreational offers, infrastructure elements, and as a source of visitors - being residents or being tourists - entering the park for recreational reasons, growing demand on data and information concerning the neighbouring area is evident. The comprehen-

sion of a national park region instead of the separately treated, island-like national park is essential - particularly in Central Europe. Therefore, one intention of monitoring is to gain a sustainable and boundless awareness in this German-Austrian recreational area. By the combination and analysis of different spatial and attribute data (e.g. social networks, spatial analysis methods etc.) for the Berchtesgaden National Park and the bordering area this can lead to a zoning of the surroundings. The adjacent land can be categorized by its importance to the field of recreation succeeding in the park area. It is therefore important, as monitoring activities concern the protected area and its surroundings, that management measures also regard the park area and the adjacent lands. In consequence, population, stakeholder and park administration should agree on discussions and co-operation on management solutions – following the monitoring results. But particularly in Europe an exigency to integrate protected areas into larger scopes exists. All too often protected areas are regarded as something apart from the adjacent land and the bordering regions. Nevertheless, especially in context of recreation, national parks cannot be seen separately from the surroundings (compare Hannemann & Job 2003).

Due to the border situation with Austria and the prospect of an Austrian nature park neighbouring the Berchtesgaden National Park, to be established in 2006, the demand for a monitoring system crossing the park borders is even more evident. This gets strengthened by the guiding principles of the EuRegio Salzburg / Berchtesgadener Land / Traunstein which the Berchtesgaden National Park and its surroundings are part of. Generally, in Central Europe research on protected areas in bordering situation is an important issue. Investigations are urgently needed for borderland protected areas. Activities in this field are poorly established, but they must increase. A good possibility of approach concerning this problem can be seen in this ongoing project and its focus on the border situation of the Berchtesgaden National Park.

## References

- Giles, W. (2003). GIS Applications in Tourism Planning. [www.cnc.bc.ca/gis/Documents/340TourismTermPaper.pdf](http://www.cnc.bc.ca/gis/Documents/340TourismTermPaper.pdf).
- Hannemann, T. & Job, H. (2003). Destination "Deutsche Nationalparke" als touristische Marke. In: Zeitschrift für Tourismus (58), p 6-17.
- Hennig, S. & Laube, M. (2005). Besuchermonitoring in Nationalparks. Eine Bestandsaufnahme in Deutschland, Österreich und der Schweiz. In: Standort – Zeitschrift für Angewandte Geographie (4/2005), p 199-204.
- Muhar, A., Arnberger, A. & Brandenburg, C. (2002). Methods for Visitor Monitoring in Recreational and Protected Areas: an Overview. In: Arnberger, A., Brandenburg, C., Muhar, A. (2002)(eds.). Monitoring and Management of Visitor Flows in Recreational and Protected Areas. Conference Proceedings. Bodenkultur University Vienna, Austria, January 30 – February 02, 2002. Vienna.
- Payne, R.J., McIntyre, N., Yuan, M. Moore, J., Bradford, L. & Elliott, S. (2004). Recreation Experience Preferences and Activity Profiles in a Crown Forest Landscape in Ontario, Canada. <http://www.metla.fi/julkaisut/workingpapers/2004/mwp002.html>.

# Application of a Remote Controlled Ultralight Air Vehicle (UAV) for Park Management and Visitor Monitoring

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*Keywords: High resolution remote sensing, visitor monitoring, park management, change detection.*

## Introduction

For efficient park management it is a necessity to have detailed information about the natural-spatial environment of the park, their changes as well as the amount, behaviour and the spatial distribution of the visitors in a high spatial and temporal resolution. From remote sensed images some of these important information concerning vegetation and vegetation dynamics, animal tracks, erosion etc. can be derived. But the “classical” remote sensed images have limitations. Satellite images often don’t have the desired spatial and temporal resolution and the acquisition of aerial photos is expensive.

Also data about the frequency and spatial behaviour of visitors are necessary to develop management strategies. For visitor monitoring numerous techniques exist. A good description of different methods can be found in Muhar et al. (2002). He stated that the use of aerial imagery as a monitoring method is limited due to its high cost and the fact that only single snapshots of recreational use are taken.

## Methods

The remote controlled UAV (ultralight air vehicle) can be a solution for these problems. It is comparatively cheap, light, easy to handle and to fly and can provide aerial photos in a very high spatial resolution and in the desired temporal resolution.

It is a remote controlled air vehicle with a 5.5 hp strong 2-stroke engine and a weight of approximately 6 kg. A payload of 5.5 kg can be carried.

The frame of the UAV hangs at a special type of parachute which serves as a wing (figure 1). This allows a slow and stable flight and also guarantees high safety in case of a failure of the motor. The sensor carrier is gimbal-mounted. Different sensors (digital cameras, video cameras, multi-spectral cameras, etc.) can be mounted. The instantaneous field of view is transmitted to the operators and can be seen on special goggles or a (laptop) screen. Pictures are taken via remote control. The actual position of the UAV which is taken by a GPS is also transmitted to the operator. A maximum flight speed of 25 km/h can be reached. This restricts the use of the UAV for wind conditions lower than 6 m/s. A maximum flight height of 4500 m and an operation distance up to 5 km are possible. The length of the runway is dependant on the wind conditions and varies between 5 m and 25 m. A detailed description of the UAV and its applications can be found in Thamm and Judex (2006).

## Results / Conclusion

Some of the advantages and disadvantages of the UAV are listed in table 1.

Some examples of the successful use of the UAV and its contribution to park management and visitor monitoring will be presented:

- Contributions to park management in the Penjari national park in Benin including vegetation monitoring, change detection and hydrological questions as well as fire management.

Table 1: Some advantages and disadvantages for the use of the UAV.

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>• Very high spatial resolution (up to 1 cm) dependent on sensor and flight height</li> <li>• High temporal resolution</li> <li>• Coverage of greater areas in short time</li> <li>• Various sensors can be used (e.g. optical, multi-spectral, thermal,..)</li> <li>• Low cost compared to “classical” remote sensing</li> <li>• Comparatively easy to operate and to maintain</li> <li>• Lightweight, easy to set up and to transport</li> <li>• Standardised semi automatic image processing possible</li> </ul>	<ul style="list-style-type: none"> <li>• Depended on weather conditions (wind, mist, rainfall)</li> <li>• In some areas complex permit procedures</li> <li>• Optical sensors have restrictions (Monitoring of processes under closed canopy not possible – thermal sensors could overcome this problem)</li> <li>• Possible disturbance of animals has to be taken into account</li> <li>• Operator should have visual contact with the UAV</li> </ul>

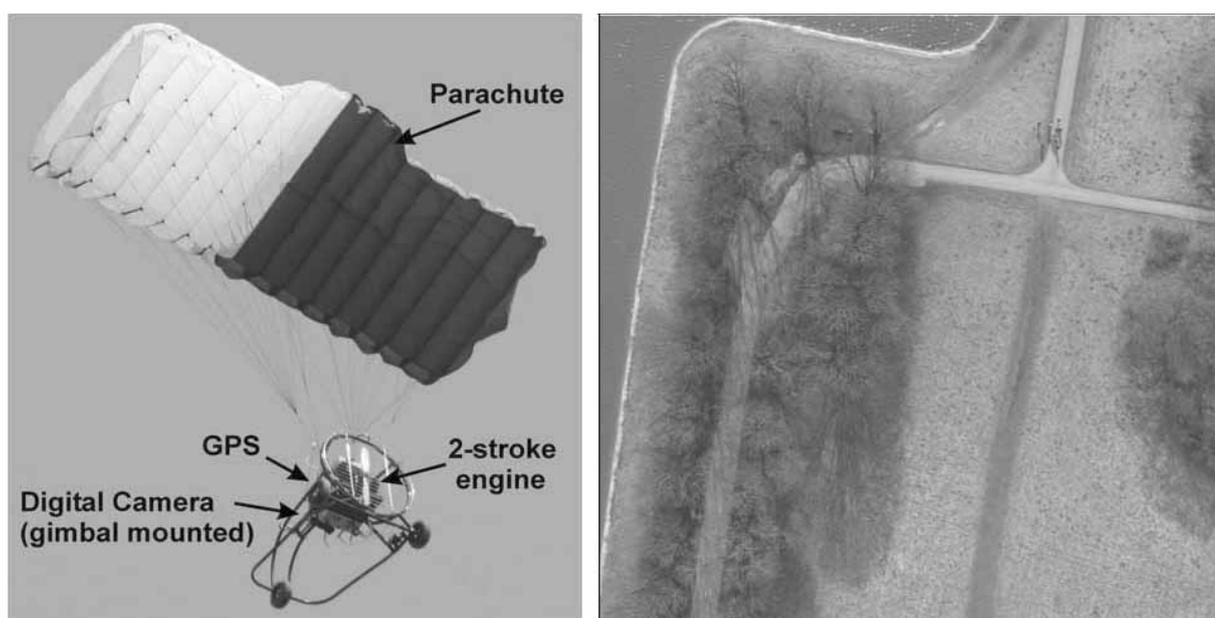


Figure 1: Picture of the UAV (left), image taken by the UAV for visitor monitoring in an urban recreation area in Cologne, Germany.

- Feasibility study for visitor monitoring with the UAV as addition to traditional monitoring systems in urban recreation areas in Cologne, Germany.
- Mapping of ski and animal tracks in the Black Forest.

Furthermore numerous application fields are possible – from landscape photography to derivation of high resolution digital terrain models. Due to the comparatively low costs and high usability the UAV is a very interesting tool.

## References

- Muhar, A., Arnberger, A. & Brandenburg, C. (2002). Methods for Visitor Monitoring in Recreational and Protected Areas: An Overview. In: Arnberger, A., Brandenburg, C. & Muhar, A. (eds.): Monitoring and Management of Visitor Flows in Recreational and Protected Areas. Conference Proceedings, Bodenkultur University, Vienna. p. 1-6.
- Thamm, H.-P. & M. Judex (2006). The “low cost drone” – an interesting tool for process monitoring in a high spatial and temporal resolution. In: ISPRS Mid-term Symposium 2006, „Remote Sensing: From Pixels to Processes“, Enschede, 8-11 May 2006, the Netherlands.

## Segmentation of Visitors' Cross-Cultural Values in Forest Recreation

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*Keywords: Segmentation, cross-cultural values, ethnicity, Hofstede, Inglehart, Kahle, Postmodern values, forest recreation.*

### Introduction

Recreation visitors to national forests are not all alike. Marketing applications have used values as the criterion for segmenting the population into homogeneous groups of individuals (e.g. Madrigal & Kahle 1994). Values can provide potentially powerful explanations of visitor behavior because they are inner- and central-oriented within a person's cognitive system, remarkably stable over time and serve as the standards of conduct (Rokeach 1973). Because culturally diverse populations may have varying values, and values may influence other, more specific beliefs as well as behaviors, it is important to study these values among increasingly diverse populations in a variety of contexts. Therefore, in this paper, we examined the potential utility of Hofstede's measure of cultural values (1984) for group segmentation in an ethnically diverse population in a forest recreation context.

### Methods

In 2002, the visitors to the Angeles National Forest (ANF) near metropolitan Los Angeles were surveyed. Because we intended to segment a population of diverse cultural values and beliefs among various ethnic groups in this study, a simple ran-

dom sample of all visitors would not efficiently yield adequate respondents of diverse ethnic groups. An on-site survey was administered at ANF sites frequented by ethnically diverse populations<sup>1</sup>. Using purposive sampling, a total of 1,332 visitors were approached, 154 of whom declined or were unable to participate the on-site survey. Of the 1,178 informants who responded, four survey questionnaires were incomplete. This resulted in 1,174 usable surveys, with a net response rate of 88 percent. Overall, 38 percent were white (n = 444), 27 percent Hispanic (n = 312), 27 percent Asian (n = 319), and 8 percent "other" including African-American, American-Indian, "other", and missing values (n=97)<sup>2</sup>.

### Results

Confirmatory factor analysis was first applied to confirm the theoretical models of Hofstede's four cultural dimensions of values (Power distance, In-

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<sup>1</sup> The use of verbal surveys to determine "values" and preferences is a very common practice. Researchers need to acknowledge the limitations of this paradigm.

<sup>2</sup> There were 14 sampling sites selected in the ANF. However, about 90 percent of the responses came from three developed sites close to Los Angeles metropolitan area. At sampling sites further from the urban edge, fewer visitors were encountered, especially on weekdays. Most of the survey respondents were hikers, backpackers as well as picnicking and scenic drive visitors, but also including small number of bikers, campers, resort guests, nature center visitors, and cabin owners.

Table 1: Indices statistics of Confirmatory Factor Analysis for Hofstede's 4-dimension model of cultural values.

Model	$\chi^2$	$\chi^2/df$	GFI <sup>a</sup>	NFI <sup>b</sup>	CFI <sup>c</sup>	RMR <sup>d</sup>
4 items per dimension	1367.16	13.95	0.80	0.70	0.71	0.13

<sup>a</sup> GFI: Goodness of Fit Index.

<sup>b</sup> NFI: Normed Fit Index.

<sup>c</sup> CFI: Comparative Fit Index.

<sup>d</sup> RMR: Root Mean Square Residual.

Acceptable fit rule of thumb:  $\chi^2/df = 2$  to 5; GFI  $\geq 0.90$ ; NFI  $> 0.90$ ; CFI  $> 0.90$ ; RMR = 0.05 to 0.10.

dividualism, Masculinity, and Uncertainty avoidance). Results showed a poor fit of the data to Hofstede's four-dimensional model (Table 1). Given the poor fit of the original four-dimensional cultural values model, we used exploratory factor analysis to reduce the cultural values variables and explore interpretable dimensions of cultural values in the context of forest recreation. We found three cultural values dimensions which we labeled Hierarchical Beliefs, Uncertainty Avoidance, and Femininity (Table 2).

We used cluster analysis to identify homogeneous groups of respondents based on similar responses to the cultural values dimensions and age, because research has demonstrated a relationship between values shift and age groups (e.g., Inglehart, 1977). We found differences in the emphasis placed on traditional gender roles versus on gender equality, on the importance of maximizing economic success versus maximizing subjective well-being, on the achievement versus individual autonomy, and on emphasizing versus de-emphasizing traditional legal and religious authority. These differences are consistent with shifts from Modernist toward Postmodernist values described by Inglehart and colleagues. Results allowed us to segment respondents into three homogeneous groups labeled Modernist, Mixed, and Postmodernist.

Among the three clusters, the Mixed group was most numerous (41 percent of the sample); in addition, this segment was most different from the other two in terms of the three dimensions of cultural values (Table 3). We are not surprised that the Mixed group was most numerous due to the diverse population in southern California in the U.S. Moreover, while conducting the on-site survey in the ANF, a few respondents asked how they could put themselves in one or another ethnic category in the questionnaire as they were actually from mixed

cultural backgrounds<sup>3</sup>. Other researchers have addressed similar situations with self-ascription to ethnic groups. On the other hand, we did find that the largest differences occurred between the Modernist and Mixed groups. Compared to the Modernists, the Mixed group was less likely to agree with those three dimensions of cultural values as well as tended to be younger.

Socio-demographic, service quality, satisfaction, and behavioral intention variables were used to validate the three values-based segments. Among socio-demographic variables, gender, formal education, ethnicity, years in the U.S., generations in the U.S., and country of birth were all related to the three segments, but household income was not (Table 4). Furthermore, compared to the Mixed clusters, the Modernists were more likely to perceive high levels of service quality, be satisfied with their forest recreation visits, and have positive behavioral intentions toward national forests (Table 5). These findings suggest that the shift from Modernist toward Postmodernist values is discernable in the forest recreation context, at least in southern California in the United States.

The findings provide evidence that supports measuring cross-cultural values to identify distinct market segments in forest recreation. The value profiles found in this study were meaningful enough to offer managers actionable portraits on which to base product development, communication strategies, and other marketing actions to match different visitor segments' cultural value orientations. For example, the Postmodernists tended to be females, to be white, to have resided longer in the U.S., to disagree with Hierarchical Beliefs values, and to perceive lower service quality in the National Forest. To help

<sup>3</sup> In the sample, there were 97 respondents who indicated themselves as "other", accounted for eight percent of the total responses.

Table 2: Reanalysis of Hofstede's cultural values items with exploratory factor analysis.

Hofstede's original cultural value dimensions and items <sup>a</sup>	New factors		
	Factor 1 <b>Hierarchical Beliefs</b> <sup>b</sup>	Factor 2 <b>Uncertainty Avoidance</b>	Factor 3 <b>Femininity</b>
<b>Power distance</b>			
1. Inequalities among people are both expected and desired. <sup>c</sup>	<b>.61</b>	.20	.14
2. Less powerful people should be dependent on the more powerful.	<b>.75</b>	-.00	.12
3. Inequalities among people should be minimized.	.04	.17	.19
4. There should be, and there is to some extent, interdependencies between less and more powerful people. <sup>d</sup>	.37	.34	.22
<b>Individualism</b>			
5. Everyone grows up to look after him/herself and his/her immediate family only.	<b>.71</b>	.01	.07
6. People are identified independently of the groups they belong to. <sup>d</sup>	.51	-.00	.43
7. An extended family member should be protected by other member in exchange for loyalty.	<b>.65</b>	.07	.19
8. People are identified by their position in the social networks to which they belong. <sup>d</sup>	.49	.40	-.21
<b>Masculinity</b>			
9. Money and material things are important.	<b>.67</b>	.21	-.08
10. Men are supposed to be assertive, ambitious, and tough.	<b>.75</b>	.18	-.06
11. Dominant values in society are the caring for others and preservation.	.21	.20	<b>.78</b>
12. Both men and woman are allowed to be tender and to be concerned with relationships.	-.07	.44	<b>.70</b>
<b>Uncertainty avoidance</b>			
13. High stress and subjective feeling of anxiety are frequent among people.	.05	<b>.81</b>	.16
14. Fear of ambiguous situations and of unfamiliar risks is normal.	.09	<b>.85</b>	.11
15. Uncertainty is a normal feature of life and each day is accepted as it comes.	.06	<b>.82</b>	.21
16. Emotions should not be shown.	<b>.69</b>	-.10	.15

<sup>a</sup> Item scores ranged from 1 (strongly disagree) to 5 (strongly agree).

<sup>b</sup> Total variance explained is 52.33 %. Factor 1, **Hierarchical Beliefs**, explained 25.28 %; factor 2, **Uncertainty Avoidance**, explained 17.09 %, and factor 3, **Femininity**, explained 9.96 % of variance.

<sup>c</sup> N = 788. Cases were excluded listwise. Principal components extraction and Varimax rotation methods were used.

<sup>d</sup> Item deleted due to low and inconsistent factor loadings.

Table 3: Three-cluster solution of cultural values and age via cluster analysis.

	Modernist <sup>3</sup> (n = 287)	Mixed (n = 358)	Postmodernist (n = 230)	F for ANOVA
Hierarchical Beliefs <sup>1</sup>	3.6 <sup>a</sup>	2.9 <sup>b</sup>	2.2 <sup>c</sup>	485.0 <sup>***</sup>
Uncertainty Avoidance <sup>1</sup>	4.0 <sup>a</sup>	3.1 <sup>b</sup>	4.0 <sup>a</sup>	332.1 <sup>***</sup>
Femininity <sup>1</sup>	4.2 <sup>a</sup>	3.0 <sup>b</sup>	4.0 <sup>c</sup>	369.0 <sup>***</sup>
Age <sup>2</sup>	37.7 <sup>a</sup>	34.0 <sup>b</sup>	33.5 <sup>b</sup>	9.8 <sup>***</sup>

<sup>1</sup> Hierarchical Beliefs, Uncertainty Avoidance, and Femininity scores ranged from 1 (strongly disagree) to 5 (strongly agree).

<sup>2</sup> Age in years used as a continuous variable.

<sup>3</sup> Group means sharing different superscripts differ significantly at 0.05 level in a post-hoc Scheffe test.

\*\*\* Significant at the 0.001 level.

Table 4: Comparison of Socio-demographics of Modernist, Mixed, and Postmodernists in the Angeles National Forest.

Characteristics	Values segments			ANOVA & Chi-square tests <sup>3</sup>	
	Modernist	Mixed	Postmodernist		
Gender <sup>1</sup>	Female	37	38	51	$\chi^2_{(2)} = 12.57^{**}$ , Cramer's V= 0.12
	Male	63	62	49	
Household income <sup>1</sup>	Less than \$ 20,000	13	19	14	$\chi^2_{(10)} = 11.32$ , Cramer's V= 0.087
	\$ 20,000 – \$ 34,999	17	16	18	
	\$ 35,000 – \$ 49,999	17	18	14	
	\$ 50,000 – \$ 64,999	16	14	11	
	\$ 65,000 – \$ 79,999	12	12	12	
	\$ 80,000 or more	26	21	31	
Formal education <sup>1</sup>	Not complete high school	3	4	2	$\chi^2_{(12)} = 21.39^*$ , Cramer's V= 0.115
	High school diploma/GED	12	15	8	
	Technical or business school	5	6	2	
	Some college	15	18	20	
	College degree	35	35	35	
	Some graduate work	5	6	7	
	Graduate degree	25	17	27	
Ethnicity <sup>1</sup>	Whites	28	37	55	$\chi^2_{(4)} = 36.49^{***}$ , Cramer's V= 0.150
	Hispanics	35	28	22	
	Asians	37	35	23	
Generation in the US <sup>1</sup>	1 <sup>st</sup> generation	35	37	21	$\chi^2_{(6)} = 22.71^{***}$ , Cramer's V= 0.145
	2 <sup>nd</sup> generation	24	13	23	
	3 <sup>rd</sup> generation	18	14	20	
	4 <sup>th</sup> generation	24	36	36	
Country born <sup>1</sup>	USA	51	60	73	$\chi^2_{(2)} = 24.79^{***}$ , Cramer's V= 0.176
	Outside USA	49	40	27	
Years stayed in the US <sup>2</sup>	Number of years stayed in USA	15.8 <sub>a</sub>	17.5 <sub>ab</sub>	20.1 <sub>b</sub>	$F_{(2, 386)} = 3.76^*$

\* Significant at the 0.05 level, \*\* significant at the 0.01 level, \*\*\* significant at the 0.001 level.

<sup>1</sup> For Chi-square test, numbers reported in cells refer to cell percentages.

<sup>2</sup> Mean with different subscript letter significantly differed at the  $p = 0.05$  level after Scheffe test adjustment.

<sup>3</sup> The number showed in the brock indicated the degree of freedom.

Cramer's V was a measure of association, with values 0.10 or less considered weak, between 0.10 and 0.30 moderate, and 0.30 or higher considered strong.

the Postmodernist group enjoy the National Forest, managers could design recreation facilities and services to better meet the needs of the Postmodernists (e.g., increase safety information and other concerns for females, such as using signs, brochures, or emergency telephones, and the presence of Forest Service officers, rangers, and volunteers); encourage the

use of persuasive, courteous, non-coercive communication that guides visitors while minimizing hierarchical power distance between visitors and Forest Service personnel. Additionally, developing programs that allow visitors to have more friendly and non-enforcement-related interactions with Forest Service personnel may also help reduce cultural values

Table 5: Comparison of perceptions of service quality, satisfaction and behavioral intentions of Modernist, Mixed, and Postmodernists in the Angeles National Forest.

Dependent variable Index/dimension <sup>1</sup>	Modernist		Mixed		Postmodernist		F for ANOVA
	Mean <sup>2</sup>	SD	Mean	SD	Mean	SD	
Service quality index <sup>3</sup>	3.95 <sub>a</sub>	.58	3.64 <sub>b</sub>	.68	3.77 <sub>c</sub>	.57	21.05 <sup>***</sup>
Facilities	3.94 <sub>a</sub>	.59	3.64 <sub>b</sub>	.72	3.80 <sub>a</sub>	.60	17.43 <sup>***</sup>
Service	4.00 <sub>a</sub>	.67	3.72 <sub>b</sub>	.81	3.87 <sub>ab</sub>	.74	11.02 <sup>***</sup>
Information	3.86 <sub>a</sub>	.72	3.50 <sub>b</sub>	.76	3.55 <sub>b</sub>	.75	20.59 <sup>***</sup>
Management	4.02 <sub>a</sub>	.62	3.69 <sub>b</sub>	.74	3.87 <sub>c</sub>	.65	19.12 <sup>***</sup>
Satisfaction index	6.94 <sub>a</sub>	1.4	6.55 <sub>b</sub>	1.5	6.84 <sub>ab</sub>	1.6	5.72 <sup>**</sup>
Behavioral intentions index	4.20 <sub>a</sub>	.54	3.78 <sub>b</sub>	.72	4.01 <sub>a</sub>	.63	34.73 <sup>***</sup>

\*\*Significant at  $p \leq 0.01$ ; \*\*\*Significant at  $p \leq 0.001$ .

<sup>1</sup> Service quality and behavioral intentions index/dimension coded on a 5-point scale from 1 = Strongly disagree to 5 = Strongly agree, while satisfaction index on a 9-point scale from 1 = not at all satisfied to 9 = extremely satisfied.

<sup>2</sup> Mean with different subscript letter significantly differed at the  $p = 0.05$  level after Scheffe test adjustment.

<sup>3</sup> Service quality dimension was created by taking the mean of the service quality items within the same dimension; service quality index, by four service quality dimensions; satisfaction index, by three satisfaction items, and behavioral intentions index, by five behavioral intentions items.

gaps between Postmodernists and officials, leading to enhanced perceptions of service quality and increased customer satisfaction.

Our results suggest several areas where additional research is needed. First, we found limited support for using Hofstede's cross-cultural measure of values in the forest recreation context. The use of Hofstede's measure in the park and recreation context has also been criticized by others. Our findings suggest that there are some degrees of validity to aspects of Hofstede's underlying conceptualization, but additional testing will be needed. Specifically, we suggest testing other measures of cross-cultural values (e.g., Kahle, Beatty, & Homer, 1986) against Hofstede's in this context. Second, in order to ensure obtaining a highly diverse sample, we employed purposive sampling procedures to collect data. This means, of course, our sample was not random, and it is inappropriate to estimate population characteristics from our results. Additional research employing probability sampling will be needed to develop a more complete understanding of patterns of values segmentation in park and recreation and to better understand relationships among cultural values, socio-demographic, and service quality related variables.

## References

- Hofstede, G. (1984). *Culture's Consequences: International Differences in Work-Related Values*. Beverly Hills.
- Inglehart, R. (1977). *The silent revolution: Changing values and political styles among western publics*. Princeton.
- Kahle, L.R., Beatty, S.E. & Homer, P.M. (1986). Alternative measurement approaches to consumer values: The List of Values (LOV) and Values and Lifestyles (VALS). In: *Journal of Consumer Research* (13), p 405-409.
- Madrigal, R. & Kahle, L.R. (1994). Predicting vacation activity preferences on the basis of value-system segmentation. In: *Journal of Travel Research* (32/3), p 22-28.
- Rokeach, M. (1973). *The nature of human values*. New York.

## Estimating Visitor Use with a Photoelectric Counting System: A Calibration Study

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*Keywords: Wilderness use estimation, mechanical counting, calibration, reliability.*

With little or no reliable wilderness use information, managers cannot adequately judge trends of resource condition and visitor use. Such data is essential for assessing visitor impacts to the resource conservation, facilities planning, budgeting, marketing, and visitor management. Government agencies that manage outdoor recreation resources have been slow to recognize the importance of consistently corrected and valid wilderness use data (Loomis 2000). The objectives of this research were to calibrate a wilderness use estimation system and to explain the potential errors coming from the system and from inappropriate visitor traffic behavior.

Researchers designed a Photoelectric Counting System (PCS) that records individual visits. PCS was installed 400 meters down from the main trailhead at Da Wu Mountain, Southern Taiwan. Da Wu Mountain is adjacent to the biggest nature reserve in Taiwan. The PCS is an instrument that includes two scanners that emit infrared beams across the trail. The infrared beams were received on the other side of the trail and the counter advanced each time when an up-hill visitor passed by two scanners. Total count, date, and time to the second of each count were recorded in an electronic log.

Two methods were used to calibrate the counters, cameras and human observers by previous research (Watson et al. 2000). Calibration done by human observers was applied to the study. Observers stationed close enough to the counter so that all traffic activating the counter was observed. In addition, the observers stationed at the hidden place, which makes observation as less intrusive as possible. For calibration purposes, observers recorded four

types of information, including: number of individuals, number of groups, direction of travel, date and time of entry and exit. A quota sampling plan was developed to reflect the fluctuation of visitor number due to monsoon/non-monsoon season and weekday/weekend. A total 30 sampling days were generated to represent the calibration period (246 days). The schedule of human observation was arranged to represent the temporal pattern of visitor use. Furthermore, the time period of human observation could not be too long to prevent fatigue and boredom of observers. Thus, the period of human observation began at 7:30 AM, ended at 15:30 PM in each sampling day, which covered almost 75% of total wilderness use.

This PCS was used successfully in the field. The system produced individual and total visitor count data analysis reports tailored to specific and diverse managerial objectives, such as visitors' frequency distribution per month, visitors' frequency distribution per week day, visitors' frequency distribution per hour. The PCS was set up to count trail traffic; the reliability of counter data was assessed by simultaneous monitoring of trail traffic by human observers. Research results show that high correlation between data recorded by human observers and recorded by PCS ( $r = 0.994$ ). During 30 sampling days, records of 10 days appeared overestimation, records of 11 days appeared underestimation. In addition, 595 groups were recorded during calibration period. 77 groups generated either overestimation bias or underestimation bias. Temporary stops at the middle of two scanners were the source of major error for inappropriate visitor traffic behavior. Consequent down-hill moving intrigued incorrect counts and was a ma-

Table 1: Table of Regression Model: dependable variable-visitor observed, independent variable-PCS counts.

ANOVA					
Model	SS	df	MS	F	Sig
Regression	66821.101	1	66821.101	2136.895	.000
Residual	875.565	28	31.270		
Total	67696.667	29			

Coefficients					
Model	Unstandardized Coefficients		$\beta$	T	Sig
	B	Std. Error			
Constant	-.260	1.518		-.171	.865
X	1.009	.022	.994	46.227	.000

jour error for the PCS. In conclusion, the distance between two scanners should be kept short and the path going through two scanners should be reserved limited space that only allows for one visitor to pass at a time in order to produce more accurate data.

## References

- Loomis, J. B. (2000). Counting on recreation use data: A call for long-term monitoring. In: *Journal of Leisure Research* (32/1), p 93-96.
- Watson, A.E., Cole, D.N., Turner, D.L. & Reynolds, P.S. (2000). *Wilderness recreation use estimation. A handbook of methods and systems.* USDA Forest Service RMRS-GTR-56. Ogden.

# The Road to a Strategic Typology of Visit Itineraries

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*Keywords: Transportation, latent class clustering, behaviour patterns, national parks.*

## Introduction

This paper presents an analysis of travel itineraries to Canada's Mountain National Parks. Its results suggest that new analytic tools can help the science community to address longstanding visitor modelling issues to better understand the outcomes of visitor use in protected areas.

The urban transportation demand literature has been addressing these issues with decades of research to model peoples' temporal and spatial distribution. This literature has long recognised that urban traffic patterns are best studied as myriad individual travel patterns (Kutter, 1973; Meister et al, 2005). This allows the system to be viewed like an ecosystem: complex, non-linear, non-probabilistic, and dynamic, with an array of inter-relationships (McKercher, 1999).

Like natural science, the search for deep-seated patterns can help to define and explain the system. However, the search for ways to find meaningful patterns in travel itinerary data is one of the longest standing issues. Specifically, there has yet to be agreement on the practical approaches that work within the capacity of desktop computers (Kutter, 1973; Joh et al, 2002; Schlich, 2003; Meister et al, 2005, O'Connor et al, 2005). One of the earliest approaches, which predates desktop computers, may offer a useful approach. Kutter's influential 1973 paper called for methods to establish useful behavioural typologies to reduce large volumes of behaviour to a manageable level. If distinct sets of place/activity behaviours exist, this understanding could form the basis for effective system modelling, as subsequent research could study these discreet groups to determine the sequential dimension and develop a rule-based heuristic model of travel behaviour.

## Methods

The purpose of this study is to determine if useful behavioural typologies can be developed for Canada's Mountain National Parks. The analysis uses latent class clustering to search for patterns. Latent class models offer an improvement over traditional approaches to segmentation, cluster, factor, regression analyses, by allowing deeper searches for patterns in diary data (Magidson & Vermunt, 2002). This paper explores "visit type" classification, or common sets of itineraries as suggested by latent class cluster analysis of activity/location "events". It illustrates the example with data from a 2003 survey of 2,376 visitor parties to Canada's Mountain National Parks.

## Results and Conclusion

The results suggest that the visit type approach offers a useful approach to the longstanding issue of reducing complex behaviour and has relevance to the ongoing study of visitor impacts in protected areas. Parks Canada and its partners continue to explore visit type classification to better understand the system of visitor use in its parks, to map visitor use and explore spatial relationships, to develop "behavioural footprints", and to correlate impacts (positive or negative) to visit patterns.

## References

- Joh, C. H., Arentze, T., Hofman, F. & Timmermans, H. (2002). Activity pattern similarity: A Multidimensional Sequence Alignment Method. In: *Transportation Research B* (36), p 385-403.
- Kutter, E. (1973) A Model for Individual Travel Behaviour. In: *Urban Studies* (10), p 235-258.

- Magidson, J. & Vermunt, J. K. (2002). Latent class models for clustering: A comparison with K-means. In: *Canadian Journal of Marketing Research* (20), p 36-43.
- McKercher, B. (1999). A chaos approach to tourism. In: *Tourism Management* (20), p 425-434.
- Meister, K., Frick, M. & Axhausen, K. W. (2005) A GA-based household Scheduler. Proceedings of the 84th Annual Meeting of the Transportation Research Board. January 9-13, 2005, Washington, DC.
- O'Connor, A., Zerger A. & Itami, B. (2005). Geo-temporal tracking and analysis of tourist movement. In: *Mathematics and Computers in Simulation* (69/2005), p 135–150.
- Schlich, R. (2003). Homogeneous Groups of Travellers. Proceedings of the 10th International Conference on Travel Behaviour Research. August 10-15, 2003, Lucerne, Switzerland.
- Wets, G., Vanhoof, K., Arentze, T. & Timmermans, H. (2000). Identifying Decision Structures Underlying Activity Patterns: An Exploration of Data Mining Algorithms. Proceedings of the 79th Annual Meeting of the Transportation Research Board. January 9-13, 2000, Washington, DC.

# Assessing Trail Use Conditions Using Still Renderings and 3D Computer Animation

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*Keywords: Bicyclists, walkers, static, dynamic, 3D computer animation, still rendering, motion, social carrying capacity, character animation.*

## Introduction

Research on crowding and social carrying capacities has become a very important scientific field in the past few years. Many urban recreation areas suffer from a high density of visitors, user conflicts such as between bikers and walkers and diverse visitor behaviours. In order to assess visitor preferences and tolerances as a basis for urban trail management, several studies have been carried out using photos or computer manipulated images. The advantage of image-based approaches is that the effects associated with crowding, especially in high-use situations, are more conducive to present than verbal descriptions. However, static images or photos may have some limitations caused by the lack of information and perceptions visitors would have in the real world, such as motion, sound and smell. This study compares a static research method using still renderings with a dynamic method by means of 3D computer animations.

## Methods

In this study 150 students evaluated 32 still rendering sets, each consisting of two still renderings and 32 3D animation sets also consisting of two ani-

mations. In both methods, static and dynamic, the same three parameters each with three levels were shown. The attributes used for still renderings and animations were the number of visitors, the visitor type and the direction of movement (Table 1). Attached to the visual part of the questionnaire, there were questions about recreation behaviour, recreation specialisation, TV/computer experience and how the test persons felt about the renderings/animations.

The still renderings and 3D computer animations were created in 3d Studio Max. For the environment a retouched digital photo from a real urban park in Vienna was used and put into the scene as a background mapping. The pedestrians and cyclists were modelled with 3D polygon meshes, and mapped with unwrapped UVW mapping coordinates. For the dynamic animations all the persons were rigged. The character animation was defined via footstep animation with adjustments for the walkers, and via free form animation, hierarchical motion connections and path follow constrains for the cyclists. A full factorial design was used. Thus 27 still renderings and 27 computer animations were produced and compiled into 32 choice sets. For the still renderings a typical mo-

Table 1: Attributes and their levels; each still rendering and each 3D animation depicts a different combination of these attributes.

Attribute	Attribute levels			
		4	8	16
Number of visitors				
Visitor types	biker/walker	25%/75%	50%/50%	75%/25%
Direction of movements	towards/away	25%/75%	50%/50%	75%/25%

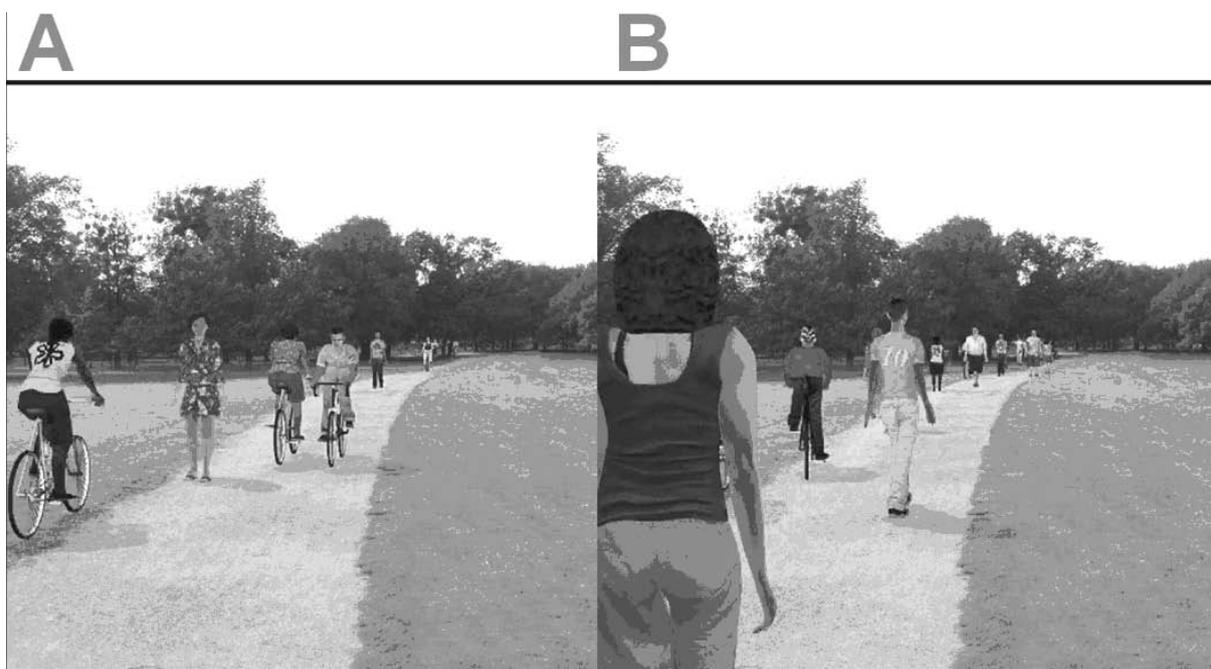


Figure 1: Choice set consisting of two still renderings.

ment of the 20 sec animation strip was extracted and saved as a static slide. The animated filmstrips had 400 frames each and were looped three times when shown to the test persons. Therefore, for each set the respondent had 60 seconds to answer five questions related to the films and still renderings. The students had to choose which scenario of the two they prefer, where they would not walk, ride a bike, or jog anymore, and which scenarios they think are still tolerable. All choice sets were shown in a standardized manner with two video beamers to two different groups at the same time. Each student evaluated eight 3D animation sets and eight still rendering sets.

## Results

The study showed that the evaluation of static versus dynamic scenarios led to different results. In general trail scenarios based on the 3D animations tended to be less preferred by students compared to still renderings.

Regarding recreational activities, in 35% of the scenarios based on still renderings the students would not walk anymore, while this number increased to 38% based on the animations. For jogging and cycling activities only slightly different results were gained. The study also showed that at mid use levels the results for the static and dynamic scenari-

os were rather similar, but at high use densities (16 persons in view) the evaluation differed dramatically. Compared to low use levels, at high use situations animations were over proportionally regarded as more preventing from recreational activities than still renderings.

Across all scenarios, 52% of the still renderings were judged as tolerable. This share decreased to 49% when the same scenarios but in motion were evaluated. In the next step data will be analyzed using multivariate methods (multinomial logistic analysis).

The respondents were also asked about the suitability of the still renderings and animations for the evaluation of trail use scenarios. While for still renderings 54% of the students answered they could place themselves “well” or “very well” into the shown scenarios, for the animations even 60 % answered with “well” or “very well”.

## Study limitations

Even if dynamic 3D computer animations are closer to the real world scenery than still renderings, they are always abstractions of the real situation visitors would find in urban parks. There are still many parameters that could influence the evaluation of the scenarios very strongly (sound, smell, and place).

# Exploring Recreation Diversity in Thailand: A Nation-Wide Study of Nature-Based Recreation Resources and Behavior

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*Keywords: Recreation diversity; nature-based recreation area; Thailand*

## Introduction

Recreation diversity in this study is defined as diversity in key components of the recreation system, including recreation resources, recreation users, and recreation activities. The study explores recreation diversity in 9 types of nature-based recreation areas in Thailand, including waterfalls, rivers and lakes, caves, hot springs, geo-morphological sites, scenic areas, nature trails, islands, and beaches. 1,504 nature-based recreation sites are listed in the country's record. However, no previous study has provided basic knowledge about recreation resources and behavior at the country level. This study was initiated to fill that knowledge gap, as a part of a project entitled "Decision Support System for Sustainable Management Planning of Nature-based Recreation Areas", funded by Thailand Research Fund (Tanakanjana, et. al, 2006). It was completed in September 2005.

## Method

Purposive cluster sampling was used to select the study sites. 119 sites around the country were chosen. These included 27 waterfalls, 10 rivers and lakes, 14 caves, 10 hot springs, 10 geo-morphological sites, 10 scenic areas, 13 nature trails, 10 islands, and 15 beaches. The distribution of the sites is presented in Figure 1. Inventories on basic characteristics of recreation resources were conducted using GPS tools along with other associated tools. The size of the recreation area, the area remaining natural, access conditions, and distance between each site were measured. Site boundaries were identified to cover the location of key resources

such as water body for waterfalls, trail body for nature trails, coral reef area for islands, etc., as well as to cover development area, and 100 meters of natural buffering from the key resources. At each recreation site a survey of users and their behavior was conducted. 1,550 visitors completed the study questionnaires.

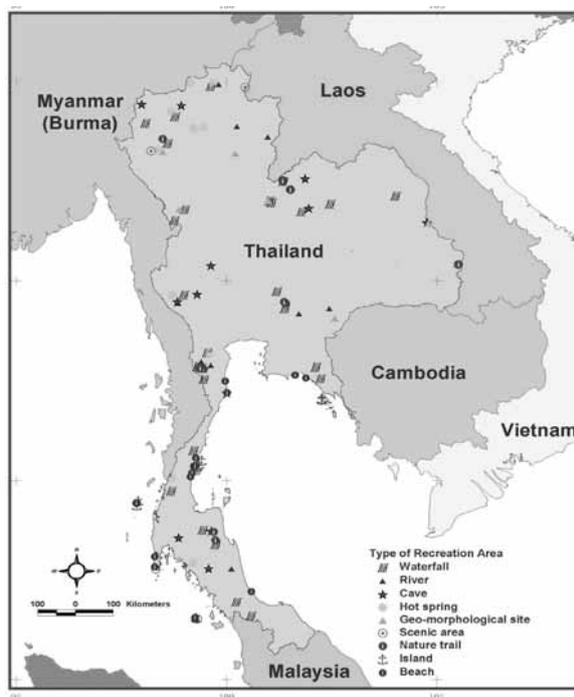


Figure 1: Distribution of the study sites.

## Results

The study found that over 80% of the study sites were situated within the boundaries of protected areas, national parks in particular, where site development and uses were regulated by the government. The majority of the recreation sites were moder-

Table 1: Percentage of natural area and developed area within each type of recreation area (n=119).

Recreation area category	Percentage of natural area	Percentage of developed area
Waterfalls	91.30	8.70
River and Lakes	90.76	9.24
Caves	81.32	18.68
Hot springs	56.97	43.03
Geo-morphological sites	83.32	16.68
Scenic areas	87.61	12.39
Nature trails	94.02	5.98
Islands	99.96	0.04
Beaches	85.08	14.92
Average	85.59	14.41

ate to small in size. The average size of waterfalls was 6,375.57 square meters, rivers and lakes was 7,694,298.77 square meters, caves was 4,262.40 square meters, hot springs was 2,021.25 square meters, geo-morphological sites was 94,401.30 square meters, scenic areas was 8,988.60 square meters, nature trails was 531,052.30 square meters, islands was 3,282,310.80 square meters, and beaches was 95,266.02 square meters. Most areas were preserved in their natural state; the overall average percentage for all types of recreation areas of areas without vegetative alteration and physical development was 85.59%. However, the percentages differed slightly for each type of recreation area, as presented in Table 1.

The access to most recreation areas is by dirt road, making the sites moderately easy to get to, particularly during the dry season (from November to April). The majority of the sites had additional recreation areas situated in a radius of 80 kilometers from the sites themselves (some of which were also included in the study). The average number of additional recreation sites in the radius was 50. Though the natural basic characteristics of recreation resources within each type of recreation area were diverse, site management of most recreation areas was uniform and consistent. Basic facilities such as parking areas, walkways, interpretive signs, trash cans, toilets, etc. were provided to area visitors at almost all sites. Most sites had visitor surveillance and control, and indirect control by interpretive programs, to some degree. The sim-

ilarity of site and user management somehow led to low diversity in the recreation experience that visitors obtain from visiting the sites.

Results from the visitor survey found that the proportion of male and female users was almost equal. Their average age was 30 years and most of them completed a university degree program. The majority of users lived in city areas. Over 50% of them had experience in visiting the site in which they were surveyed before. Most user groups were individual-mass tour groups with an average group size of 10 people (Mean = 10.49; SD. = 12.83). Generally, the diversity in socio-demographic characteristics of visitors to nature-based recreation areas in Thailand was moderate to low.

Recreation motivation or desired recreation experience was another aspect of recreation diversity explored in this study. This was measured with a 5-point rating scale on how important each motivational item is in visiting each site. It was found that the three motivating factors with the highest mean score were motivation for being with nature, with a score of 4.31, motivation for escaping from crowds and noise, with a score of 4.21, and motivation for experiencing the scenic beauty of the landscape, with a score of 4.12. Discriminant analysis found that the mean scores of the 15 motivational items were significantly different among each type of recreation area. For only 3 items, including motivation in cultural learning, motivation in being independent, and

Table 2: Result from Discriminant Analysis related to recreation motivation (n=1550).

Recreation Motivation	Mean (SD)										F	Sig
	Waterfall	Cave	River/ Lake	Hot Spring	Geo-site	Scenic Area	Nature trail	Island	Beach			
1. Being close to nature	4.4070 (.6607)	4.3120 (.7118)	4.2105 (.8108)	4.2892 (.7076)	4.3134 (.6651)	4.1111 (.7774)	4.3868 (.6557)	4.3636 (.6936)	4.2655 (.7240)	2.655	0.007	
2. Experiencing the beauty of the natural landscape	4.1860 (.7131)	4.2160 (.7137)	4.0329 (.8644)	4.0723 (.7930)	4.2388 (.6737)	4.0741 (.8395)	4.2170 (.6620)	4.5152 (.6138)	4.0982 (.7977)	3.339	0.001	
3. Learning about nature	3.4744 (.9393)	3.7040 (.8035)	3.5066 (.8378)	3.6506 (.8473)	3.7164 (.7910)	3.2500 (.9082)	3.7736 (.8868)	3.7727 (.7959)	3.2764 (.9571)	7.376	0.000	
4. Cultural learning	2.9326 (1.0747)	3.1680 (1.0139)	3.0921 (1.0507)	2.9880 (1.0534)	3.0000 (1.0038)	2.8611 (1.0453)	2.9245 (1.1015)	2.9545 (.9834)	3.0436 (.9954)	1.138	0.334	
5. Tranquility and solitude	3.6927 (1.0384)	3.9200 (.9123)	3.6053 (.9708)	3.4578 (1.1614)	3.7015 (.9813)	3.2315 (1.0195)	3.8208 (.9237)	3.5000 (.9806)	3.5273 (.9900)	5.009	0.000	
6. Relaxing in peaceful place	4.0135 (.8806)	4.0800 (.7362)	4.0132 (.8764)	3.8916 (.8836)	4.0672 (.8601)	3.5926 (1.0855)	4.0566 (.8489)	3.7879 (.9530)	3.9527 (.8887)	3.608	0.000	
7. Escaping from crowds and noise	4.3019 (.8289)	4.1520 (.8333)	4.2171 (.8909)	4.0964 (1.0195)	4.2313 (.8309)	3.9167 (.9082)	4.2830 (.7777)	4.3030 (.7640)	4.1782 (.8884)	2.601	0.008	
8. Escaping from routine	3.8248 (.9859)	3.8240 (1.0005)	4.0197 (.9096)	3.6506 (1.0980)	3.7761 (1.0379)	3.7500 (.9285)	3.8774 (1.0208)	4.0909 (.8723)	3.9600 (.9937)	2.134	0.030	
9. Seeking an experience of self-reliance	3.4151 (.9782)	3.7840 (.8761)	3.4079 (.8792)	3.3373 (.9912)	3.4254 (.9125)	3.3611 (1.0184)	3.5094 (1.0071)	3.5758 (.8781)	3.2036 (1.0047)	4.443	0.000	
10. Physical development	3.2803 (.9738)	3.6080 (.9747)	3.0789 (.8730)	3.0964 (1.0195)	3.3209 (1.0307)	3.2130 (.9477)	3.5566 (1.0055)	3.6212 (.9075)	3.0073 (1.0935)	7.606	0.000	
11. Practicing outdoor skills	2.9434 (.9834)	3.3040 (.9691)	3.1184 (.9555)	2.7952 (1.0092)	3.0672 (1.0127)	2.8611 (.9013)	3.0283 (1.0091)	3.3485 (.9363)	2.8764 (1.0177)	4.302	0.000	
12. Adventure and risk-taking	2.9650 (1.1059)	3.5840 (1.0487)	2.8816 (1.0975)	2.6386 (1.1107)	2.8060 (1.1600)	2.7870 (.9477)	3.2264 (.9287)	3.5303 (.8269)	2.6364 (1.1361)	13.164	0.000	
13. Spending time with an intimate friend or family member	3.9650 (.9423)	3.7520 (.9809)	3.6184 (1.0481)	3.7590 (1.0660)	3.7687 (.9880)	3.8333 (.8701)	3.7642 (.9315)	3.7273 (.8329)	3.8873 (.9769)	2.319	0.018	
14. Meeting new people	3.2695 (1.0385)	3.4800 (1.0595)	3.1645 (.9728)	3.4578 (.9410)	3.1194 (1.0336)	3.3056 (.9116)	3.1698 (.9707)	3.3788 (.9243)	3.2109 (1.0529)	1.960	0.048	
15. Visiting new places	3.7520 (1.1498)	4.1680 (.8302)	3.7039 (1.1089)	3.7711 (1.0744)	3.7164 (1.0942)	3.9074 (1.1401)	3.8585 (1.0993)	4.3636 (.7969)	3.6982 (1.1991)	4.637	0.000	
16. Being independent	3.9515 (.9170)	3.8320 (.9816)	3.8421 (.7899)	3.8916 (.9241)	3.8881 (.9312)	3.7778 (.9406)	3.6321 (1.0358)	3.8636 (.8573)	3.8764 (.9662)	1.405	0.190	
17. Convenient and comfortable facilities.	3.5526 (.9526)	3.6960 (.8446)	3.5724 (.8267)	3.6867 (.8253)	3.7239 (.8618)	3.4167 (.8874)	3.5094 (.9685)	3.3485 (.7941)	3.7200 (.8617)	2.770	0.005	
18. Safety	3.7358 (.8946)	3.8320 (.7592)	3.8487 (.8671)	3.8434 (.8763)	3.8433 (.8213)	3.6204 (.8616)	3.8585 (.8216)	3.7727 (.7400)	3.7636 (.8493)	1.063	0.387	

Remark: % of Variance=40.9; Canonical Correlation=.345; Sig=.000

Table 3: Factor loading of recreation motivation (n=1,550).

Recreation motivation	Factor loading				
	1	2	3	4	5
1. Physical development	.837				
2. Practicing Outdoor skills	.796				
3. Adventure and risk-taking	.778				
4. Seeking an experience of self-reliance	.750				
5. Relaxing in a peaceful place		.834			
6. Tranquility and solitude		.831			
7. Escaping from crowds and noise		.707			
8. Convenient and comfortable facilities			.816		
9. Safety			.687		
10. Being with an intimate friend or family member			.557		
11. Being independent			.528		
12. Meeting new people			.471		
13. Experiencing the beauty of the natural landscape				.846	
14. Being close to nature				.697	
15. Learning about nature				.517	
16. Visiting new places				.516	
17. Escaping from routine					-.613
18. Cultural learning					.577

**Remark:**

- Factor 1 = Motivation for physical development and seeking an experience of self-reliance (Eigenvalues = 5.060)
- Factor 2 = Motivation for relaxing, escaping from crowds and noise, and solitude (Eigenvalues = 1.971)
- Factor 3 = Motivation for safety, comfort, and social bonding (Eigenvalues = 1.471)
- Factor 4 = Motivation for experiencing nature and learning (Eigenvalues = 1.323)
- Factor 5 = Motivation for escaping from routine and cultural learning (Eigenvalues = 1.091)

Cumulative % of Variance = 60.652

motivation for safety was there no significant difference found, as presented in Table 2.

However, the overall correlation among each motivational item and type of recreation area was moderate (Canonical Correlation = .345; Sig. = .000). There was not much difference in the motivation of users who visited each type of nature-base recreation area. Recreation motivation or desired recreation experience in this study accounted for 40.9% of variance in the users of each type of recreation area.

Factor analysis was used to group motivation items into domains. It was found that the 18 items of recreation motivation could be grouped into 5 domains. The first motivation domain was motivation for physical development and self-reliance. The second motivation domain was motivation for relaxing, escaping from crowds and noise, and finding solitude. The third domain was motivation for safety, comfort, and social bonding. The fourth domain was motivation for nature experiencing and learning. The last domain was motivation for escaping from routine and cultural learning. The cu-

mulative percent of variance for the 5 factors was 60.65%. Factor loading of each motivation item within each domain is presented in Table 3.

As for recreation activities, it was found that most visitors to nature-based recreation areas engaged in more than one type of recreation activity. The average number of activities engaged in by each individual was 3.89. The type of recreation area with highest average number of engaged recreation activities was islands (5.01) while the lowest number was caves (3.03). The top 5 activities in which visitors engaged were sight seeing, relaxing, taking photos, picnicking, and playing in waterfalls. The percentage distribution of visitors to each type of recreation area, classified by engaged recreation activities, is presented in Table 4. Most activities were general recreational activities that did not require the individual characteristics or the particular resources available at the particular site of recreation. The recreation activity pattern found in Thailand's nature-based recreation areas differed from the pattern found in Western countries (Gartner & Lime, 2000; Haas, 2001).

Findings from this study led to the development of Recreation Opportunity Spectrum of Thailand's nature-based recreation areas. They also contributed to the country's policies related to recreation management. Maintaining recreation diversity becomes a new task to be achieved in the near future. More in-depth research on recreation diversity is also required.

## References

- Gartner, W.C. & D.W. Lime. (2000). *Trends in Outdoor Recreation, Leisure and Tourism*. New York.
- Haas, G. (2001). *Conserving Recreation Diversity: Collaborating Across Boundaries*.  
<http://www.georgewright.org>.
- Tanakanjana, N., Arunpraparut, W., Pongpattananurak, N., Nuampukdee, R., & Chumsangsri, T. (2006). *A Final Report of the Project "Decision Support System for Sustainable Management Planning of Nature-based Recreation Areas"*. A Report Submitted to Thailand Research Fund. Kasetsart University. Bangkok.

# MASOOR: The Power to Know – A Story About the Development of an Intelligent and Flexible Monitoring Instrument

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*Keywords: Agent based modelling, MASOOR, recreation, visitor, nature management.*

## Introduction

Dutch managers of nature areas follow the policy of open nature areas (Ministerie van LNV 2005). In this way they allow people to experience, benefit from and develop an interest in wildlife and geology. This will benefit people's health and allow visitors to experience other valued aspects of visiting the countryside such as tranquillity, open space, fresh air, unpolluted waters and scenery. The last decades the managers are confronted with an increasing amount of visitors. The policy of open nature areas for recreation can conflict with the policy of protecting species in these areas. Decision makers and managers need tools to plan and manage lands to accommodate increasing human use while at the same time, maintaining the ecological integrity of the landscape (Gimblett 2005). The tool should be able to analyze and evaluate biodiversity and recreation integratively (Pouwels et al. 2006). In this paper we focus on the recreation modelling as part of this tool. More specifically, we describe the MASOOR model, an intelligent and flexible model that has been developed for front country situations.

Recreation models: the need for an intelligent and flexible model

In general, a recreation model should:

1. analyze and integrate monitoring data
2. evaluate future plans
3. transfer model results to different spatial scales
4. be flexible to different sites

5. be able to use local knowledge and data

6. be meaningful for stakeholders

Simulation models such as RBSim 2 (Itami et al. 2000, Lawson et al. 2002), Wilderness area Simulation Model (Wagtendonk 2004), Extend (Lawson et al. 2003) and GCRTSim (Roberts et al. 2002) have been developed, specifically to establish the optimum level of use of a wilderness area with regard to crowding. These models have been applied to back country areas in Australia and USA that have an extensive or moderate path density. As a result, they often use 'typical travel itineraries' (Arrowsmith & Chhetri 2003). However, in urban societies like the Netherlands, nature areas have a large recreational accessibility and a high path density. Although some visitors will follow 'typical trips', a large percentage will choose their route on other aspects like landscape characteristics (vegetation, diversity), path characteristics, and crowding (Hull & Stewart 1995, Tahvanainen et al. 2001). This raised the need for an intelligent and flexible model in which agents are able to make a lot of choices (Elands & Marwijk 2005).

Spatial-agent based models linked directly to geographical information systems hold great promise for studying complex systems such a wildlife population dynamics, human behaviour, traffic flows and other phenomena (Gimblett 2005, Itami & Zanon 2003). We explored several types of simulations in ecological applications in population dynamics and dispersion models (Verboom 1996; Vos et al. 2002) before developing a recreational model. Pedestrian movement models have been

developed since the 1970s. Recent developments in modelling techniques, and especially advances in agent based simulation, artificial intelligence and robotics, open up the possibility of developing integrated and complex models.

## MASOOR

The MASOOR (Multi-Agent Simulation Of Outdoor Recreation) model is an agent-based model that focuses on the simulation of the behavioural aspects of recreational movement in natural areas.

In the model, we adopt a holistic, agent based approach to the individual movement of recreational users. An agent is an identifiable object in the computer's memory, which is autonomous, and goal-directed (Hayes 1999). Agents are autonomous in that they are capable of effective independent action, and their activity is directed towards the achievement of a defined task or goal. In our case the agent is spatially located and aware of its location. The main task for our agents is to navigate through a network of paths and to achieve one or more recreational goals (such as visiting a certain attraction, or walking for 2 hours).

The navigational implementation of the agents is adopted from artificial intelligence robotics, in the form of a Nested Hierarchical Controller. This allows us to build a modular framework that simulates behaviour on different geographical scales. The framework consists of a movement control module and a 'world model' (see figure 1). The world model is spatially explicit and directly linked to a GIS.

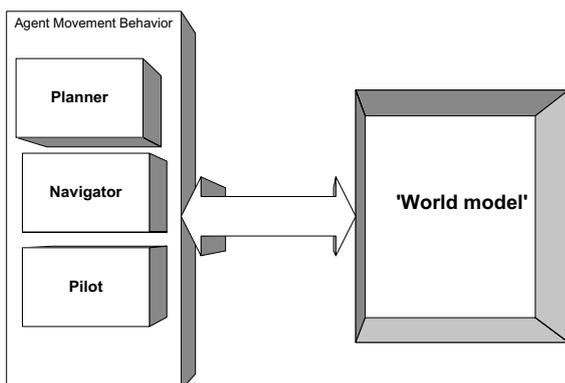


Figure 1: The framework of MASOOR.

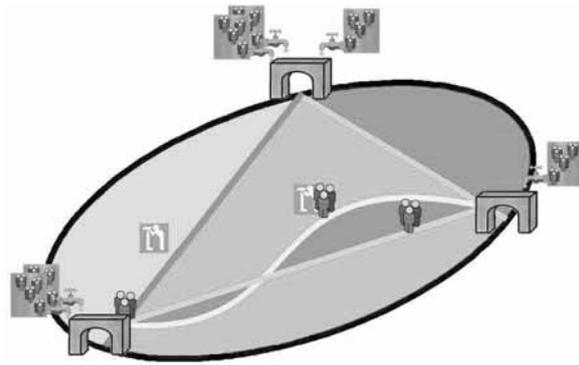


Figure 2: Graphic representation of a network.

### The world model

We treat the environment or natural area as a fixed and closed system with a limited number of fixed entry points. Typical gates are car parks, village centres and railway stations. These gates are projected on the nodes of a track network. Recreational agents are arriving in the modelled area at the gates. Each gate can contain one or more sources that release the different agent types, with their own arrival distributions, simultaneously into the simulation (see figure 2).

The individual tracks in the network are used by the agents to 'walk' along, and are attributed for their surface type, attraction and other characteristics. These attributes make it possible to select paths that specific types of agents prefer. In some phases agents choose an attraction as a distant goal. These attractions can be presented as the nodes of the network, like a pub or tea room, or in the form of a grid, representing an attractive area.

### Agent movement behaviour

The logic of the movement control module is based on a Hierarchical control system commonly used in robotics and intelligent agents (e.g. Kronreif & Furst 2001). This system is divided in three sub modules: planner-navigator-pilot.

1. The planner in MASOOR selects attractions and other global goals to achieve. It also keeps track of the time spent, and will change the phase<sup>1</sup> if required.

<sup>1</sup> The modular framework provides a flexible way to implement different types of agents. The simplest implementations use three phases in the agent's visit to the recreational area. In the first phase the agent is entering the area and leaving the entrance. In the second phase the agent has a more exploratory behavioral characteristics, it is browsing around in the more attractive areas. In the last phase the agents is making its way back to the entrance.

2. The navigator converts the results of planning to an increased level of resolution by adding additional information and setting the limits for the pilot.

3. The pilot implements the results of navigation and transforms the abstract commands of the navigator into actual movement selections. The navigator leaves a number of alternatives for the pilot. The pilot is able to make a choice between the different alternatives by using a composite of simple rules. The results of those rules are evaluated by using multiple criteria analysis and by applying a fuzzy selection algorithm.

Each of these systems is operating on its own geographical scale. In the dynamic operation of the model, agents use the three levels of behaviour to navigate and find their way around the network. We assume one or more phases in the agent's visit. In each of those phases the goals and behaviour are adjusted.

## Applications and future developments

MASOOR is still being in development. The application of MASOOR in a number of case studies:

- Wadden Sea Area (2003)  
Pilot study, goal: development of behavioural rules
- Veluwe (Grobben 2004)  
Pilot study, goal: stakeholder acceptance
- Dwingelderveld (Elands et al. 2005)  
Academic study, goal: developing parameters recreation and nature quality
- PROGRESS (Henkens et al. 2006)  
Implementation study in New Forest and Fontainebleau, goal: planning, future scenarios and visitor management.

Future developments of MASOOR include:

- Calibration of the model using GPS data
- Establishing links to regional and national scale models such as FORVISITS (Henkens et al. 2005)
- Developing rules of thumb for national models

## References

- Arrowsmith, C. & Chhetri, P. (2003). Port Campbell National Park: Patterns of Use. A report for the development of a visitor typology as input to a generic model of visitor movements and patterns of use. Melbourne.
- Elands, B. & Marwijk, R. v. (2005). Expressing recreation quality through simulation models: useful management tool or wishful thinking? (Paper presented at the 11th International Symposium on Society and Natural Resource Management, June 16-19, Östersund, Sweden ed.). Wageningen.
- Elands, B., Marwijk, R. v., Jochem, R., Pouwels, R. & Boer, T. A. d. (2005). Natuur in Nederland: recreatie en biodiversiteit in balans. Een modelstudie naar recreatiekwaliteit. Wageningen.
- Gimblett, H. R. (2005). Modelling Human-Landscape Interactions in Spatially Complex Settings: Where are we and where are we going? Paper presented at the MODSIM 2005 International Congress on Modelling and Simulation, Modelling and Simulation Society of Australia and New Zealand, December 2005.
- Grobben, M. S. (2004). Networks in the heart of the Veluwe: A participative scientific method for balanced function combination of nature and recreation in and around nature areas (Alterra-rapport 997). Wageningen.
- Hayes, C. C. (1999). Agents in a nutshell—A Very Brief Introduction. In: IEEE Transactions on Knowledge and Data Engineering (11/1), p 127-132.
- Henkens, R. J. H. G., Jochem, R., Pouwels, R. & Visschedijk, P. A. M. (2006). Development of a zoning instrument for visitor management in protected areas. In: Siegrist, D., Clivaz, C., Hunziker, M. & Iten, S. (eds.) (2006). Exploring the Nature of Management. Proceedings of the Third International Conference on Monitoring and Management of Visitor Flows in Recreational and Protected Areas. University of Applied Sciences Rapperswil, Switzerland, 13-17 September 2006. Rapperswil.
- Henkens, R. J. H. G., Vries, S. d., Jochem, R., Pouwels, R., & Reijnen, M. J. S. M. (2005). Effect van recreatie op broedvogels op landelijk niveau : ontwikkeling van het recreatiemodel FORVISITS 2.0 en koppeling met LARCH 4.1. Wageningen.
- Hull, R. B. & Stewart, W. P. (1995). The landscape encountered and experienced while hiking. In: Environment and behavior (27/3), p 404-426.
- Itami, R. M., MacLaren, G. S., Hirst, K. M., Raulings, R. J. & Gimblett, H. R. (2000). RBSIM 2: Simulating human behavior in National Parks in Australia. Integrating GIS and Intelligent Agents to predict recreation conflicts in high use natural environments. Paper presented at the 4th International Conference on Integrat-

- ing GIS and Environmental Modeling (GIS/EM4): Problems, Prospects and Research Needs, Banff, Alberta, Canada, September 2 - 8, 2000.
- Itami, R. M. & Zanon, D. (2003). Visitor Management Model for Port Campbell National Park and Bay of Islands Coastal Reserve: Phase 2 Simulation. Brunswick, Victoria Australia: GeoDimensions Pty Ltd.
- Kronreif, G. & Furst, M. (2001). TCP-based communication for task oriented programming and control of heterogeneous multi-robot-systems. Paper presented at the International Symposium on Robotics, Seoul/Korea.
- Lawson, S. R., Itami, B., Gimblett, R. & Manning, R. E. (2002). Monitoring and Managing Recreational Use in Backcountry Landscapes Using Computer-Based Simulation Modeling. Paper presented at the Workshop: Travel Simulation Modeling for Recreation Planning, Rovaniemi, Finland.
- Lawson, S. R., Manning, R. E., Valliere, W. A. & Wang, B. (2003). Proactive monitoring and adaptive management of social carrying capacity in Arches National Park: an application of computer simulation modeling. In: *Journal of Environmental Management* (68), p 305-313.
- Pouwels, R., Elands, B. & Opdam, P. F. M. (2006). Integrating Recreation and Biodiversity in Urban Societies: Goals, monitoring and modelling approaches at different scales. In: Siegrist, D., Clivaz, C., Hunziker, M. & Iten, S. (eds.) (2006). *Exploring the Nature of Management. Proceedings of the Third International Conference on Monitoring and Management of Visitor Flows in Recreational and Protected Areas*. University of Applied Sciences Rapperswil, Switzerland, 13-17 September 2006. Rapperswil.
- Roberts, C. A., Stallman, D. & Bieri, J. A. (2002). Modeling complex human–environment interactions: the Grand Canyon river trip simulator. In: *Ecological Modelling* (153), p 181–196.
- Tahvanainen, L., Tyrvaïnen, L., Ihalainen, M., Vuorela, N. & Kolehmainen, O. (2001). Forest management and public perceptions: visual versus verbal information. In: *Landscape and Urban Planning* (53), p 53-70.
- Verboom, J. (1996). *Modelling fragmented populations: between theory and application in landscape planning* (PhD thesis) (Vol. 3). Wageningen, The Netherlands: Forestry and Nature Research (IBN–DLO).
- Vos, C. C., Baveco, H., Chardon, P. & Goedhart, P. (2002). The role of habitat heterogeneity on dispersal in agricultural landscapes. In: *Landscape Ecology* (submitted).
- Wagtendonk, J. W. v. (2004). Simulation modeling of visitor flows: where have we been and where are we going? In: Sievänen, T. et al. (2004)(eds.). *Policies, Methods and Tools for Visitor Management – Proceedings of the Second International Conference on Monitoring and Management of Visitor Flows in Recreational and Protected Areas*, June 16-20, 2004, Rovaniemi, Finland. Rovaniemi.

# Monitoring Commercial Operators' Movements in Terrestrial and Marine Protected Areas in Australia: A Review of Challenges for Emerging Technologies

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*Keywords: Commercial operators, monitoring, vehicle tracking, GPS, issues.*

## Introduction

Recent work by Wardell and Moore (2004) on visitor monitoring systems for national parks found that most Australian park agencies relied on traditional, unsophisticated yet robust sampling technology for capturing visitor data in the field. These technologies included mechanical (and occasionally digital) car counters, walking trail registration log-books, localised surveys and visitor questionnaires, entrance fee records, and web-based surveys. Recently, some park agencies (e.g. CALM WA) started to introduce a limited number of GPS-based vehicle tracking systems for marine operators (Shark Bay NP).

The majority of these technologies provide only spatially or temporally limited information about visitor movements within protected areas. Without more detailed and long-term data, management planning decisions are based on managers' perceptions and influenced by external and financial and political pressures (Pitts and Smith 1993). Planning based on predominantly subjective observations can become problematic when trying to find the most efficient solution for striking a balance between conservation and visitor recreation.

The advent of inexpensive, mass-produced IT-based tracking and communication devices has opened a range of opportunities for developing solutions that would allow ongoing, automatic and remote collection of visitor movements in protected areas. In Australia, the initial focus for such technology is on commercial tour operators. Currently, the vast majority of commercial tour providers legally op-

erating in National Parks and other relevant protected areas have to apply for a time-limited permit under relevant nature conservation statutes (Buckley et al. 2001). In some areas, they also have to collect and pay entrance fees (e.g. Kosciusko National Park, Snowy Mountains) or an environmental management charge (EMC, Great Barrier Reef) for their clients on a per capita and day basis. This provides mostly reliable information about the general commercial use of these areas, but very little data in terms of individual sites targeted by these operators. Some national or international icon sites or sites with special recreational infrastructure (e.g. diving pontoons) are firmly incorporated on itineraries of larger companies (e.g. Quicksilver, Aries (glow worm tours – Natural Bridge, CERRA)) and are visited daily, unless weather conditions impose such risks to call for a cancellation of the entire trip. In these cases, visitor fees would provide a good indication about some aspects of commercial usage of sites within protected areas.

Australia, however, has many protected areas that provide visitors with self-drive or smaller guided tours and, therefore, opportunities to select from a number of sites for their visits' itineraries. Fraser Island, the bareboat charter industry in the Whitsunday Islands and most national parks in the Australian Outback are typical examples. Many of these tours also encompass overnight stays (camping, anchoring) which tend to have greater localised impacts than short sight-seeing visits. Other types of operators without any site-specific itinerary include megafauna viewing charters, dive charters, and estuary and deep sea fishing tours.

Table 1: Vehicle tracking concepts and examples of existing technology.

Technological principle	Basic requirements	Examples	Objects
A) location restricted/dependent			
1.) sensing of signals emitted by object (movement/optical)	a 'natural' signal emitted by the object of interest strong enough to allow detection against background signal / 'noise' (and natural variations in background signal)	track counters (digital, ground vibration), wireless sensor networks (WSN) with motion detection motes, vis-video surveillance, infrared image analyses, . . . .	Visitors on foot, vehicles (engine heat)
2.) detecting reflection of signals emitted from a base station (pinging)	detection of a reflection of a unique (strong) signal (often coupled with information from transponder)	military or commercial radar (commercial aircraft and vessel traffic surveillance systems, speed radar), sonar (U-boat or mine detection, fish finder, etc.)	Vehicles
3.) detection of specific transponder signal (tagging)	some type of unique ID tag (actively or passively transmitting object info) to be fixed to object of interest, and one or several local receivers (beacons or base stations) to detect presence / position of ID tag	RFID tags, swipe cards, toll bridge systems, mobile phone / PDA tracking, vehicle location systems, aircraft transponder . . . .	Visitors and vehicles supplied / fitted with tags
B) location unrestricted/independent			
GPS-based	access to GPS signal (satellites) and mechanisms for data storing and/or data transmission to central processing unit.	fleet (vehicle, trailer, container) management systems, fishing vessel tracking (QFS BNE), truck toll system for German highways . . . .	Visitors and vehicles supplied / fitted with GPS receivers and data logging and/or data transmission devices

The majority of these operators rely on vehicles which can be tracked by a range of technologies, including magnetically or electrically coupled RFID tags, E-tags (microwave transponders) and their relevant readers linked to a central database for cross referencing, mobile phone field strength readings, fleet management systems, recently developed GPS-based highway toll collect systems, and even military battlefield combat ID systems (BCIS). The successful application of any of these systems is determined by their costs, which include

- production and installation of the transponder and 'interrogator' devices (incl. development or adaptation, applicability),
- supply of power to various system elements,
- reliability of position information and spatial resolution under problematical field conditions (dense canopies, deep gorges, etc.),
- the object to be monitored,

- transmission of collected information to a data processing centre, and
- maintenance and 'half-life' of all equipment under field conditions in remote areas.

## Methods

This paper tries to determine a range of robust, cost-effective and adaptable systems for monitoring commercial tour vehicles in protected areas in Australia based on the above criteria, a review of functional and technical (hardware, data capture and transfer, wireless communication) aspects of current object (vehicle) tracking technology, and spatial aspects of tour operations in Australia (e.g. the location of national parks in Australia in relation to major tourism nodes and mobile phone networks (coverage of existing and emerging systems: CDMA, GSM, 3G)). Additional feedback from consultations with a range of PAMs, oper-

ators and vehicle tracking system managers (e.g. the Vessel Monitoring System (VMS)), was used to further identify some of the challenging legal and data management aspects and constraints of such visitor monitoring systems.

## Results

From a VMS point of view, commercial operations in PAs can be subdivided into guided tours and self drive tours using hired vehicles. Both commonly require a license issued by PAMs under relevant nature conservation legislation, which, in theory, enables managers to require implementation of a VMS. The range of vehicles used by commercial operators for providing access to PAs in Australia include cars, 4WDs, minibuses, campervans, buses and trucks and also any type of vessel (aircraft are not included as they are already closely monitored through air traffic control systems). In theory, there are three principal concepts of vehicle tracking technology (table 1).

Technologies listed under A1 – A3 were not considered further as candidates for widespread implementation: they were either expensive (A2), limited to short distances (A3, passive ID tags), heavily service-reliant (A3, energy supply and maintenance to tag readers), not capable of identifying individual (unique) objects (A1, track counters), or considered too intrusive (A1, video surveillance – object tracking).

In the Australian context, GPS-based vehicle tracking systems were regarded as the most promising solution for collecting more detailed information about visitor movements in terrestrial as well as marine PAs in Australia:

- most of its vegetated areas are eucalypt dominated, dry sclerophyll communities with open canopies and good GPS reception;
- all areas have mostly good GPS satellite coverage;
- most tourism hotspots in PAs are isolated (even data subject to a GPS error of 100m would still allow identification of the actual route(s) taken);
- independent of local sensor equipment, the same technology can be used for terrestrial as well as marine areas;

- well proven and developed technology (transport and logistics industry);
- ongoing reduction in costs for system hardware (on board units) and data transfer (via mobile phone network).

GPS-based VMS can be implemented using a variety of already existing hardware modules. These range from portable, handheld GPS-assisted PDAs to hardwired specialised onboard tracking units (Figure 1). All systems will require some post-event processing on one or several servers using special ‘back-end’ software for producing a range of relevant reports depending on the specific information needs of each end user. Whether these systems can provide real-time location and status information or only post-event data depends on cellular phone network coverage (data transfer via satellite, e.g. Inmarsat C, is generally cost prohibitive). Online real time vehicle tracking systems (VTS) are already in use for public transport providers (municipal bus company, Perth) and large mining and truck companies. A visual analysis of GIS overlay data (see maps in Appendix) of mobile phone coverage in Australia, however, suggests that the majority of VTS for PAs, if implemented, will only provide post-event data collection systems.

Another key element of most VTSs is their capability of accepting additional data input (usually relating to vehicle performance), which can be extended to record the number and type of visitors or clients carried on each trip, possibly even by tapping into the operators’ business system via a Bluetooth connection. Another alternative would be post-hoc processing of data packages with trip details and a unique ID number at the backend VTS server and its data processing software. A simple GIS overlay analysis with areas or nodes attracting fees in individual parks can then be employed to automatically generate charges on a per visitor and per site basis. The backend system can be further extended to link with automatic pay systems so that payments for charges created by the VTS can be electronically transferred to the relevant conservation management agencies (similar to already existing road toll collect systems in Europe and Australia).

A further encouraging aspect for developing VTS-based visitor monitoring systems in Australia is the recent implementation of industry-wide stan-

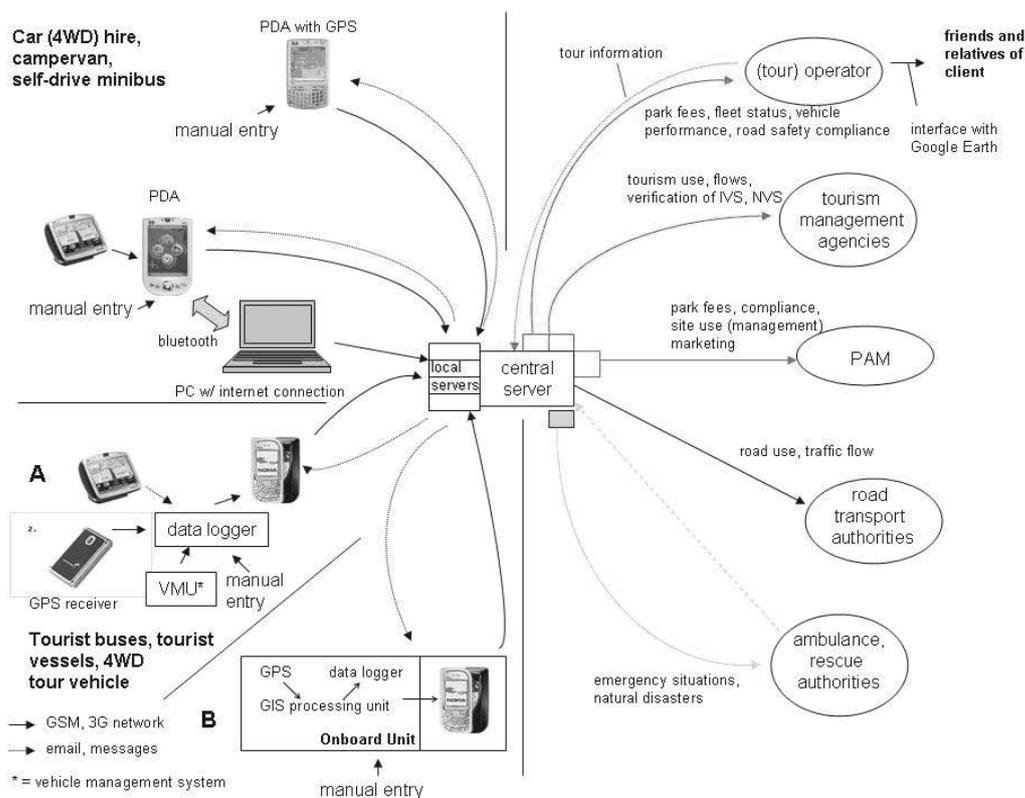


Figure 1: Hardware and server components for vehicle tracking systems.

dards for data collection, management and security by VTS providers under the Transport Certification Authority's (TCA) Intelligent Access Program (IAP) in 2005<sup>1</sup>. In other terms, most technical issues with VTSs are already largely solved or can be solved by using off-the-shelf hardware and software available for other applications, mostly in the transport sector.

There are, however, a number of constraints for implementing a VTS-based tour operator monitoring system in Australian PAs. These are linked in the first instance to data ownership, existing licence and entry fee structures (reflecting the variety of philosophies of PAMs about user pays systems), and the general mindset about the so-called 'big brother' syndrome of the system's key stakeholders: PAMs, operators, visitors and the general public.

The first and foremost issue relates to ownership of the positional data that would be generated by the VTSs. In the first instance, operators should be entitled to receive data about their own movements on a per trip or per week, month or year basis as

part of the lease agreement with their VTS service provider. Where implementation of a VTS is prescribed as part of an operational condition of a licence or permit required and issued by PAMs, the licence provider should also be enabled to extract all data relating to its licencees free of charge, especially for compliance monitoring. In this case, operators would be required to agree to such data transfer as part of their licence conditions. The set of questions associated with data ownership becomes more complex when management agencies (e.g. road transport authorities or state tourism management and marketing agencies) interested in traffic and visitor flows wish to access VTS data:

- whether and to what extent can these data be released (and in what format) with or without permission of the operator,
- whether fees can be charged, and if, how should such payments be distributed between the VTS service provider and the PAM agency,
- who will be held responsible for insuring that such data are safely stored and not being released for wrongful purposes?

Based on feedback from current operations, these things have not been fully considered in the Australian VTS landscape.

<sup>1</sup> National Transport Commission (Model Legislation – Intelligent Access Program) Regulations 2005 (Cth).

Another aspect of PA management in Australia complicates matters further: each State and Territory has passed its own jurisdiction for setting licence and entry fees under nature conservation legislation<sup>2</sup>, or for road maintenance, use and management under transport legislation. This requires more work and, more importantly, much more consultation to develop and implement a national data capture and data filter (backend) system to reduce costs and improve efficiency. Without such a national system, other users of PAs (self-drive tourists using hire vehicles or private users) are less likely to adopt VTSs for automatic payment of park fees.

One of the key constraints for a VTS-based visitor monitoring system is the currently low or very low licence and park-entry fees. In Queensland, for example, use of National Parks by non-commercial visitors does not attract a fee at all. The EMC for visiting the Great Barrier Reef, on the other hand, has been set at AUD 4.50 per person per day for most operations. There are also no fee structures in the current systems that take into account the environmental sensitivity, managerial effort or operational expenses within individual parks. Costs for leasing a VTS (hardware, communication, and server support) are currently around AUD 100-150.- per vehicle and month. VTS not only provide visitor monitoring data and deliver fees, they also provide means for compliance monitoring (hard-wired systems only). A full cost benefit analysis including all these aspects has yet to be undertaken in the Australian context.

One of the biggest hurdles for implementing any visitor monitoring system in Australia is the nationwide objection against any form of governmental control, monitoring and surveillance. Typical examples are common road safety enforcement technologies such as red light and speed cameras and even driver's licence demerit point systems in different states. These were either introduced much later than for example in Europe or, in regard to demerit points, are not fully cross-linked between States. A driver with a Queensland licence who was caught speeding in NSW will have to pay his/her fine, yet the accompanying deduction in demerit points will not necessarily be recorded in

Queensland. Other examples include the slow uptake of remote sensing technologies for monitoring land clearing and other agricultural practices, despite Australia's nearly ideal environmental conditions (e.g. generally low cloud cover and flat, sparsely vegetated terrain).

## Conclusions

Australia's vast and empty landscapes and, in most areas, its thin population base present an excellent case for introducing an efficient and effective GPS-assisted, VTS-based system for monitoring and surveying movements of visitors on commercial tours using PAs. Based on this first qualitative scoping study, the key impediments to introducing such sophisticated visitor monitoring technology are, in the first instance, legal aspects of data ownership, the complex nature of Australian nature conservation legislation, and ultimately and most importantly, the general resistance of key stakeholders to anything related to the 'big brother' concept of ongoing, remote surveillance.

## References

- Wardell, M.J. & Moore, S.A. (2004). Collection, storage and application of visitor use data in protected areas (Guiding principle and case studies). Sustainable Tourism Collaborative Research Centre (STCRC) Technical Report Series, STCRC, Gold Coast, Australia.
- Pitts, D. & Smith, J. (1993). A visitor monitoring strategy for Kakadu National Park. Tracks to the Future: Managing Change in Parks and Recreation: Royal Australian Institute of Parks and Recreation National Conference, Cairns, Queensland, Sept. 1993, RAIPR, Dickson, ACT, Australia.
- Buckely, R.C., Witting, N. & Guest, M. (2001). Managing People in Australian National Parks Vol 2: Commercial Operations Management. Sustainable Tourism Collaborative Research Centre (STCRC) Technical Report Series, STCRC, Gold Coast, Australia.

<sup>2</sup> e.g. Environmental Protection (Biodiversity Conservation) Act 1999 (Cth), Nature Conservation Act 1992 (Qld), National Parks and Wildlife Act 1974 (NSW), National Parks and Wildlife Act 1972 (SA).

# Spatio-Temporal Variations of Visitors of Recreational Shellfish-Gathering at an Artificial Beach in Tokyo Bay

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*Keywords: Shellfish-gathering, Uminokouen, Ruditapes philippinarum, image analysis, video camera, visitor impact.*

## Introduction

The Uminokouen is an artificial sand beach located in Tokyo Bay, Japan. A significant number of the people visit this park for shellfish-gathering (seashell-digging) every spring. The present study focuses on the time variations of spatial structure of visitors of recreational shellfish-gathering in the Uminokouen. Field observations using video cameras are conducted and an image analysis technique is applied to quantify the distribution of visitors and to clarify affectors of human procedure in the intertidal zone during the shellfish-gathering.

According to the image analysis, it is found that the people move to more shallow areas appearing in ebb tide as time goes on and it seems that the human procedure during the shellfish-gathering is mainly affected by the tidal condition and topographic features.

The Uminokouen is a shallow artificial sand beach located in Tokyo Bay, Japan, as shown in figure 1. The width of the ebb tide beach from the shore line is approximately 120 m. The dominant species in the intertidal zone is the short-necked clam (*Ruditapes philippinarum*). People can enjoy shellfish-gathering freely in the beach. The high season of the shellfish-gathering is in consecutive national holidays around the beginning of May, as shown in figure 2. Due to this recreational shellfish-gathering, the clam resource is drastically decreased after this season every year (Kudo 2002). Fortunately, the

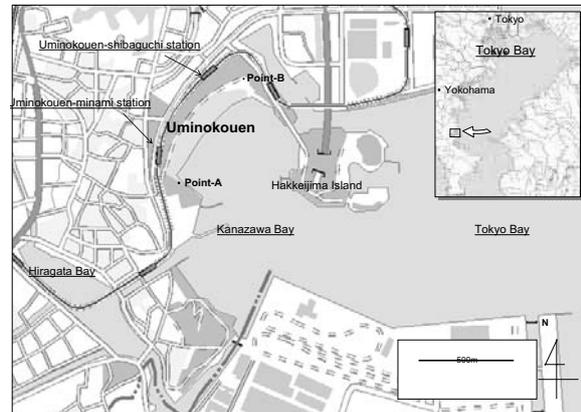


Figure 1: Observation site "Uminokouen".

clam resources have recovered naturally so far. However, there is a possibility that destruction of natural clam resources will occur if such shellfish-gathering is continued. Therefore, it is necessary to quantify the visitor impact of the shellfish-gathering to the clam resources.



Figure 2: Photograph of the shellfish-gathering in the Uminokouen at 9:56 May 8, 2005, which was taken from point-B shown in Figure 1.

Hence, this study focuses on the spatio-temporal variations of visitors during shellfish-gathering in the Uminokouen and an image analysis technique using video camera is applied to quantify the visitor impact and to clarify affectors of human procedure during the shellfish-gathering.

## Methods

The field observation was carried out on May 3, 2003. Semidiurnal tide was most predominant and the low tide time was 12:00 pm in the period. Two video cameras were installed at point-A, as shown in figure 3. The left side video camera was fixed in

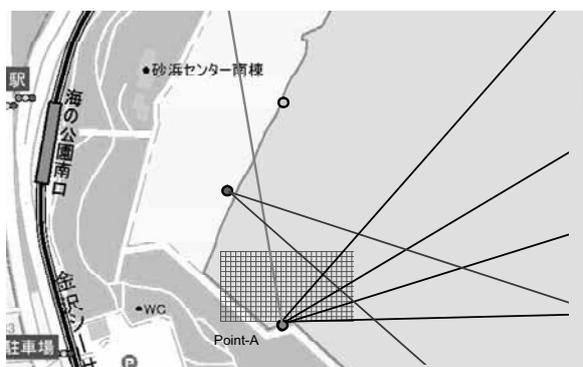


Figure 3: A spatial grid for spatial positioning.

a northern direction. On the other hand, the view direction of the right side video camera was not fixed due to follow the time change of distribution of people. A spatial grid was set near the point-A for spatial positioning, which is denoted by red lines in figure 3. The resolution of the grid is 5 m x 5 m in the horizontal plane. The grid was converted from the ground coordinate to the image coordinate of the video camera, calculated by the collinearity equation. After that, the figure of the converted grid was put on a captured video image using a image processing software to count the number of shellfish-gathering people and identify the land differences in every grid cell.

## Results

Figure 4 shows the time change of the landscape recorded by the two video cameas and the distribution of the observed shore line and counted heads in the rightward figure. In the

rightward figure, a wet ebb tide beach area is colored brown, a dried ebb tide beach area is colored yellow and a undersea area is colored blue, and a number of shellfish-gathering people are also plotted on the grid points. According to these figures, it is found that the people move to a shallow area appearing by change of tide level, which denoted by brown color. Therefore, it is found that the water depth is a strong affector of the human procedure during the shellfish-gathering. It is interesting that the human procedure during shellfish-gathering is not decided only by the distribution of the short-necked clam resource. In addition, an aerial photo which was taken at low tide on May 8, 2005, as shown in figure 5, was analyzed using the method described above to clarify the distribution of people in the whole area of the Uminokouen. According to the results, the people distributed in the intertidal zone widely and there were relatively few numbers of people at the central area of the park. One can consider that it occurred because the water depth at the central area of the park is relatively deeper than south and north side and this place is away most from the car parks and the stations. Moreover, there are few people in dried area of ebb tide beach. Consequently, one may consider that the tidal condition and topographic features are the main affectors of the human procedure during the shellfish-gathering in the beach.



(a) at 10:00



(b) at 12:00



(c) at 14:00



(d) at 15:00

Figure 4: Video pictures by two video cameras with the converted grid, and the diagram of counted heads and the observed shore line at every grid cell.



Figure 5: Aerial photo which was taken at low tide in May 8, 2005 provided by The Mainichi Newspapers Co., Ltd.

## References

- Kudo, K. (2002). The comparison of biological productivity between a natural beach and an artificial beach. *Kouseisya-kouseikaku. Role of Fisheries in Environmental Management and Remediation*, p 71-85. [in Japanese].

Visitor / User Conflicts and other Behavior Studies

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Norman Backhaus (Chair)

# Assessing User Conflicts in an Urban Forest by Long-Term Video Monitoring

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*Keywords: Bicyclists, children, conflicts, urban forest, user behaviour, use levels, video monitoring, Vienna.*

## Introduction

Urban forests suffer from intense use and multi-use activities by fast and slow moving visitors such as bicyclists, joggers and walkers and are affected by inappropriate visitor behaviours such as releasing the dog from the leash. Therefore, user conflicts might be very likely to occur, in particular at heavily used main access points. Information about the kind and amount of user conflicts occurring during the year would assist area administration in forest management.

## Methods

Long-term data on user conflicts were collected in an inner urban forest, which is situated in the south of Vienna, Austria. The inner urban forest of 120 hectares provides about 14 km of forest roads, gravel trails and many footpaths. Cycling is permitted only on two trails, and dogs are allowed, but must remain on a leash.

Video monitoring was undertaken at three main multi-use access points over a period of one entire year (2002-2003), daily from dawn to dusk (Arnberger 2006). Each monitoring unit consisted of a weatherproof black-and-white video camera and a time-lapse video recorder. In order to avoid vandalism and to allow for unobstructed observations, the cameras were hidden in nesting boxes. The cameras were installed on wood-poles about four meters above ground, or on roofs of buildings. The time-lapse video recorders captured single images at fixed intervals of 1.6 seconds over the entire day. With the type of video camera installed and

its specific setting, it was impossible to identify individuals in the video images, ensuring anonymity of the subjects. To reduce analysing costs, only 20 minutes of observations per each hour of the year were taken into account. The tapes were viewed on a television monitor by trained students. The following data were captured from the video tapes: location, date and time of conflict, kind of conflict and activity type involved, and users' reactions to conflict. In addition, on-site interviews with 952 visitors were conducted at access points on ten days.

## Results

During the year of observation, 284 user conflicts were recorded. This is a very small number, compared to 239.000 visitors registered at the three access points. About half of the conflicts were taped on workdays. While at weekends, most conflicts occurred during the main visiting period in the afternoon; on workdays, conflicts occurred more often in the later hours of the day (Figure 1). Generally, the higher the use levels were, the more conflicts were recorded,  $r = 0.240$ ,  $p < 0.001$ . The decrease of user conflicts in autumn was obvious, while in March most of the conflicts (20% of all conflicts) were recorded by video interpreters.

Most conflicts occurred between walkers and bicyclists (38% of all conflicts), followed by intra-activity conflicts of walkers (20%), conflicts between walkers and joggers (18%) and walkers with maintenance cars (7%). Surprisingly low was the conflict potential between

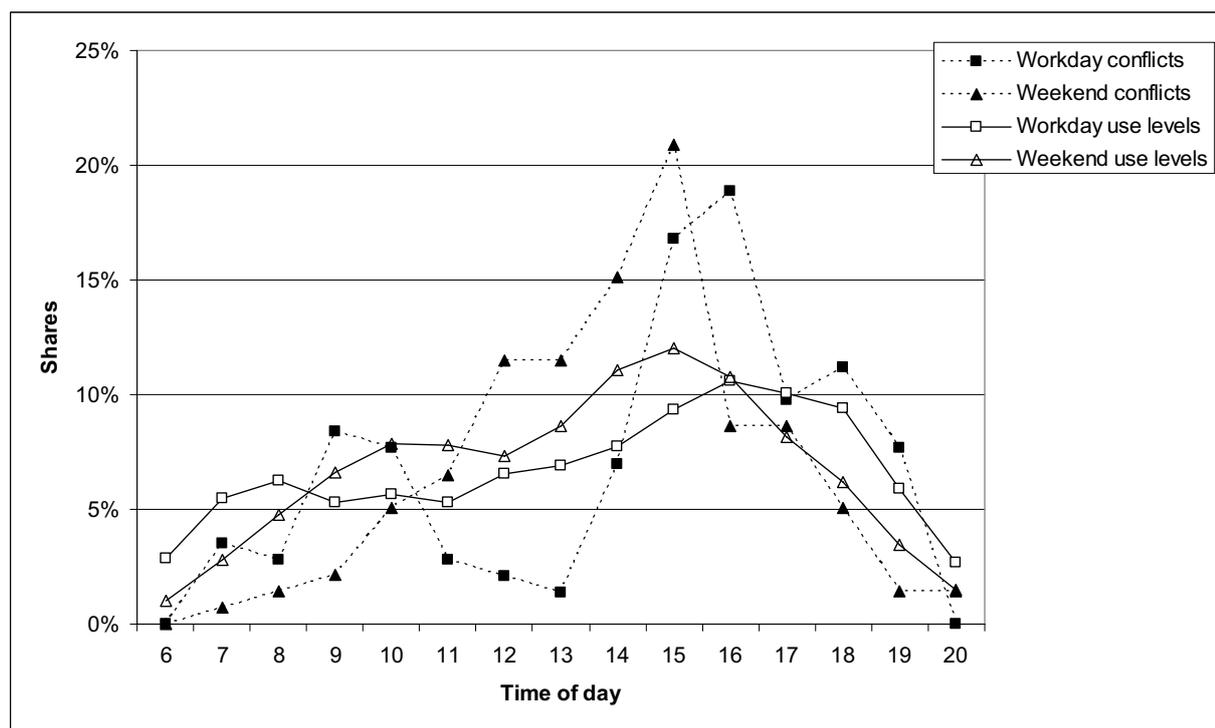


Figure 1: Daily progression of recreation use and user conflicts by weekends (including Saturdays and holidays) and workdays assessed by one-year video monitoring.

dogs and other users. Only 4% of conflicts were with dogs, although dogs were seen by forest visitors as the most annoying factor revealed by on-site interviews. Bigger groups were more likely to be involved in a conflict, in particular groups with children. While 17% of users involved in conflicts were children, the average share of children use was 8%. Some conflicts resulted in accidents, a fall from the bicycle; most often in displacement behaviour, stop of the activity, and alerting behaviour.

Highest shares of conflicts were videotaped at the entrance, where bicyclists could travel with high speed due to the paved surface of the main trail; and where maintenance cars for a local restaurant and many other user groups were present. Thus, mostly conflicts of walkers with fast moving users, i.e. bicyclists, joggers and cars, were recorded; more likely at high use times and over-proportionally involving children. Based on these results, forest management should specifically target the conflict between bicyclists and walkers at the main access points.

## Study limitations

Video recordings are an excellent source of information about recreation use and therefore a useful management tool. This study provides information about user conflicts at three access points, however, not about the total amount of occurring conflicts. Such information would require a long-term monitoring of all trails within the forests. Due to precautions taken to ensure the anonymity of the subjects, resulting in a relatively low image resolution of the black-and-white video images and a minimum distance between camera and visitor, video interpreters might have overlooked or misinterpreted some conflicts.

## References

- Arnberger, A. (2006). Recreation use of urban forests: An inter-area comparison. In: *Urban Forestry & Urban Greening* (4/3-4), p 135-144.

# Sequence Effect on Satisfaction Regarding Perceived Crowding: Whitewater Rafters in Taiwan

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*Keywords: Indicators, questionnaire design, recreational carrying capacity, standards.*

## Introduction

The correlation between perceived crowding and satisfaction tends to be weak (Manning, 1999). Questionnaire design, such as information provided or the question sequence can affect respondents' level of satisfaction (Manning et al., 2002; Schul & Schiff 1993). Most studies seldom indicated the sequence of questions regarding perceived crowding and satisfaction. Thus, this study examined whether question sequence affected on satisfaction with regard to perceived crowding.

## Methods

The study population comprised whitewater rafters on the HsiuKulan river in eastern Taiwan between July 2001 and June 2002. Thirty-five sampling days were randomly selected. Questionnaires were distributed on-site. Respondents were aided by trained interviewers. As a result, 2,402 valid questionnaires were obtained. The satisfaction question appeared first on the first page of the questionnaire. On the second page, directly following the question regarding perceived crowding, the question regarding satisfaction was asked again. A 5-point Likert scale was used for measuring satisfaction, ranging from 1 not at all satisfied to 5 very satisfied. Perceived crowding was measured by using a 9-point scale, ranging from 1 not at all crowded to 9 very crowded.

## Results

The results were as follows:

- (1) The level of satisfaction for the second measure was significantly lower than for the first measure ( $M = 3.75$  vs.  $M = 4.06$ ,  $p < .01$ ).
- (2) Of all subjects, 60% did not change their answers, whereas 7% increased and 33% decreased their level of satisfaction.
- (3) The education level of those whose answers for satisfaction did not change was significantly higher than that of subjects whose answers changed.
- (4) Table 1 shows that perceived crowding for those whose level of satisfaction decrease was highest, whereas perceived crowding for those whose level of satisfaction increase was the lowest. Thus a high degree of perceived crowding resulted in the decreased satisfaction levels.

## Conclusion

Two conclusions were drawn: First, the correlation between satisfaction and crowding is weak, consistent with literature. Second, respondents may over- or under-estimate their satisfaction level—the crowding question combined with the second satisfaction question gave respondents an opportunity to re-evaluate their satisfaction level. Analytical results and conclusions have implications for outdoor recreation and satisfaction researchers, suggesting that two satisfaction questions and an intervening variable design deserve methodological attention in the future.

Table 1: Effect on satisfaction based on satisfaction change type using ANOVA test.

Satisfaction change Satisfaction Perceived crowding	Satisfaction decrease ( <u>M</u> , n)	Satisfaction unchanged ( <u>M</u> , n)	Satisfaction increase ( <u>M</u> , n)	F	P
Level of satisfaction (1st measure )	4.58 (798)	3.90 (1432)	2.90 (172)	560.87	0.000***
Level of satisfaction (2nd measure)	3.44 (798)	3.90 (1432)	3.97 (172)	123.86	0.000***
Perceived crowding on boats	3.77 (798)	3.65 (1432)	3.36 (172)	3.44	0.032*
Perceived crowding on people	4.50 (798)	4.23 (1432)	4.14 (172)	4.91	0.007**

\* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001

## References

- Ajzen, I., Brown, T. C., & Rosenthal, L. H. (1996). Information bias in contingent valuation: Effects of personal relevance, quality of information, and motivational orientation. In: *Journal of Environmental Economics and Management* (30), 43-57.
- Dawson, C.P., & Watson, A.E. (2000). Measures of wilderness trip satisfaction and user perceptions of crowding. In: *USDA Forest Service Proceedings (RMRS-P-15-VOL-4)*, p 93-98.
- Manning, R. E. (1999). *Studies in outdoor recreation research and research for satisfaction*. Oregon State University Press.
- Manning, R. E., Lawson, S., Newman, P., Laven, D. & Valiere, W. (1999). Methodological issues in measuring crowding-related norms in outdoor recreation. In: *Leisure Sciences* (24), p 339-348.
- Moore, D. W. (2002). Measuring new types of question-order effects: Additive and subtractive. In: *Public Opinion Quarterly* (66), p 80-91.
- Schul, Y. & Schiff, M. (1993). Measuring satisfaction with organizations: Predictions from information accessibility. In: *Public Opinion Quarterly* (57/4), p 536-551.

# Encounter and Behavioral Norms of Hikers: A Study of the Taroko Gorge National Park, Taiwan

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*Keywords: Encounter norms, embarrassment, guilt, informal sanction, internal sanction, norm crystallization, obligation, shame.*

## Introduction

Due to the heavy use of mountain trails, national park policy makers are concerned about how to establish social carrying capacity indicators. Developing evaluative standards for judging the acceptability of impacts caused by hikers is important. The normative approach was developed in North America as a useful method of conceptualizing, collecting, and organizing empirical value judgments regarding resource management issues. The study examined the personal and social encounter norms of hikers, as well as their behavioral norms on the Taroko Gorge national park trails, Taiwan - a non-North American setting.

## Methods

The survey instrument's content and format was based on the questionnaires developed by Vaske and Donnelly (2002), Heywood (2002) and Heywood and Murdock (2002). The survey gathered the following data: (a) hiking experience and level of specialization; (b) the number of hikers encountered and their level of perceived crowding; (c) social obligations and self-reports of sanctions for jamming trail traffic. In total, 475 questionnaires were obtained using an on-site survey in 2005.

## Results

The survey results were as follows: (1) Most hikers (57.5%) had a personal encounter norm; (2) The consensus of the social encounter norm was high;

(3) The perceived encounters and perceived crowding for those with a norm were significantly higher than those without a norm; (4) When perceived number of encounters exceeded a hiker's personal encounter norm, their perceived crowding level increased; (5) Over 90% of the hikers said they should always give way to other hikers; (6) The intensity of the behavioural norm was low, which was determined by summing subject responses to shame and guilt (internal sanctions) and embarrassment (informal sanction); (7) The power and prevalence of the behavioral norm were low.

## Conclusions

Three conclusions were drawn: (1) Encounter norms exist for most backcountry hikers, consistent with North American literature; (2) The encounter-norm-crowding relationship can be generalized as Vaske and Donnelly (2002) suggested; (3) The results of the behavioral norm suggested cross-cultural variations for sustainability and carrying capacity evaluations should be considered for future research. Suggestions were made for national park management. For instance, encounter norms, perceived encounters, and perceived crowding should all be included as carrying capacity indicators for the Taroko Gorge national park trails. Since internal and informal sanctions were low, either compulsory trail regulations or educational programs should also be considered.

## Acknowledgements

The authors would like to thank the National Science Council of Taiwan for financially supporting this research under contract NSC 94-2415-H-259-004.

## References

- Donnelly, M.P., Vaske, J.J., Whittaker, D., & Shelby, B. (2000). Toward an understanding of norm prevalence: A comparative analysis of 20 years of research. In: *Environmental Management* (25/4), p 403-414.
- Heywood, J.L. (2002). The cognitive and emotional components of behavior norms in outdoor recreation. In: *Leisure Sciences* (24), p 271-281.
- Heywood, J.L. & Murdock, W.E. (2002). Social norms in outdoor recreation: Searching for the behavior-condition link. In: *Leisure Sciences* (24), p 283-295.
- Kim, S.-O. & Shelby, B. (1998). Norms for behavior and conditions in two national park campgrounds in Korea. In: *Environmental Management* (22/2), p 277-285.
- Vaske, J.J. & Donnelly, M.P. (2002). Generalizing the encounter-norm-crowding relationship. In: *Leisure Sciences* (24/3-4), p 255-269.

# Monitoring of Mountain Bikers in a Sensitive Bird Area around the Tanzboden, Switzerland

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*Keywords: Visitor monitoring, mountain biking, user conflicts, protected areas, sensitive wildlife habitats.*

## Introduction

Due to the high attractiveness of their landscape and the manifold topography, the adjacent regions Toggenburg and Linthregion in the Eastern part of Switzerland are increasingly visited by people searching for recreation. In the last few years especially, the numbers of mountain bikers have increased. A large part of this area around the Tanzboden (alt. 1449m) is under federal protection and that of the Canton of St. Gall. Among these endangered habitats are high moors, mire landscapes of especial beauty as well as landscapes and natural monuments of national importance. Particularly the mountain cock (*Tetrao gallus*) and the black grouse (*Tetrao tetrix*), which are sensitive to any nuisance and belong to the protected species on the red list, are dependent on these kinds of habitats.

At the moment, there exists no official connection crossing the protected area for cyclists between the two regions. Because of this conflict situation between the mountain bikers and nature protection, the Canton of St. Gall has given consent to a provisional opening of one biking route over the Tanzboden in order to canalize the bikers. But the official opening could result in an increase of cyclists on and off track and thus to an increased risk for the sensitive wildlife habitats. In order to prevent this, the Mountainbike Monitoring Tanzboden was initiated.

## Methods

The monitoring consists of two phases: I: Determining the actual state before the official opening of the biking trail

II: Evaluating the results after opening and signalling of the trail.

This paper describes the results of the first phase which has been conducted between June and October 2005. Different monitoring methods had been applied at ten important junctions. One of the objectives was to test the effectiveness of these methods for this type of task. The applied methods were: manual counting (4 points, 8 days), interviews (4 points, 8 days), automatic cameras (2 points, continuous) and radar surveillance (1 point, continuous).

The signalling and opening of the route was planned for 2006. The second phase of the monitoring will most probably take place between June and October 2007 after people have adjusted to the new situation.

Radar surveillance for example, of which we hoped for significant data, showed difficulties in uneven topography and therefore produced data which was difficult to interpret. Due to other technical prob-

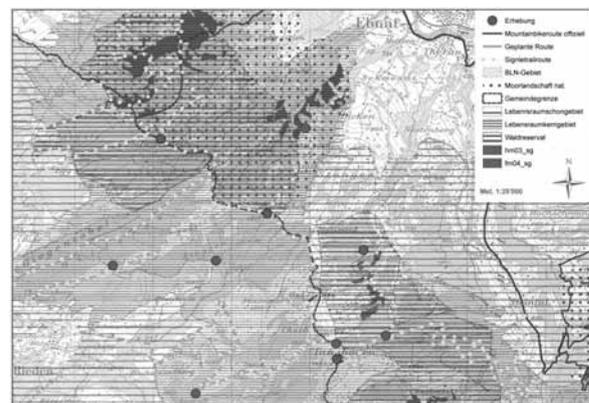


Figure 1: Overview of the monitoring points in the region around the Tanzboden.

Table 1: Evaluation of Monitoring Methods.

Method	Technical handling	Time needs	Manpower requirements	Reliability	Date Significance	Total Evaluation
Interviews	+	--	--	+	++	+
Manual counting	++	--	--	+	+	+
Photo cameras	-	+	++	--	-	-
Radar	-	+	++	-	--	-

lems, substantial data could not be obtained, neither by photo cameras nor by radar surveillance. Although the need for time and manpower of interviews and manual counting exceeded by far the available budget, they still seem to be the most appropriate methods. Interviews allow the obtaining of a lot of valuable data, i.e. age, sex, favoured routes, how often they take this route, used orientation guides (see table 1).

### Results

A large majority of the bikers is male and takes the route once to twice a year. The majority of the bikers live within the adjacent communities. The assumption that the unofficial Single-

trailmap (very popular among non local bikers, but not approved officially, therefore showing routes which cross protected areas) would be responsible for an increase of bikers during the last years could not be confirmed.

Figure 2 shows the distribution of the bikers within the investigation area. The gray arrows will be affected by the canalization of the route and show the official hiking trail on which it is not allowed to bike anyway. Not unexpected is the fact that bikers seem to follow the restaurants. Also the majority stays within their originating region and doesn't cross the peak of the Tanzboden.

### Conclusion

Technical complex monitoring systems are often not suitable for an outdoor monitoring in remote areas (maintenance, power supply). Only a monitoring within a relatively small area will provide reliable data since the frequencies of visitors may differ greatly within the area of investigation. Each local position and problem requires a specific monitoring setting.

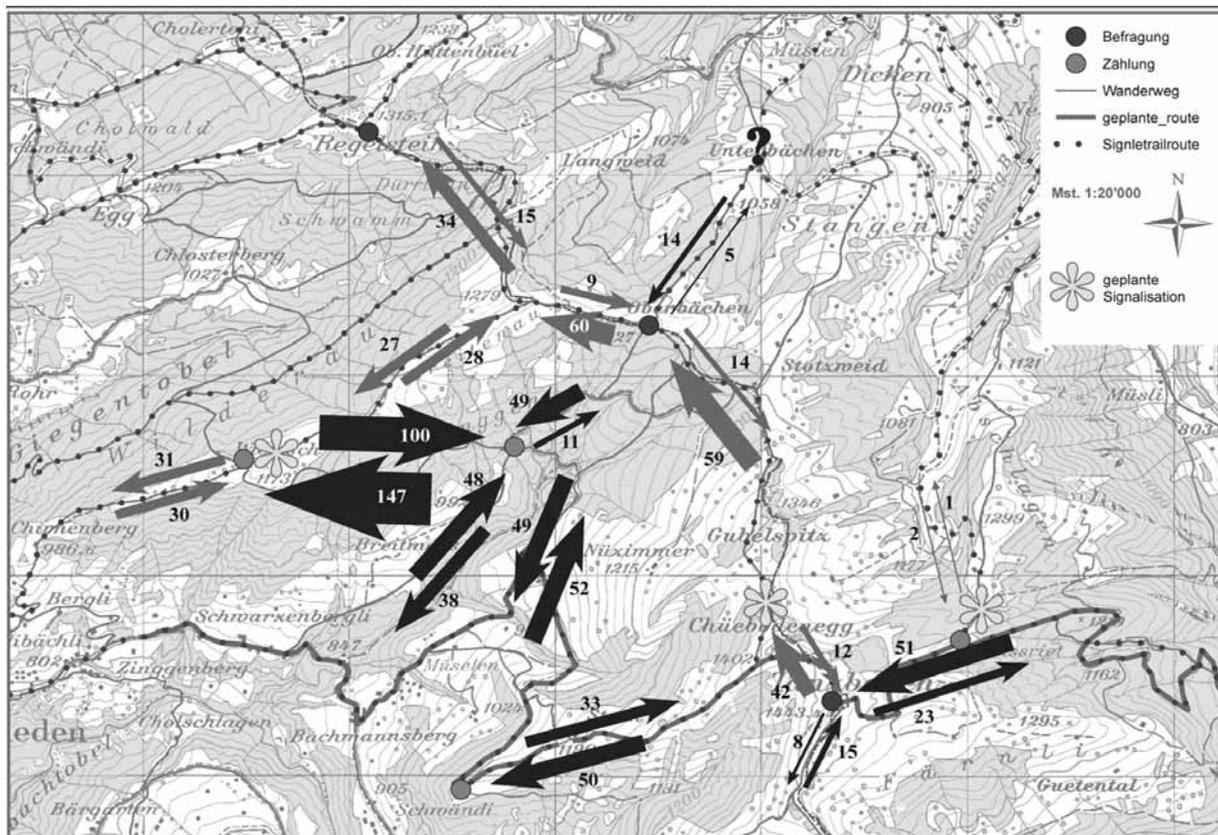


Figure 2: Distribution of the bikers.

## Acknowledgments

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## References

- Bundesamt für Umwelt, Wald und Landschaft – BUWAL. (2001). Praxishilfe Auerhuhn und Haselhuhn: ihr Schutz in der regionalen Waldplanung. Bern.
- Gilomen, M.P. (2005). Die Zielgruppe «Mountainbiker» - eine statistische Erhebung im soziodemografischen, wirtschaftlichen und touristischen Bereich. Bern.
- Muhar, A., Arnberger, A., Brandenburg, C. (2002). Methods for Visitor Monitoring in Recreational and Protected Areas: An Overview. In: Arnberger, A., Brandenburg, C., Muhar, A. (Eds.) (2002). Monitoring and Management of Visitor Flows in Recreational and Protected Areas. Conference Proceedings. Bodenkultur University Vienna, Austria, January 30-February 02, 2002. Vienna, p 1-6.
- Schroff, U., Ammann, S. & Bernasconi, A. (2005). Bikerwaldpass Rheinfeldten – Grundlagen und Umsetzung eines innovativen Finanzierungsmodells. Bern.

# **Perceived Crowding and Satisfaction among Overnight and Day Visitors on Hallig Hooge – A Visitor Survey in the Wadden Sea National Park, Schleswig-Holstein, Germany**

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*Keywords: Perceived crowding, visitor conflicts, satisfaction, survey, expectations, motivations.*

## **Introduction**

Although use level in German National Parks increases, there are only a few research activities into social effects of tourism on outdoor recreation. The objective of this survey is the relationship between social effects like perceived crowding and expectations and visitor satisfaction in this special background.

As an example of high use recreation areas there is the Wadden Sea National Park in the north of Germany. It is a very important recreation area with more than 4 million day trips and 17 million overnight stays a year. During the summer months there are several hot spots along the coast and on the islands where user density is very high and crowding occurs. One of the tourist hot spots are the “Nordfriesische Halligen” - small marsh islands in the Wadden Sea which are unique in the world.

The research area Hallig Hooge is a main tourist hot spot at the border of the National Park. Nearly 110 inhabitants live on the small Hallig (ca. 590 ha). It is an important destination for day visitors during summer and attracts up to 3.000 visitors a day. On the Hallig are two different types of day visitors: guided and non-guided visitors. Despite this, overnight stays of visitor groups have an important role. Day and overnight tourism is the main income for the local economy. The Hallig offers different activities like walking, swimming, biking and enjoying nature for the visitors.

## **Methods**

A quantitative survey of 260 visitors of Hallig Hooge was carried out in August and September 2005 to examine crowding and visitor satisfaction on this stressed island located in the National Park.

The research determined crowding and differences in motivation for the trip according to the three sample groups. It also compares perceived crowding, motivations and expectations between guided and non-guided daytrips. To measure crowding a visual approach was used in the survey. A series of five photographs was handed to the visitors. On the picture was illustrated a path on one part of the island with different numbers of hikers. Visitors were asked to evaluate the acceptability of visitor density, perceived visitor density and their expectations before the trip. Several regression methods were used to identify variables which influence the perception of crowding and expectations of the visitors.

## **Results**

Results of the statistical evaluation suggest that there are differences between the visitor groups in terms of their satisfaction of the visit, their evaluation of the different activities, their perception of crowding and their motivations for the trip. In general the study shows that low or moderate levels of crowding and conflicts were reported. 20 percent of the visitors reported some degree of perceived crowding. The survey shows that non-

guided day visitors are the most sensitive visitors (nearly 30 percent report some degree of perceived crowding). In the study, aspects of the perception of crowding and intervisitor conflicts will be discussed in detail. Study data can be used to help local tourist management improve conditions for the different visitor groups on Hallig Hooge.

## References

- Fredman, P. & Hörnsten, L. (2003). Social Capacity and Visitor Satisfaction in National Park Tourism. In: Proceedings from the 12th Nordic Symposium in Tourism and Hospitality Research. Stavanger.
- Klug, A. (1999). Bewertung der Erholungseignung und tourismusbedingten Naturraumbelastungen an der Nordseeküste Schleswig-Holsteins mit GIS – Grundlagen für Planung und Küstenmanagement. In: Berichte, Forschungs- und Technologiezentrum Westküste der Universität Kiel.
- Manning, R.E. (1999). Studies in Outdoor Recreation. Oregon State University Press.
- McCool, S.F. & Lime, D.W. (2001). Tourism Carrying Capacity: Tempting Fantasy or Useful Reality? In: Journal of Sustainable Tourism (5/29), p 372-388.
- Shelby, B., Vaske, J.J. & Heberlein, T.A. (1988). Comparative Analysis of Crowding in Multiple Locations: Results from fifteen Years of Research. In: Leisure Sciences (1), p 269-291.

# Measuring Public Interest and the New Environmental Paradigm in the Transformation of a Public Park into a Protected Area "Los Colomos" Forest, Guadalajara, Mexico

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*Keywords: Mexico, Los Colomos, new environmental paradigm, survey.*

## Introduction

Los Colomos forest is a public city park with 92 hectares (230 acres) administered by the county administration in Guadalajara City (UdeG, 2003). Los Colomos Park is unique as a park due to its extension inside a city with almost 4 million people, and is surrounded by a high to very-high income neighbourhood. This is a resource that attracts tourists to visit the city, and provides enjoyment for the locals.

The county administration is considering the need to transform this park into a natural protected area because of the water resources in the park which must be preserved and are important to satisfy the needs of Guadalajara. This issue of the legal protection has been under discussion since 2004. The studies to support the legal proposal were funded and conducted between September 2005 and February 2006. Part of the studies conducted include among others: flora and fauna, hydrology, soils, and social issues. In this paper issues related to social studies regarding perceptions of people of the park within the scope of this transition towards a natural protected area are reported. It is considered that public opinion provides a close idea of the participation processes that may arise in this transition. In depth interviews and two general surveys were conducted. The results of this research should give insight into the management program and zoning.

## Methods

This report is based on two general surveys. These surveys were conducted during two week-long periods (December 2005 and February 2006). The difference between these two was stated by the changes regarding weather and school vacation periods. The total number of interviews conducted with statistical representation was 330 for both cases. The questionnaire includes closed and open questions. The closed questions were analyzed using SPSS, and the open questions under the technique of content analysis. The analyzed issues in this sequential survey regard: (1) the hours the park is open; (2) what aspects visitors liked most/didn't like about the park; (3) suggestions for management; (4) personal perspectives about changes; (5) problems in the park which the visitor perceives; (6) visitor's knowledge regarding management, and activities or services provided by the park administration; (7) entrance fee; (8) better services for people with different capabilities; (9) areas of interest for more information, and (10) information seeking behavior.

## Results

Among the findings it is relevant that 52% of the visitors first visited the park 10 years ago or more, or as long as they can remember; 18% first visited the park less than 10 years ago, and 17% first visited the park 5 years ago or less.

In general, visitors are confident regarding the future of this park.

Considering the next 5 years, 81% of the respondents believe that the quality of the park will remain “the same” to will be “much higher”. This drops to 71% considering the next 10 years, and then drops to 63% considering the next 15 years. Some of the reasons for low confidence reported are encroachment, erosion, and deforestation. One of the reasons supporting the confidence in the higher quality is because they think the park will be protected. Almost all the visitors (91%) are in favor of the legal protection of the park. In general, people present low level of knowledge regarding the management, but on the other hand, a good proportion (63%) reports recognition of the official norms in the park. Regarding the New Environmental Paradigm, visitors show mostly adherence to the NEP vs. the Dominant Social Paradigm (Dunlap, Van Liere, Mertig & Jones, 2000). Most of the visitors (78%) indicate that it is important to allocate space for wild plants and animals, 53% consider that humanity should not govern nature, and 87% indicate that humanity is part of nature and wildlife and not apart. With the stated above and other indicators documented in this study it can be stated that the proposal to protect this park legally counts with a good base of public support. Efforts should be directed into zoning that warrants the permanence and improvement of the quality that ensures the preservation of the park as a water resource. The challenge is to meet the visitor’s needs, but the hydrological vocation of the area should be considered of paramount importance above all other human needs.

## References

- Dunlap, R. E, Van Liere, K. D., Mertig, A. G. & Jones, R. E. (2000). Measuring Endorsement of the New Ecological Paradigm: A Revised NEP Scale. In: *Journal of Social Issues* (56/3), p 425-442.
- Ramírez-Q.-C., A.I & Anaya-C., M. (2003). *Guadalajara City Parks*. Universidad de Guadalajara, Mexico. <http://www.guadalajaparks.udg.mx/colomos/index.html>.

## Shaping Culture in Nature: Human Use Management in Canada's Mountain National Parks

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*Keywords: National park management, visitor experience, culture and nature.*

### Introduction

Located in the Rocky Mountains on the border between Alberta and British Columbia, Banff, Yoho, Jasper and Kootenay National Parks comprise the majority of the Canadian Rocky Mountain Parks World Heritage Site. The area draws more than 5 million visitors per year. Management decisions are directed by a dual mandate (protection versus use) and the recently amended Canada National Parks Act (2000) which puts maintenance of ecological integrity as the first priority for all national parks managers. More specific direction is provided in individual park management plans approved by Canadian Parliament. These plans were recently amended to reflect significant changes in the human use management, based upon a prediction that visitation and associated environmental impacts will increase significantly. For their part, scientists have been using an indicator species, the grizzly bear, to measure changes in ecological integrity. Subsequently, the human use management strategy is built upon a framework for the conservation of grizzly bears. Put into effect to protect the wildlife from human caused mortality and from habituation to humans, trail and area closures throughout the park have increased dramatically over the past ten years. Critics of this bio-centric approach to management ask whether the park is for bears or humans (Cooper et al 2002). How one experiences the mountain national parks is, to a large degree, dictated by infrastructure. A network of hardened trails leads visitors to popular destinations; trail closures have an immediate and decisive effect upon one's national park experience.

Realizing the predicaments created by relying solely on biology and other natural sciences, Parks Canada's latest corporate orientation documents prepare for an important shift, one that recognizes that ecological integrity cannot be achieved without 'people'. There is an emphasis upon human relations and interactions with nature and the involvement of Canadians as partners and advocates for National Park Policy. One aim is to 'convert' visitors who presently have low awareness and understanding of ecological integrity (Parks Canada 2005). Parks Canada set a target that 50% of park visitors will have a learning experience. Using first hand experience as a key to personal awareness and understanding, it was decided that the learning experiences would be: guided walks or hikes, interpretive programs and interpretive exhibits. Focus on the visitor requires a shift, from emphasizing the provision of services, facilities and programs in a way that meets only Parks Canada's goals and objectives, to one where the visitor's needs and expectations becomes the focus (Parks Canada 2005).

### Methods & Results

Methodology to learn more about the people using national parks includes on-line surveys, traffic and trail counters, and site-specific projects employing triangulated methods. The value of social science research is already being recognized. A 2003 survey of Banff, Jasper, Kootenay and Yoho National Parks revealed visitor's most popular activities. The human use of remote and fragile natural areas is far less than previously assumed. As well, annual visitation was over-estimated by nearly 2 mil-

lion visits. From this and other research, the Agency hopes to develop “products, services and events to reach specific audiences and produce both short and longer-term changes” (Parks Canada Agency 2005: ii) and tools for predicting and measuring those changes. Human use simulation modelling is such a tool being developed for integrating human activities with wildlife movements, predicting impacts of displacing use and monitoring human use.

## **Conclusion**

There are inherent complications with adopting this new approach to national parks. The contradictions in reducing human use while at the same time encouraging more visitors to experience the park first hand suggests that neither approach has been considered from the park managers perspective, many of whom will ponder the values of ecological integrity versus visitor experience. Discourse on experiential tourism touts individuality and personal experience, yet there is an underlying theme in support of a homogenous and conditioned visitor/tourist population. Political realities are such that, due to the popularity of these national parks, making obvious, positive progress is imperative. As neither the necessary tools nor content have been developed, much work lies ahead.

## **References**

- Cooper, B., Hayes, J., & LeRoy, S. (2002). Science fiction or science fact? The grizzly biology behind Parks Canada management models. Fraser.
- Parks Canada Agency (2005). National performance and evaluation framework for Engaging Canadians: External Communications at Parks Canada. Unpublished. Produced by the Performance, Audit and Review Group, February 2005. Government of Canada. Canada.
- Parks Canada Agency (2003). Visitor Survey of Banff, Jasper, Kootenay and Yoho National Parks. Unpublished. Sponsored by Parks Canada, the Mountain Parks Visitor Survey Partnership and Alberta Economic Development. Canada.

# Coping With Recreation Conflict: How User Group and Value Conflicts Predict Recreation Coping and Satisfaction

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*Keywords: Angling, conflict, coping, recreation, satisfaction, structural equation modeling.*

## Introduction

Previous research has examined recreation conflict, coping and satisfaction (Manning 1999). Our research goals were to: (a) examine conflicts experienced by Minnesota anglers, (b) explore coping actions used by Minnesota anglers, and (c) test how conflict and adoption of coping mechanisms related to angler satisfaction.

Recreation research has documented substantial conflict in outdoor recreation (Manning, 1999). The research has generally focused on explicit conflict by comparing normative beliefs about acceptable and unacceptable behaviors. Most research on recreation conflict has examined interpersonal conflict, but some has explored social values conflict (Manning 1999). Much conflict in outdoor recreation arises between participants in different activities, and often it is asymmetric (i.e. cross-country skiers object to snowmobilers but not vice versa) (Manning 1999). However, intra-group conflict has also been documented (Manning 1999).

Coping is described as “an adaptive reaction to a perceived is-ought discrepancy” (Greve & Strobl 2004, p 194). Psychology researchers have described three types of coping: (a) problem-centered, which is the modification of the is-state that causes the problem, (b) reaction-centered, which is the modification of the ought-state or the internal perception of the problem, and (c) avoidance of the problem (Greve & Strobl 2004). Recreation researchers have identified behavioral and cognitive coping strategies, which parallel the problem-centered and reaction-centered types of coping (Man-

ning 1999): Displacement, rationalization, and product shift are the three primary coping strategies employed by recreationists who maintain participation in an activity (Manning & Valliere 2001).

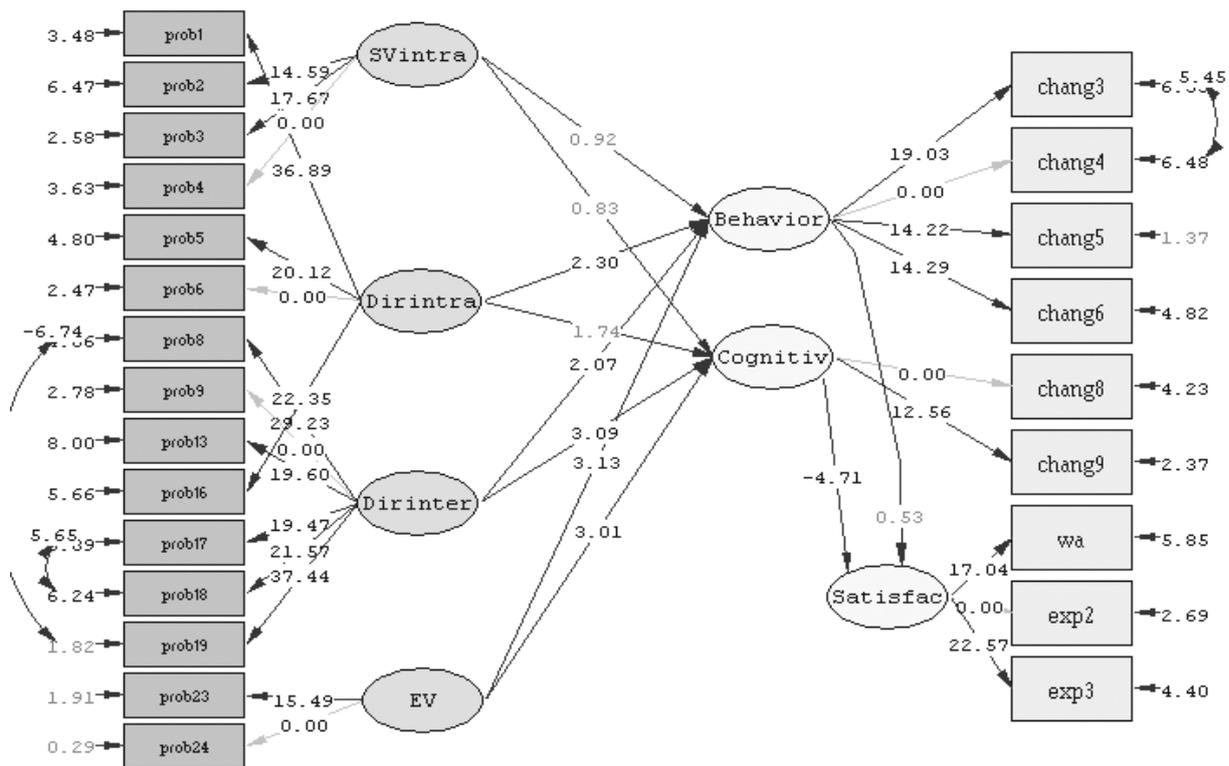
Recent research has examined the relationship between coping and satisfaction (Johnson & Dawson 2004) and the relationship between recreation conflicts and outcomes (Schuster, Hammitt & Moore 2006). Much work is left to be done to improve measures of user outcomes and to examine how conflict and coping influence user satisfaction.

## Methods

Results were derived from a 2003 study of anglers in Minnesota, U.S.A. We used structural equation modeling to examine how (a) intergroup conflict, (b) intragroup conflict, (c) social values conflict, and (d) environmental values conflict predicted behavioral and cognitive coping. We tested three models to examine (a) the direct effects of conflict on recreation satisfaction, (b) the effects of conflict on satisfaction fully mediated by coping, and (c) the effects of conflict on satisfaction partially mediated by coping.

## Results

In our conflict and coping only model, we found that direct intergroup conflict and environmental values conflicts were related to both behavioral and cognitive coping. Direct intragroup conflict and social values were not related to either behavioral or cognitive coping.



Chi-Square=557.53, df=233, P-value=0.00000, RMSEA=0.060

Figure 1: Path diagram showing t-values for best-fit conflict-coping-satisfaction model.

Table 1: Structural equation modeling goodness of fit indices for conflict-coping model and three conflict-coping-satisfaction models.

Model	$\chi^2$	Df	$\chi^2/df$	$\Delta\chi^2$	RMSEA (90% CI)	CFI	NFI	GFI	AGFI	AIC	$\Delta AIC_0$	ECVI (90%CI)
Conflict-coping model	417.38	172	2.43		.060 (.053; .067)	0.99	0.98	0.77	0.70	535.38		1.34 (1.20; 1.50)
1. Conflict-coping-satisfaction, direct-effects model	507.72 <sup>a</sup>	228	2.23		.056 (.050; .063)	0.98	0.97	0.78	0.71	651.72	0	1.68 (1.52; 1.85)
2. Conflict-coping-satisfaction, full mediation model	557.53 <sup>a</sup>	233	2.39		.060 (.053; .066)	0.98	0.97	0.76	0.70	691.53	39.81	1.78 (1.61; 1.97)
3. Conflict-coping-satisfaction, partial mediation model	552.88 <sup>a</sup>	229	2.41		.060 (.054; .067)	0.98	0.97	0.76	0.69	694.88	43.16	1.79 (1.62; 1.97)
- Model 1 vs. 3		1		45.16								
- Model 1 vs. 2		5		49.81								
- Model 2 vs. 3		4		4.65								

Among our three conflict, coping and satisfaction models, the direct effects model of conflict and coping on satisfaction was our best fit model. (see table 1.). In this model, cognitive coping was negatively related to satisfaction. (see figure 1).

Results suggest that conflicts between user groups and environmental degradation may lead to coping among anglers, while conflicts between anglers and social values conflicts may not. Results also suggest that cognitive coping may not lead to greater satisfaction with the recreation experience.

## References

Greve, W. & Strobl, R. (2004). Social and individual coping with threats: Outlines of an interdisciplinary approach. In: Review of General Psychology (8/3), p 194-207.

Johnson, A. K. & Dawson, C. P. (2004). An exploratory study of the complexities of coping behavior in Adirondack wilderness. In: Leisure Sciences (26), p 281-293.

Manning, R. E. (1999). Studies in outdoor recreation: Search and research for satisfaction. Oregon State University Press.

Manning, R. E. & Valliere, W. A. (2001). Coping in outdoor recreation: Causes and Consequences of Crowding and Conflict Among Community Residents. In: Journal of Leisure Research (33/4), p 410-426.

Schuster, R., Hammitt, W.E., & Moore, D. (2006). Stress appraisal and coping response to hassles experienced in outdoor recreation settings. In: Leisure Sciences (28), p 97-113.

# Crowding in Danish Forests – a Nonexistent Problem?

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*Keywords: Recreation, carrying capacity, social dimension, crowding, preference, forest, Denmark.*

## Introduction

An overview of the research on the social dimension of carrying capacity has been compiled by e.g. Stankey & Manning (1986) from which an excerpt is cited below:

*“... It is important to distinguish the concept of crowding from the more simple concept of amount of use. Many recreational areas are used intensively, but this does not necessarily mean they are crowded.*

*... Crowding norms are a function of more than just the number of other users. A variety of use characteristics as well as situational variables affect personal judgments about crowding....*

*...Problems such as crowding can only be assessed with specific measures addressing these problems.”*

A relatively large proportion of the research on crowding is based on experiences in wilderness or other remote areas in North America. In this paper, the topic is discussed in a very different setting: Danish forests – A setting characterized with a relatively high number of inhabitants on a relatively small and intensively exploited land area (5.4 mill. inhabitants on 43,000 km<sup>2</sup> of which 11% is forest and 10% are other nature areas).

## Preferences for meeting other forest visitors

The general Danish population’s assessment of encountering different numbers of various types of forest visitors has been studied by Jensen & Koch (1997)<sup>1</sup>.

<sup>1</sup> Representing the Danish population (15-77 years old), a postal questionnaire survey accomplished in 1977-78 (n: 2826, response-percentage 89.4%) as well as in 1993-94 (n: 2916, response-percentage 83.7%).

Seven types of forest visitors were studied: families in the woods, horse-riders, joggers, bicyclists, hunters, car- and moped-riders; each type in the numbers: 1, 2, 5 and 10. It was not asserted unexpectedly that the fewer forest visitors were encountered, the higher was the perceived quality of the forest visit.

Also differences in the assessment of encountering different types of forest visitors are found. The types of forest visitors studied can be split into three groups: (1) highest ranked: families in the woods, horse-riders and joggers; (2) an intermediate group: bicyclists and hunters; and (3) lowest ranked: car drivers and moped-riders.

## Research on perceived crowding

Questions about the social dimension of outdoor recreation are included in a study of the recreational use of 592 forest and other nature areas, carried out in 1996-1997 (Jensen 2003<sup>2</sup>). This material provides the first general background for analyses of the notion crowding in a Danish context.

In the questionnaire a number of questions are included, all of which have proven their value in a number of other studies in relation to crowding (e.g. Shelby et al. 1989).

The core question is:

How did you perceive the area here today regarding the number of other visitors?  
(tick one box on the scale from 1 to 9)

1	2	3	4	5	6	7	8	9
Not crowded at all		Slightly crowded		Moderately crowded			Extremely crowded	

<sup>2</sup> A total of 592 areas took part in the survey. 20 data collections were carried out representatively over 12 months in 1996-97 (stratified sampling). The questionnaire was delivered to all parked cars at the sampling times. 85,673 questionnaires were delivered. The response-percentage was 46.7% (due to the nature of this data-collection it has not been possible to use reminders to minimize non-response).

From the responses it can be ascertained that on average, 13% of the visitors indicate the area at least as “slightly crowded”; 3% at least as “moderately crowded”; and less than 1% found the area “extremely crowded” – indicating more than 85% of the visitors do not perceive the area as crowded at all.

## **Conclusion**

Although preference studies show that the Danish general population does not prefer to see many other visitors in the forests, on-site surveys (where e.g. more than 40 of the areas have a visitation higher than 2,000 visitor hours per hectare per year) indicate that crowding and conflicts between different user groups, in general, is not a major problem in Danish outdoor recreation.

So far, the sustainability of the social dimension of the carrying capacity does not seem to be exceeded in the Danish forests. But of course, for those relatively few visitors that experience a concrete exceeding, this is not a negligible problem for the visitor as well as the manager.

## **References**

- Jensen, F.S. (2003). Friluftsliv i 592 skove og andre naturområder. In: Skovbrugsserien (32), Forskningscentret for Skov & Landskab, København.
- Jensen, F. S. & Koch, N. E. (1997). Friluftsliv i skovene 1976/77 - 1993/94. Forskningsserien (20), Forskningscentret for Skov & Landskab, København.
- Shelby, B., Vaske, J.J., & Heberlein, T.A. (1989). Comparative analysis of crowding in multiple locations: results from fifteen years of research. In: *Leisure Sciences* (11), p 269-291.

Economic and Social Effects of Recreation  
and Nature Tourism

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Christophe Clivaz & Andréa Finger-Stich (Chairs)

# Sample Selection Bias in Visitor Surveys: Comparative Results of an On-Site and an Off-Site Survey Assessing Recreational Benefits of Forests

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*Keywords: Economic valuation, forest recreation, on-site sample, sample selection bias, off-site random sample, weighting, forest visitors.*

## Introduction

Information about visitors of recreational areas establishes an important basis for the management of these areas. Frequently, the data on visitor characteristics, their behaviour and requirements is collected in on-site surveys. This approach is efficient because the target population can be addressed directly. However, the selection probabilities of visitors depend on external factors and so they differ, for example, according to visit frequencies. Therefore, results of on-site surveys have to be interpreted carefully and generalisations from on-site samples to the population of all visitors have to take into account unequal selection probabilities. In particular, the sampling strategy affects estimates of recreational benefits in economic valuation studies.

Differences between on-site and off-site samples were examined in our study on recreational benefits of the forests in the city of Zurich. Furthermore, we analyzed the impact of weighting and other methods to correct for selection bias in on-site samples and tested them empirically by comparing the corrected on-site results with estimates from an off-site random sample.

## Methods and Data

Recreational benefits can be assessed in monetary terms either with revealed preference methods as for example the travel cost method (e.g. Parsons

2003) or with stated preference methods (Bateman et al. 2002). In our study, we estimated recreational benefits of Zurich's city forests with the contingent valuation method and assessed visitors' willingness to pay (WTP) for an annual permit allowing them to visit the forests within the city area. As these valuation methods rely on survey data, sample selection and data collection are crucial steps of the valuation process. Approaches to adjust mean sample estimates include the calculation of weighted averages (Morrison 2000).

Sample weights are commonly calculated by adjusting distributions of sample characteristics to the respective distributions within the population. This approach assumes that these characteristics are correlated with the target variable, which is 'individuals' WTP' in contingent valuation studies. Alternatively, sample weights can be determined according to the probability of an individual being sampled. A framework incorporating different aspects of sample selection probability in on-site surveys was proposed by Elsassner (2001). We adopted this approach to derive weighting factors for our on-site sample.

The data in this study came from two surveys carried out in September 2004. In an on-site survey, visitors were interviewed at ten different sites within the forested area of Zurich. An off-site mail survey was carried out among randomly chosen residents of Zurich. The questionnaires were almost identical and both surveys evaluated WTP for a visitor permit in order to derive rec-

reational values of the forest with the contingent valuation method. Furthermore, we assessed visit frequencies for the urban forests and other green spaces within the city area, forest visiting behaviour and socio-economic characteristics.

## Results and Conclusions

According to the mail survey, 88% of the city residents have visited the urban forests at least once during the past 12 months. Comparing these forest visitors in the off-site sample with the on-site sample revealed substantial differences. Visit frequencies for all urban green spaces were higher among on-site sampled visitors than in the population sample. Furthermore, average WTP for an annual visitor permit varied significantly. The on-site value exceeded the off-site value because WTP increased with the number of visits and frequent visitors were more likely to be sampled in the forests. Moreover, the two samples differed regarding several variables describing forest visiting behaviour and socio-economic characteristics. For example, the respondents in the on-site sample were older, educated to a higher level and were more likely to live in a city-district adjoining a forest.

The results of the different methods to correct on-site estimates for sample selection bias showed that the weighted mean of visitors' WTP corresponded to the residents' mean WTP. Similar findings were observed regarding other variables. Our results suggest that weighting on-site data according to individual selection probabilities approximates off-site estimates and therefore provides a valid approach to estimate population values with on-site sample values. However, weighting the data increases the variance of the estimates. Therefore, on-site surveys have to be based on larger samples than off-site random surveys to achieve the same confidence level.

## References

- Bateman, I. J. et al. (2002). *Economic Valuation with Stated Preference Techniques: A Manual*. Cheltenham.
- Elsasser, P. (2001). Probleme der Stichprobenauswahl und der Repräsentativität bei KBM-Umfragen. In: Elsasser, P. & Meyerhoff, J. *Ökonomische Bewertung von Umweltgütern. Methodenfragen zur kontingenten Bewertung und praktische Erfahrungen im deutschsprachigen Raum*. p 17-36. Marburg.
- Morrison, M. (2000). Aggregation Biases in Stated Preference Studies. In: *Australian Economic Papers* (39/2), p 215-230.
- Parsons, G. R. (2003). The travel cost model. In: P. A. Champ. *A primer on nonmarket valuation*, p 269-329. Dordrecht.

# Economic and Social Effects of the Development of Recreation and Environmentally Sound Tourism through the Example of a Hungarian National Park

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*Keywords: National parks, ecotourism, recreation, economic and social effects, sustainable development.*

## Introduction

The Aggtelek National Park, fourth in Hungary, was established in 1985. Its extension is 20 170 ha, the main part of which is nominated as Biosphere Reserve. The caves of the Aggtelek and Slovak Karst were designated as a world heritage site by the World Heritage Committee of the UNESCO in 1995 becoming the first such site among the Hungarian natural values. The World Heritage Status, the outstanding natural values, the landscape and climatic conditions and the traditional culture together provide excellent conditions for the complex tourism developments of the region.

The geographical position of the Aggtelek National Park is favourable regarding both domestic and international tourism. This is due to the fact that large international traffic is present on the M26 and E71 routes – that encircle the national park – because of the presence of the Slovakian border. However, protected areas are found distant enough from these routes – considering dis-

turbance and air pollution (figure 1.) The national park is found in the vicinity of the former heavy industrial triangle marked by the towns Miskolc-Kazincbarcika-Ózd having a total population of around 252 thousand people. The Aggtelek National Park is a favourite recreation destiny for people living here but numerous visitors arrive from other points of the country – around 200 thousand people a year (Domán 1998).

The economic restructuring in Hungary after 1989-90 found the heavy industry in drastic recession. Its negative effects affect this region in multiple ways, considering both the environment and the community. The social effects of the economic structure's change are even more highlighted. Mass dismissals generated a significant unemployment rate, leading to the increase of the so-called "living crimes". This process is unfavourable from the aspect of both environmental protection (e.g. wood stealing) and coming visitors. Besides unemployment, the poor infrastructure (e.g. lack and poor provision of roads, railway) together with poverty give reasons of the transmigration of the younger generation resulting the accelerated ageing of the population (Statistics Handbook of B-A-Z County 2004).

Undeveloped infrastructure and the difficult accessibility prevent the development of tourism. However, this isolation assists the preservation of the motives of folk architecture and the craftsmanship traditions presenting opportunities for the development of country tourism.



Figure 1: Geographical position of the Aggtelek National Park.

Village housing would provide a solution to the poor standard of commercial accommodation that is the result of the general poverty in the region and to the weakness of the entrepreneurs.

The direct consequences of the transit character of tourism are the low number of visitors and the low level of revealing of tourist values, so the guarantee for a return of investments is relatively low. Thus the senescent resident population shows distrust in relation with tourist developments. The recently performed GEF program is trying to solve these problems.

## Methods

The necessity of the program is proven by the fact that, though there are several unfavourable effects on the natural environments of Central Europe, not less than 30 % of it is still rich in natural values. In the frame of the GEF program we perform a direct analysis on the support capacity of a defined research area, determining the loadability of the landscape. We developed a system of aspects essential in the course of planning the tourist utilization of a given object.

The contentment of attendants (as customers) and inhabitants (relating their disturbance) is measured by questionnaires, while to detect the contribution of the tourism to the local economy we also made a data collection among tourist service companies, especially focusing on the effects of tourism on employment conditions, on living standard and on general price level.

## Results

In the researched area, significant, but recently idle cultural and natural capacities – related to the sustainable development of environmentally sound tourism – are available, the development of which can improve the competitive power of the tourist sector, decreasing at the same time the undesired concentrations in space and time. However, the development of capacity for acceptance of tourism and the establishment of services of high quality promoting the raising of resident times and spending are essential. From the development of tourism, the region can primarily expect the rising of

employment level, the spatial equalization of economic development, the advancement of the image, and an acquittal from the stereotype of the “citadel of heavy industry”.

## References

- Edit, D. et al. (1998). The region and the tourism development plan of the ANP. Jósvalő.
- Statistics Handbook of B-A-Z County. (2004). Miskolc.

## **The Pfyng-Finges Park (Valais/Switzerland): What Repercussions on the Regional Economy?**

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*Keywords: Regional nature park, economic impacts, regional development, nature tourism, visitor behaviours.*

### **Introduction**

Following the emergence of several park projects at the end of the 1990s, the Swiss Government has assigned the Swiss Agency for the Environment, Forests and Landscape (SAEFL) to prepare a revision of the Federal nature and landscape protection law to enable the creation of different types of parks (national park, regional nature park, peri-urban nature park). For the SAEFL, "the regional nature park is a development tool for regions, and especially for rural areas" (Oppizzi 2003, 5). It is especially by the means of the development of tourism that one hopes to improve the economy of these areas. The study by Siegrist et al. (2002) on the potential of nature tourism shows indeed that Swiss tourists who stay in their country demand protected areas in their holiday region. The intention to enhance the value of regions with high quality natural or cultural heritage for tourism is also due to the fact that on an international level, ecotourism is a constantly growing market (Arnberger & al. 2002, Epler Wood 2002, Eagles 1999).

Does the creation of a regional nature park really contribute anything from the point of view of the regional economy? Even if the Pfyng-Finges park was created recently, we propose to analyse it in order to see what the current economic repercussions of this park are and what the future challenges are.

### **Presentation of the Pfyng-Finges park**

Pfyng-Finges is crossed by the wild Rhone River and comprises pine groves, ponds, hills and an alluvial zone. The combination of natural and cul-

tural values and the Mediterranean climatic conditions of the Pfyng-Finges region constitute the ideal basis for the development of nature tourism, which aims at conserving the landscapes and the richness of fauna and flora.

In March 2000, the "Pfyng-Finges Association" was founded. Its members are the administrative bodies concerned (municipalities, socio-economic regions, canton), tourist offices, environmental associations, various private persons and public institutions. The objective of this association is the creation of a nature park and the development of innovative tourist activities in the fields of nature and culture. Concretely, various activities were set up these last five years (exposures, accompanied excursions, hiking paths, catering, etc.)

### **The Pfyng-Finges park: good for the regional economy?**

To answer this question a survey by questionnaire was performed out in the summer 2004 on the visitors of Pfyng-Finges (Clivaz & Richard 2006). This survey shows that a great part of the current visitors are people of the area using this territory for their leisure activities (walking, jogging, bicycle, etc.). Thus, these people come several tens of times per year to Pfyng-Finges to practise these activities. Only a quarter of the questioned visitors live in a distance of more than 80 km of Pfyng-Finges.

As one could expect it, Pfyng-Finges is especially frequented during the weekend. For 71% of the visitors, Pfyng-Finges constitutes the principal goal of their transit. In regard to behav-

tour in the site, 15% of the visitors do not follow the marked out paths, which can involve a disturbance of fauna and flora. Nevertheless, these same paths constitute, along with information on fauna and flora and the communication of the rules to be respected on the site, the most important elements for the questioned visitors. The visitors also wish more directional and didactic signs, more places for picnicing as well as a better maintenance of the infrastructure (paths, ponds, etc.).

Approximately half of the questioned visitors do not make any expenditure on the site of Finges. 85% of the visitors who spent something spent less than 30 Swiss Francs. To finish this short overview of the results of the survey, we can mention that three-quarters of the visitors reject the idea to have to pay to enter the Pfyng-Finges Park. The visitors who do agree with this idea are ready to pay on average 5,4 Swiss Francs.

## Conclusion

The survey carried out by the visitors of the park of Pfyng-Finges shows that the direct economic impacts remain still relatively limited today. Three factors can explain this result. Firstly, the tourist offer of Pfyng-Finges still remains unknown to many potential visitors (excursionists and tourists). Secondly, at the moment Pfyng-Finges only offers a limited range of tourist products and services for the visitors who do not have many opportunities to spend their money. Thirdly, a great part of the current visitors are people of the area practicing leisure activities that generate almost no economic repercussions.

In this context, the challenges will be in the future to improve marketing and to develop the tourist offer in order to increase the repercussions of the park on the regional economy. Various projects under development, like the inauguration in 2007 of the park interpretation centre, let us think that these challenges should be taken up.

## References

Arnberger A. et al. (2002). Monitoring and Management of Visitor Flows in Recreational and Protected Areas. Institute for Landscape Architecture and Landscape Management. Conference Proceedings Jan 30 – Feb 02, 2002. Vienna.

Clivaz C. & Richard S. (2006). Excursionnisme et parcs naturels – Résultats de l'enquête auprès des visiteurs du Bois de Finges. Sierre.

Eagles P. F. J. (1999). International Trends in Park Tourism and Ecotourism. Gland.

Epler Wood, M. (2002). Ecotourism: Principles, Practices & Policies for Sustainability. UNEP.

Oppizzi D. (2003). Critères provisoires pour la réalisation des Parcs naturels régionaux. Bern.

Siegrist D. et al. (2002). Naturnaher Tourismus in der Schweiz. Angebot, Nachfrage und Erfolgsfaktoren. Bern.

# Economic Analysis of Recreation by Tourists on Protected Coastal Zones: A French Case

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*Keywords: Economics, recreation, tourism, attribute-based method, non-market goods valuation, management costs, coastal zones.*

## Introduction

Recreation is a major use of protected coastal zones and demand derives both from local and tourist populations. Economic impacts of such policies are hard to handle for many reasons. First, recreation is a non-market service and the lack of price is often associated with a lack of benefits. This situation is well known by economists who have elaborated various techniques for giving an economic value to many environmental functions. The Travel Costs Method (TCM) is one of the most used techniques for recreation but unfortunately tourists are generally dropped out the sample on the basis that they do not fit the standard economic hypothesis well. Secondly, supply side is frequently neglected. This is partly because information on inputs, costs and outputs is scattered between public agencies or managers. Thus, complete analysis of recreation is also relatively rare.

We offer here an integrated economic analysis of recreation activities in the Gironde area, a portion of coastal zone located in the South West of France. It's famous for its natural character and tourist attractiveness. Natural spaces are composed by sandy beaches, dunes and three large pine forests.

## Methods

In many occasions, recreation activities fit the theory of Lancaster (1966) well, whereby individuals get satisfaction from certain characteristics (scenery, trails density, water quality) in addition to the total number of trips and prices (McConnel 1977).

For this reason, we develop an analytical framework based on this kind of approach, as it seems to offer better opportunities for connecting supply and demand (compared to global valuation).

Regarding the lack of literature, we propose a simple analytical framework for describing the production costs of recreational attributes. It's based on standard microeconomics of production and designed to include both direct and restoration costs. For the demand, we show how to adapt the standard Travel Cost Method by using a 3 stage decision process and a random utility model. This comes from an early work made by Bell and Leeworthy (1990), recently adapted by Riera Font (2000) in the Balearic islands. Under the new hypothesis, this type of model allows for the application of the TCM with tourists. Here, we focused on the third step and the relevant "on-site costs". The definition of the latter is discussed in the paper.

## Results

Based on the previous models, we empirically estimate cost functions for various attributes. We make separated estimations for the three spaces (beach, dune and forest) and specific management actions. Total number of visits  $F$ , as well as beach lengths  $LN$ ,  $Ld$ , and  $Lf$ , recreation area size (in forests)  $SZA$  and cycling paths' length  $LPC$  appear to be the dominant factors. Each functional form is linear. This allows a matrix of marginal (or average) costs (table 1).

Table 1: Marginal costs of producing recreational attributes (Euros 2002).

<i>Management actions</i>	<i>Constant</i>	$L_N$ (km)	$L_d$ (km)	$L_f$ (km)	$S_{ZA}$ (Ha)	<i>Config</i> (dum)	$F_{est}$ (visits)	$F$ (visits)	$L_{pc}$ (Km)
<i>Life guarding</i>							0,049		
<i>Beach cleaning</i>		13.992							
<i>Dune management</i>			3.100						
<i>Cycling paths</i> (investment)									2.682,98
<i>Cycling paths</i> (operating)									626,19
<i>Recreation areas</i> (investment)	7.603				917	20.972			
<i>Recreation areas</i> (operating)				8.138,42	1.197,81			0,016	
<i>Forest management</i>					589,75				589,75
<i>Total</i>		13.992	3.100	8.138,42	2.713,56	20.972	0,049	0,016	3.898,92

Table 2: Marginal benefits for recreational attributes (Euros 2002).

<i>Attributes</i>	<i>Unit</i>	<i>Marginal benefit</i> (day/household/€)	<i>Marginal benefit</i> (day/individual/€)
Cycling paths ( $L_{PC}$ )	1km	22,60	5,65
Recreation areas ( $S_{ZA}$ )	1ha	1,26	0,32
Beach Length ( $L$ )	100m	8,67	2,17

Functional forms are estimated using OLS and panel data techniques (depending on the database). Turning to the tourists demand, a conditional logit is estimated where on-site costs, squared on-site costs, beach length, recreation areas and cycling paths are all significant. By doing so, we find some of the variables used in the supply analysis again. We derive measures of consumer surplus for households and individuals related to each of the three previous attributes (table 2).

In the last part of the paper, we balance costs and benefits. Each attribute appears to have a significant economic value as a relatively small number of visits (between 690 and 8451 depending on the attribute) offer a positive net value. These figures are quite low compared to the total number of tourists' day-visits (around 5 million) given by regional statistics. This tends to suggest the actual management conforms to economic optimality and invites us to think of related policies such as funding. On that particular point, our work also offers indications. For instance, peak pricing is relevant for at least three reasons: seasonality of demand and costs, and capacity costs (through variable SZA).

## Conclusion

To conclude, we discuss the overall contribution of the attribute based approach for economic valuation of recreation management. The presented one is very appealing for the identification of key variables (recreational characteristics) but still suffers from limitations in the evaluation of global costs and benefits. For these reason, it must be completed with techniques rather than focusing on the total number of visits such as count data models.

## References

- Bell F.W. & Leeworthy V.R. (1990). "Recreational Demand by Tourists for Saltwater Beach Days", In: Journal of Environmental Economics and Management (18), p 198-205.
- Hanley N., Shaw W. D. & R.E W. (2003). The New Economics of Outdoor Recreation. Cheltenham, U.K - Northampton, USA.
- Lancaster K. J. (1966). "A new approach to consumer theory". In: Journal of Political Economy (74), p 132-157.
- McConnell K. E. (1977). "Congestion and Willingness to pay: A Study of Beach Use". In: Land Economics (53/2), p 185-195.

## Estimating Recreation Market Share for National Forests

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*Keywords: Land management, land use, recreation activity, recreation resources, market share.*

### Introduction

Public land managers are often faced with deciding among several alternatives for how to allocate limited funding for the maintenance, improvement, or development of recreation resources and opportunities. Often those decisions are linked to resources that support particular recreation activities, and a goal is to ensure that local residents are well served. One key piece of information is identifying what activities occur often on those lands. More important is identifying for which activities the agency lands are a primary resource. This paper documents a method for determining the relative importance of a specific public lands base for supporting a set of recreation activities for a defined population. In essence, the analysis estimates the share of a regional recreation activity market captured by a particular resource base. Specific examples of results are provided from several National Forests in the U.S.

### Methods

This method combines information from two major recreation surveys for the US. Information about the amount of recreation activity occurring on a particular national forest comes from the Forest Service's National Visitor Use Monitoring (NVUM) data. These data provide the numerator for the market share analysis. Total recreation activity is estimated through results from the National Survey on Recreation and the Environment (NSRE). Key elements that enable computation of a market share are consistent definitions of the set of recreation activities, the metric for activity vol-

ume, and the bounds for the geographic area of the origin market. In this case the activity volume metric was days of participation in an activity.

The first step in the analysis is to define a geographic area that serves as the control region. From the NVUM data, a cumulative distribution function (CDF) of distances traveled for onsite visits is constructed. The CDF determines the distances from the forest that generate a target percentage of total visits. It is not unusual for a high percentage of National Forest visits to be generated from a small area. By mapping the origin counties of survey respondents who live in the targeted regions, a general picture of the primary market zones can be realized. For this analysis, market zones that generate half and three-fourths of the visits to a national forest are defined. Activity volume occurring on the forest and generated by the target origin zone is computed by a weighted analysis of the percent of visits from the target origin zone engaging in each recreation activity, and multiplying by the number of total visits emanating from that zone. Visits are converted to activity days by multiplying by average visit length in days. NSRE data describes the total volume of recreation that is generated by the population in the same geographic area, regardless of destination. The process is to first determine the percent of the population engaging in an activity, and multiply by the average annual days of participation per participant.

NVUM data provide an estimate of the amount of recreation activity days originating from a given area and ending on a national forest. NSRE data provide an estimate of activity days originating from the same area and ending anywhere.

Table 1: Market share analysis for 50% visit zone around White River National Forest.

Activity	NSRE annual activity days Total (1000's)	NVUM annual activity days on WRNF (1000's)	Market share (%)
Picnicking	16,704	246	1.47
Driving for pleasure	31,491	371	1.18
Hiking	114,299	1,424	1.25
Developed camping	7,751	330	4.26
Primitive camping	7,804	194	2.49
Off- road driving	16,328	243	1.49
Backpacking	6,050	164	2.71
Snowmobiling	1,105	147	13.29
Downhill skiing	5,275	2,991	56.7
Cross-country skiing	2,172	516	24.88
Gathering forest products	11,047	79	0.72
Viewing natural scenery	161,919	2,092	1.29
Visiting nature centers	59,225	187	0.32
Horseback riding	3,311	46	1.4
Hunting big game	2,543	173	6.79
Fishing, cold water	19,011	301	1.58
Biking / Mtn. biking	113,080	482	0.43
Viewing wildlife, etc	124,341	1,559	0.74

The ratio provides an estimate of the market share of recreation days from that origin that are captured by the national forest.

## Results

Results of the market area zone analysis for the White River NF(WRNF) in Colorado are displayed in Figure 1. Geographic resolution was limited to counties. Counties in red are ones that had surveyed respondents and lay within the 50% distance zone.

50% AND 75% MARKET AREA FOR WHITE RIVER NF

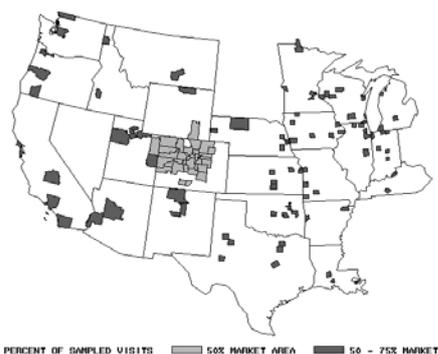


Figure 1: 50% and 75% market share for White River NF.

Counties shown in blue were ones that had survey respondents and lay in the 50 to 75% zone. While the 50 percent zone is a fairly tight geographic area, the draw of a number of major ski areas and summer resorts causes the 75% zone to cover a large portion of the country. Market share analysis was limited to the 50% zone. Table 1 shows the market share results for that origin zone.

The WRNF is a primary provider for winter recreation opportunities for the market zone. This estimate is that over half of the downhill skiing days, and nearly one-quarter of cross-country skiing days generated by the origin zone population have a destination on this forest. As well, over 13 percent of snowmobiling days occur there. In addition to those activities, the forest is an important resource for big game hunting (market share of about 7%), and developed camping (over 4 % market share). Although the market area population generates over 2 million activity days of viewing scenery and over 1.4 million days of hiking, and 1.5 million days of viewing wildlife on the forest, the WRNF market share for each of those activities is less than 1.5%.

# Modelling Visitor Expenditures at Fulufjället National Park, Sweden

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*Keywords: Expenditures, economic impact, national park, protected areas, visitor studies.*

## Introduction

Protected areas should not be regarded as geographically isolated entities and it is essential to adopt a perspective that extends beyond park boundaries. A national park is in itself a sight often worth seeing which attracts visitors, but in many cases it is associated with a larger complex including transportation, lodging, food service, outdoor recreation opportunities and other attractions. This presentation reports analyses of expenditure data at different geographical levels from visitor surveys at Fulufjället National Park in Sweden. The region directly surrounding the park is referred to as a 'gateway' area, and many of the tourism businesses providing services for visitors to Fulufjället are located there.

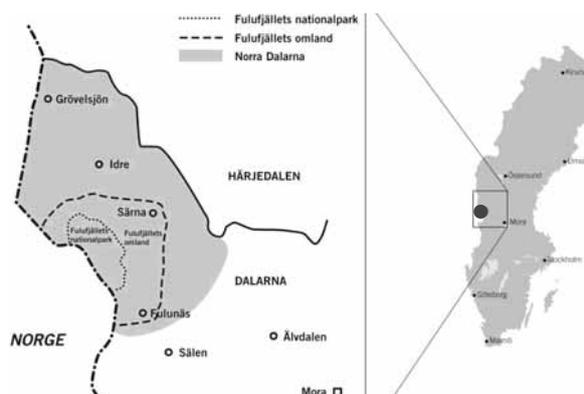


Figure 1: Fulufjället National Park with surroundings.

The volume and type of non-resident visitor expenditures is the primary economic force behind regional tourism impacts and represents an influx of new money to the economy. Studies of expenditure patterns help to describe the size of each travel market in economic terms and destinations

can better benefit from marketing efforts. It also leads to the identification of attributes influencing travel expenditure characteristics among market segments. Numerous studies of household travel and expenditures are available on a macro level, but less is known about socioeconomic factors that affect this pattern and the effects of underlying demographic characteristics on visitors' expenditures (Cannon & Ford 2002; Fish & Waggle 1996).

Fulufjället National Park represents an important trend in current Swedish environmental policy as this is the first national park where the planning strategy explicitly builds on visitor data in order to develop recreational opportunities and tourism (Wallsten, 2003). In the year before and the year after designation, extensive visitor surveys were conducted to guide the park management plan and further development, as well as to monitor changes in visitor characteristics, activities and impacts (Fredman et al. 2005). According to visitor surveys, park visitation increased by 40% following its designation (Fredman et al. 2006).

## Methods

Visitor surveys were undertaken at Fulufjället National Park in the summers of 2001 and 2003 by means of automatic trail counters and self-registration boxes (Fredman et al. 2005). A sample of 980 Swedish and 520 German visitors that registered at the self-registration boxes received a mailed questionnaire sent to their home address some weeks after the visit (response rate >80%). Besides several attitude questions about outdoor recreation and park management, the survey in-

Table 1: Proportion of visitors who reported an expenditure and average expenditures in each geographical region (95% c.i. in brackets).

	Fulufjället National Park (NP)	Fulufjället Gateway area (outside the NP)	Fulufjället region (outside gateway area)
Swedish visitors	46.1% 178.6 SEK (155.2 – 202.1)	30.7% 777.5 SEK (615.4 – 939.5)	55.5% 1702.6 SEK (1552.6 – 1852.6)
German visitors	42.4% 349.2 SEK (119.2 – 579.2)	39.7% 1859.2 SEK (1054.7 – 2663.8)	48.3% 3402.2 SEK (2577.6 – 4226.8)

cluded items concerning travel patterns, demographic background and visitor expenditures. In the 2003 survey respondents reported their expenditures on lodging, food, shopping, activities, transportation etc. in Fulufjället National Park, the gateway area and the region outside the gateway area.

## Results

Data analyses show several significant differences in expenditure patterns between the geographical regions and the two nationalities studied (table 1). Among Swedish visitors, 46% reported at least one expenditure item in the National Park, 31% reported expenditures in the gateway area and 55% in the region. The equivalent figures for the German visitors are somewhat lower in the National Park and Fulufjället region, while almost 40% reported expenditures in the gateway area. Looking at the average expenditures among those who reported at least one expenditure item in each geographical area respectively, there are considerable higher numbers among German visitors compared to Swedish. Given the efforts to develop tourism in the Fulufjället Gateway area, it is surprising to find that only about one third of the visitors report expenditures in this area.

Combining the data of the two nationalities, a logistic regression was used to analyze determinants of expenditure frequencies (i.e. whether or not a visitor reported any expenditure), and determinants of expenditure average levels were analyzed using a log-linear regression model. Preliminary results show that the quality of the recreational experience, previous visits, nationality, gender, income, wilderness purism, and length of stay are associated with expenditure frequencies, while income, and length of stay are associated with expenditures levels.

## References

- Cannon, T.F. & Ford, J. (2002). Relationship of demographic and trip characteristics to visitor spending: an analysis of sports travel visitors across time. In: *Tourism Economics* (8/3), p 263-271.
- Fish, M. & Waggle, D. (1996). Current Income versus Total Expenditure Measures in Regression Models of Vacation and Pleasure Travel. In: *Journal of Travel Research* (fall), p 70-74.
- Fredman, P., Hörnsten Friberg, L. & Emmelin, L. (2005). *Friluftsliv och turism i Fulufjället. Före - efter nationalparksbildningen*. Naturvårdsverket, rapport 5467. Dokumentation av de svenska nationalparkerna, nr 18.
- Fredman, P., Hörnsten Friberg, L. & Emmelin, L. (forthcoming) Increased Visitation from National Park Designation. In: *Current Issues in Tourism*.
- Wallsten, P. (2003). The "Inside-Out" Process. A Key Approach for Establishing Fulufjället National Park in Sweden. In: *Mountain Research and Development* (23/3), p 227-229.

## Assessment of Local Economic Impacts of Recreation: The Case of Pallas-Ounastunturi National Park

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*Keywords: Economic impacts, recreation, visitor expenditure, input-output analysis.*

### Introduction

In many rural areas the number of inhabitants is rapidly decreasing as people move into cities. This leads to fewer jobs and services in the countryside, which further precipitates migration from the villages. In Finland nature-based tourism has been suggested as a key to break this vicious circle. However, it is still unclear how much income and employment nature tourism actually generates in the host area and how these effects should be measured.

This study is part of a process which aims at creating a regional economic impact assessment system for Metsähallitus (Finnish Forest and Park Service) which needs economic impact information to justify investments and maintenance of nature protection areas. The assessment system will be based on visitor survey data collected regularly by Metsähallitus in all recreation areas under its administration. In this case study a U.S. Visitor survey / input-output-model (Stynes et al. 2000) is modified and tested in Pallas-Ounastunturi National Park in northern Finland. The model includes three components: annual number of visitors, their average spending in the area and multipliers derived from the local input-output table.

### Methods

To test the reliability of the spending estimates received from regular visitor surveys, an expenditure survey was conducted applying a diary method in the national park and its surroundings in 2004. The survey revealed the average spending and segmentation of the spending in eight expenditure categories. The annual number of non-local

visitors (95,200) in Pallas-Ounastunturi was multiplied with the average spending in each category to achieve total spending.

The local input-output table was constructed from the province-level table by aggregating industries and using a number of companies in each industry aggregate as a location quotient (e.g. McCann 2001 170). Before entering the total spending into the input-output model, the leakages and value-added tax were subtracted. The leakages from the local economy occur because enterprises buy materials and services outside the region. The remaining sum, the change in final demand, was then entered into the input-output model and as a result the direct and indirect impacts of national park visitors' spending on the local income became known. The number of jobs, salaries and communal taxes were counted, utilising the information from Statistics Finland.

### Results

As table 1 shows, the results indicated that the visitor survey spending estimates are slight underestimations, compared to the estimates from the diary method. The difference between the methods was statistically significant in winter but not quite in summer. The average length of visit was seven days in winter and five days in summer. Tourists spent the most money on lodgings, restaurants and retail shops.

Impacts on the local income, jobs, salaries and taxes are shown in table 2. The local input-output analysis indicated that due to a multiplication effect, one euro of travel income produces on average 1,27 euro for the local economy.

Table 1: Mean visitor spending in the research area per trip.

	Summer	Winter
Expenditure diary	156 €	306 €
Visitor survey	128 €	257 €
p-value	0,084	0,000

Table 2: Local direct and indirect economic impacts.

	Winter Direct	Summer Direct	Winter + Summer Indirect	Total
Net income, 1000€	5 450	4 118	2 559	12 127
Number of jobs	81	64	18	163
Salaries, 1000 €	1 556	1 184	367	3 107
Communal taxes, 1000€	297	225	70	591

This case study showed that recreation tourism may notably affect the local economy of the area. As the results, as well as the multipliers derived from the local input-output model, were in line with previous studies, it can be concluded that a U.S. model is applicable also in Finland. However, in order to establish the economic impact assessment system, the study should be repeated in different types of recreation areas. Considering the accuracy and effort required, it should also be contemplated whether counting the indirect effects is worthwhile in less popular areas where the indirect effects tend to be much smaller.

## References

- McCann, Philip. (2001). *Urban and Regional Economics*. New York.
- Stynes, D.J., Propst, D.P., Chang, W-H. & Sun, Y.Y. (2000). *Estimating National Park Visitor Spending and Economic Impacts; The MGM2 Model*. Michigan State University. <http://www.prr.msu.edu/MGM2/MGM2.pdf>.

# Are Admission Fees for Large Urban Historic Parks Feasible and Fair? Empirical Results from a Survey in the Prussian Palace Gardens in Berlin and Potsdam

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*Keywords: Admission fees, visitors' acceptance, recreation areas, historic parks, willingness-to-pay, contingent valuation, survey, iterative bid design.*

## Introduction

The question of how large urban recreation areas can be financed in a sustainable manner is currently intensively debated in Germany. In view of decreasing local public budgets, the introduction of admission fees receives increasing attention among policy makers. Since many urban parks in Germany have a historic character and often are protected as horticultural monuments, assuring a proper and sustainable maintenance is of particular importance. In Berlin and its surroundings, there are several huge public recreation areas in urban areas where admission fees are already obligatory and constitute an important financial source. Recently, the foundation that is in charge of the management of the large Prussian palace gardens in Berlin and Potsdam announced it would consider the introduction of admission fees even for those Parks that are located in densely populated areas. Clearly, the Parks concerned show an enormous social importance in terms of size, visit numbers and the variety of possible recreation activities.

Admission fees are potentially at odds with recreation objectives and social and equity concerns wherefore citizens' and users' acceptance can not be taken for granted. In this context, the perception of fairness of first-time admission fees might play a crucial role in determining visitor responses to fees. Obviously, charging the access to public parks would imply that the open access policy, which is still pursued in the major-

ity of German urban parks, could not be retained. There is little doubt that the introduction of prices reduces use rates, depending on the elasticity of demand. Consequently, we can expect that obligatory admission charges will result in a drop of visitor numbers. In particular, local people living closest to the Parks are likely to be particularly indignant at the thought of paying a fee for an area they are used to enter without any restrictions. Furthermore, admission fees might particularly exclude low-income people from recreation in the historic gardens. The expectable decrease of visit numbers might not only point to unintended social effects but also question the economic feasibility of admission fees because we can not take for granted that revenues will exceed the costs associated with admission charges. However, the magnitude of the reduction of the overall use level is an empirical issue just as the acceptance of fees, the expectable use rates of different user groups and their average willingness-to-pay.

## Methods

Against this background, we present the results of a visitor survey (N = 1550) that was undertaken in two well known historic parks in the Berlin-Potsdam Region in Germany: the Palace Garden Sanssouci and the Palace Garden Charlottenburg. Both palace gardens rank among the most frequented urban parks in the region and attract more than 1,5 million visits per annum each.

However, the palace gardens do not only attract local people seeking recreation but international and national tourists in parallel. The objective of the empirical analysis was to assess the acceptance of admission fees and to elicit visitors' willingness-to-pay. Apart from expectable revenues, we analyzed the potential effects of different price strategies on the visit numbers and the perceived fairness. We also assessed the impact of admission fees on different types of visitors (tourists, local people etc.) and income-groups. In particular, we aimed to show whether, and if so to what extent, low income users may show to be more responsive to the introduction of admission fees than high-income visitors.

## **Results**

We will show that both the income of the respondents and the type of visitor determine significantly visitors' willingness-to-pay. Furthermore, we used the survey to analyze the visit motives, the planned activities during the visit and visitors' attitudes regarding various issues (e.g. fairness of admission fees, alternative fund raising options, importance of horticulture monument preservation). In the presentation we will focus explicitly on the interrelationship between the motives and attitudes and the measured willingness-to-pay. Finally, we will show that proximity to the historic Parks does not only influence the frequency of visits and the reported length of the stay at the site but also the perceived fairness of access fees. To assess the willingness-to-pay, we implemented the Contingent Valuation Method, an iterative bid design was used to assess use rates associated with different fees and pricing strategies.

# How Involvement and Economical Benefits can Change Local Residents' Attitudes of Nature Conservation and Tourism: Karula National Park, Estonia

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*Keywords: Community-based tourism, public involvement, national park development, attitudes, perceptions, impacts.*

## Introduction

In case of tourism development in protected areas, local community involvement and benefits from tourism are important issues. Income from tourism has potential to raise local awareness and satisfaction of national parks. Consequently, crowds and traffic can cause negative impacts on the local community (Andereck et al 2005, Tosun 2006). Public involvement in decision making processes in park management and participation in tourism are important aspects to increase resident satisfaction (Fennell 2003). This paper presents an overview of local resident satisfaction of tourism and nature conservation in Karula National Park.

Karula National Park was established in 1993 to protect diverse post-glacial and cultural landscapes in Southern Estonia. Seventy percent of the park is covered by natural landscapes includ-

ing eskers, cupolas, lakes and forests. Cultural landscapes of Karula formed as a result of human activities during hundreds of years and covering 30% of the park's territory. The national park's territory is 111 km<sup>2</sup> and population is 178.

## Methods

In 1998 and 2005 studies were carried out among local residents of their perceptions and satisfaction about the national park's regulation and tourism development. Seventy-seven households live permanently in the area; sixty-six were interviewed in 1998 and 62 in 2005. The working group visited each home and interviewed one representative of each household. The sample was compiled considering equality of gender and proportionality of age. Onsite structured survey was used with a brief follow-up interview. In 2005 also 14 summer residents were investigated.

Table 1: Respondents' assessments of the statements.

	True (%)		Not true (%)		Cannot say (%)	
	1998	2005	1998	2005	1998	2005
Thanks to the existence of Karula national park I have gained economic benefits	16,7	31,6	72,7	60,5	10,6	7,9
I hope to gain economic benefits in the future due to the national park	31,8	44,7	39,4	36,8	28,8	17,1
I am glad to live in Karula national park	53	75,0	4,5	10,5	42,4	13,2
The existence of Karula national park disturbs my daily life	21,2	11,8	75,8	81,6	3	3,9

## Results

In both years respondents thought that nature in the national park was worth protection. During the second investigation when the national park was already in existence more respondents hoped to gain economic benefits than during the first study and less people said that the national park disturbs their daily life (table 1). In both studies the main problems were related to forest cutting and building restrictions.

The number of tourism enterprises has grown from 4 in 1998 to 12 in 2005. Entrepreneurs who were operating before the establishment of the national park did not find so much help of the national park's promotion for their businesses as those entrepreneurs who started later.

As residents' attitudes towards the national park got more positive towards visitors their attitudes became more negative (table 2).

Table 2: Is a large amount of visitors a danger to Karula area?

	True (%)		Not true (%)		Cannot say (%)	
	1998	2005	1998	2005	1998	2005
Thanks to the existence of Karula national park I have gained economic benefits	16,7	31,6	72,7	60,5	10,6	7,9
I hope to gain economic benefits in the future due to the national park	31,8	44,7	39,4	36,8	28,8	17,1
I am glad to live in Karula national park	53	75,0	4,5	10,5	42,4	13,2
The existence of Karula national park disturbs my daily life	21,2	11,8	75,8	81,6	3	3,9

There are several reasons for attitude changes in the national park during the two investigations. In the beginning of the establishment of the national park people were sceptical of the national park regulations which were new and caused misunderstanding. After 1998 the national park administration made an effort to inform and involve locals more in the management process. The national park administration helped to clean up some locals' favourite recreation places and provided financial support for maintenance of cultural landscape.

## Conclusion

Each year with the increase of visitors, locals have perceived more disturbances by visitors. The study showed that locals who were more involved in tourism were more positive about the national park and less critical towards visitors than those residents who benefited less from tourism. Summer residents were much more negative about vis-

itors than locals because they are mostly in the national park at the same time than visitors and they do not benefit from tourism like many locals do. Despite more negative attitudes towards visitors in 2005 the majority of respondents were positive about tourism development in general and thought that this was an important tool to improve life quality of a local community. Due to involvement and informing process by the national park administration locals' attitudes about national park have become more positive during 7 years; many of them found that the national park does not only mean restrictions but also support for their activities.

## References

- Andereck, K.L., Valentine, K.M., Knopf, R. C. & Vogt, C.A. (2005). Residents perceptions of community tourism impacts. In: *Annals of Tourism Research* (32), p 1056-1076.
- Fennel, D. (2003). *Ecotourism. An Introduction*. Routledge.
- Tosun, C. (2006). Expected nature of community participation in tourism development. In: *Tourism Management* (27), p 493-504.

# Winter Sport Tourism – Victim under Conditions of Climate Change?!?

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*Keywords: Winter sport tourism, climate change, destination choice, discrete choice experiment.*

## Introduction

In many Austrian regions winter tourism is an important source of income. Therefore they are highly dependent on sufficient snow conditions. In the past, some winters' lack of snow gave the alpine ski destinations a first idea of the impacts of climate change. The question arises: how do different types of winter sportsmen react to changing skiing conditions caused by climate change and how sensitive are they to snow independent substitutes? To follow this question an inquiry of 1000 Viennese skiers and boarders was conducted using an online questionnaire. The application of a Discrete Choice Experiment secures an individual oriented approach that takes the various preferences of skiers and boarders into account and helps to identify destination choice determining attributes. The result of the inquiry aims to show future options for winter (sport) tourism management.

## Methods

There are some studies dealing with climate change impact assessment and the adaptation strategies of winter sport destinations, but only a few consider the adaptation strategies of winter sport tourists and their impacts on their activity and destination choice. This survey follows an individual oriented approach to survey the adaptation processes of winter sport tourists under conditions of climate change.

The inquiry of active skiers and boarders comprises the following topics:

- skiing biographies and reasons for changes in the destination choice;
- travel motives and the preferences in winter sport;
- destination choice determining attributes and the potentials of snow independent substitutes (part of the DCE);
- expectations according to climate change.

The inquiry centres on a discrete choice experiment (DCE). Hypothetical profiles of ski destinations are combined to choice sets of two. Each profile is described by eight attributes concerning the performance of ski destinations with two to four levels. Four of these choice sets are offered to the respondents. From each of these choice sets the respondents have to choose the most preferred alternative (Louviere & Woodworth 1983, Louviere et al. 2000).

The DCE has three sequences aiming to survey the trade offs (see figure. 1):

- between profiles of ski destinations to learn about the preferences concerning the ski related performance of winter sport destinations (1<sup>st</sup> Sequence);
- between snow sureness and other ski related aspects of the destination to learn about the significance of snow sureness(2<sup>nd</sup> Sequence);
- between snow sureness and additional free and snow independent attractions, to learn about the acceptance of substitutes(3<sup>rd</sup> Sequence).

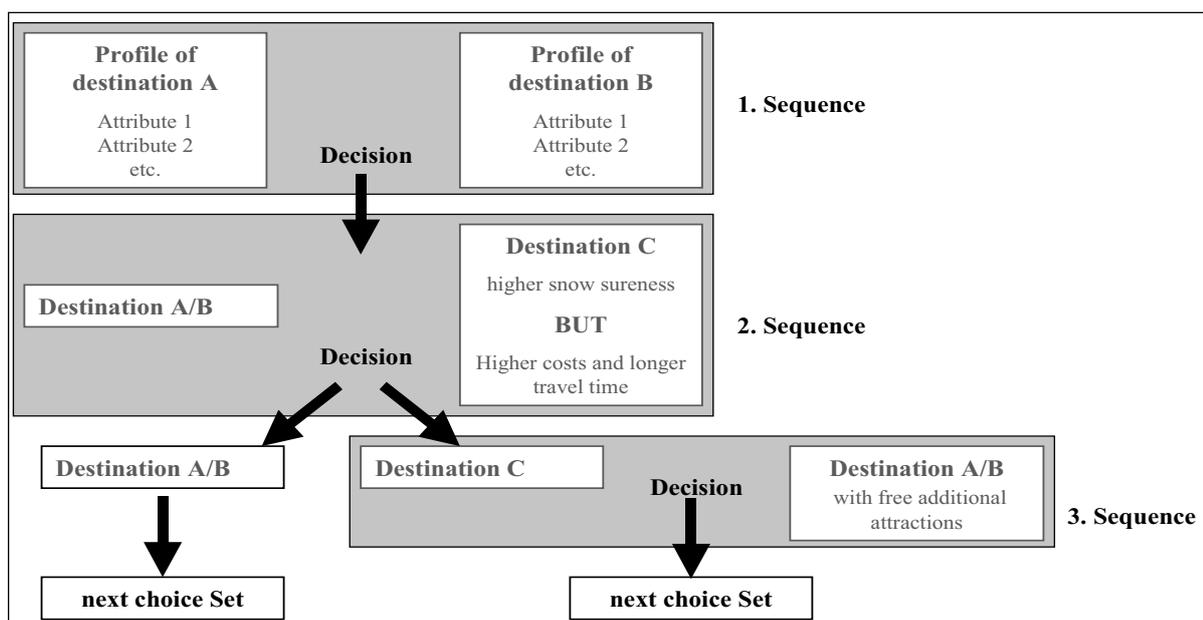


Figure 1: DCE's three sequences.

The DCE takes the multi-attributive nature of destination choice into account and allows also an exploration of non-existing alternatives that supports the scenario conduction (Haider 2002, Timmermans 1984, Timmermans & Golledge 1990). Thereby attributes are considered in the context of each other. But the analysis allows estimating the part worth utility for each attribute level and therefore its relevance for the decision. Because of its decompositional character the DCM allows to generate every possible profile out of the eight attributes and to calculate the probability of every possible profile to be chosen. This information will be used in a decision support system (DSS) that helps estimate further development potentials of winter sport destinations and supports the trade off of further development goals and investments.

## Results

The survey shows that skiers develop their own adaptation strategies to deal with changed skiing conditions. These strategies are as various as the types of winter sportsmen are. In winters, lack of snow destinations in high altitudes become more important and travel distances lose relevance. Obviously compensation measures of the destinations also influence the destination choice. Especially in context with this year's strong winter the survey shows that there are other requirements besides snow

sureness concerning the quality of the destinations' performance. The DCE proved to be a qualified method to cover the complexity of the activity and destination choice of winter sport tourists.

## References

- Bürki, R. & Elsasser, H. (2003). Auswirkungen von Umweltveränderungen auf den Tourismus – dargestellt am Beispiel der Klimaänderung im Alpenraum. In: Becker, Ch. et al. (ed.). *Geographie der Freizeit und des Tourismus*. München.
- Haider, W. (2002). Stated Preference & Choice Models – A Versatile Alternative to Traditional Recreation Research. In Arnberger, A. et al. (ed.). *Monitoring and Management of Visitor Flows in Recreational and Protected Areas*. Conference Proceedings, p 115-121. Vienna.
- Louviere, J., Hensher, D.A. & Swait, J. (2000). *Stated Choice Methods*. Cambridge.
- Louviere, J. & Woodworth, G. (1983). Design and analysis of simulated consumer choice or allocation experiments: An approach based on aggregate data. In: *Journal of Marketing Research* (20/4), p 350-366.
- Timmermans, H. (1984). Decompositional multiattribute preference models in spatial choice analysis : A review of some recent developments. In: *Progress in Human Geography* (8/2), p 189-212.
- Timmermans, H. & Golledge, R.G. (1990). Application of behavioural research on spatial problems II: Preference and choice. In: *Progress in Human Geography* (14/3), p 311-334.



Exploring the Foundation of Human-Wildlife Conflict  
in Parks and Protected Areas

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Frank Jensen Sondergaard & Jerry Vaske (Chairs)

# Conflict Strategies as a Task for the Management of Protected Areas – Shown at the National Park Donau-Auen

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*Keywords: Conflict, conflict potential, conflict strategy, conflict analysis, visitor monitoring, management of protected areas.*

## Introduction

The establishment and management of a protected area can rarely be put into practice without conflicts. As early as in the planning phase, conflicts with individual user groups, owners, residents, communities and regional businesses become apparent. Protected area management is confronted with a number of conflicts concerning interests, targets and spatial use, which interact with each other, last for a long period of time, and can create complex conflict situations. The targeted and farsighted handling of conflicts is a basic task of protected area managements. This includes taking an active position in conflict processes, as well as avoiding unnecessary confrontations, and canalising conflicts with the aim of fulfilling the duties and goals of a protected area. In this case, conflict strategy means taking a complex approach to a complex problem. This conflict strategy should focus on a complex regional view of conflict, including potential conflicts and their effects on planning and management and, at the same time, making it possible to act flexibly in conflict situations.

From the viewpoint of social sciences, a conflict is regarded as a confrontation between at least two parties (conflict as process of interaction). Before this, only a potential for conflict exists, consisting of the conflict subject and the, still peaceful, conflicting parties (Berkel 1997). Unlike a problem, there can not be a one-sided solution to a conflict, as it is often thought by management. Besides information and communication deficits, conflicts in protected areas result from spatio-structural con-

flict potentials. From the ecological viewpoint, this means that an unfortunate relationship exists between the sensitivity of a landscape and the intensity of its use (e.g. visitor frequencies, overlapping of various uses like agriculture, forestry, leisure and recreation use, settlement activities). Resultant environmental protection derives measures to limit use and to set legally binding restrictions and regulations. Their implementation is usually accompanied by conflicts. From the point of view of the users, a potential for conflict exists when their own demands are hindered by restrictions from environmental protection and regulations in the protected area. This users' perspective was underestimated by the management of protected areas for a long time (Ziener 2003).

## Methods

In the Lobau, the Viennese part of Danube Floodplains National Park, the authors accomplished a comprehensive analysis of conflict potentials and conflicts, as well as the conflict management strategy of the park management. Diverse methods were used like video monitoring, interviews of visitors, in-depth interviews with local experts as well as structure and process analysis.

## Results

In the Upper Lobau a conflict potential exists due to the high level of fragmentation of the wild-life's habitat through a dense network of paths as

well as the high intensity of use by various user groups. The conflict potential in the Lower Lobau is characterized by a large number of very sensitive phytotypes. In reaction to this situation the park management provided maps of bike and hiking paths in the Lobau which did not show the entire network of paths. However, the hoped for (gentle) steering effect did not occur. The management was forced to realize that, in the recreational area, to a large extent, by people living nearby (Arnberger et al. 2001), all paths continued to be used and that, therefore, that kind of method would not lead to easing the situation in sensitive areas. There is another conflict with dog owners who, in spite of the regulation that dogs be kept on the leash in National Parks, let their animals run free. Of the estimated 50,000 dogs, per annum, in the entire Lobau, only 34% are leashed (Arnberger et al. 2005). A conflict not only exists with the park management because the wildlife is unsettled, but also with visitors without dogs who feel disturbed and endangered. In both conflicts it is necessary to deal with certain user groups and individual users. The conflict strategy combines steering measures and land use concepts with a broad spectrum of communicative, cooperative and consensus-oriented activities.

## Conclusion

A conflict solution is made up of two components linked with each other. On one hand, a broad spectrum of communicative, cooperative and consensus-oriented activities relies on the immediate settlement of the conflict. On the other hand, a reduction of the conflict potential between sensitivity and intensity of use requires seeking a solution within the framework of steering measures, sustainability approaches and integrated use concepts.

## References

- Arnberger, A., Brandenburg, C., Muhar, A. & Eder, R. (2005). Hunde als Herausforderung für das Schutzgebietsmanagement. In: Pröbstl, U., Sterl, P. & Wirth, V.: *Tourismus und Schutzgebiete - Hemmschuh oder Partner?* 24.11.-25.11.2005. Vienna.
- Arnberger, A. & Brandenburg, C. (2001). Der Nationalpark als Wohnumfeld und Naherholungsgebiet - Ergebnisse der Besucherstromanalyse im Wiener Anteil des Nationalpark Donau-Auen. In: *Naturschutz und Landschaftsplanung* (33/5), p 157-161.
- Berkel, K. (1997). *Konflikttraining. Konflikte verstehen, analysieren, bewältigen.* In: *Arbeitshefte für Führungspsychologie* (15). Heidelberg.
- Ziener, K. (2003). *Das Konfliktfeld Erholungsnutzung – Naturschutz in Nationalparks und Biosphärenreservaten.* Aachen.

# Reported Conflict between Pastoralists and Wildlife around the Ruaha National Park, Tanzania

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*Keywords: Human-wildlife conflict, pastoralists, Ruaha, large carnivores, Tanzania.*

## Introduction

Protected areas are vital for conservation, but are often of insufficient size to contain viable populations of very wide-ranging species, such as cheetahs (*Acinonyx jubatus*), African wild dogs (*Lycaon pictus*) and other large carnivores (Woodroffe & Ginsberg, 1998). Consequently, these animals often stray outside reserve boundaries onto adjacent unprotected land, where they frequently cause intense conflict with people. They can impose significant costs on reserve-adjacent communities in a variety of ways, such as by killing livestock, and these costs are felt particularly acutely in poor communities, where even relatively small numbers of stock losses can represent a significant proportion of a household's annual income (Oli et al. 1994). Moreover, the presence of large carnivores can result in 'opportunity costs' for local people, where they have to invest time and money in guarding livestock rather than working or attending school.

The intensity of such conflict often results in local communities attempting to control the numbers of animals viewed as problematic, and this is frequently done using lethal means, such as poisoning or shooting. This can have a serious impact on the population of the species concerned: human-wildlife conflict has played a significant role in the range contractions and population crashes of various species, and has even been implicated in the global extinctions of some species (Woodroffe et al. 2005). In Africa, conflict with humans has played a key role in the decline of cheetahs, lions (*Panthera leo*) and African wild dogs, and it has been identified as one of the most pressing conservation issues facing large African carnivores to-

day (Ray et al. 2005). Addressing such conflict is therefore clearly important both for conservation and for the livelihoods of people living close to reserves, but developing effective resolution strategies hinges upon a detailed understanding of the real causes of conflict, so this is a vital step towards successful conflict mitigation.

## Methods

This study investigated attitudes of 60 Maasai and Barabaig pastoralists towards wildlife in areas close to the Ruaha National Park, Tanzania, with particular emphasis on five focal carnivore species, namely cheetahs, African wild dogs, lions, leopards (*Panthera pardus*) and spotted hyaenas (*Crocuta crocuta*). Attitudes were examined using a semi-structured questionnaire administered by the author and/or a Tanzanian research assistant at the respondent's household. Levels of conflict were assessed by showing respondents pictures of various species and asking them to rank them as posing a big problem, a small problem or no problem in the area around their household. Responses were then assessed in relation to various socio-economic factors and reported depredation levels.

## Results

Pastoralists reported significant problems with wild animals, particularly large carnivores, mainly because of the threat they posed to cattle. Respondents reported a low level of retaliatory killing, but a closer examination of the reasons behind this suggested it was predominantly due to circumstantial constraints rather than innate tolerance.

Wealth (measured through stock holdings) and the proportion of cattle losses attributed to predators emerged as the most important determinants of conflict examined: respondents were more tolerant if they were wealthier and had suffered less depredation. There was some inter-tribal variation in tolerance, with the Barabaig apparently more tolerant of large carnivores than the Maasai, but this was probably due to the greater wealth of the Barabaig interviewees. Despite their close proximity to it, people knew little of the Ruaha National Park, had received little outreach from Park personnel and received few benefits from its presence.

As greater wealth and lower depredation rates were both important factors affecting attitudes towards carnivores, improved livestock husbandry could be an important aspect of conflict resolution, as it would address both issues. However, successful conflict mitigation will not only depend upon reducing depredation, but also by improving the cost-benefit ratio of wildlife presence and providing direct, relevant benefits from conservation. Implementing effective conflict resolution schemes which address these factors should have significant benefits for both human and wildlife populations on the edges of protected areas.

## References

- Oli, M.K., Taylor, I.R. & Rogers, M.E. (1994). Snow leopard *Panthera uncia* predation of livestock: An assessment of local perceptions in the Annapurna Conservation Area, Nepal. In: *Biological Conservation* (68), p 63-68.
- Ray, J., Hunter, L. & Zigouris, J. (2005). Setting Conservation and Research Priorities for Larger African Carnivores. In: *WCS Working Paper* (24).
- Woodroffe, R. & Ginsberg, J.R. (1998). Edge effects and the extinction of populations inside protected areas. In: *Science* (280), p 2126-2128.
- Woodroffe, R., Thirgood, S. & Rabinowitz, A. (2005). The impact of human-wildlife conflict on natural systems. In: Woodroffe, R., Thirgood, S. & Rabinowitz, A.(Eds.), *People and Wildlife: Conflict or Coexistence?* p 1-12. Cambridge.

## Images of Nature as Sources of Conflict

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*Keywords: Images of nature, nature policy, nature management, perception of nature.*

One of the problems nature policy and management agents, like national governments or natural park managers, have to deal with, is that different stakeholders may have different images of nature, and therefore, give different meanings to the same natural place. Hence, even if general goals, for example nature conservation, are embraced by all stakeholders, conflicts on a more practical level may arise, due to different opinions about what real nature is, how to treat nature, et cetera. An image of nature is understood here as a relatively stable network of meanings and ideas that people attach to nature. Thus, an image of nature is a property of the mind-structure of an individual subject. It is a frame of reference guiding and organising the way people perceive and value nature, and it gives direction to opinions about nature policy. Several Dutch scholars have been studying people's images of nature (Born et al. 2001, Buijs & Filius 1998, Buijs & Volker 1997, Groot & Born 2003, Jacobs et al. 2002, Keulartz et al. 2004). Their findings show some remarkable convergences. The aim of this presentation is to provide a brief overview of Dutch studies of images of nature, stressing the major theoretical underpinnings as well as empirical findings of these studies.

The mentioned studies reveal a similar range of dominant images of nature amongst Dutch citizens. Typically, the range consists of three to five different images of nature, with a wild image on one extreme side, to a functional image on the other extreme side. For example, the different images as formulated below are found by Buijs & Filius (1998), in a qualitative study, and confirmed by Jacobs et al. (2002), in a survey study:

1. Image of wild nature (29% of subjects): only natural sites totally untouched by man are considered real nature (such as deserts, oceans, the South Pole); 'hands-off' is the ideal nature policy.
2. Image of autonomous nature (22%): nature is everything that is not made by humans (e.g. weed spontaneously growing in built areas is also natural); nature-policy should be directed towards nature itself, not to human ends.
3. Image of broad nature (23%): everything that grows is nature, whether or not influenced by man (e.g. a tree in a garden is real nature too); man is allowed to influence nature, with respect for nature, coexistence is the ideal.
4. Image of decorative nature (11%): the question what nature exactly is, is not very relevant within this image, it is an excellent place for recreation and enjoyment in the first place; nature should be made beautiful and accessible for humans.
5. Image of functional nature (15%): nature controlled by man is real nature too (e.g. agricultural areas are natural); nature should be used for the benefit of man.

The number of people in the Netherlands having an image of nature towards the wild side of the range is much bigger than the number of people having an image towards the functional side. While the images found in other studies differ slightly in details, the range from wild to functional is found over and over again.

Interestingly, the studies reveal that images of nature consist of three different dimensions: the cognitive dimension (what is real nature), the normative dimension (how should we treat nature) and the expressive dimension (what are the values re-

lated to nature). Important differences between images of nature are found to reside in opinions about what degree of spontaneity is essential for nature (for the cognitive dimension), to what degree nature may be used for the benefit of man (normative) and the degree of challenge versus safety nature offers (expressive). Several authors (e.g. Buijs & Volker 1997, Groot & Born 2003) have argued that the foundation of differences in images of nature may lay in the fundamental view people have on the relation between man and nature. Jacobs et al. (2002) found indeed that the ecocentric view (nature stands above man) correlates significantly with a wild image of nature, and that an anthropocentric view (man stands above nature) correlates with a functional image of nature.

While the existence of a spectrum of images of nature from wild to functional is confirmed by all mentioned studies, and a method for investigation is established, the same studies leave many questions open for debate and research. It is unknown whether this spectrum is typical Dutch, typical Western or universal. Moreover, it is hypothesized, but hardly tested, that someone's image of nature highly affects his opinions in specific conflicts.

## References

- Born et al. (2001). The new biophilia: an exploration of visions of nature in Western countries. In: *Environmental Conservation* (28/1), p 65-75.
- Buijs & Filius (1998). *Natuurbeelden in de praktijk. De invloed van natuurbeelden en natuurvisies op gedrag en mening over het beleid*. Wageningen.
- Buijs & Volker (1997). *Publiek draagvlak voor natuur en natuurbeleid*. Wageningen.
- Groot & Born (2003). Visions of nature and landscape type preferences: an exploration in the Netherlands. In: *Landscape and Urban Planning* (63), p 127-138.
- Jacobs et al. (2002). *Waterbeelden: een studie naar de beelden van waternatuur onder medewerkers van Rijkswaterstaat*. Wageningen.
- Keulartz et al. (2004). Concepts of nature as communicative devices: the case of Dutch nature policy. In: *Environmental Values* (13), p 81-99.

# Visitor and Resident Acceptability Norms towards Wolf Management Actions

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*Keywords:* Wolf management, gray wolf, norm theory, local residents, visitors.

## Introduction

The management of wildlife, a publicly-owned resource in the United States, depends ultimately on public acceptance of management actions and policies. The lack of public acceptance has led to specific wildlife ballot initiatives in several states and more generally, stimulated long-term policy changes that have redefined the options available to managers. Widespread public involvement in wildlife management issues appears to be a product of changing demographics and the rise of politically-effective interest groups. These broad social changes have not been matched in wildlife management agencies, where a traditional reliance on only biological information and professional judgment still predominate. A paradigm for evaluating information about the publics' views of the acceptability of wildlife management policies is needed to help bridge the gap between changing public expectations and traditional professional (biological) judgment.

Norm theory offers one such paradigm for identifying publicly acceptable policies and helps explain why management actions are judged acceptable or unacceptable. Using the structural norm approach, a technique to represent social norms graphically, researchers have described the prevalence, range of tolerable conditions, intensity and crystallization (group agreement) for a wide range of natural resource topics. Although the technique has proven useful, crystallization is typically not visually presented. To overcome this limitation, this paper incorporates the Potential for Conflict

Index (PCI) into the structural norm methodology. The PCI provides a means to visually display group agreement and the other structural characteristics of norms.

The objectives of this study were to: (a) demonstrate the utility of combining the structural norm approach with the Potential for Conflict Index to collect and organize information about the publics' norms for managing wolves in the Grand Teton National Park (GRTE), (b) monitor changes in these norms across human-wolf interactions of varying severity, and (c) compare the norms reported by local residents and visitors to GRTE.

## Methods

Gray wolves (*Canis lupus*) appeared in Grand Teton National Park northern boundary in October of 1998, two years after being reintroduced to Yellowstone National Park. Over 300 wolves are currently estimated to reside in the Greater Yellowstone Area (GYA). Human populations in the area have also increased in recent years. The population of Teton County, Wyoming, for example, increased 73% from 1990 to 2005. Park visitation for GRTE now averages 2.5 million visitors annually. In addition, unlike other national parks, grazing rights in the GRTE are protected, and livestock and wolf conflicts have increased. Livestock depredations by wolves within the Greater Yellowstone Area resulted in the deaths of approximately 150 cattle, sheep, and goats during 2003. Two thirds of these depredations occurred on public grazing al-

lotments and 34% on private property. The U.S. Fish and Wildlife Service responded to these depredations by killing 38 wolves in 2003.

To understand the acceptability of alternative management actions for addressing human-wolf conflict, we sampled local resident ( $n = 604$ , response rate = 51%) and park visitor ( $n = 596$ , response rate = 81%) populations during 2003. The local resident sample included individuals who live within a 100-mile radius of Jackson, Wyoming. Park visitors were initially surveyed on-site to collect basic information and addresses for the follow-up mail survey. A total of 1,200 mail surveys were used in our analyses. A telephone non-response check for the resident sample did not identify any statistical differences between respondents and non-respondents to the mail survey.

The survey described six different hypothetical situations depicting possible human-wolf encounters. Respondents evaluated the acceptability of several management options designed to remedy or prevent the conflict in the hypothetical situation (e.g., monitor the situation, frighten the wolves away, capture and relocate the wolves, destroy the wolves). Acceptance of management actions were coded on a 7-point Likert-type scale ranging from “highly unacceptable” (-3) to “highly acceptable” (+3).

## Results

For all scenarios, park visitors rated “monitor the situation” more favorably than local residents ( $t = 7.46$ ,  $p \leq .001$ ). For those situations where wolves had not caused any loss of cattle or pets, local residents rated management options aimed at prevention of human-wolf interaction (i.e. trail closure or cattle removal from federal grazing allotments) as significantly less acceptable than park visitors ( $t = 5.31$ ,  $p \leq .001$ ). In scenarios where wolves caused loss of pets or cattle, local residents rated non-lethal management options (i.e., capture and relocate, or frighten the wolves away) significantly less acceptable than park visitors ( $t = 2.67$ ,  $p = .008$ ). In these latter scenarios, local residents rated “destroy the wolves involved” as acceptable, whereas park visitors rated this management option as unacceptable ( $t = 12.32$ ,  $p \leq .001$ ). As the

severity of human-wolf interaction scenarios increased, the potential for conflict index values increased substantially for both local residents and park visitors. These findings highlight the controversial nature of lethal management actions and suggest situations where agency caution should be exercised.

# Human Responses to Wildlife: Stakeholder Acceptance Capacity and Human Learning

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*Keywords: Human learning, human-wildlife interaction, park and protected area management, stakeholder acceptance capacity.*

## Introduction

Interactions with wildlife in parks and protected areas often elicit conflicting human responses, e.g. visitors and indigenous residents may disagree about population levels of species such as elephants, lions, brown bears, or wolves. Both visitors and indigenous residents sometimes benefit from interaction with wildlife, but the benefits are not without costs, such as direct attacks; disease transmission; and consumption or damage to crops, timber, and fish. Because benefits and costs of human-wildlife interaction fall disproportionately on different people, stakeholders often disagree about managing wildlife. Thus, human responses to wildlife are often as important as biological carrying capacity in determining and attaining optimum wildlife population levels in parks and protected areas.

## Methods

Our goal in this paper is to outline current knowledge about human responses to wildlife and the learning processes influencing those responses. Our method is to review and synthesize existing research about stakeholder acceptance capacity (SAC) for wildlife and human learning.

SAC for wildlife varies among those with different stakes in wildlife. In Norway, for example, farmers and tourists hold different stakes in wolf management and prefer different population levels (Kaltenborn and Bjerke 2002). SAC determinants include: (a) internal, psy-

chological variables, such as wildlife value orientations, attitudes and beliefs; (b) experiential variables, such as occupation and past experience with wildlife; and (c) situational specifics, such as wildlife species and encounter type or frequency (Zinn et al. 2000).

## Results

Colorado studies provide examples of each determinant. First, individuals with utilitarian wildlife value orientations were nearly three times more likely than those with protectionist wildlife value orientations to accept controlling the mountain lion population with increased hunting. Second, individuals whose had lived near colonies of black-tailed prairie dogs five years or longer were nearly twice as likely as those who had lived near colonies less than five years to accept destroying all prairie dogs in the area. Third, responses to beavers and coyotes found in residential areas illustrate the importance of situational specifics. Destroying a beaver or coyote was widely opposed unless it carried a disease harmful to humans. In that situation, destroying the animal was widely accepted.

Wildlife value orientations, attitudes, beliefs, and perceptions are not learned reflexively. They depend on pre-existing knowledge, skills, values and beliefs; the social context in which the stimulus is received; and emotional ties activated by the stimulus (Bandura 1986). There-

fore, individuals respond differently to the same stimulus. Four aspects of human learning—enactive learning, behavior modeling, expectancy, and tutelage—can help park and protected area managers anticipate, understand, and respond to visitors' and indigenous residents' acceptance capacity for wildlife (Zinn et al. 2006).

Enactive learning occurs during direct interaction with the environment and depends on the specifics of the interaction (Bandura 1986). For example, a small mammal might flee from one person but bite another, causing the two individuals to learn different lessons about the species. Behavior modeling occurs when one person models or imitates another's behavior (Bandura 1986). This can be seen in parks and protected areas when a tour group member models the behavior of his or her guide. What the behavior modeler learns about wildlife depends in part on the behavior he or she imitates. What one learns in a given situation also is influenced by expectancy, or expectations (Kowalski & Westen 2005). Often an individual with realistic expectations about wildlife will behave more appropriately and have a more successful experience than someone with unrealistic expectations. Finally, much human learning occurs through tutelage or instruction (Kowalski & Westen 2005). In tutelage, learning is influenced by the knowledge, skills, and motivation of both instructor and learner.

## Conclusion

In conclusion, humans' responses to wildlife are influenced by wildlife value orientations, attitudes, beliefs, and perceptions learned through complex cognitive and social processes. What we learn about wildlife depends largely on what we already know, what we expect, and who we are with. Unsurprisingly, some humans perceive a particular species primarily as a material resource, others perceive the same species primarily as a competitor or threat, and still others perceive it primarily as a fellow-creature. Understanding how these contrasting perceptions originate can help park and protected area managers respond appropriately to them.

## References

- Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. New Jersey.
- Kaltenborn, B.P. & Bjerke, T. (2002). The Relationship of General Life Values to Attitudes Toward Large Carnivores. In: *Human Ecology Review* (9/1), p 55-61.
- Kowalski, R. & Westen, D. (2005). *Psychology*. New York.
- Zinn, H.C., Manfredi, M.J. & Decker, D.J. (2006). Habituation of humans to wildlife: A different perspective. Manuscript in review.
- Zinn, H.C., Manfredi, M.J. & Vaske, J.J. (2000). Social psychological bases for stakeholder acceptance capacity. In: *Human Dimensions of Wildlife* (5/3), p 20-33.



Bridging the Ecological and Social Science Divide  
in Visitor Impact Monitoring and Management

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# The Ecological and Human Benefits of the Nature-Based Recreational Area

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*Keywords: Attention restorative effect, perceived restorative scale, landscape ecology, benefit.*

## Introduction

Psychophysiological researches have emphasized the influences of environment on individuals' stress (Ulrich 1981, Parson et al. 1998; Honeyman 1992) and the influences of landscapes on restorative attention (Kaplan & Kaplan 1989). Parsons (1998) indicated that, compared to cities, Nature is able to relieve one's tension and anxiety effectively. Keeping the benefits of landscape ecology structure in mind, the present research pursues the influences of landscape structures on one's psychological as well as physiological responses.

The research purposes of this study are to realize the effect of landscape structures on participants' physiological reactions (Electroencephalography, EEG; Electromyography, EMG; and Heart Rate, HR) and to realize the effect of landscape structures on participants' psychological reactions (Perceived Restoration Scale, PRS) in a natural based recreational area.

## Methods

In order to measure visitors' benefits in the nature-based recreational areas, this study adopted the items of the Perceived Restoration Scales (PRS) as the index of respondents' psychological responses. Furthermore, the physical responses of the right and left hemisphere brain wave (EEG), the Electromyography (EMG) value of respondents' forehead muscle were also included as indicators.

From a conceptual perspective of psychophysiological benefits resulting from landscapes, it is found that both Kaplan and Ulrich proposed

the aesthetic theory of environmental evolution. While Kaplan highlighted the cognitive process, Ulrich proposed a combined analysis of emotional, physical, and cognitive reactions. The present study examines the influence of landscapes on both the physiological reactions and the psychological reactions.

The relationship between landscape and species are emerging issues that have been depicted in many articles. Landscape structures are helpful to model the distribution of birds and also useful on the land policy. Studies assert birds are particularly sensitive to the landscape patch size. Birds are good subjects to test the relationship between species and landscape elements, while landscape scale is a suitable scale to test the relationship between species and land use. Different studies have categorized land uses into different types. The main categories include constructed areas, farms, man-made grassland, man-made woods, un-worked areas, grassland, natural woods, water bodies, and waterside areas.

Categories in this study were learnt from previous studies and interviews with experts of related fields to select the most representative landscape structure indices of the testing sites. The landscape structures selected in this study include vegetated lands, un-worked areas, woods, grasslands, and farms.

The eCognition ver. 4.0 was used to digitize the aerial photographic maps with the scale of 1/5000, followed by the calculation of indices of the landscape's ecological structures with FragStats for Arc View. The relationships among the landscape ecological structure indices, bird di-

versity, and the respondents' responses indices were tested. Respondents' perceptions of each recreational area were recorded with their oral statement for a further qualitative analysis.

## Results

The result is consistent with previous studies on the relationship between bird capita and fragmented built areas, since the fragmented, high density and high built areas represented a space with many grain sites, which allow birds to find food and shelter. The water body shows a similar effect on the relationship between the landscape's ecological structures and bird capita especially on the 250 meters radius level of the landscape ecological map. While most of the grass and woods show an opposite effect, the higher the fragmentation of the grass and woods, the more negative the effect on the bird species and capita. The analysis results show the effect of the landscape's ecological pattern on the wildlife species.

Most of the landscape's ecological structure indices have a positive effect on the respondents' rEEG, IEEG, and PRS responses. All of the built land indicators have a positive effect on the EMG and HR responses, while all the indicators of the built landscape have a negative effect on the IEEG, EMG and a very (all of them) negative effect on the psychological PRS responses.

The woods show a positive effect on respondents' IEEG and PRS responses, the water body has a positive effect on the rEEG and HR only on the 250 meters radius landscape map. All the landscape's ecological indicators have a negative effect on the PRS responses on the 250 and 500 meters radius map.

## References

- Honeyman, M.K. (1992). Vegetation and stress: a comparison study of varying amounts of vegetation in countryside and urban scenes. In Relf, D.(ed.). *The Role of Horticulture in Human Well-Being and Social Development*, p 143-145. Portland.
- Kaplan, R. & Kaplan, S. (1989). *The experience of nature: a psychological perspective*, p 177-201. Cambridge.

- Parsons, R., Tassinary, L.G., Ulrich, R.S., Hebl, M.R. & Alexander, M.G. (1998). The view from the road: implications for stress recovery and immunization. In: *Journal of Environmental Psychology* (18), p 113-139.

# Developing Spatially-Balanced Sampling Protocols for Visitor Impact Monitoring in Protected Areas

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*Keywords: GIS, spatial sampling, visitor impacts, campsites, trails, Rocky Mountain National Park.*

## Introduction

Protecting park resources and providing a quality visitor experience are two goals of the U.S. National Park Service mandated by the Organic Act of 1916 and the Wilderness Act of 1964. Developing programs for monitoring visitor impacts to natural resources can provide park managers with useful information that can inform resource and visitor management decisions.

## Literature Review

Monitoring visitor impacts is logistically challenging in backcountry and wilderness areas due to the dispersed distribution of sites and trails over the landscape and associated field time involved. It is imperative to create a robust and efficient visitor impact monitoring program that will inform visitor capacity management frameworks and adaptive management approaches (Grumbine 1994). Recent advances in geospatial techniques have benefited campsite and trail impact monitoring, especially the use of global positioning system (GPS) technology to document location of sites and impact attributes (Leung & Marion 2000). In contrast, while geographic information systems (GIS) have been utilized to derive spatial sampling strategies in landscape ecology and conservation biology (Theobald 2005), little attention has been paid to the potential of adapting the same concept to facilitate trail impact monitoring. Recently, efforts were made to apply the concept of spatially-bal-

anced sampling designs to trail condition monitoring in Rocky Mountain National Park. This paper presents results of these applications.

## Methods

This study was conducted to develop an efficient sampling plan for measuring recreation related impacts to trails in the Bear Lake corridor in Rocky Mountain National Park, Colorado and addressed the following objectives: 1) Estimate the number of visitors along the Glacier Gorge trail; 2) Inventory trail conditions; 3) Examine the relationship between visitor use and trail conditions; 4) Compare results of different data collection methods. Visitor use was estimated using automated infrared trail counters and trail conditions were sampled using a 100 meter interval based sampling plan and a spatially balanced sampling plan

The spatially balanced sampling plan was based on visitor accessibility. Accessibility was defined as the time it would take a hiker to travel to a location within the study area along the trail based on distance from the trail head and slope. ArcGISv9.1 was utilized to create an "accessibility probability surface". Since visitor use diminishes at further distances from the trailhead it was assumed that more impacts would occur where more hikers visited. All locations within one hour of the trailhead were given a probability of 1, locations within two hours of the trailhead were given a probability of 0.9, and locations beyond two hours of

the trailhead were given a probability of 0.8. All locations outside of the trail corridor were given a probability of 0. For each point, Universal Transverse Mercator (UTM) coordinates were provided that allowed navigation to the sample point. Ninety-nine prioritized points were visited.

## Results

Results estimate that 474 visitors per day hiked to Alberta Falls, 157 visitors per day hiked to Mills Lake, and 46 visitors per day hiked to Black Lake. The average trail width for the entire trail was approximately 4.5 feet and the average maximum trail depth was approximately 2.75 inches. Because trail condition samples were drawn from a population using an unequal inclusion probability, we weighted the importance of each sample based on the inverse of their inclusion probability. That is, the more likely that a location was sampled (e.g. approaching 1.0), the smaller the weight – and the less likely that a location was sampled (e.g. 0.1), the larger the weight ( $1/0.1 = 10$ ). The strength of using a probability-based sample is that a statistically reliable estimate of the population can be made. Furthermore, no statistically significant difference was found between the results of the spatially balanced dataset and the 100 meter interval dataset for trail width and depth. Regression analysis revealed a strong relationship between visitor use and trail width.

## Conclusion

Protecting both resources and visitor experience can be very challenging for parks and related areas experiencing increasing visitation and diverse types of activities and managers often rely on management by objectives planning frameworks such as Limits of Acceptable Change (LAC) and Visitor Experience Resource Protection (VERP). At the heart of management by objectives planning frameworks are setting appropriate management objectives, the development of associated indicators and standards of quality and a strong and consistent monitoring program that signals when management action should be taken. Over the last several years, there has been much discussion about the efficacy of such planning frameworks.

Moreover, budget constraints have forced many parks to do more work with fewer people and often let monitoring and analysis of data fall by the wayside. For all of these reasons, researchers and managers must work together to develop creative approaches to collecting data that balances efficiency and precision and acknowledges the constraints of managers in the field. The above approaches are a step in this direction and use the latest spatial technology, knowledge from current literature, and spatial statistics to accomplish these tasks hence strengthen management by objectives planning frameworks.

## References

- Grumbine, E. R. (1994). What is ecosystem management? In: *Conservation Biology* (8), p 27-38.
- Leung, Y-F. & Marion, J. L. (2000). Recreation impacts and management in wilderness: A state-of-knowledge review. In: Cole, D.N. et al. (eds.), *Proceedings: Wilderness Science in a Time of Change*; Vol. 5: Wilderness ecosystems, threats, and management, May 23-27, 1999. p 23-48. Missoula.
- Theobald, D.M. (2005). *GIS Concepts and ArcGIS Methods*. Conservation Planning Technologies. Fort Collins.

## **Managing Visitor Impacts along Australia's Remote Kimberley Coast – The Forgotten Dimension of Balancing Country**

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### **Introduction**

The expectations on tourism as a stimulator for economic opportunities can be high for communities with limited economic activities, particularly in areas with attractive natural values such as spectacular scenery, wildlife, flora and tranquillity. Sustainability has become a buzz word in recent years, particularly with the concept of the triple-bottom-line which implies that to build a sustainable industry for the long term, activities need to be balanced not only in terms of their economic impacts, but also on the environmental impacts on the area and the social and cultural impacts on the local community. In a current project looking at the expedition cruise ship industry along the remote Kimberley Coast in Australia's North West, we are encountering an additional dimension that has been largely lost in western culture, the impacts on the spiritual and cultural connection to country by Aboriginal Australians. Country refers to the area to which a particular group of people are born and spiritually connected. Country is multi-dimensional including people and Dreamings and areas of land and/or sea including all living and non-living things, the sub-surface, underground and the sky above.

The Kimberley Coast extends for 3000 km between Broome and Wyndham in Western Australia. It is accessible almost only by sea or air and has gained increasing popularity in recent years because of its spectacular scenery, pristine nature, Aboriginal rock art and remoteness, giving visitors the impression of exploring an 'untouched' world. Over re-

cent years, there has been an exponential increase in expedition cruise operators offering luxury experiences along the Kimberley Coast and visiting natural, cultural and historic on-shore sites along the way. Vessel capacity is also on the increase with vessels operating in 2006 ranging from 8 (+4) to 106 (+68) passengers (+staff). Interest by the new operators and visitors is continuing to grow, as does the size of vessels visiting the area.

Much of the Kimberley Coast is Aboriginal Lands Trust (ALT) land with two areas declared as National Parks/Nature Reserves. Visitation to the area has been largely unmanaged because of its vastness and lack of resources. The rapid increase in the number of operators and some recent incidences have led to increasing concerns about visitor safety, environmental impacts (e.g. trail erosion, littering), economic benefits and social and cultural impacts (e.g. souveniring at cultural and historic sites, inappropriate cultural behaviour). In the absence of an effective management structure and with unclear and limited jurisdiction and responsibilities by government agencies, there is a clear need for a joint approach and strong communication to provide a management framework with a view to making the Kimberley Coastal tourism industry sustainable for the long term.

### **Methods**

This paper presents on a project set up to provide a baseline of current activities, visitation hotspots, environmental impacts and cultural issues and to

provide recommendations on potentially suitable management frameworks for the area. Data was gathered through desktop research, workshops and meetings with Aboriginal custodians and non-Aboriginal stakeholders, field trips to country with Traditional Owners, monitoring of the biophysical environment where expeditions cruise ships land on-shore to conduct excursions and field trips on a number and range of expedition cruise ships to observe activities, impact and visitor behaviour while visiting on-shore sites.

## Results

We found that in 2006, 32 operators were offering expedition cruises from between 4 to 18 days. The trip 'experience' was advertised using terms such as 'the trip of a lifetime', 'wild and remote', but also 'special indulgence' and 'unparalleled comfort and luxury'. Their key shore-based attractions advertised were visiting key natural features such as waterfalls and swimming holes; cultural features such as Aboriginal rock art sites; and historic sites. There are a number of key sites between Broome and Wyndham that are visited by most operators. Current environmental impacts such as extensive trail formation and trail erosion or littering appear to be minimal with recovery of damaged vegetation occurring during the wet season from November to March, during which tours are not offered. Cultural impacts are more difficult to measure, but there is anecdotal evidence of vandalism, souveniring, site degradation and culturally inappropriate behaviour.

## Conclusions

Appropriate visitor management on-site appears to be crucial for both visitor experience and impact minimisation, requiring a low visitor to guide ratio and a high level of education and interpretation. We also found that one of the key issues for the management of activities in the area is the ignorance of the spiritual connection and significance of country to the Aboriginal custodians of the land by stakeholders such as land managers and operators. Their lack of knowledge and understanding of the spiritual connection to country by the Traditional Owners, often combined with a lack of ap-

propriate consultation has in the past resulted in mistrust, uncertainty and fear between the parties involved. A workable management framework will need to include appropriate protocols for consultation, means for exchange of cultural and historical information as well as measures to ensure environmentally and culturally appropriate visitor management on-site.



## Visitor Information and Visitor Management

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Reto Rupf (Chair)

# Visitor Conflicts and their Resolution for Forest and Park Management in Jozankei National forest, Japan

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*Keywords: Forest and Park management, visitor conflict, Jozankei National Forest, questionnaire survey.*

## Introduction

During the past decade, demand for recreational use in the national forests is a major concern for forest management, especially in protected forests. In Japan, it has been difficult for forest managers to satisfy these demands because they lack the data on recreational use in the forest, social scientific knowledge to analyze the conflict between visitors and managers; as well as discussions to solve the conflict. Furthermore, in recent years, accidents during outdoor activities are increasing steadily. Thus, it is also a matter for the managers and public sectors to avoid or reduce every type of accident in the forest.

This paper seeks to illustrate the present situation and the conflicts between the visitors and the forest managers and to discuss how to solve the conflicts in the Jozankei National Forest, Japan, as an example.

## Method

Jozankei National Forest is a part of the Shikotsu Toya National Parks and many citizens venture into the forest for recreational use. According to the leading survey, at least 10,000 people come into the forest per year. Concurrently, it is vital as the water source for the 1.8 million population of Sapporo city. The forest manager has to satisfy these demands and produce timber simultaneously.

We conducted two questionnaire surveys: 1) For visitors at the Jozankei National Forest, we distributed the questionnaire sheets on the windshield of the parked cars along the forest roads with envelopes to send it back after filling out the responses in June 2005.

2) For foresters belonging to the Ishikari forestry management office which is responsible for maintaining the forest, we directly distributed and recovered the questionnaire sheets in 2002.

## Results

We distributed 207 questionnaire sheets for visitors during 5 days in June 2005 and received 118. Thus, response rate was 57.0%. The main age brackets were 50's and 40's, and the ratios were 41.4% and 33.4% respectively. About three-fourth of the visitors were male. The major pattern during the visit was: 1) to go into the forest around 8 o'clock in the morning 2) to stay at least 4 to 6 hours while doing various activities, 3) to go back to their own place around sunset. These findings well followed the result of mechanical monitoring at the control gate (Takahashi 2002). Most of visitors lived in Sapporo city, which is one of the major urban areas surrounding the forest, and no one visited who lived outside the one-hour drive vicinity. The objectives of the visit were mostly to cultivate bamboo shoots and wild edible plants. Most of them were collected for self-consumption or gifts for relatives and neighbours, not for merchandise. 86.2% of the respondents visited with family, neighbours and colleagues as a group. The average number of persons per group was 2.8; only 13.6% of them visited solely.

While in the forest, they rarely feel at risk of an accident, but 53.4% of them took measures for preventing accidents. 63.6% of the respondents accepted to share the cost if effective measures for accidents in the forest would be in place. On the other hand, they were not satisfied with control of

the gate at the entrance of the forest. Acceptable ideas for gate control were varied depending on the respondent's opinion from full control to free access.

We also proposed the survey to 16 foresters belonging to the Ishikari forestry management office in June 2002. As a result, four-fifths of them considered that visitors have at least some sort of effect on management activities such as additional maintenance of the forest roads and other facilities, illegal cutting and dumping of waste. They also pointed out that the current method of gate control at the entrance of the forest for controlling the visitors was not effective. The ideas for visitor control were varied from free access to strict control, same as the results from visitors.

These results indicate that Jozankei National Forest gives unique recreational opportunities for the neighbouring citizens, especially for the middle- and senior-aged. But, many gaps exist between the visitors and the managers, and both sectors are not satisfied at the current moment. On the other hand, visitors could accept to pay the cost in return for valuable services, and both sectors had various ideas for filling the gaps. Thus as a next step, we will emphasize integrating harmonizing visitor use into the forest and recreational management plan.

## References

- Takahashi, M. (2002). Actual condition and problem of visitor use in Jozankei National Forest, Japan. In: Arnerberger, A., Brandenburg, C., Muhar, A. (2002) (Eds.). *Monitoring and Management of Visitor Flows in Recreational and Protected Areas*. Conference Proceedings. Bodenkultur University Vienna, Austria, January 30 – February 02, 2002. Vienna., p 65-68.

# MASOOR in the Alpine Areas: Agent-based Modelling as a Tool for the Management Planning in Natura 2000 Sites

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## Introduction

The European Commission is establishing a network of biotopes and habitats – called Natura 2000 – by decree of two directives, which all member states must comply with. Once established, adequate management shall ensure a favourable conservation status. Two research programmes founded by EU-grants, one in the Netherlands, Great Britain and France (called PROGRESS) and one in Austria, Slovenia, Germany and Italy (called AlpNaTour) are designing and assessing management plans in intensively used recreation and tourism areas. Both projects try to find cost efficient tools for data collection, analysis and management in different ecological environments (see Pröbstl et al. 2005, Elmauer et al. 2005).

In PROGRESS the research team used the agent-based modelling very successfully to show and to predict further deterioration in the protected sites. There the applicability of GPS, aerial photos, and agent-based modelling with the MASOOR program have been tested (Visschedijk & Henkens 2002). Against this background, the question was whether the use of the agent-based modelling could also be adapted to an alpine environment.

The alpine space is characterised by its close association with nature, several rare species and natural habitats of European significance, and a high proportion of conservation areas. It also hosts more than 120 million tourists a year, making it one of the most important leisure and recreation areas in Europe. Many leisure activities can

be pursued, and the economic potential is high. The sensitivity of alpine habitats and biotopes as well as the susceptibility of many species to disturbances, may lead to the potential for conflicts between the various land uses, especially tourism and conservation. The division of large, high quality habitats by regional and national borders adds further challenges to the planning processes and their implementation. Furthermore the alpine area is characterized by different activities like hiking, rock climbing, cross country skiing and others. Often, access to the mountainous areas is facilitated by cable car.

The management plan is the adequate and required instrument to protect Natura 2000 sites in the alpine environment. It should integrate ecological, social and economic interests. Progress on these issues requires a solid data base about ecological, local social, and visitor information, as well as analytical tools that integrate these data effectively into the planning process. Therefore we tested whether agent-based modelling could be a suitable tool for the management planning process in the alpine area.

## Methods

To test agent based modelling in an alpine environment two test sites were chosen. The modelling was adapted for hiking in high mountainous areas at the Schneeberg and for crosscountry skiing at the Ötscher both located in the last foothills of the Alps about 150 kilometres southwards from

Vienna in Lower Austria. In both cases the model is based on GIS-mapping, an inquiry via questionnaire and GPS- information.

## Results

Basically the combination of GPS and agent-based modelling is a suitable and helpful tool in several different locations and for different activities. The main advantages can be described as follows:

The operating expense for the data collection for the management planning process can be reduced. Furthermore agent-based modelling also contributes positively to a participatory planning process, because the use and the distribution of different user groups in the site can be visualized. Compared to a simple GIS based mapping, the disturbance and the regional distribution during the day or the season can be shown.

On the other hand there was a need to adapt the MASOOR program to the different ecological conditions and sites in the alpine area. An adaptation of the database for the model was necessary concerning

- the attributes of the paths,
- the different user groups,
- the access to the area (for ex. by cable car),
- the influence on the protected habitat types,
- the types of possible deterioration.

In summary, these new technologies offer promising directions, but significant amounts of further research will be needed to support the planning process in various protected sites all over Europe.

The use of agent-based modelling makes a remarkable contribution to reduce costs of the planning process.

## References

- Elmauer, T., Knoll, T., Pröbstl U. & Suske, W. (2005). Managementplanungen für Natura 2000 in Österreich. In: Naturschutz und Biologische Vielfalt (26), p 269-286.
- Pröbstl, U., Sterl, P. & Wirth, V. (ed.). (2005). Tourismus und Schutzgebiete - Hemmschuh oder Partner? Vienna.

- Visschedijk, P. & Henkens, R. (2002). Recreation monitoring at the Dutch Forest Service. In: Arnberger, A., Brandenburg, C., Muhar, A. (2002) (Eds.). Monitoring and Management of Visitor Flows in Recreational and Protected Areas. Conference Proceedings. Bodenkultur University Vienna, Austria, January 30 – February 02, 2002. Vienna.

# Comparison of the Use of Communication Channels between Amateur and Serious Hikers in Fulfilling Information Needs

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*Keywords: Information searching behavior, external information source, information needs, hikers, recreational experience, visitor management, forestry areas.*

## Introduction

Hiking/backpacking has been among the top five favorite leisure pursuits in Taiwan for the past 20 years. In responding to the increased number of visitors, provision of information has been used as a management tool in managing recreational use of forestry areas to guide and control users' activities and behaviors. Information is provided to insure a joyful experience to the public while also is needed to persuade users to assume low-impact behaviors to minimize the damage of recreational use.

Hiking in wilderness circumscribes a unique context, in that trail conditions, weather, and wildlife are constantly changing. Information, thus, is crucial to hikers/backpackers. Unlike tourist destinations, information is well-provided, information of wilderness areas is often insufficient, hard to obtain, or even no information could be found. Lack of information, in extreme, might lead to dangerous and life-threatening situations. How to make information available is a complex task. Accordingly, to deepen the understanding of information needs, seeking, and uses of communication channels will enable forestry managers to distribute information effectively.

In the long line of information searching behavior research, numerous evidences were found indicating that tourists search information before they take trips (Fesenmaier 1994, Fodness & Murray 1999). External information was needed to solve problems (Lovelock & Weinberg 1984) and overcome constraints (Anderson 1987, Coble & Selin 2003) in response to information needs. A variety

of sources of information was selectively used with a variety of search strategies in planning a recreational trip (Fodness & Murray 1999), the usage of information sources also varied by the experience (Krumpe & Brown 1982).

Compared to information searching studies of other recreational and tourism areas, research on information use and network of hikers/backpackers has been scarce. This study fills the gap. The objective of this study was, therefore, to understand the communication channels used by amateur and serious hikers to acquire information and knowledge in fulfilling hiking-related information needs.

## Methods

### Study Setting

This study was conducted at the Da Wu Mountain Hiking Trails (DMHT) in cooperation with the Republic of China Forest Bureau. DMHT is located adjacent to the Da Wu Natural Reservation Area in southern Taiwan and is one of the most popular hiking trails in southern Taiwan.

### Sampling

The rainy season and typhoon have great influence on the number of visitors and the DMHT's management. Heavy rain often leads to the closure of DMHT. The time frame, thus, for on-site sampling was June 19, 2004 to March 31, 2005. Hikers were approached as they were exiting or entering. Interviewers identified themselves as members of a research team who, in cooperation with the Forest Bureau, were conducting a user study relat-

ed to the hiking trail system. They were asked to leave contact information (i.e. names, addresses, and cell phone numbers) and invited to participate the study. Data was collected on 42 different days, including 11 days on raining season (26.2%), and 31 days on dry season (73.8%). Of these, 16 days were on weekend (38.1%) and 26 days on weekday (61.9%). Sampling time started from 7:30 in the morning and ended at 15:00 in the afternoon. In total 1728 hikers were recorded, 39 of them refused to give contact information (2.3%), 164 of them were repeat visitors (9.5%), 117 of them were rangers and forestry workers (6.8%). Thus, 1408 contact information were collected and double checked for the duplicates, and then produced a list of 1354 contact information that constituted the sampling frame for data collection.

The contact information was collected over nine months; for instance, questionnaires were mailed out at three periods of time to avoid the willingness of participating this study dying down over time. The first mail-out was from Sep. 1 to Oct. 30, 2003. The second mail-out was from Nov. 1, 2004 to Jan, 15, 2005. The third mail-out time was from Jan 16, 2005 to March 31, 2005. 737 surveys were mailed out. Of these, 557 surveys were returned (76.6%) and, of these, 549 were usable for the purposes of this study (98.6%).

### Data Collection

The survey instrument was a self-administered questionnaire consisting of three sections, two of which were referenced in this study. The second section focused on the use of communication channels. To assess the usefulness of communication channels in response to a specific type of information needs eight categories of communication channels were included: organized groups/clubs, sports shops/specialized stores, friends/family members, mountaineer/hiker magazines, outdoor books, travel magazines, and Internet. Respondents were asked to identify the best or the most useful communication channel in regard to each type of information need. These communication channels are essential when obtaining hiking/backpacking related information, such as choosing hiking routes, gaining new knowledge about equipment, weather condition.

The third section of the questionnaire included questions on individuals' sociodemographic characteristics including, gender, age, education, hiking style, and memberships in hiking/backpacking organized groups/clubs. The level of expertise was assessed through the following questions: "Days spent hiking for the past one year," "Years in pursuing hiking," "Role taken during a hike", and "The perceived importance of hiking in their daily life".

### Data Analysis

The Statistical Package for the Social Sciences (SPSS Inc. 2004) was used to analyze the data obtained from they survey. First, descriptive statistics were computed to profile respondents. Then, Chi-square statistics were employed, on amateur and serious hikers to examine differences in the use of communication channels.

### Result and Discussion

Table 1 provides basic descriptive information about the respondents. Among the respondents, there were 76.1 per cent living in southern regions. A big proportion of respondents (32.3 per cent) spend 20 to 50 days hiking in a year, followed by more than 50 days (19.4). The majority of respondents (60 per cent) took a role as a follower during hiking. About 49 per cent pursued hiking between 4 to 10 years; and 22.7 per cent pursued hiking for more than 11 years. More than half of the respondents did not have any membership (57.4 percent). 15.1 per cent with membership in local organized groups/clubs, 15.1 per cent with membership in company and college outing groups, and another 12.4 percent with membership in national organized groups/clubs.

Table 2 lists the usage of eight communication channels. Information obtained from friends/relatives was the primary information channel for all respondents for the most types of the information needs, except on "acquaintance of companions" and "weather information". The second most useful communication channel was organized groups/clubs, especially in finding information on "general hiking information", "seeking companion during planning a hiking trip", and "acquaintance of companion", as well as using it as "the primary

source of hiking knowledge and skill”. Over 45 percent of respondents indicated that the Internet was the best communication channel for weather information. It was also identified as the second most useful communication channel for obtaining information on “hiking route related information” and “general hiking information”. Surprisingly, many respondents identified that sports shops were the second most useful source for gaining knowledge and hand-on experience on hiking gear and gadgets. Table 2 also reveals that the best place to make acquaintances was during a hike.

Respondents who acted as hiking leaders and followers differed significantly on the use of communication channels in fulfilling their information needs, including general hiking information, opinion, hand-on experience, the newest hiking gear/gadgets, weather information, and hiking route-related information. Respondents acting as hiking leaders were more likely to use the Internet for obtaining general hiking information, weather information, and hiking route-related information than those acting as followers. They also were more

likely to use organized groups/clubs as their primary information source of hiking knowledge and skill, and as the major opinion source for planning hiking trip than others. In addition, they were more likely to gain hand-on experience and the newest information about hiking gear/gadgets in using sports shops/specialized stores. Overall, those who acted as followers were more inclined to rely on friends/relatives in fulfilling their various information needs, except weather information. Many respondents from both groups agreed that the best place of making the acquaintance of companions was during hiking.

Respondents living in southern and non-southern regions were different significantly in using communication channels to fulfill every aspect of their hiking-related information needs, as indicated on table 4. Generally, respondents living in southern regions were more likely to fulfill all their hiking-related information needs by asking friends/relatives than respondents lived in non-southern regions. Respondents living in non-southern regions were more likely to use organized groups/

Table 1: Respondents’ Profile.

Variables	N	%	Variables	N	%
Gender			Hiking style		
Male	406	74.0	Solo	49	8.9
Female	143	26.0	With friends/Family members	326	59.5
Age			Participated hiking organized via organized groups/clubs	115	21.0
Under 18	6	1.2	Participated hiking via commercial travel organizers	58	10.6
19-30	85	17.3	Role taken during hiking		
31-45	156	31.8	Leader/Assistant	216	49.8
46-60	229	46.6	Follower	327	60.2
61 and Over	15	3.1	The Attendance of outdoor skill training camps/seminars		
Residence			No	313	57.5
Southern region	418	76.1	Yes	231	42.5
None southern region	131	23.9	Years in pursuing hiking activity (year)		
Hiking days in a year (days)			0-3	200	37.5
0-10	157	29.5	4-10	212	39.8
11-20	100	18.8	11-40	121	22.7
21-50	172	32.3	Memberships		
51 and Over	103	19.4	None	315	57.4
Education			Company or college outing groups	83	15.1
Senior high	73	13.4	Local organized groups/clubs	83	15.1
Junior high	143	26.3	National organized groups/clubs	68	12.4
Technique school	122	22.4			
College and beyond	206	37.9			

clubs to seek companions, meet companions, extend hiking experience, and share knowledge and skill than those lived in southern regions. Many of them also identified that this communication channel was used as the primary information source of hiking knowledge and skill. Over fifty percent of them even considered it as the most useful opinion source in planning hiking trip. In addition, they were more inclined to use sports shops/specialized stores to gain knowledge and hand-on experience on hiking gear and gadgets and the newest information on hiking gear/gadgets. Moreover, Internet was used for obtaining information on weather and hiking route by the many of respondents from both regions, however, respondents lived in none southern region were more likely to obtain these two types of information from the Internet.

Respondents with different levels of expertise also differed significantly in the use of communication channels. In general, respondents with a lower level of expertise were highly likely to ask friends/relatives for general hiking information, seeking companions, extending and sharing hiking experience and knowledge, gaining hands-on experience on hiking gear/gadgets, and route-related information. Over sixty-five percent of them also greatly depended on it as the primary information source of

hiking knowledge and skill, and indicated it was the most useful opinion source in planning a hiking trip (table 5). While respondents with higher levels of expertise were more likely to use organized groups/clubs for above mentioned information needs. Again, Internet was used for weather information. Interestingly, respondents with higher levels of expertise were less likely to use Internet in fulfilling their various information needs. Moreover, respondents with lower levels of expertise were more inclined to use sports shops/specialized stores to gain hands-on experience on hiking gear/gadgets.

### Conclusion and Implications

This research discloses that there were significant differences in the utilization of communication channels between serious hikers and amateurs in fulfilling various types of information needs. Serious hikers were more likely to use organized groups/clubs as the primary communication channel of hiking knowledge and skill, and to perceive it as useful communication channel for planning a hiking trip. While amateurs largely relied on friends/relatives as the primary communication channel in fulfilling various types of information needs.

Table 2: The Use of Communication Channels in Fulfilling Information Needs.

Communication Channel	General		Personal		Specific Information				Social		
	A	B	C	D	E	F	G	H	I	J	K
Organized groups/Clubs	22.1	24.6	21.3	28.8	14.4	12.2	10.5	18.9	31.0	26.9	18.5
Sports shops	2.8	1.4	3.0	—	18.1	21.4	2.3	1.9	0.9	2.8	1.2
During a hike	—	—	—	—	—	15.6	7.6	7.2	38.8	—	28.8
Friends/Relatives	45.0	66.5	51.7	48.9	48.9	32.7	25.2	37.6	24.9	54.5	47.6
Internet	22.1	4.6	9.5	9.5	8.3	12.2	46.3	27.4	0.7	8.1	3.2
Mountaineer/Hiker magazines	3.7	2.0	4.9	4.2	4.9	5.1	1.4	4.9	0.0	4.7	0.0
Travel Books/Magazines	2.3	0.6	4.8	0.4	4.8						
Others	1.9	0.4	1.8	1.6	0.5	0.7	6.7	1.9	3.7	1.9	0.4

A: General hiking information  
 B: Seeking companion in planning stage  
 C: The primary information source of hiking knowledge and skill  
 D: Opinion sources for planning a hiking trip  
 E: Gaining knowledge and hand-on experience on hiking equipment and gadget  
 F: Hiking gear and gadget  
 G: Weather information  
 H: Hiking route related information (trail condition, hiking distance/direction, and water source)  
 I: Acquaintance of companion  
 J: Extending hiking experience  
 K: Sharing hiking knowledge and skill

Table 3: The Use of Communication Channels Used by Respondents Taking Different Hiking Status in Fulfilling Information Needs.

Communication Channel	Leader (%)	Follower (%)	DF	Chi-square	P-value
General hiking information					
Organized groups/clubs	24.7	24.6	2	23.409	.000**
Friends/family members	38.9	57.3			
Internet	36.3	18.1			
Seeking companions as planning hiking trips					
Organized groups/clubs	29.0	23.4	2	2.060	.357
Friends/family members	66.4	71.6			
Internet	4.7	5.0			
The primary information source of hiking knowledge and skill					
Organized groups/clubs	32.8	21.4	2	11.025	.004*
Friends/family members	53.1	68.4			
Internet	14.1	10.2			
Opinion sources for planning a hiking trip					
Organized groups/clubs	39.7	29.6	2	11.505	.003*
Friends/family members	46.0	61.5			
Internet	14.3	9.0			
Acquaintance of companion					
Organized groups/clubs	35.9	30.7	2	3.631	.163
Friends/family members	22.0	29.2			
Hiking	42.1	40.1			
Extending hiking experience					
Organized groups/clubs	34.0	27.8	2	3.857	.145
Friends/family members	55.3	64.1			
Internet	10.7	8.2			
Sharing hiking knowledge and skills					
Organized groups/clubs	22.4	16.4	3	7.216	.065
Friends/family members	42.2	53.5			
Hiking	31.8	27.1			
Internet	3.6	3.0			
Gaining knowledge and hand-on experience on hiking gear and gadget					
Organized groups/clubs	19.1	14.5	3	8.948	.030*
Sports shops/specialized stores	24.2	17.7			
Friends/family members	45.9	59.5			
Internet	10.8	8.4			
Obtaining newest info about hiking gear and gadget					
Organized groups/clubs	13.9	12.3	4	12.298	.015*
Sports shops/specialized stores	26.9	19.8			
Friends/family members	26.9	39.9			
Hiking	20.2	14.2			
Internet	12.0	13.8			
Weather information					
Organized groups/clubs	15.3	11.4	2	7.366	.025*
Friends/family members	23.5	35.2			
Internet	61.2	53.5			
Hiking route related information					
Organized groups/clubs	23.4	22.4	2	11.720	.003**
Friends/family members	35.6	50.2			
Internet	41.0	27.4			

Table 4: Communication Channels Used by Respondents Living in Different Regions in Fulfilling Information Needs.

Communication Channel	None Southern Region (%)	Southern Region (%)	DF	Chi-square	P-value
General hiking information					
Organized groups/Clubs	33.3	22.0	2	23.462	.000**
Friends/Relatives	31.7	56.6			
Internet	34.9	21.4			
Seeking companions planning hiking trips					
Organized groups/Clubs	41.4	20.6	2	25.947	.000**
Friends/family members	51.9	75.2			
Internet	6.8	4.2			
The primary information source of hiking knowledge and skill					
Organized groups/clubs	35.7	22.7	2	12.609	.002*
Friends/family members	48.7	67.1			
Internet	15.7	10.2			
Opinion sources for planning a hiking trip <sup>(11)</sup>					
Organized groups/clubs	52.1	26.9	2	32.974	.000**
Friends/family members	33.9	63.2			
Internet	14.0	9.9			
Acquaintance of companion					
Organized groups/clubs	47.3	28.3	2	25.992	.000**
Friends/family members	10.9	31.0			
Hiking	41.9	40.8			
Extending hiking experience					
Organized groups/clubs	41.3	26.5	2	12.787	.002*
Friends/family members	47.1	65.2			
Internet	11.6	8.2			
Sharing hiking knowledge and skills					
Organized groups/clubs	27.6	16.0	3	15.969	.001*
Friends/family members	37.3	52.1			
Hiking	29.1	29.5			
Internet	6.0	2.4			
Gaining knowledge and hand-on experience on hiking equipment and gadget					
Organized groups/clubs	24.8	13.2	3	35.517	.000**
Sports shops/specialized stores	27.2	17.9			
Friends/family members	32.0	61.8			
Internet	16.0	7.0			
Obtaining newest info about hiking equipment and gadget					
Organized groups/clubs	14.8	12.4	4	27.282	.000**
Sports shops/specialized stores	33.6	19.3			
Friends/family members	20.3	39.4			
Hiking	11.7	18.1			
Internet	19.5	10.9			
Weather information					
Organized groups/clubs	14.9	12.1	2	22.142	.000**
Friends/family members	13.2	36.5			
Internet	71.9	51.4			
Hiking route related information					
Organized groups/clubs	26.5	22.5	2	38.262	.000**
Friends/family members	21.4	44.8			
Internet	52.1	32.6			

Regardless of hiking status, regions, and the level of expertise, the Internet was identified the most useful communication channel for weather information. This study only analyzed 8 communication channels used by amateurs and serious hikers in fulfilling information needs. Other potential communication channels should be included in future studies. More follow-up studies will be needed to understand the reason in making the choice of communication channels to help forestry managers better deploy effective and durable information strategies.

## References

- Anderson, R.B. (1987). Reassessing the odds against finding meaningful behavioral change in mass media health promotion campaigns. Paper presented to the Conference on Communication Theory and Public Relations, Illinois State University, Normal.
- Coble, T.G. & Selin, S.W. (2003). Hiking alone: Understanding fear, negotiation strategies and leisure experience. In: *Journal of Leisure Research* (35/1), p 1-22.
- Cole, D.N., Hammond, T.P. & McCool, S.F. (1997). Information quantity and communication effectiveness: Low-impact messages on wilderness trailside bulletin boards. In: *Leisure Sciences* (19), p 59-72.
- Fesenmaier, D.R. (1994). Traveller use of visitor information centers: Implication for development in Illinois, In: *Journal of Travel Research* (33/1), p 44-50.
- Fodness, D. & Murray, B. (1997). Tourist information search, In: *Annals of Tourism Research* (24/3), p 503-523.
- Fodness, D. & Murray, B. (1999). A model of tourist information search behavior, In: *Journal of Travel Research*,(37/3), p 220-230.
- Krumpe, E. & Brown, P.J. (1982). Redistributing backcountry use through information related to recreation experiences. In: *Journal of Forestry*, (June), p 360-364.
- Lovelock C.H., & Weinberg, C.B. (1984). *Marketing for Public and Nonprofit Managers*. New York.



## Poster Session

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# Monitoring Trampling Impacts in the Disposal of Human Waste at Campsites and Visitors' Attitudes to a Carry-out System

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*Keywords: Trampling, campsite, aerial photograph, pack-out, plastic bag, attitude, visitor.*

## Introduction

Several camping impacts have been reported on campgrounds in natural settings (Hammit & Cole 1998). These impacts include trampling of vegetation, soil erosion, littering, growth of social trails, damage to trees and creation of fire sites. One study showed the enlargement of a campsite and increased vegetation loss around some designated campgrounds in Daisetsuzan National Park, Japan (Aikoh et al. 1995). This provoked the necessity of further monitoring and the establishment of a campground management strategy by park managers. Also, the number of visitors and managers who cared about the impact of feces and toilet paper around the campgrounds increased.

Recently, the lack of toilet facilities in mountain huts and campgrounds has become an urgent management issue in national parks in Japan. Most mountain huts have only latrines; therefore, there is concern about the potential contamination of drinking water. Feces and toilet paper are found around designated mountain campgrounds without toilet facilities. The Ministry of Environment and some municipality governments have provided financial support to the private owners of mountain huts, and promoted new sanitary technology developments in remote areas. However, replacing or installing toilet facilities in remote areas, and the maintenance of such facilities, is very costly. Due to a lack of finances, some municipalities are promoting the carry-out system, which involves the distribution of free plastic bags to hikers, and the collection of the carried-out bags. The key to the success of this system is the compliance of visitors.

The purposes of this study are to monitor the impact of feces on campgrounds without toilets, and investigate the compliance of visitors to the human waste carry-out system procedures.

## Methods

There are nine shelters and 12 designated campgrounds in Daisetsuzan National Park. Two shelters and seven campgrounds have no toilet facilities. The popular campgrounds, Minaminuma and Bieifuji, were investigated using aerial photographs. Photographs taken in 1977, 1982, 1987, 1992 and 1997 by the Forestry Agency were scanned using a flatbed scanner. Digitized bare grounds and paths around campgrounds were traced and mapped. Length of paths and the size of bare ground were calculated. In 1999, we conducted an on-site survey to verify the maps, and assessed the existence of feces and toilet paper around the campsites.

Visitors' attitudes to the carry-out system were investigated in 2001 and 2005 at the trailhead of Mt. Rishirisan, in Hokkaido. The towns of Rishirifuji and Rishiri, near Mt. Rishirisan and its trailheads, have been promoting a trial of the carry-out system since 2000. Before this promotion, much feces and toilet paper were found around the summit, huts and lookout points. The promotion consisted of distributing free plastic bags at trailheads and hotels, and collecting used plastic bags at trailheads. Most Japanese hikers are not accustomed to such a system, therefore the managers and town officials are now concentrating on the attitude and compliance of hikers. In 2001, 218 hikers and in 2005,

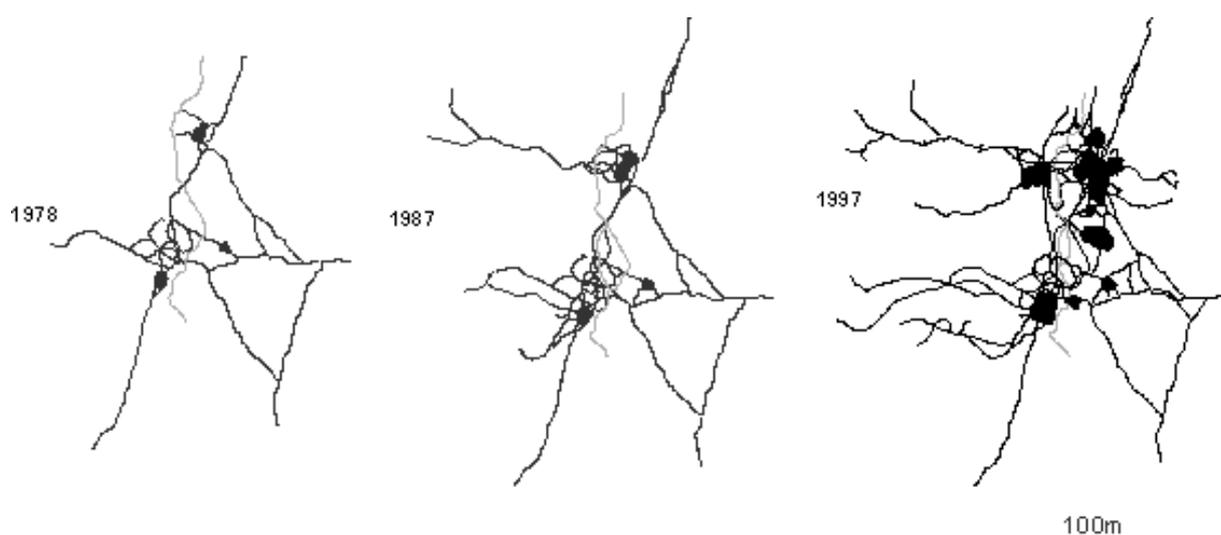


Figure 1: Change of campsites and social trails around Minaminuma campground.

125 hikers were asked to answer a questionnaire on their recognition of camping impacts and their attitude to the carry-out system.

## Results

Minaminuma campground is close to popular Mt. Tomurausi (altitude 1,960 m). It takes about five hours on foot from the nearest trailhead to reach it. There are eight bare campsites, and many social trails stretching radially from them. We found much feces and toilet paper at the end of each social trail. Aerial photographs showed that the number of bare sites increased from three to eight, the area of bare ground increased from 120 to 1066 m<sup>2</sup>, and the length of paths increased from 876 to 2409 m in the last two decades (figure 1). The same trends were found in the Bieifuji campground.

The visitors who complained about encountering feces and toilet paper in Mt. Rishirisan decreased during the past five years, from 23% to 6%. Visitors who recognized and approved of the carry-out system increased from 51% to 78%. However, the reported willingness to pay for the carry-out system was insufficient to cover the actual cost of plastic bags.

## Conclusion

Enlargement of campsites and growing social trails are indicative of the disordered conditions of the campgrounds. It is necessary to restrict tents to

designated sites, and to educate visitors about low-impact camping practices. Visitors to Rishiri Island appear to be aware of the carry-out system. However, cost sharing of distribution and collection of plastic bags is becoming a controversial subject.

## References

- Aikoh, T., Nakajima, Y. & Asakawa, S. (1995). Enlargement of Bare Grounds at Campsites in Daisetsuzan National Park. In: *Papers on Environmental Information Science* (9), p 63-68.
- Hammit, W.E. & Cole, D.N. (1998). *Wildland Recreation: Ecology and Management*. New York.

# **Tourism in Biosphere Reserves: Genesis of a Territorial Issue Case of Ida-ou-tanane, in the High Atlas Mountain (South-West of Morocco)**

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*Keywords: Biosphere Reserve Arganeraie, genesis, tourism attitudes, monitoring, High Atlas Mountain, Morocco.*

## **Introduction**

The expansion of tourism in protected spaces, in particular the biosphere reserves, draws more and more attention because of its social and territorial repercussions: tourism fits into the landscape strongly and penetrates through extremely different environments. No more space can escape from the geographical extension of tourism. And its territorial impact starts to be measured with those of other activities.

## **Methods**

The tourist practices and territory will be the subject of investigations for this work within a socio-spatial approach. Being near the greatest tourist station of Morocco (Agadir), for a long time Ida-ou-tanane territory became an attraction for international tourists as well as for national hikers. Great numbers of tourists prefer to take refuge in the gorges of this mountain than to remain in the seaside resort of Agadir. The result is the emergence of a new tourism system, of which territory is the basis and the local society is the reflection. However, this country constitutes the example of a specific and fragile ecosystem. Its localization in the Biosphere Reserve Arganeraie (MAB-Morocco), gives it even more fragility. The tourist activity starts to become a determining economic element in this area. And the efforts devoted lately to the development of rural tourism in Morocco, encourage this orientation more and more.

## **Results and conclusion**

Two Monitoring forms are to be questioned (figure 1) : Monitoring of space or Monitoring of the tourists?

To answer this question, three reports are proposed in this contribution:

### **1. Tourism transforms the areas**

As tourism develops in the villages, it is spread and organized in specific places. Its spatial radiation can reach all the places. Tourism transforms existing places, but it also creates new locations. A geographical phenomenon which “upsets the order established in the hierarchies and the functioning of concerned space”.

### **2. Interactions: a socio-space genesis**

The profile of rural tourism is very difficult to define. With a precise and limited offer, the demand is characterized by high diversity. The result is a great diversity in the attitude of the tourists about respect to territory and society. However the relation between tourism and the social context of the inhabitants is difficult to approach in the policies of management. However, the needs of the tourists in the excursion places become increasingly large.

### **3. The attitudes and the spatial forms of tourism**

The development of a tourist area in Ida-ou-tanane resulted in the constitution of privileged sites associated to a specific tourist practice (bivouacs, speleology, excursion). During the 15 last years, the

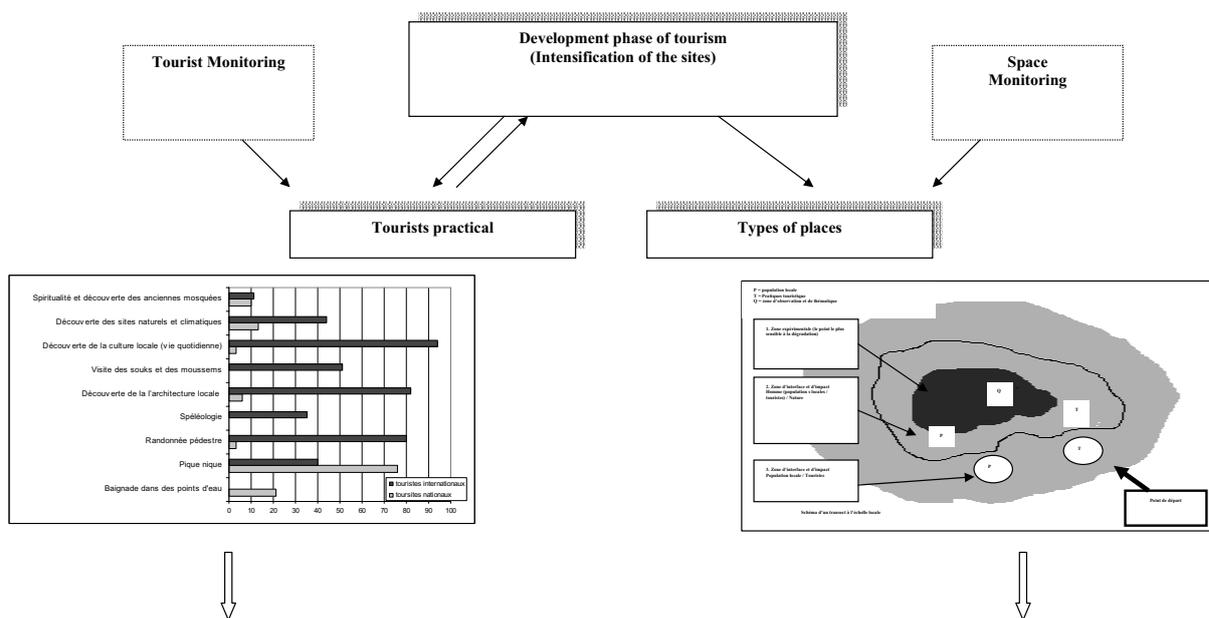


Figure 1: Two Monitoring forms.

development of tourist territory does not cease to increase the number of sites with tourist interest. The result is the evolution of tourist practices and the intensification of the rate of tourist functioning.

## References

- Amzil, L. (2006). Touristification d'une zone rural montagnaise. (PhD in progress). Mohammed-V University, Rabat.
- Amzil, L. (2005). Haut Atlas occidental: une zone de montagne en déséquilibre? Cas d'Ida-ou-tanane, essai géographique sur une communauté et un espace. In: pour une nouvelle perception des montagnes marocaines. Actes du 7ème colloque maroco-allemand, Rabat 2004, p 81-88.
- Amzil, L. (2004). Crisis of environment or crisis of community? Geographical analysis of a community in the rural western High Atlas Mountains. In: Eco-complexity and dynamics of the cultural landscape. 34th Annual Conference of the Ecological Society in Giessen GFÖ. Germany.

## Recreational Impacts on Nature-Based Recreational Areas

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In order to depict the impacts of the recreational activities on the natural based recreational areas of Taiwan. This study analyzed the landscape ecological indicators (LEI), the environment impact (EI), and the bird's indices (BI), followed with the on-site visitor's perceptions (VP) of the environmental impacts due to the recreational activities (RA). The relationship between landscape ecological structures and natural environmental impact in the natural based recreational areas were examined and analyzed.

For the on-site works, the first step is the on-site investigation of the natural environmental impacts, which includes the bird species, and recreational noise. The second section was the visitors' interview, the questionnaire items includes the cognitions of environmental impacts, their recreational purpose, satisfaction and acceptable management programs. The third section tests the relationships among landscape ecological structures, recreational impacts, and ecological function indicators of bird species.

The period of this study was performed in the past two years. The work for the first year includes the establishment of the evaluation model of the natural environmental impacts in the ecotourism areas. The model was tested at the MeiFong area, which is located in the mountain area of the middle part of Taiwan. The work for the second year was to refine the evaluation model by monitoring the conditions of the MeiFong areas and tests the evaluation model with the proposed indicators at 2 new ecotourism areas. Finally, this study tries to com-

pare the selected three testing areas to propose the management strategies and the programs for the ecotourism development.

The findings of the first year from the on-site investigations of soil compactness, vegetation cover, and roots exposures were compared with the results of the other 2 sites. The survey of the bird investigation shows the Steer's Liocichla (*Liocichla steerii*) has the highest frequency observation rate in the MeiFong area. From the visitors' reported perceptions, visitors' cognition of crowding, too much traffic, over-development, few wildlife observed, and the bad landscapes of power lines and pipelines. All the findings show the recreational impacts were serious due to development in past few years. The woods were the largest area in the landscape's ecological structure of the MeiFong area, while the water bodies were the fewest.

The relationships between landscape ecological structures were tested. Under the hierarchy of 100 meters investigation radius, farmland, wasteland, and the built area were found to have significant relationship with the bird ecological indicators. Under the 50 meter investigation radius, only grassland and wasteland have a significant relationship with the bird ecological indicators. However, under the 500 meter investigation radius, there was no relationship between landscape ecological structures and the bird ecological indicators. The Mean Patch Fragmental Dimension (MPFD) shows more than 2 significant relationships with the bird ecological indicators,

and plays a role as a good indicator in regard to the farm and grassland. For wasteland and the built areas, the Mean Shape Index (MSI) is a better predictor for the birds.

## References

- Antrop M. (2001). The language of landscape ecologist and planners 3. A comparative content analysis of concepts used in landscape ecology. In: *Landscape and Urban Planning* (55), p 163-173.
- Arrowsmith, C. & Inbakaran, R. (2002). Estimating environmental resiliency for the Grampians national park, Victoria, Australia: A quantitative approach. In: *Tourism Management* (23), p 295-309.
- Farina, A. (1998). *Principles and Methods in Landscape Ecology*. New York.
- Forman, R. T. T. & Deblinger, R. D. (2000). The ecological road-effect zone of a Massachusetts (U.S.A) suburban highway. In: *Conservation Biology* (14), p 36-46.
- Forman, R.T.T., Reineking, B. & Hersperger, A. M. (2002). Road Traffic and Nearby Grassland Bird Patterns in Suburbanizing Landscape. In: *Environmental Management* (29/6), p 782-800.
- Forman, R. T. T. (1995). *Land mosaics*. Cambridge.
- Grenier, D., Kaae, B. C., Miller, M. L. & Mobley, R. W. (1993). Ecotourism, landscape architecture and urban planning. In: *Landscape and Urban Planning* (25), p 1-16.
- Hammitt, W. & Cole, D. (1998). *Wildland recreation — Ecology and management*. John Wiley & Sons, Inc.
- Hansson, L. (2000). Edge structures and edge effects on plants and birds in ancient oak-hazel woodlands. In: *Landscape and Urban Planning* (46), p 203-207.
- Knight, R. L. & Cole, D. N. (1991). Effects of recreational activity on wildlife in wildlands. *North American Wildl. Nat. Res. Conf.* (56), p 238-247.
- Roggenbuck, J. W., Williams, D. R. & Watson, A. E. (1993). Defining accept-able conditions in wilderness. In: *Environmental Management* (17/2), p 187-197.
- Wall, G. & Wright, C. (1977). *The environmental impact of outdoor recreation*. Dept. of Geography Publication Series, No. 11. Waterloo.

## **Alternative Index of Carrying Capacity in Nature Tourism: The Relationships between Stakeholders' Emotional Labor and Carrying Capacity of Community-Based Nature Tourism in Atayal Smangus Tribe, Taiwan.**

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*Keywords: Recreational Carrying Capacity, Emotional Labor, System simulation, visitor management.*

The demands of increasingly affluent consumers for 'remote', 'natural' and 'exotic' environments have created an upsurge in ecotourism ventures (Scheyvens 1999). As many governments have encouraged public investment and made economic development programs more dependent on economic viability, nature tourism has been seen as a major element in the economic redevelopment of many aboriginal tribes located in recreational and protected area in Taiwan. Training in hospitality, servicing in meal and accommodation, has become the majority skill for indigenous tourism and consistent with the emphasis, the terms ecotourism and indigenous cultural tourism often being used merely as marketing tools (Thomlinson & Getz 1996, Butler & Hinch 1996). Moreover, with the growth of such efforts, lack of production capacity makes the locals more dependent upon the tourism economic system and turns away the resource-based philosophy from ecotourism. Many ecotourism researches have raised the similar problems; the locals become more dependent upon tourists, emphasize service and are merchandise oriented and gradually turn to high impact tourism.

The major concerns related to sustainable development is that of limits to numbers of tourists. However, the issue of carrying capacity of destinations, in both human and environmental terms, has received little consistent attention in the tourism field (Butler 1999). Much excellent research has been conducted on carrying capacity in wilderness areas in which few or no people live, but relatively

little has been done in popular tourist destinations, where large numbers of permanent residents live and mix with large numbers of tourists, especially for the development of indigenous tourism. Therefore, application of carrying capacity in nature tourism ultimately requires more judgments from the interdisciplinary managers, based on natural resource, social and managerial considerations. Moreover, from the empowerment perspective in the indigenous community-based nature tourism, it seems by nature to make the stakeholders be part of the managers.

As noted above, this paper considers ways in describing a framework which has been designed for an explorative study of the female stakeholders' social psychological value, emotional labor, as the index of carrying capacity toward the tribe-based nature tourism (Stankey 1973, Shelby & Heberlein 1984, Hochschild 1993, Vincent & Thompson 2002). For the research site, an Atayal Smangus Tribe, famous for nature resources tourism and the first co-management example in indigenous communities of Taiwan, was chosen. As for the nature of the communities' co-management, they cooperate in all the responsibility of tourism resources management and share all the economic generation from nature tourism. However, the only tourism service is the meal provided in the tribe chophouse. Therefore, survey data will be drawn from 120 sections during lunch and dinner preparing for tourist flow in May and June, 2006. Interviewing and observations will be involved in the

variables, including female stakeholders' emotional labor, service performance, tourists' satisfactions, the number of visitors per days.

The purpose of this study includes

1. To examine the relationships between aboriginal women's emotional labor and service-performance in community-based indigenous tourism.
2. To probe aboriginal women's emotional labor toward the impact of tourist satisfaction.
3. To establish the relationships between carrying capacity and tourist satisfaction.

The analysis in this research will apply computer system simulation to compute the number of visitor and waiting time about the meal services by Arena 3.0 program (Kelton et al 1999). Queuing theory will be deal with the relationship between female stakeholders' social psychological value and nature tourists or reservationists' experiences. Pearson-Correlation analysis, ANOVA, and multiple regression analysis will be applied to test the statistical hypothesis. Research implications and management applications are discussed for community development in nature and recreational tourism resources.

## References

- Butler, R. (1999). Understanding Tourism. In: E. L. Jackson and T. L. Burton (Eds.) *Leisure Studies: Prospects for the Twenty-First Century*, p 235-251. State College.
- Butler, R. & Hinch, T. (1996). *Tourism and Indigenous Peoples*. International Thompson Business Press, UK.
- Hochschild, A. R. (1983). *The managed heart*. Berkeley.
- Kelton, W.D., Sadowski, R.P. & Sadowki, D.A.. (1998). *Simulation with Arena*. McGraw-Hill, U.S.
- Scheyvens, R. (1999). Ecotourism and the empowerment of local communities. In: *Tourism Management* (20), p 245-249.
- Shelby, B. & Heberlein, T. A. (1984). A Conceptual Framework for Carrying Capacity Determination. In: *Leisure Sciences* (6/1), p 433-451.
- Stankey, G.H. (1973). Visitor Perception of Wilderness Recreation Carrying Capacity. USDA For. Serv. Res, Pap. INT-142.
- Thomlinson, E. & Getz, D. (1996). The Question of Scale in Ecotourism: Case Study of Two Small Ecotour Operators in the Mundo Maya Region of Central America. In: *Journal of Sustainable Tourism* (4), p 183-200.

Vincent, V. C. & Thompson, W. (2002). Assessing community support and sustainability for ecotourism development. *Journal of Travel Research* (41), p 153-160.

## **“La Semaine du Goût”, The Beginning for a Sustainable Tourism?**

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*Keywords: Tourism, sustainable, Switzerland, natural reserve, participation, stakeholders, heritage, fish.*

The “Grande Cariçaie” is a great marshland, about 3000 hectares of area, situated along the south shore of the Lake of Neuchâtel, in the occidental part of Switzerland. This string of seven natural reserves with a strict protection is alternating with intensive touristic zones (harbours, camping places and secondary homes). Since 1982, the “groupe d'étude et de gestion” (GEG, Studying and managing group), commissioned by the authorities of Fribourg and Vaud cantons, manage this area. One of the main mission of the GEG, out of keeping the marshland up and doing scientific studies on the site, is planning how to receive and informing people in this protected area. A working group, named “sous-commission d'information” (SCI, committee for planning information), was created in 1992 to help the GEG in this function.

At the beginning, the information strategy was limited to the natural reserves but, since 2002, managers want to extend this way of thinking by associating several south shore's stakeholders. Lake leisure represents an important part of local economy and protected areas are often considered as pulling the country's development up short. Thus, protected area users and tourism representatives were invited to join the SCI. The idea of the protected area managers is to develop a sustainable tourism concept. This alternative form of tourism, in opposition with massive tourism, would cover conservation and enhancement of the environment and heritage, economic and social development and preservation and im-

provement of the quality of life of local residents. Within the SCI, the different stakeholders, brought together in a participative process, could elaborate actions in this way.

To put this concept in concrete form, the GEG has organized, in association with the local tourism office, and in partnership with the SCI, a manifestation for the “Semaine du Goût” (Week of Taste) with the South Shore as a full-scale “festive country”. This Swiss event upholds taste diversity and produce quality, in a sustainable development way. The goal of the manifestation was to illustrate the link between consumers and natural resources, and to show that preserving natural heritage was important for local economy too. So, as a central theme, the SCI decided to use the lake's fishes: a natural resource which take part of the local heritage and brings income for restaurants and fishermen in the country. Moreover, to follow as much as possible a sustainable process, organizers watched over all restaurants and all fishermen were invited to join the event, and to express themselves in a meeting. It was important to communicate about sustainability which is a foreign concept in the country too.

For ten days, several types of activities were proposed. Thirteen restaurants proposed a special menu with fishes from the lake and caught by a local fishermen; five fishermen opened their door to the public and proposed to bring people on their boat during the fishing; three centers for growing public awareness of nature and history, located on the South Shore, proposed activities, and a pisciculture showed several of the lake's live fish-

**Rive sud du lac de Neuchâtel**  
Une nature préservée, un terroir, des poissons, des hommes

**Venez découvrir les poissons du lac**  
du 15 au 25 septembre 2005

**Le poisson du lac: une ressource naturelle, la pêche: un métier, des goûts, des savoir-faire.**

Les acteurs de la rive s'associent pour vous faire découvrir le poisson du lac de Neuchâtel, de son milieu de vie à l'assiette. Un événement placé sous le signe du développement durable. Au programme:

- démonstrations, dégustations et vente chez les pêcheurs
- animations dans les centres-nature et histoire
- saveurs du lac et du terroir chez les restaurateurs partenaires
- la Grande Caricaie à pied, à vélo, en calèche, en bateau ou en train

**Yverdon-les-Bains**  
• La Plage

**Cheseaux-Noréaz**  
• Centre Prostatua de Champ-Pittet  
• Restaurant du Centre Pro Nat

**Yvonand**  
• Luc Ottonin  
• La Couronne  
• Le Colvert  
• Restaurant de la Gare  
• Restaurant de l'Hôtel de Ville

**Cheyres**  
• L'Écu

**Estavayer-le-Lac**  
• François Schmid  
• Pisciculture  
• Les Lacustres  
• Buffet de la gare La Renardière  
• La Gerbe d'Or  
• Hôtel-restaurant du Port  
• Restaurant du Cercle de la voile  
• Restaurant de l'Hôtel de Ville  
• Café-Restaurant du Château  
• Poissonnerie du Camus

**Chevroux**  
• Le Jura

**Gletterens**  
• Village lacustre

**Cudrefin**  
• Luc Galléron  
• Centre-nature ASPO de La Sauge  
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**Delley-Portalban**  
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[www.grande-caricaie.ch/gout](http://www.grande-caricaie.ch/gout)

Un projet de la Sous-commission d'information et d'accueil du public de la Grande Caricaie et de l'Association Touristique d'Estavayer & Région

Figure 1: Brochure of the "Semaine du Gout" on the South Shore of Lake Neuchâtel.

es. Each of these stakeholders received documents about fisher trade, lake's fishes, protected areas for them and the public. The results are: 721 special menus were sold, 25 persons joined the fishermen and about 150-200 persons were present for all of the activities proposed.

The organisation of this event was interesting to measure difficulties but also potentialities for putting into practice a theoretical concept such as sustainable tourism. The country is not sensitive to this idea and it was impossible to make a real "sustainable event", because many independent stakeholders were involved. Another difficulty was to mobilize fishermen and restaurant owners which are not used to be requested for events and to work together. More than that, the message about sustainability was difficult to explain because each one was thinking according to his personal interest. Finally, public participation was not as important as hoped for, perhaps in part because of a bad weather and a geographic dispersion of activities proposed.

However, this event succeeded in joining together stakeholders from economic, environmental and cultural worlds around a same subject which en-

hances the countryside, which was an innovation. Speaking about enhancing natural and cultural heritage was very new for this countryside where massive tourism is the only form known and this approach was appreciated by all the stakeholders questioned at the end of the event. At last, this manifestation permitted to speak about sustainable tourism and to sensitize people about this notion.

This impulse was only a beginning on the long way of sustainability tourism, but it could be a basis of new collaborations in the future.

## Participatory Planning of Recreational Areas – Landscape Development Concepts in Switzerland

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*Keywords: Landscape development, participation, involvement, recreation.*

In recent years, Landscape Development Concepts (LDC) have emerged as an instrument for landscape planning on municipal and regional level in Switzerland. By the end of the 1990s it attained an official meaning in the course of the Swiss sustainability policy (BfR 1996, BUWAL 1998). LDCs are to be regarded as a response to the current state of landscape planning in Switzerland. In contrast to housing zones, there is no official planning instrument that coordinates the development of the landscape (in sense of green space) of the whole municipal area, including recreation areas. An LDC is planned to include all functions and uses of a landscape (e.g. recreation, agriculture, forestry, flora, fauna, housing), treating them comprehensively rather than separately. As the LDC is a not legally binding planning instrument, wide acceptance and support for the project implementation are crucial for its success. Thus, an LDC has to be developed successively, bringing together stakeholders, authorities, experts, directly affected people and a wider public, assessing and considering their interests and needs (Bolliger et al. 2002, Winter 2000).

However, it is still unclear is how the concept of LDC has been adapted in practice and which experiences have been made with this new planning instrument. This paper addresses the above stated gap in existing research, specifically regarding the potential of LDCs for the development of municipal recreation areas. The evaluation is based on our research in several Swiss municipalities during the past two years. In the first part of our study, a semi-standardized questionnaire was mailed to local experts of all German-speaking municipalities that had finished the elaboration of an LDC (n = 17). In the second part of our research, we selected a com-

munity in the peri-urban region of Zurich that had recently started the elaboration of an LDC. In this case study, we applied multiple research methods. The results presented here are based on the qualitative analysis of meetings held by the LDC committee and interviews with participants.

In the survey among all LDCs in Switzerland, we explored how recreational needs and demands are considered in the elaboration of LDCs. In a first step, we show which participatory techniques were used to assess recreational interests and needs. Organized interest groups, i.e. leisure, sport or nature protection associations were mainly involved by communicative interaction techniques like round tables, field inspections, workshops and informal discussions. In contrast, non-organized persons were merely informed by information letters, internet and newspaper articles. The implications of these results for the acceptance and the reputation of the LDC in the municipality are discussed. According to the survey results, recreation was, together with agriculture, forestry and the conservation of flora and fauna, an issue in most LDCs. However, only few representatives from the fields of leisure and recreation were involved in the LDC planning phase. This is rather surprising, because these fields are regarded to be essential issues in LDCs. Possible reasons for this underrepresentation are discussed. From the qualitative analysis of interviews and the LDC committee meetings, we identified problems that typically arise during the participatory planning process of an LDC. For example, participants were often confronted with the scepticism of other persons regarding the results of the LDC. Specifically, for persons responsible for the LDC, doubts regarding the appropriateness

of their work and a weak interest shown by stakeholders and the local population became considerable obstacles for them. Finally we outline the potential of the LDC as a concept for participatory planning of municipal recreation areas as well as recommendations for further projects of participatory landscape planning.

## References

- Bolliger, P., Charollais, M. & Condrau, V. (2002). Werkzeugkasten LEK [Tool kit LDC]. Rapperswil, Lausanne.
- Bundesamt für Raumplanung (BfR) (1996). Grundzüge der Raumordnung Schweiz [Principles of spatial planning in Switzerland]. Bern.
- Bundesamt für Umwelt, Wald und Landschaft (BUWAL) (1998). Landschaftskonzept Schweiz [Landscape Concept Switzerland]. Bern.
- Winter, D. (2000). Landschaftsentwicklungskonzept (LEK) – ein neuer Stern am Planungshimmel [The Landscape Development Concept (LDC) – a new star on the planning horizon]. In: DISP (143), p 39-45.

## Researches on the Visitor's Activities and the Barrier Status around Kairakuen Park

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*Keywords: Tourism, visitor's activities, Kairakuen Park, barrier-free.*

### Introduction

The Ministry of Land, Infrastructure and Transport developed a model project in 2003 to help community-based people work together to create advanced space for sightseeing and exchanges with the help of measures and companies involved in the hardware and software business. The model project that was named "Creating Space for Sightseeing and Exchanges" designated eight regions as the place to put the project into operation as part of its activities. In one of the eight designated areas, "Conference to promote the collaborative project for Hitachi and Fusa" that covers an extensive area astride Ibaraki and Chiba Prefectures made a step forward to promote the tourism business. The conference conducted survey on sightseeing resources in the middle and north parts of Ibaraki Prefecture and found that Kairakuen Park is the core of the sightseeing resources and an important sightseeing spot of the region. That is, improved charm of space in Kairakuen Park will result in activating tourism that is closely related to the regional resources.

At the same time, Agency of Cultural Affairs has been focusing on measures to utilize cultural assets in present-day Japan since it implemented a special project for the utilization of historical sites in 1989. The public in general strongly requires measures for a barrier-free environment in the move to construct a welfare society. Cultural assets are not an exception, and the move to utilize historical sites also needs barrier-free mea-

asures. In June 1994, the law to facilitate the construction of specific buildings easily accessible by elderly and physically handicapped people (Heart Building Law) was put into effect. This law is designed to promote quality of buildings and enhance public welfare for the purpose of facilitating the construction of buildings that the elderly people who have some limit on their daily and social life, the physically-handicapped people and those who have some limit on their daily and social life can use without difficulty. In November 2000, the Heart Building Law was followed by Barrier-Free Transportation Law that is a law to facilitate the movement of elderly and physically handicapped people by public means of transport without difficulty.

Barrier-free measures are not necessarily enacted well at historical sites and sightseeing spots despite the implementation of the above laws and other ordinances. In these social circumstances, Okamoto et al. drew a map of the barrier-free status in Kairakuen Park in "Research on Barrier-Evaluation Method for Wheelchair Users around Kairakuen Park."

In this research, we conducted a questionnaire survey on the utilization at Kairakuen Park and clarified the routes frequently used by visitors to know well about characteristics and value of Kairakuen Park. Besides being an important sightseeing resource in Ibaraki Prefecture, many people visit Kairakuen Park in occasions other than during the Plum Festival as a recreational space. It is our belief that this research will contribute

to the effective improvement of barrier-free measures in Kairakuen Park and reduce barriers that handicapped people feel with the limited budget.

## Methods

This research aims to clarify the current status of Kairakuen Park in Mito in Ibaraki Prefecture that is one of the three most famous Japanese gardens across the country and the place of recreation and relaxation for Mito citizens, and to explore the way to have it used equally by healthy people and wheelchair users.

We first conducted a survey on how Kairakuen Park is used by healthy people and found that it is used not only at the time of event but also on ordinary holidays. We also realized that it is used by people of various generations and from various places, loved by people regardless of age and sex, and attractive enough to induce people living outside Ibaraki Prefecture to visit. Kairakuen Park is used by people for various objectives, and we concluded that it can satisfy lots of needs that people have in their minds.

Next, we conducted a survey on how visitors wander inside Kairakuen Park to know how it is used by them. Following this survey, we conducted a questionnaire survey for handicapped people to know whether or not they have visited a sightseeing spot so far and what they are concerned about during their visit to Kairakuen Park. This survey leads to our understanding that they are concerned most about the current barrier status.

In the last stage, we merged the barrier-free map drawn by Ibaraki University and data we obtained through the survey on the wandering behavior,

and drew the priority route map for barrier-free improvement. This map gives priority for eliminating barriers within the spots in Kairakuen Park where many people are wandering.

Figure 1 shows the methodology of our research.

## About Kairakuen Park

Kairakuen is a Japanese garden located in Mito city of Ibaraki Prefecture. It is as famous as Korakuen in Okayama city and Kenrokuen in Kanazawa city, and these three Japanese gardens are called the three most famous Japanese gardens across the country. Kairakuen was constructed by the ninth generation in Mito clan of feudal lord Nariakira Tokugawa in July 1842. Nariakira crumbled Mt. Shichimen that faced Lake Senba and created a place where samurai who trained themselves at the Koudoukan hall to become both a good warrior and a good scholar could take a rest and mingle with people of the domain. He named this place Kairakuen. It was renamed Kairakuen Park when Kairakuen acquired the neighboring Senba Park in July 1999. Now it has a total area of 300 hectares, and it is world's second largest park adjacent to the urban district, following the Central Park in New York.

Kairakuen main-park itself is about 13 hectares in area where 3,000 plum trees of 100 kinds are implanted. It holds the Plum Festival from late February to late March every year and has about 1.3 million visitors annually. Besides being famous for plum trees, Kairakuen has lots of places of interest of each season. Visitors can enjoy cherry trees in spring, crimson Kirishima azaleas in early summer, brilliant green mousou bamboos and Japanese cedar trees in midsummer, and lovely bush clovers and maple trees in autumn. They are moved by the impressive scenery that overlooks Lake Senba through these seasonal attractions. Moreover, plum trees of various kinds, such as "Tazunaki", "Shoujyou" and "Youchou" are implanted in the new park that expanded below Kairakuen Park. In addition, the new park is studded with lawn fields of the four seasons and ponds where waterfowls play. Visitors can enjoy this vast area in a relaxed manner, and people of Mito city use it as a recreational place in their daily life without reservation.

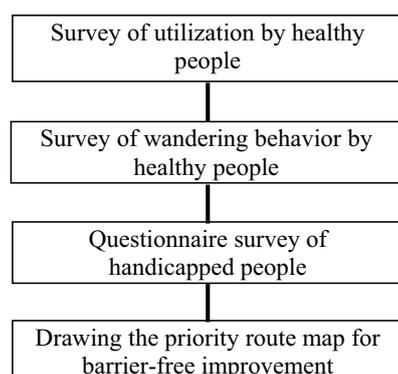


Figure 1: Research methodology.

Table 1: Summary of survey on utilization.

Survey in March 2002	Event	Plum festival
	Number of Respondents	371 people
	Questionnaire method	Interview
	Dates of survey	March 13, 2002, Thursday
		The fourth plum appreciation day: March 17, 2002, Sunday
	Area covered	Whole area of Kairakuen
Survey in December 2005	Event	None
	Number of Respondents	108 people
	Questionnaire method	Interview
	Dates of survey	December 28, 2005, Sunday
	Area covered	Whole area of Kairakuen

## Survey on utilization of Kairakuen Park

We conducted survey on utilization of Kairakuen Park when an event was held in the three years from 2002 to 2004 and on holidays in December 2005. In this research, we studied utilization of Kairakuen Park by looking into the attributes of visitors, purposes of visit, and wandering routes during the Plum Festival in 2002 and on holidays in 2005. Table 1 shows the brief summary of survey on the event day (Plum Festival) and ordinary holidays. Figure 2 indicates the age groups of visitors in the Plum Festival, while figure 3 shows those on ordinary holidays. No great difference in age group was observed between visitors during the Plum Festival and those on ordinary holidays.

We also inquired into the departure places of visitors of Kairakuen Park. The departure places of visitors during the Plum Festival are shown in figure 4, and those of visitors on ordinary holidays in figure 5. As these two figures indicate, sightseers from other prefectures account for as much as about 72% of all visitors during the Plum Festival, whereas about 80% of visitors on ordinary holidays are people living in Mito city. This figure indicates that Kairakuen Park is widely used by people of Mito city in their daily life.

Next, we inquired about the purpose of utilization of visitors of Kairakuen Park. Figure 6 indicates purposes of visit that visitors raised during the Plum Festival, while figure 7 shows those given by visitors on ordinary holidays. Figure 7 clearly indicates that people of Mito city use Kairakuen Park for exercise on ordinary holidays. Next, we looked into the wandering behavior of visitors of

Kairakuen Park by purpose. The survey results collected during the past three years made us confirm that visitors concentrated on the main park of Kairakuen from each parking lot. Figure 8 indicates the wandering behavior of total visitors on ordinary holidays; figure 9, that of visitors for a walk; figure 10, that of those visitors who let children play; and figure 11, that of visitors for sightseeing.

The red part gives the routes that visitors with a specific purpose usually take. Pink, yellow, blue, and green are used besides red to show the five stages. As a whole, many wandering patterns were observed around Lake Senba, and they cover the whole of Kairakuen Park. Figures 8 and 9 give almost the same tendency because people who visit for a walk account for almost 60% of all visitors. Many families who visit to let their children play are found in the field of the four seasons, which offers one of the appealing points of Kairakuen Park. We found that Kairakuen Park is used for diverse purposes and visitors give a tendency to select places depending on the purpose of visit.

Questionnaire survey for handicapped people:

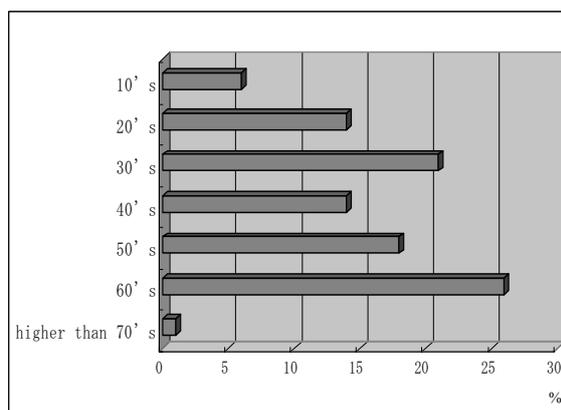


Figure 2: Age groups of visitors during the plum festival.

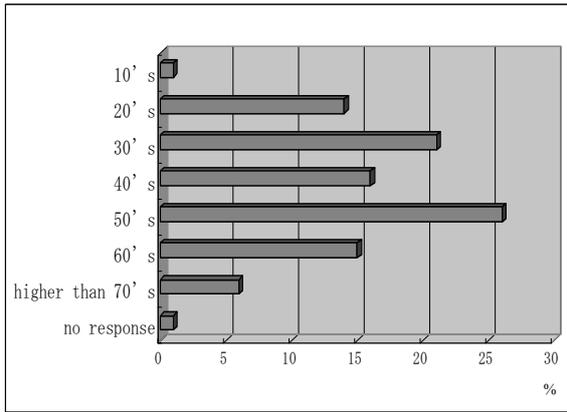


Figure 3: Age groups of visitors in ordinary holidays.

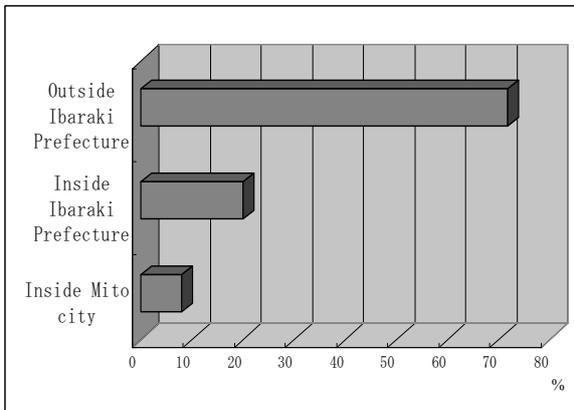


Figure 4: Hometowns of visitors during the Plum Festival.

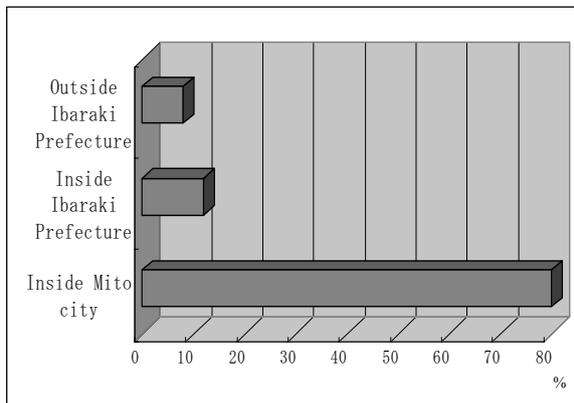


Figure 5: Hometowns of visitors on ordinary holidays.

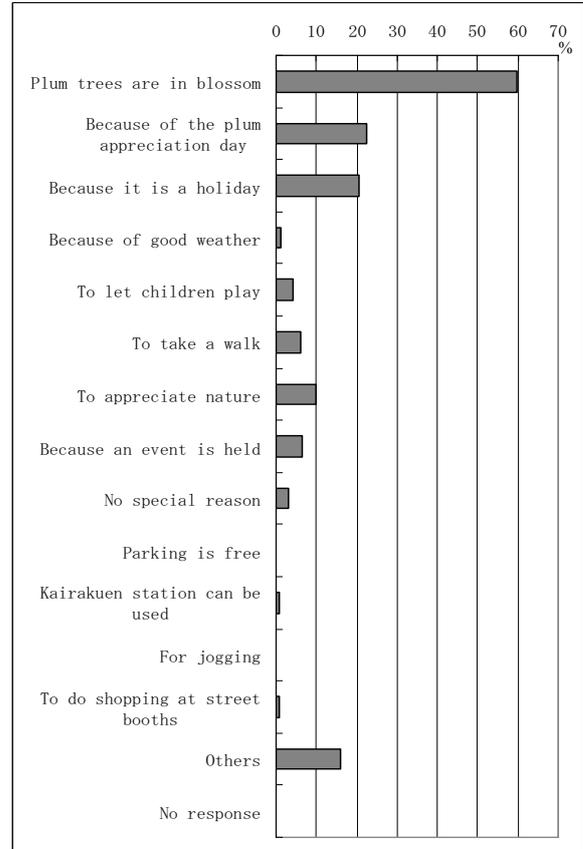


Figure 6: Purposes of visit during the Plum Festival.

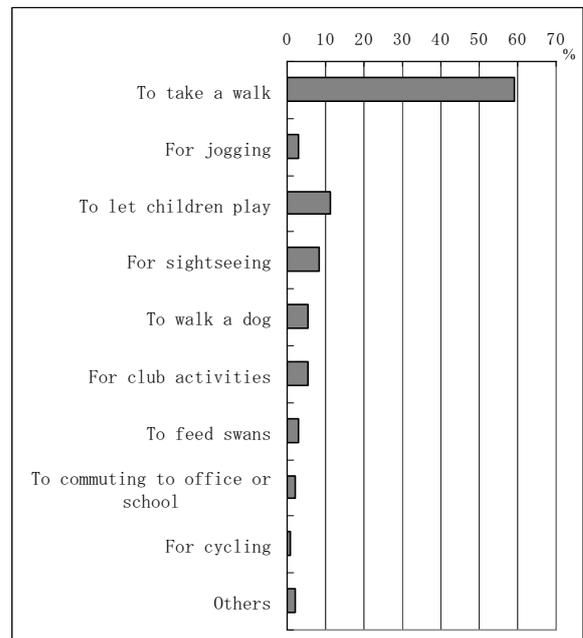


Figure 7: Purposes of visit on ordinary holidays.

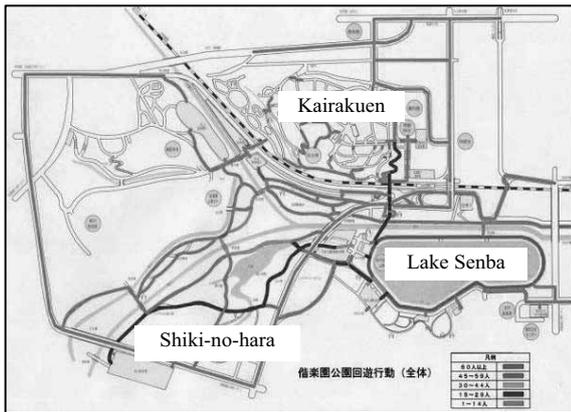


Figure 8: Wandering behavior (total).

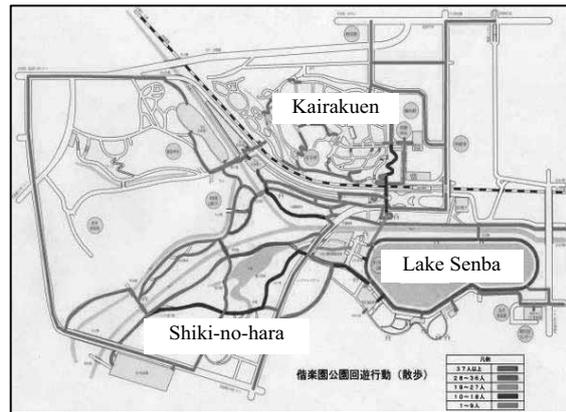


Figure 9: Wandering behavior (for walking).

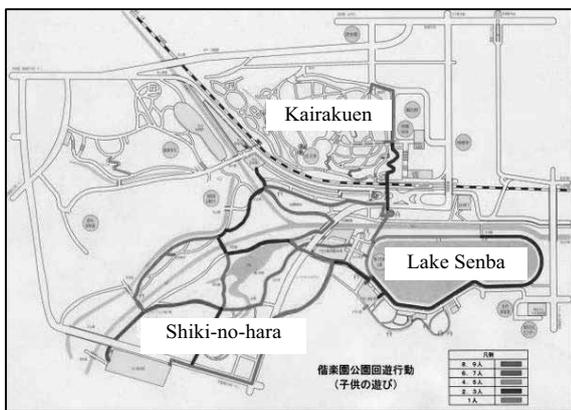


Figure 10: Wandering behavior (to let children play).

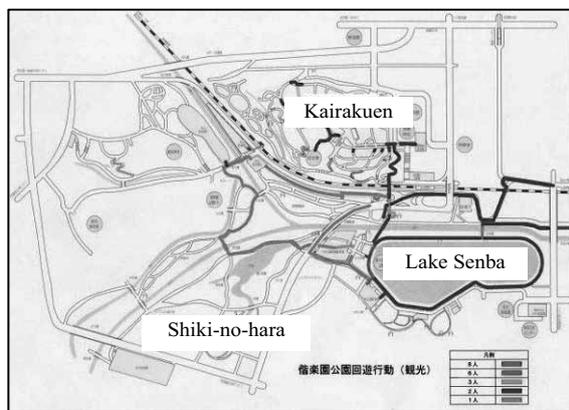


Figure 11: Wandering behavior (for sightseeing).

We conducted a questionnaire survey for people suffering from handicaps in orthopedics, hearing, or vision to know whether they had been to sightseeing spots and what they required of the sightseeing spots they visited. People subject to the survey were those who are active in handicapped facilities. We sent the questionnaire survey to them through the facility managers and got the survey back to us. Because we received 55 copies out of 120 copies that were sent, the collection rate was

45.8%. In terms of attributes of handicap, about 59.5% of respondents were wheelchair users. Every respondent was orthopedically impaired.

Figure 12 shows the results of the question about whether or not they visited a sightseeing spot, and figure 13 indicates the interest that they got in the sightseeing spot they visited. We learned that 55% of handicapped people had never visited a sightseeing spot. This is presumably because they have limited field of activities and because measures for

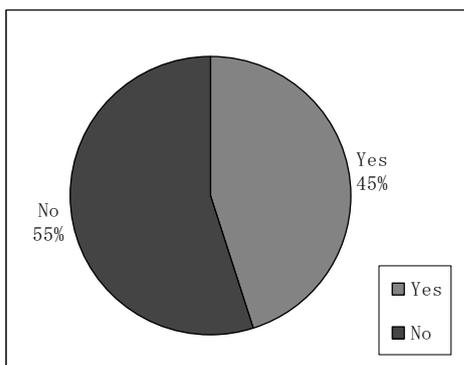


Figure 12: Existence of experience which visited the tourist resort.

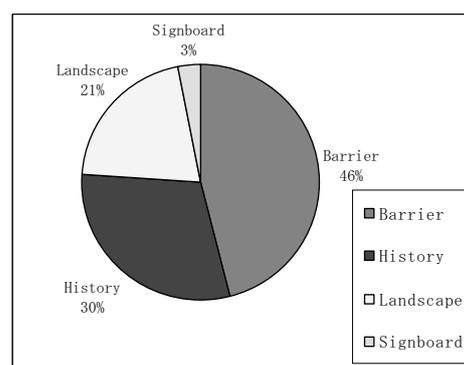


Figure 13: The item of interest of a tourist resort.

Table 2: Brief summary of barrier survey.

Date of survey	October 29,2003
Place of survey	Inside Kairakuen Park
No. of researchers	3 wheelchair users, 3 caretakers, 20 students of Ibaraki University, 2 Ibaraki prefectural staffs, 1 park administrative
Method of survey	Field survey using questionnaire sheets

barrier-free are not adequately enacted. We also learned that handicapped people who had ever visited a sightseeing spot gave higher priority to the current barrier status than to the history and scenery of the sightseeing spot they visit, showing they are interested in barrier-free most.

Table 3: The Difficulty Level Evaluation Method for Route 'pass' ability (created by Ibaraki University).

Difficulty Level	Life Support Mito and Ibaraki University
A	No difficulty
B	Possible to get around by oneself
C	. Possible to get around either if able to control a wheel-chair well or if have a helper with oneself in case of a senior
D	. Must have a helper with oneself ( the height of a step being within 10-15cm, in which case the front wheels can go beyond it while the back wheels can't)
E	. Impossible to get around (possible when having two helpers to lift the wheel-chair) . Stairs having a few steps or step being more than 15cm high
F	. Impossible to get around (possible when having more than three helpers, or totally impossible) . Stairs having more than three steps

### Barrier survey in Kairakuen Park

In this research, we refer to the barrier map of Kairakuen Park drawn through the research by Okamoto et al. Table 2 shows the brief summary of the barrier survey. Kairakuen Park developed its own "Method to judge the difficulty level of routes of the Ibaraki University type" with reference to the difficulty levels set up by Tokyo Metropolis (table 3). Figure 14 shows the barrier map of Kairakuen Park that it drew using the above method. This barrier map is put on the website of department of park administration of civil engineering division of Ibaraki Prefecture. (<http://www.pref.ibaraki.jp/bukyoku/doboku/01class/class11/index.html>.)

Figure 14 indicates that there are various difficulty levels of barriers inside Kairakuen Park. Moreover, lots of barriers exist in Kairakuen main-park that makes rather hard for handicapped people to



Figure 14: Barrier-free map of Kairakuen Park.

wander. When we examined the entire Kairakuen Park, we found that most barriers are in the difficulty levels of A and B (filled in blue and green). In addition, there seem lots of routes that allow handicapped people walk without support, and only a few barriers exist. In reality, however, there are lots of small-scale barriers that prevent walking without support. This prevents handicapped people from wandering in Kairakuen Park.

### Proposal for improvement of the barrier-free status in Kairakuen Park

In this research, we wish to propose that an order of priority should be established for the improvement of the barrier-free status inside Kairakuen Park to organize a barrier-free environment efficiently with the limited budget. The priority of each route was decided with reference to the wandering behavior on ordinary holidays (figure 8) that was drawn on the basis of the utilization survey and the barrier-free map (figure 14). We gave the highest priority to the red points in figure 8 that are equivalent to the points with the difficulty levels from C to F in figure 14, and gave the next highest priority to the points in pink that are equivalent to the points with the difficulty levels from C to F in figure 14. Table 4 shows the level of importance of each route, on which the order of priority of barrier-free improvement in Kairakuen Park is based as indicated in figure 15.

Table 4: Order of priority of barrier-free improvement.

Wandering behavior	Difficulty level in barrier map (C-F)	Priority of improvement	Map of improvement
Red	Not-applied		
Pink	Not-applied		
Yellow	Applied	1	
Blue	Applied	2	
Green	Applied	3	

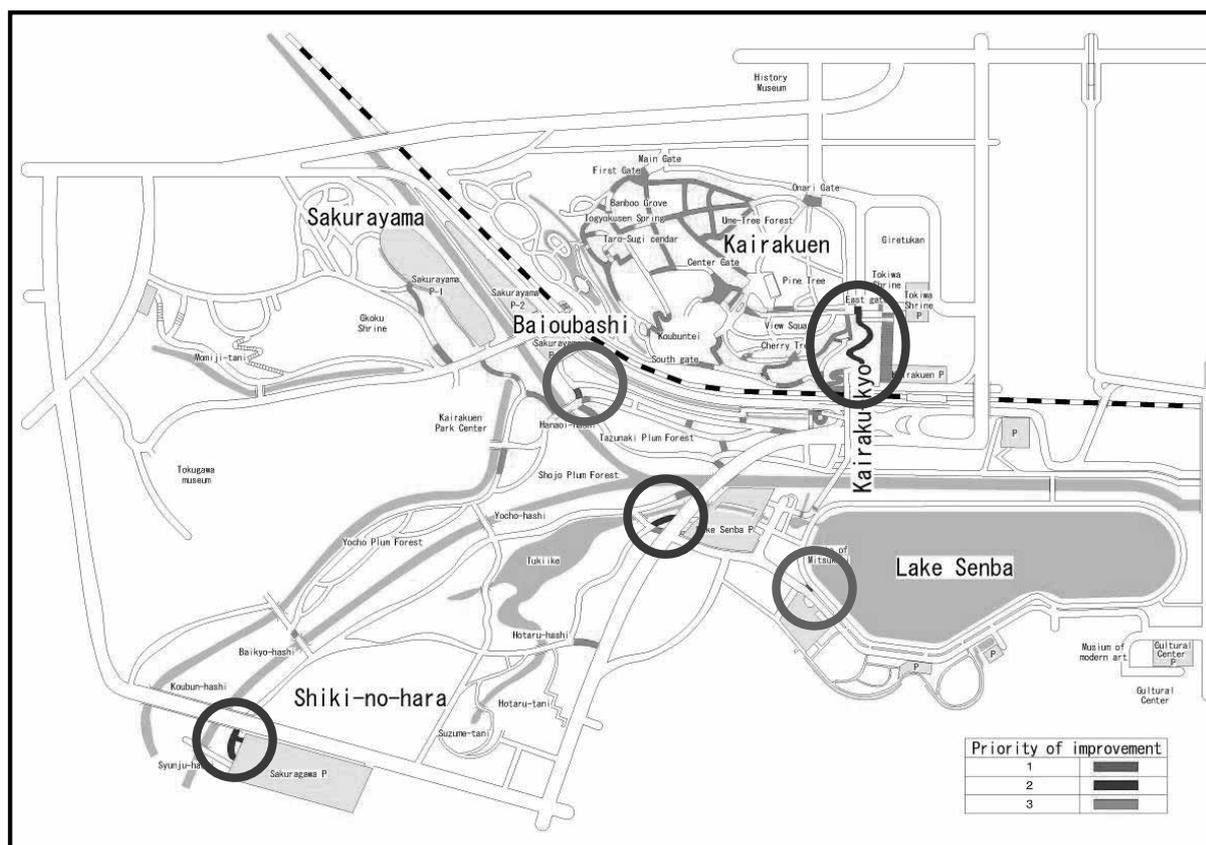


Figure 15: Route map of priority of barrier-free improvement.

It is most effective to improve the barrier-free situation according to the order from red, blue, and to green to allow handicapped people to enjoy the same wandering behavior as healthy people do on ordinary holidays. The priority to improve barrier-free status in Kairakuen main-park is low because the number of healthy visitors is small from the point of view that it is used on ordinary holidays. Moreover, none of the red and pink routes that provide lots of wandering behavior in figure 8 prevents handicapped people from wandering without support. In addition, the red route has two points that need improvement, and the blue route has three such points. It is necessary to work out a method of improvement, but we think that this situation can be improved without delay.

## Results

In this research, we studied the utilization status, purposes of usage, and wandering behavior of visitors of Kairakuen Park in association with the improvement of sightseeing resources. From the questionnaire survey given to handicapped people, we

learned what interested them in sightseeing spots. And we drew a map to show the order of priority to improve the barrier-free status using the wandering routes made clear by the utilization survey and the barrier-free map of Kairakuen Park. In the future, effective improvement is strongly sought in light of the current situation that requires improvement with the limited budget.

For public relations of sightseeing in the future, demand grows stronger for transmission of information that goes particulars and satisfies the needs of Internet users because the Internet will be used more frequently. Everyone can download the barrier-free map drawn by Ibaraki University freely and share it with others without any restriction. We participated in the walking tour of Kairakuen Park with wheelchair users in March 2006. We enjoyed the tour following the route that we selected according to the barrier-free map published by Ibaraki University we carried in our hands. Judging from the reality that information truly required by users is invariably used, we think that detailed information on route by purpose of visit and by utilization of visitors is in great demand.

In this research, the priority of improvement of the barrier-free status is based on the data obtained from wandering behavior on ordinary holidays. This is because Kairakuen Park aims to be a park that enables handicapped people to enjoy throughout the year by placing emphasis on its characteristics that offer visitors opportunities to enjoy scenery of the four seasons. We are planning to respond to the requirements of handicapped sightseers from a long distance by drawing a route map with the improvement priority of the barrier-free status drawn on the basis of the wandering behavior when an event is held like the Plum Festival that symbolizes Kairakuen Park most.

It is our belief that the priority map to improve the barrier-free status drawn in the course of this research will be used to improve Kairakuen Park and promote the utilization of handicapped people. This promotes the tourism business and activates the regional industry, and ultimately makes Kairakuen Park loved more by local residents and sightseers whether or not they are handicapped.

## References

- Akira, O. (2004). Research on the Barrier-Evaluation method for wheelchair users around Kairakuen Park. 25th Asian Conference on Remote Sensing, p 1626-1631. Ibaraki.

# Visitor Monitoring of Eight Recreational and Protected Areas

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*Keywords: Outdoor recreational activities, national parks and protected areas, monitoring movements.*

## Introduction

The primary objective of the project is to provide answers on if, where applicable, and how the use of an area changes when it is awarded national park status, increased focus and attention. The project can also, as a side effect, provide knowledge and understanding of how various information, administrative and organisational strategies affect the use of, and level of attention paid to, our national parks.

The project can quantify the use of differing types of open-air recreational areas and help to clarify the usefulness of organisational initiatives in relation to the number of users.

The project is part of a more comprehensive cooperation with The Nordland Research Institute.

Four new national parks are under establishment in Nordland. One of the objections to the establishment of the parks is that public use of the areas will increase and thus threaten that which one wishes to preserve. This claim has not been verified. The main objective of the project is thus to increase our level of knowledge on how the establishment of national parks affects the use of these national park areas (and organised and adapted leisure areas) in thinly populated counties such as Nordland.

## Methods

Pressure pads that were developed in Scotland are employed. The pressure pads are buried at a depth of 6-7 cm in pathways and covered with earth/gravel from the area immediately adjacent. The pressure pads are connected to a con-

cealed data pod. Both the pad and the pod are concealed under the surface. Data is transferred to a computer once per year. Each footstep on the pad results in a registration or "hit". The date and time of the hit is registered simultaneously. The registration period is from June 1st to October 31st.

The pressure pads are laid in recreational areas in the vicinity of populated areas, previously established national parks, newly established national parks and national parks under establishment. This pattern is designed to allow us to isolate the impact of national park status on the use of walking/hiking areas, and any changes in the impact of national park status over time.

Any increase in the level of interest in the area is monitored via Internet searches, searches in news media and similar. Registrations will cover a period of between 4 and 7 years in order to negate any incidental seasonal variations.

## Expected results

On the basis of our general experience, we expect to see an increase in recreational use of areas that are established as national parks. The methodical layout will also illustrate the impact of any change in status, changes due to improved organisation/physical changes, and increased focus on the area.

The results are affected by a number of change factors simultaneously. Time series are entered in advance of the establishment and a three to four year period subsequent to this. This provides, together with the choice of areas studied, the possibility to make corrections for the impact of the various change factors.

Table1: Provisional results 2005.

<b>Location</b>	<b>Type of area</b>	<b>2003/2004</b>	<b>2005</b>
Futelva	Recreational area close to populated area	25 231 (8601)	26 144 (9431)
Sjunkan/Misten	Planned national park	1	1
Rago	Established national park	1 314 (3769)	2 026 (3160)
Junkerdalsura	Newly established national	6 341 (3695)	7 015 (5041)
Storjord Arboretum,	Recreational area close to populated area	2	2 982 (3836)
Granneset	Established national park	1 974 (3143)	1 916 (3067)
Stavassdal	Planned national park	368 <sup>3</sup> (2517)	750 (2705)
Simskaret	Established national park	1 839 (2593)	1 596 (3145)

Table 1 shows the number of hits on the pressure pads during the period they have been placed out. The pods at Futelva, Junkerdalsura and Storjord Arboretum register traffic from mid-April to the end of October. The pods at the other locations register traffic from around June 1<sup>st</sup> to the end of October. This is due to frost and snow conditions.

The figures in brackets show the number of hours the pads and pods have been installed.

<sup>1</sup> Installed in the autumn of 2005

<sup>2</sup> No registrations were made for the Arboretum in 2004.

<sup>3</sup> This figure is lower than expected due to the temporary re-routing of the pathway.

Table 2: Assessment of expected results.

<b>Change</b>	<b>Recreational area close to populated area</b>	<b>Established national park</b>	<b>New national parks</b>	<b>Comments</b>
General increase in outdoor activities	Increase	Increase	Increase	
Increase in impact of national park status	No change	Increase	Increase	Seen in comparison to the overall picture
Status results in increase in outdoor activities	No change	No change	Increase	Seen in comparison to the overall picture
Increased focus on some areas	Increase	?	Increase	Depending on point of focus
Improved preparation for outdoor activities	Increase	?	?	Depending on where improvements are made

## Are There Too Many Visitors in National Parks? A Campsite Analysis in Two Finnish National Parks

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*Keywords:* Tourism, campsite, trampling, vegetation change, national park.

### Introduction

Nature-tourism is one of the fastest growing industries and often concentrates on pristine environments like national parks. As the amount of visitors increase, nature is exposed to more extensive wear, which may threaten the conservational value, as well as the recreational value of these areas if the change is not under control.

The major and visible impact of recreation is mechanical trampling of vegetation. Ecological changes are inevitable even after short-term trampling (Tolvanen et al. 2001, 2004). Due to trampling the original species are often replaced by more tolerant species and moreover, alien species can be carried along by visitors and pose a threat to native vegetation. In Finland many National Parks are concentrated in north, where environmental factors set limitations to the recovery of the vegetation after disturbance. It is important to identify sensitive environments and species when planning new trails and campsites. Monitoring techniques for campsites have been developed particularly in North America (Cole 1989, Hammit & Cole 1998).

Also in Finland a few studies have been made concerning the impacts of recreation on vegetation in campsites (e.g. Rautio et al. 2001). Yet, there is a need for more detailed studies in a variety of environments for developing a reliable and cost-effective technique for campsite monitoring in Finnish National Parks.

We studied the effects of increasing tourism on the vegetation at campsites in two National Parks in Northern Finland; Pallas-Ylläs NP (summer 2003) and Oulanka NP (summers 2005-2006). The main focus was in the following questions: What is the size of the areas with visible changes in vegetation? How do the number of visitors, campsites age, vegetation type, number of trails in the campsite and distance between campsite structures affect quantity of changes?

### Methods

We surveyed 39 campsites with varying structures. Wilderness huts, campfire sites, lean-to shelters and Lapp pole tents situated along trails were considered as campsites. From campsites areas with

visible changes in vegetation were measured and separated into two zones; (I) zone with destroyed vegetation cover and (II) zone with continuous vegetation cover but clearly affected by trampling. From each campsite two main structures (e.g. campfire site, wilderness hut) were chosen as mid-points. From each point transect lines were directed to each cardinal and half-cardinal points. From transects the species composition and percentage of vegetation coverage was estimated in different zones with 50x50 cm square frames and compared to undisturbed areas. Visitor numbers were estimated with electronic counters, guest books and questionnaires.

## Results

The visitor number and vegetation type had a significant impact on the size of the area disturbed. Moreover, the size was relative to distance between wilderness huts and campfire sites. The most sensitive vegetation types were mountain heaths and dry pine forests. Trampling tolerance of vegetation types was mainly explained by vegetation composition. Dwarf shrubs were sensitive to trampling and disappeared quickly from the intensively used areas, whereas graminoids were more tolerant. Among mosses and herbs there were both sensitive forest species and tolerant secondary species. In all campsites there were species, which have been carried along by hikers and were alien to the original biotope.

In future, the areas affected by trampling in campsites of national parks should be measured regularly. Also the alien species in campsites should be monitored and removal of aggressive invasive species should be considered. When planning new campsites the most sensitive biotopes should be avoided. The size of the disturbed area can be affected by careful planning of the locations of structures. The buildings should be constructed closer to each other or campsites can be established on already trampled areas like hiking trails.

## References

Cole, D.N. (1989). Area of vegetation loss: a new index of campsite impact. In: Research note INT-389 US Department of agriculture. Ogden.

Hammit, W.E. & Cole, D.H. (1998). *Wildlife recreation: ecology and management*. New York.

Rautio, J., Helenius, M. & Saarinen, J. (2001). Urho Kekkonen Kansallispuiston kuluneisuus:

luontomatkailun ympäristövaikutusten seuranta ja mittaaminen. In: Järviluoma, J. &

Saarinen, J. (toim.) *Luonnon matkailu- ja virkistyskäyttö tutkimuskohteena*. Metsäntutkimuslaitoksen tiedonantoja (796) p 111-124.

Tolvanen, A., Forbes, B., Rytönen, K. & Laine, K. (2001). Regeneration of dominant plants after short-term pedestrian trampling in sub-arctic plant communities. In: *Man and the biosphere series: Nordic mountain birch ecosystems*, p 361-370.

Tolvanen, A., Rämetsä, J., Siikamäki, P., Törn, A. & Orell, M. (2004). Research on ecological and social sustainability of nature tourism in northern Finland. In: Sievänen, T., Erkkonen, J., Jokimäki, J., Saarinen, J., Tuulentie, S. & Virtanen, E. (ed.) (2004). *Policies, Methods and Tools for Visitor Management*. Proceedings of the Second International Conference on Monitoring and Management of Visitor Flows in Recreational and Protected Areas, June 16- 20, 2004, Rovaniemi, Finland.

## **Linking Forestry and People in an Urban Landscape, a Participatory Approach - Case Studies from West London**

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*Keywords: Sustainable urban forestry, ethnic minorities, environmental justice, participatory approach.*

The role of high quality green spaces has won a significant place in the London sustainable development agenda as to ensure all Londoners are within the walking distance of a quality nature. To achieve the goal of sustainable living, each and every part of the society needs to be aware about their role, rights and responsibilities and come forward to take partnership with an increased sense of ownership in the development and enhancement of urban-green space. That also includes the involvement of ethnic minorities, poor and disadvantaged groups. However, ensuring environmental participation of a range of social group including ethnic minorities into the use and enhancement of green space is always challenging to fulfil. The importance of ethnic minorities' participation to acquire a quality of life has long since been forgotten and neglected. The main goal of the research is to explore issues related with Urban Forestry (UF) in all the parts of local life including environment, economic & social issues in LB of Hounslow (LBH). The study also aims to examine the inequality issues that may be deeply embedded in the society in the use of urban green space. It also addresses ethnic minorities' environmental participation with regards to their involvement in the use and enhancement of urban green space exploring new challenge and demand using participatory approach. Both qualitative such as focus group discussion (FGD), key informants surveys (KIS) & direct observation (DO); and quantitative research methods including GIS interpretation tools will be used to identify any gaps and to recommend for the future UF strategy with an achievable and quantifiable programs to the benefit of all kind of residents

in LBH. This will then form a basis for examining and improving upon existing policy and identifying key area to develop a just and sustainable UF models in the future. The paper is an attempt to present an overview of participatory action research (PAR) which is on-going at this stage.

### **References**

- Collonson, N. (2005). Space for People: Targeting Action for Woodland Access. In: Quarterly Journal of Forestry (99/4), p 296-302.
- Department of the Environment, Transport and the Regions. (2000). Our Towns and Cities; the Future, Delivering an Urban Renaissance.
- Sustainable Development Resource network (SDRN)/DE-FRA. (2004). Environment and Social Justice: Rapid Resource and Evidence Review.
- United Nations Environment Program. (1992). The Convention on Biological Diversity (CBD).
- Greater London Authority. (2002). The Mayor's Biodiversity Strategy, Connecting with London's Nature.

## Visitor Management in a Floodplain Area near Zurich

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### Introduction

We present our approach to visitor flow management and visitor information in a newly recreated floodplain area in Geroldswil and Dietikon near Zurich.

The area was recreated in 2004 as an ecological compensation for the renovation of the hydroelectric power plant Wettingen, operated by the Electric Power Company of the City of Zurich (ewz). The floodplain measures 900 m<sup>2</sup> and is situated close to an old 2'000 m<sup>2</sup> nature reserve area across the river Limmat. One year after construction, some sensitive bird species like the Little Ringed Plover (*Charadrius dubius*) have already bred in the new alluvial plain area. The floodplain has become a natural reserve. In 2005, the opposite riverside was recreated. New gravel isles and coves were built to revitalize the borderline.

However, on weekends, the number of visitors on the trails bordering the area rises to approximately 70/h, many of them walking their unleashed dogs. Although prohibited, people tend to enter the area

in summer, to go for a swim in the river or to have a picnic at the riverbank. Authorities had to take measures to manage the visitor flow and to protect the area from trespassing.

### Methods

We identified potential problems related to visitors and established protecting measures.

To manage visitor flow and inform the public about regulations for protection of the area the following actions were taken:

- Structural measures (fencing off trails)
- Placement of information boards
- Informative articles in the local press
- Surveillance service by student rangers

During surveillance, rangers journalized misdeeds and recorded and evaluated discussions with visitors and other observations.

### Results

The mean number of visitors is 21/h on weekdays and 67/h on weekends. On weekends, 66% of all visitors are walkers. On weekdays 43% of all visitors are dog walkers. In summer, swimmers are numerous. Birdwatchers are infrequent.

### Identified problems are (decreasing relevance)

- Trespassing on the isle and gravel banks
- Swimming in forbidden areas of the river
- Free running dogs in protected zones
- Entering protected zones.



Figure 1: Investigation area near Zurich. Paths are marked in red, viewing platforms and hide as yellow points. The protected area is hatched.



Figure 2: View of a hide for birdwatchers to observe without disturbing animals.

In summary, the most important misconduct is walking on gravel banks along the riverside (35% of all misdeeds). On summer weekends, swimming is very popular (32% of all misdeeds). On weekday, in contrast, freely running dogs are the main problem (20% of misdeeds). Misconduct is always located in the same places. Thus, problem areas can clearly be located and dealt with on the spot (i.e. with information boards or fences). Problems arise from habits such as walking along the river's side. Also alternative non-prohibited swimming areas need to be offered closely. The local press was found to be an appropriated forum for informing the public and for discussion.

Landscape elements such as hedges, fosses, gravel-covered areas, vegetation units, and water increase attractiveness of an area. Once an

area is made attractive and accessible, rangers or appeal boards have little effect on visitor flow. Clear and reasonable protection rules are then vital for effective work of the rangers to protect the area. Protecting fences are relatively well accepted by the public and can be added to hedges. Hides and viewing platforms are appreciated when placed at attractive viewpoints.

### Conclusion

- Key for a successful management of visitor flow is the composition of landscape elements in situ
- Alternative possibilities (swimming) should be offered
- Rules have to be clear and reasonable
- Surveillance service effectively increases acceptance of protection rules
- The local press and information boards are appropriate means of communication to the public

### References

creato – Netzwerk für kreative Umweltplanung. Ennetbaden. (2001). Erneuerung Limmatwerk Wettingen. Bauprojekt, Umweltverträglichkeitsbericht 2. Stufe. Im Auftrag Elektrizitätswerk der Stadt Zürich - ewz; not published.

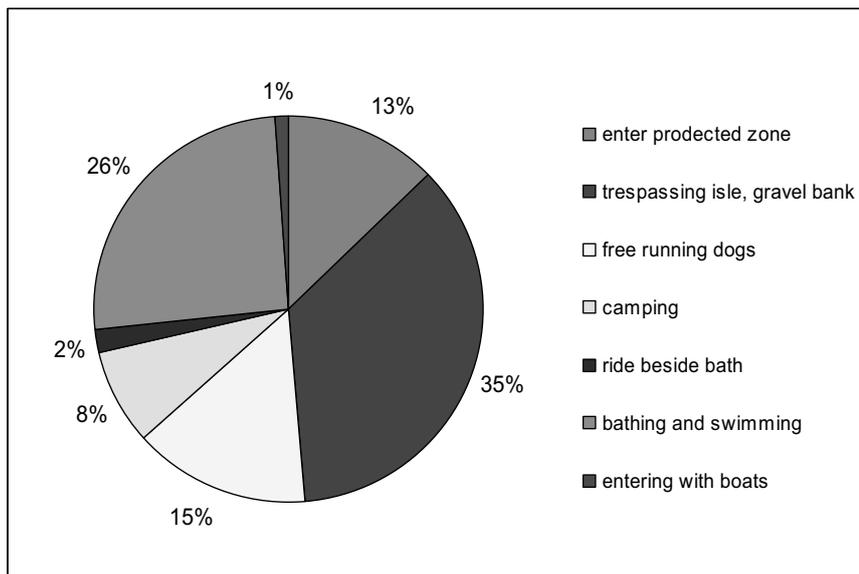


Figure 3: Percentage of all misdeeds in the investigation area between April 16th and July 17th, 2006 (number of control rounds = 37). Only during eight of all 37 rounds (22%) no misconduct was recorded.

# Prognosis on the Expected Landscape Changes in Mueritz National Park (Germany) and Landscape Perception of both Residents and Tourists

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*Key words: National Park, landscape perception, predicting landscape changes.*

## Introduction

Mueritz National Park is situated in the north east of Germany, half way between the cities of Berlin and Rostock. At present, over 70% of the area is covered by trees, with a large number of lakes located scattered throughout the huge forests. The national park also hosts peatlands, meadows, fields and a couple of small villages.

The national park authorities plan a variety of actions that will have effects on the landscape. Currently it is dominated by vast pine forests shaped by intensive silviculture. Agriculture and forestry will be reduced, drainage measures and water pumps will be shut down and the peatlands restored. In the surrounding areas, socio-economic changes are on the way. Employment in traditional sectors diminishes, while tourism is set to increase and become one of the main economic factors in the region.

Given these management plans, changes to the landscape in the coming years are unavoidable. However, impacts of these plans on the scenery have not yet been analysed in any detail. Nor has any study of the preferences of either visitors or residents for a certain type of scenery ever been undertaken.

## Research questions

- Which sceneries in Mueritz National Park are considered the most attractive by tourists and residents?
- What changes in landscape can be expected in the coming years?

## Aims

The objective is to determine the kinds of scenery with which the visitor will be confronted in the future. The analysis of both the tourists' and the residents' perception of the landscape will provide a framework for the park authority to identify scenic attractiveness of the National Park. By bringing together these two steps, the national park authorities will be able to identify potential conflict areas and initiate dialogue with the stakeholders.

## Methods

Different steps will be employed, each adapted to meeting the needs of the various aspects contained within the study. These include:

1. Present state and management objectives described in the national park plan (Nationalparkplan 2003)
  - using Forest Inventory data from 1999,
  - analysing agricultural land based on the method described in Strobel and Pulkenat (1995).
2. Prognosis
  - using Delphi-method for the agricultural land
  - simulating forest growth with "SILVA 2.2", developed at the Institute for Forest Growth at Munich University
3. Analysis of scenic preferences and their perception by interviewing passing persons at 5 different spots inside the park. Landscape preferences are identified in three different ways:
  - general impression

- on-site scenery
- using photographs

### First results

Over 70% of the national park area is covered by forests. Such large proportions of woodland are often sceptically perceived (e.g. Arbeitskreis Forstliche Landespflege 1991). The few existing open spaces inside the park often represent a richly structured, traditionally maintained cultural landscape with a great deal of local variation. Although this type of scenery does not really fit in with the goals of a national park, landscape planning theory claims these open places to be 'very precious' and an important component of landscape aesthetics.

According to an analysis carried out in 1993 and 1994 (Strobel & Pulkenat 1995), many of the open spaces within the national park still exist and are kept open.

The research work carried out in the summer of 2005 focused on landscape perception. People encountered on the hiking and bicycle trails were interviewed, as were tourists canoeing on the River Havel. First results indicate visitors' preferences for lakes. Peatland is also favoured by many, but is also disliked by some. The most unpopular feature are the man-made pine forests. The visitors' means of discovering nature are also interesting. The majority want to discover nature by bike. Canoeing, on the other hand, is most popular amongst the well educated, young visitors.

### First conclusions and Outlook

The first results of the comparison of the landscape analysis of 2004 with that of 1993/1994 reveal that the maintained meadows play an important role from an aesthetics perspective. Apart from their own intrinsic aesthetic value they also facilitate open views of the lakes, which are the most preferred landscape feature. Peatland may also play a more important role, as those who have seen it often found it very attractive.

Broadleaf forests with beech are considered quite interesting, much more so than the pine stands.

In 2006, research work will focus on simulation with SILVA 2.2 and Delphi interviews.

### Acknowledgments

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### References

- Arbeitskreis Forstliche Landespflege. (1991). Waldlandschaftspflege. Ecomed. Landsberg
- Nationalparkamt Mueritz. (2003). Nationalparkplan
- Strobel & Pulkenat. (1995). Landschaftsbild im Müritznationalpark – Gutachten des Nationalparkamtes Mecklenburg-Vorpommern (unpublished).

# **Does Survey Mode Affect Study Results? A Comparison of Internet-Based and Onsite Surveys of Visitors to Prince William Forest Park, USA**

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*Keywords: Internet-based surveys; survey methodology; visitor use management; national parks; Prince William Forest Park.*

## **Introduction**

Survey research is a primary tool for national parks and related protected areas to collect information about park visitation patterns, visitor and trip characteristics, and visitor attitudes concerning park management. Traditionally, these studies are administered using onsite and/or mail surveys to collect information from visitors. With the increasing availability to the public of the internet and the relatively low cost of administering internet-based questionnaires, it is possible that internet surveys could play an important role in conducting future visitor use studies. The purpose of this study is to assess the utility of internet-based survey methods for studies of visitors to national parks. To do this, a study was conducted at Prince William Forest Park to test whether independent samples of internet and onsite survey respondents from the same visitor population yield similar study results.

## **Methods**

Sampling was conducted on six weekend days during October, 2005. Visitors were intercepted as they were exiting the park and asked screening questions to determine whether they were eligible for the study. Eligible visitors who were willing to participate in the study were randomly assigned to complete a questionnaire onsite or an identical questionnaire on the internet at a later time. Contact information, including an email address was collected from individuals participating in the in-

ternet-based survey. The internet-based survey was administered using a modified Dillman approach, including an initial email and three follow-up emails containing a link to the online survey. Study participants assigned to the onsite survey completed the questionnaire at a pullout near the entrance/exit station where they had been intercepted.

## **Results**

Response rates for the onsite and internet surveys were 71.4% and 75.2%, respectively. Results of statistical tests suggest that there are no significant differences between the internet and onsite samples with respect to age, sex, race, education, and state of residence. These results suggest that the internet and onsite survey participants represent two independent samples from the same population of Prince William Forest Park visitors.

For the most part, there were no statistically significant differences in the distribution and central tendency of responses to questions concerning visitors' trip characteristics, attitudes toward park management, and preferences for facilities, services and programs between the internet and onsite samples. Nonetheless, some differences were observed. For instance, internet respondents were more likely than onsite respondents to report being a day use visitor and having visited an unpaved road in the park, while onsite respondents were more likely to report camping in an RV and driving for pleasure in the park. Significant differenc-

es between internet and onsite results were also observed for some questions concerning the importance of trip motivations. Significant differences were also observed on the importance of some aspects of park programs, facilities and services; however, there were no differences in reported satisfaction associated with any of the park programs, facilities and services included in the questionnaire. In questions where it was an option, onsite respondents were more likely to choose a 'don't know/not sure' response than internet respondents.

## **Discussion**

While internet-based surveys may not be interchangeable with onsite survey methods for visitor use studies, the results of this study suggest that they may produce similar results. Differences between the results of the internet and onsite surveys observed in this study may be due to question formatting limitations within current internet survey software that prevented the use of identical layout for some questions. Differences observed in this study might also be due, at least in part, to the fact that internet and onsite survey respondents completed their questionnaires during different temporal phases of their park experience. If so, this would suggest that decisions about whether to use internet-based survey methods should consider whether the "post-trip phase" is the appropriate point in the recreation experience to collect the information sought. Lastly, differences observed between onsite and internet survey results may be due to chance, given that a large number of statistical tests (140 separate tests) were performed to compare the two samples.

## **Conclusion**

When administered properly, this study suggests internet surveys provide a potentially cost-effective and time-efficient method to collect information about visitor use and users. However, additional research is needed to further assess the comparability of internet-based surveys to onsite and mail surveys, and to explore reasons for differences when they are observed.

# 3D Computer Visualizations to Incorporate Recreational Use and Values into Forest Management Planning for Ontario Crown Lands

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*Keywords: 3D visualization, public participation, recreation management, forest management planning, computer simulation, Geographic Information Systems, landscape images.*

## Introduction

The forests on public (Crown) lands play a major role in the lifestyle of northern Ontario residents, both as a source of jobs and raw materials and as a setting for recreation activities. Many outdoor recreation opportunities rely upon and/or are affected by the access created by resource extraction activities (primarily forestry) on Crown lands. While this recreational access is a significant benefit associated with forestry activities, recreational use is not formally included in forest management planning. Currently there is no formal recreational land-use planning in Ontario, leaving recreation management as a de facto component of forest management planning, largely dealt with through input from public open houses and from Local Citizens Committees (LCCs) selected to represent a range of public views. This situation is problematic as the limited understanding of forestry and recreation interactions, and the reactive rather than proactive role of public involvement, have hindered the effective inclusion of recreation in forest management planning (Lachapelle et al. 2003).

Research on LCCs suggests that the communication methods used to facilitate the exchange of information between managers and the public can form a barrier to effective communication (Robson

2004). Traditionally, public involvement in forest management planning has relied on maps, tables, and graphs to communicate information about future forest conditions under proposed management strategies. Critics of this process suggest that the volume and complexity of the information presented to the public, combined with the lack of time available for interested individuals to acquire a sufficient level of expertise to understand the information, limits the effectiveness of public involvement (Meitner et al. 2003).

Meaningful participation in forest management planning requires tools and techniques that will foster a more thorough comprehension of what forest management alternatives will mean to people who value the land being managed. Three-dimensional computerized visualization is a means of representing complex data and ideas that simplifies the communication of information to people who may not otherwise be able to perceive the implications of particular management actions or understand the concepts involved (Meitner et al. 2003). However, despite considerable anecdotal evidence of the benefits of visualization, there has been limited experimental research comparing the effectiveness of traditional media and computerized visualizations (Lewis & Sheppard 2005).

## Methods

This project involves an experimental comparison of the effectiveness of computerized visualizations versus communication media traditionally used in forest management planning (i.e. maps, tables). The ability of people to interact with computerized visualizations is limited by the time and computer resources required to create visualizations for all parts of the land-base. In essence, the optimal tradeoff between the level of detail shown in visualizations and the time required to create the visualizations needs to be established through extensive testing of visualization tools with various audiences. The first phase of the project includes the development of automated visualization processes, coupled with the identification of specific valued places which are the highest priority areas for visualizations. The visualizations used in the project are refined in a two-stage process involving input from: a) a panel of experts in forest management and visualizations to provide guidance on technical aspects such as accurately representing forest inventory data; and b) LCC members who comment on the usefulness of different viewpoints, animations, etc. The outcome of the first phase of the project is a process to develop visualizations which can effectively communicate information about forest management planning to members of the public.

The latter phase of the project is an experimental comparison between visualizations and traditional communication media in the two public involvement contexts used in forest management planning in Ontario: public open houses and Local Citizens Committees. Experiments will be conducted separately for each group, as the LCC members have a much greater familiarity with the types of information used in forest management planning than do most lay people attending open houses. The LCC members will be randomly assigned to either the experimental or control group. Each group will work through a hypothetical forest management scenario, using either visualizations (experimental) or traditional communication media (control). Similarly, participants from the general public will be randomly assigned to experimental and control groups and will be presented with a hypothetical open house session involving either visualizations or traditional communication media.

## Results

The effectiveness of the visualizations versus the traditional communication media will be compared by several methods. During the experimental sessions, participant observation will examine the way in which participants interact with the media and with each other. Following the sessions, interviews will be conducted with each participant to determine his or her satisfaction with the communication media. Participants will also be asked which specific aspects of the communication media helped and/or hindered their understanding of the information presented. Finally, the usefulness of the resulting public input will be evaluated by forest managers. Conclusions will then be drawn about the effectiveness of visualizations versus traditional communication media.

## References

- Lachapelle, P.R., McCool, S. F., & Patterson, M.E. (2003). Barriers to Effective Natural Resource Planning in a „Messy“ World. In: *Society and Natural Resources* (16), p 473-490.
- Lewis, J.L. & Sheppard, S.R.J. (2005). Culture and communication: Can landscape visualization improve forest management consultation with indigenous communities? In: *Landscape and Urban Planning* (in press).
- Meitner, M., Gandy, R., & Sheppard, S.R.J. (2003). Exploring, forecasting and visualizing alternative ecosystem management scenarios. In *Proceedings, ESRI Users Conference, July 2001, San Diego, California*.
- Robson, M. (2004). *Social Capital, Context, Consensus-building and Cooperation in Community-based Forest Management*. Unpublished Ph.D. dissertation. University of Toronto.

## **Biathlon Centre and Larchwood in Lenz, Graubünden, Switzerland**

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*Keywords : Larchwood, pastured woodland, leisure centre, biathlon, golf course, biodiversity.*

### **Introduction**

On one hand woodland is spreading in the Swiss Alps due to the reduced agricultural interest of land on steep slopes. On the other hand there is a growing interest in harmonious landscapes combined with the most perfect touristic infrastructures. Due to this contradictory evolution the pressure on the left over good agricultural land is growing. A forgotten paragraph in the woodland laws can help reduce the pressure between sportive infrastructures, lovely landscape, ecological values and an economically sustainable agriculture.

### **Situation**

A new biathlon centre is planned in the town of Lenz in the eastern Swiss Alps. The planned centre, to be used as a national base, will require several hectares of land. The proposed site is currently used to summer livestock belonging to the town's seven farmers. This loss of pasture land is critical because coincidentally an additional number of hectares of land used for pasture on the local golf course will also be taken out of use starting in 2009. A massive reduction in the total available pasture in Lenz in the coming years is the result.

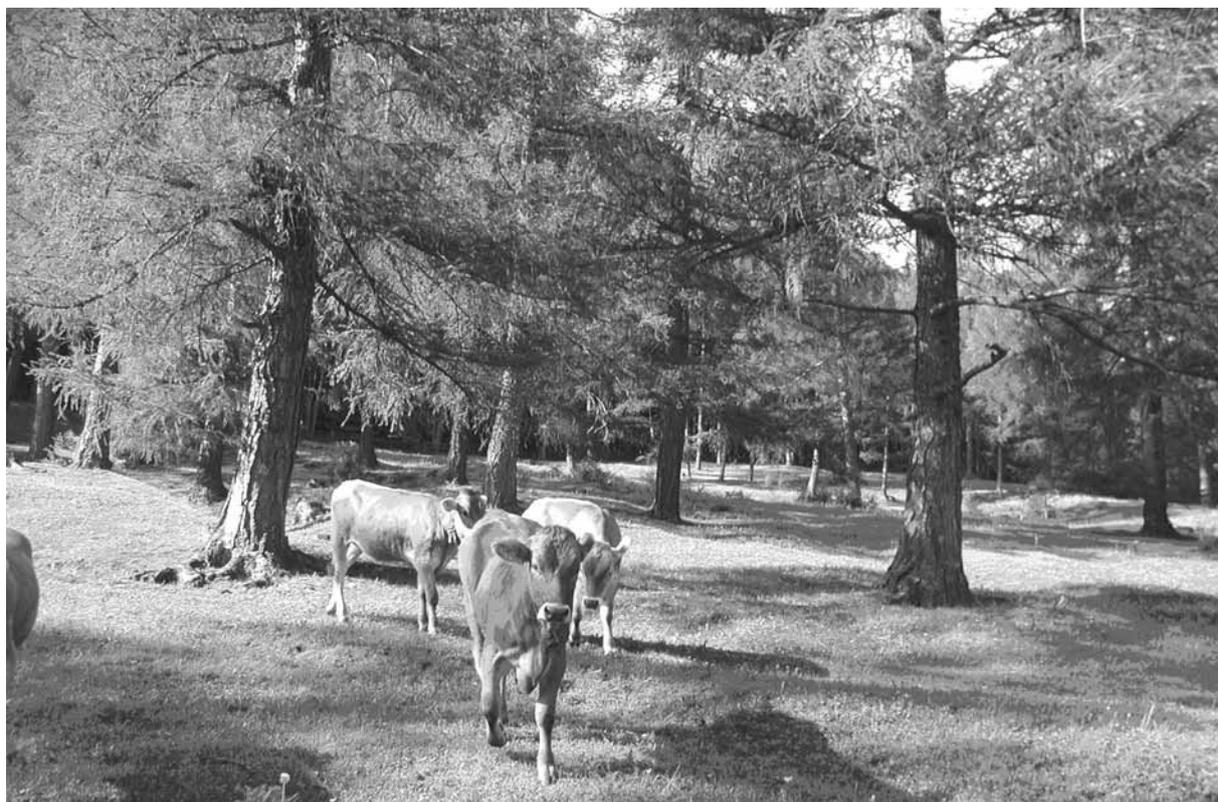


Figure 1: Larchwood – pastured woodland in Engadin, Switzerland.

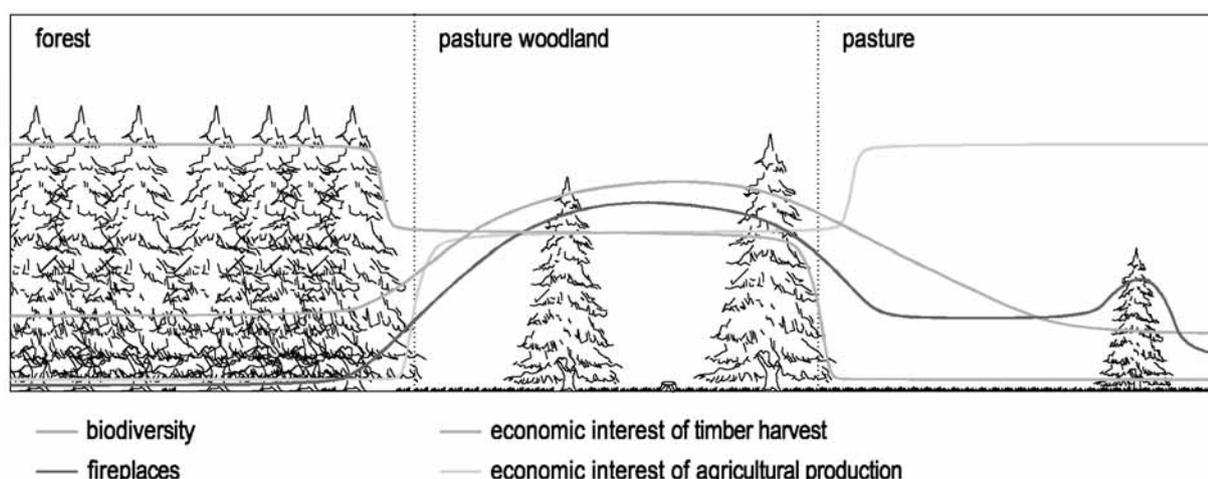


Figure 2: Forest-pasture – woodland-pasture: amount of fireplaces as an indication of the spontaneous recreational use of land.

A primary objective of this project is to provide the farmers with replacement land within the community as far as this is possible. A second objective is to provide ecological compensation for the proposed centre.

### Larchwood pastures in the old days

The whole region around Lenz is touristically interesting because of its lovely landscape. The attractiveness is largely due to the old larchwood pastures. They build the framework for a park-like landscape. Unfortunately farmers using modern agricultural techniques have lost interest in the larchwood pastures. As a result the park like, half open woodland is growing into much denser, much less attractive wood, which is at the same time much less valuable ecologically.

### The point of questions

Basically compensation is required for the farmers' losses of land and the ensuing losses of income. Additionally, it will be necessary to provide ecological compensation for the planned buildings. Ideally measures can be found which will serve both purposes. The most important income of Lenz is tourism. It is based on the natural beauty and diversity as well as on the sports infrastructure. Out of this the following questions arise:

- How does the new centre have to be integrated without losing aesthetic qualities of the landscape?

- How could the aesthetic quality of the landscape be improved in spite of the new infrastructure? Could it even be possible to regain lost values, such as the pastured larchwood?
- Which measures have to be taken to ameliorate the soft (landscape) and the hard (buildings) touristic infrastructures in the same time?

### Methods

For the comprehensive analysis a landscape development concept (LEK) over the entire town area below the forest boundary was carried out. It differentiated between ecological values, deficits and potentials. Detailed floristic or faunistic field surveys were not carried out but all existing material, such as regional and national inventories, were gathered, analysed and incorporated into the LEK.

Additionally the landscape was surveyed in the field and all relevant agricultural structures were evaluated. All the information was brought to a plan in the scale of 1:5000. A spatial analysis of values and deficits in the plan, combined with other relevant criteria, led to the location of optimal areas for ecological or aesthetic improvements, as well as potential new pasture. On this basis a proposal for the necessary land exchanges was worked out.

Different scenarios were developed showing where and by which measures pasture land could be gained. The provision of new pasture land will be combined with ecological compensation because semi open pastured woodland is a very valuable biotope. In this way "new" pasture land for the farmers and

ecological compensation for the planned buildings are one and the same. The focus of this project was set on the woodland aspect. With an ordinary LEK all the elements of the landscape would be analysed equally. This LEK focused mainly on the potential of woodland pastures as well as on the ecological and aesthetic improvement of the woods. Additionally the protective functions of the woods against avalanches and rockslides had to be incorporated.

## **Conclusions**

1. The national and the county woodland law foresee the possibility of using woodland as pasture – a forgotten aspect, which helped to “find” new land for the different needs.
2. Pastured woodland is part of a dwindling, valuable, cultural heritage. With a new approach these values can be revitalised.
3. The creative interpretation of the woodland law combined with ecological compensation could help saving the touristically important pastured woodland in many places all across Switzerland.

## **References**

- Naef, F. (2000). Neue Waldweiden anstelle von Ersatzaufforstungen. UVB Golfplatz Zuoz.
- Naef, F. (2004). Waldweiden. In: Der Gartenbau (24/04).
- Naef, F. (2005). Bäume – Begleiter des Menschen. In: Der Gartenbau (Sonderdruck).

## Visitor Use and Impact Monitoring: An Adaptive Design Model

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*Keywords: Adaptive management, adaptive monitoring, monitoring design, decision making process, protected areas, visitor impacts, visitor monitoring, impact monitoring, recreation ecology.*

Visitor use and impacts are a significant management concern in many protected areas. Command of visitor use and behavior is vital to sustaining the ecological health of protected area resources and the quality of visitor experiences; through communication of visitor issues protected areas garner funding and administrative support. While visitor use and impact monitoring has been recognized as an integral part of adaptive management strategy and an essential component in management planning frameworks such as Limits of Acceptable Change (LAC) and Visitor Experience and Resource Protection (VERP), there has been insufficient guidance for establishing and sustaining such programs. As a result limited progress has been made to develop long-term effective monitoring programs to inform management decisions (Cole & Wright 2004, Warnken & Buckley 2000). Change in budget, personnel and even catastrophic environmental events uproot monitoring programs.

Because of the drastic differences in impact concerns, environmental attributes, availability of park personnel and volunteers, and changing information needs, protected-area impact monitoring programs, if they are to be efficient and sustainable, must be adaptive to these constraints while maintaining integrity and utility in yielding useful information (Ringold et al. 1996, Smit 2003). This presentation posits a conceptual model that illustrates essential elements, considerations and process of an adaptive design for visitor use and impact monitoring. Examples of elements include multiple-tier monitoring triggered by anticipated or unexpected change, adaptive sampling design, prioritization of indicators, and refined indicator measures based on monitoring results.

Figure 1 illustrates the key components of an adaptive monitoring program. Protected areas must develop monitoring programs out of environmental and institutional history. A small protected area is made up of soils, climate, flora, and fauna all before facilities, programs, infrastructure and people are added to the equation. The background and understanding of these systems is the foundation of any monitoring program. Once there is a general understanding of the physical and cultural location the real work on a monitoring program can begin. The protected area goals and resources are then taken into account to determine priority of indicators, sampling, and methods to be considered in the monitoring program. These elements of the monitoring program priorities can be analysed in preliminary sampling research to determine the effectiveness of proposed techniques.

Origins of a monitoring plan should not be considered the only way in which monitoring can be carried out at this location. From current resources and goals the initial plan should optimize the priorities and available resources and resource conditions of the protected area. A multi tiered program should be drafted to anticipate change in the environment (i.e. anticipated natural disaster such as hurricane or earthquake in prone areas or flooding in low lying study areas) and resources (budget or staffing cuts) which may influence the monitoring program negatively. The tiered system should also provide for positive changes which allow for expansion and enrichment of monitoring programs.

The resulting original monitoring program is more comprehensive and ready to adapt to the changes that are known in advance or happen overnight. The compressing and expanding style of monitoring al-

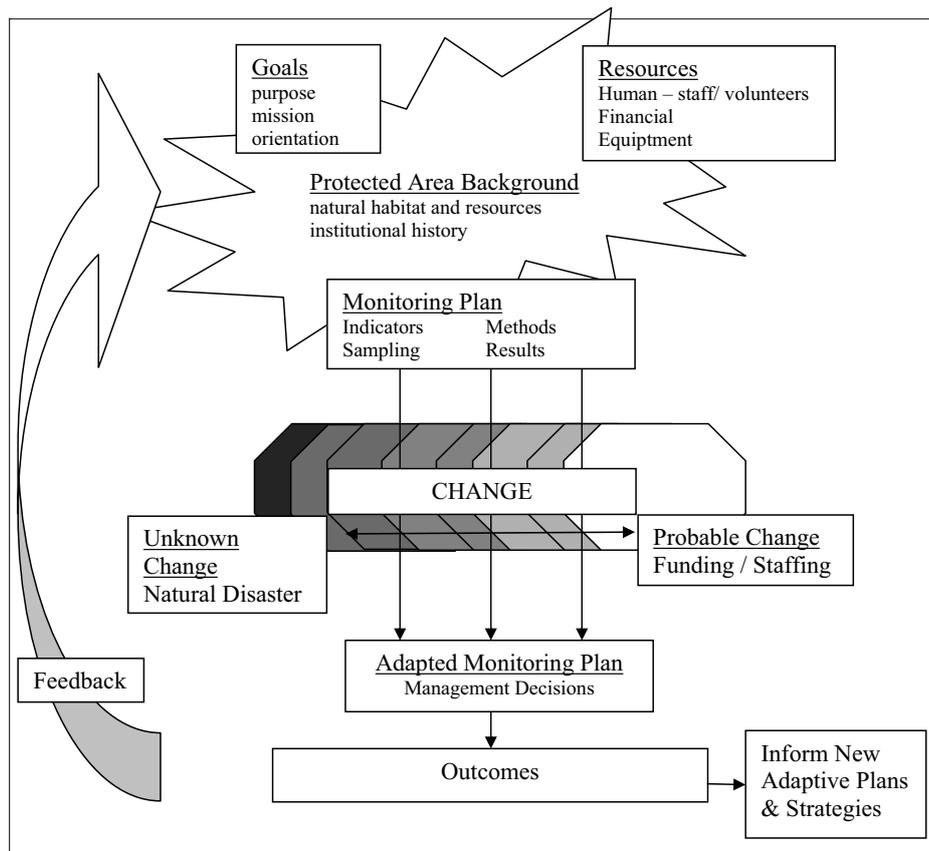


Figure 1: Adaptive Monitoring conceptual model.

allows for programs to continue monitoring during and after times of social or environmental crisis. The new adaptive plan is already primarily drafted before a disaster strikes. The lessons learned through that change from initial monitoring to adapted monitoring can be used to inform how well the plan could be adapted and what the original protected area can do to refine and use the knowledge learned to inform other planners, managers, and stakeholders. Examples from protected areas of the United States and Australia will be provided in this presentation to illustrate the adaptive design model.

Ecosystems and political systems suffer constant change there is a need to have relatively uniform monitoring for longitudinal understanding. Building an adaptive monitoring plan that is designed to change, yet emphasize ecological priorities and consistent methods the understanding of those protected areas can truly begin. The reactivity of the natural environments must be understood if visitors are to be given the best possible experiences when visiting protected areas. Constancy built into an adaptive plan will foster this much needed area of learning about our treasured protected places.

## References

- Cole, D. N., & Wright, V. (2003). Wilderness Visitors and Recreation Impacts: Baseline Data Available for Twentieth Century Conditions (Gen. Tech. Rep. RMRS-GTR-117). Ogden.
- Holling, C. S., (ed.) (1978). Adaptive Environmental Assessment and Management. New York.
- Ringold, P. L., Alegria, J., Czaplowski, R. L., Mulder, B. S., Tolle, T. & Burnett, K. (1996). Adaptive monitoring design for ecosystem management. In: Ecological Applications (6/3), p 745-747.
- Schelhas, J., Buck, L. E. & Geisler, C. C. (2001). Introduction: The challenge of adaptive collaborative management. In: Buck, L.E., Geisler, C.C., Schelhas, J., & Wollenberg, E. (eds.). Biological Diversity: Balancing Interests Through Adaptive Collaborative Management. New York.
- Smit, A.-M. (2003). Adaptive Monitoring: An Overview (DOC Science Internal Series 138). Wellington.
- Warnken, J. & Buckley, R. (2000). Monitoring diffuse impacts: Australian tourism developments. In: Environmental Management (25/4), p 453-461.

# How to Achieve Nature Protection Involving Local People

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*Keywords: UNESCO, MAB, participation, conservation, development, added value, INNOREF, visitors management, Biosphere Reserves, Entlebuch.*

## Introduction

The UNESCO MAB strategy established in Sevilla 1995 aims to create models for sustainable development, enhancing benefit and added value for local population and conserving natural and cultural heritage. The Section Natural Sciences of the Swiss Commission for UNESCO has started to disseminate and support projects implementing the MAB philosophy and methods. The targets are:

- Respecting needs and local knowledge of the inhabitants
- Taking into consideration ecological cycles, local resources, production and service chains
- Involving people into the whole decision and implementation processes
- Creating public private partnerships
- Building up a management system responsible for the integrated development
- Developing participatory research and education
- Implementing a Quality Economy strategy, e.g. by creating new offers and services for a sustainable tourism and labelling schemes for local products.

## Methods

The implementation of a sustainable regional development will be reached through participatory processes and bottom-up network structures. Participatory processes ask the contribution of interested participants and a permanent learning pro-

cess. Therefore a Biosphere Reserve is focusing on creating stakeholder and public involvement, corporate citizenship, management structures and capacity building within regional networks. The bottom-up approach is including the stakeholders from the beginning into the decision and implementation process. In fact the bottom-up process will not be successful without the top-down support by politics and the side-in effect due to support from research, national and international organisations, increasing know how and competences within the region.

The Interreg IIIC project INNOREF (2004 – 2007) derives from the MAB philosophy and the Entlebuch methodology. In INNOREF the target process is initiated by networks, assisted and moderated by a Professional Service Centre (PSC), which define goals relating to the regional strategy and topics of sub-projects, according to needs having emerged in the area and defined through a SWOT analysis. Networking is essential already in the decision process in order to create acceptance, synergies, innovation and to improve co-operation and resource efficiency. Capacity building is improved through training of PSC and stakeholder networks.

## Results

The Entlebuch Biosphere Reserve (CH) has achieved increasing added values and a well established participatory culture. The main achievements are: a new tourist destination strategy, high authenticity and stakeholders involvement, diversification of the tourism offers linked to agri-tour-

ism, packages for seminars connected to research, education, nature and recreation, the Biosphere Reserve school, increased overnights during summer season (3.5 - 5 %), increased income for producers of local products, improved guest flow in the core area through excursion offers and formation of guides. The project's website, media, presentations and excursions are most effective means of communication and multiplication to make a process visible and to obtain feedback: in 2005, 104500 visits to the website, 900 articles, 8000 participants at excursions and presentations.

In INNOREF the four regions Friuli Venezia Giulia, Umbria (Italy), Western Greece (GR) and Hranicko (CZ) are creating successfully new opportunities through innovation and resource efficiency in eight sub-projects e.g. sustainable tourism services, labelling of agri-tourism offers, biomass energy, environmental management system, restructuring historical buildings, ICT medicine, participative spatial planning. Through creation of bottom-up structures with stakeholders networks, capacity building of local authorities, professional service centres and an impact oriented communication strategy, the regions have initiated a participatory long-term process in order to protect natural and cultural sites and to develop marginal areas.

The Swiss Commission for UNESCO has initiated with the Task Force Quality Economies of UNESCO MAB a labelling scheme for commercial goods and services and a pilot project in order to achieve benefit for local people, to improve visibility and recognition of the activities of the Biosphere Reserves.

Furthermore the Swiss Commission is involved in the coordination of the "Decade of education and sustainable development" and has started cooperation with other countries, implementing concepts based on the program MAB, e.g. with the MAB Committee of the Czech Republic, disseminating the experiences and methods from Switzerland and INNOREF in their Biosphere Reserves.

## Conclusion

The process of the Entlebuch Biosphere Reserve has been made possible through the private-public partnership, giving the needed flexibility and

freedom to the management. The cooperation process allows sustainable growth and prosperity in the region. The experiences from the Entlebuch process, the 'I-method' may enable the adaptation and application of the model in other regions as well. The 'I-method' as a concept can therefore be used in regions with different historical, political, cultural backgrounds because it is based on local human and natural resources and knowledge and aims to benefit the local population. The methodical course of action allows for an acceleration of all processes, which additionally enhances the development of added values in the region. Therefore, a secure economic perspective is prerequisite for the conservation of a natural and cultural landscape and of intact social structures.

## References

- INNOREF Interreg IIIC. (2006). I-Method. [www.innoref.net](http://www.innoref.net).
- UNESCO Biosphäre Entlebuch. (2006). [www.biosphaere.ch](http://www.biosphaere.ch).
- UNESCO MAB: Task Force Quality Economy. [www.unesco.org/mab](http://www.unesco.org/mab).

# Conflict between Local Villagers and Elephants (*Elephas maximus*) at Kuiburi National Park, Thailand

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*Keywords: Human-wildlife conflict, local residents, Kuiburi National Park, Thailand.*

## Introduction

Kuiburi National Park is a biodiversity-rich protected area of Thailand. It provides critical habitat for the Asian elephant (*Elephas maximus*) and other endangered species. It is estimated that approximately 140 elephants reside within the park boundaries. Within 5 km of the park's boundaries, there are 34 villages where most local villagers have agriculture as their major occupation. Over 39,000 hectares are planted pineapple farms which are a strong attractant for elephants. The disturbance on pineapple farms by elephants has caused serious conflict between local villagers and elephants, and has subsequently extended to a conflict between local villages and the national park authority. This conflict has occurred since 1995 but was elevated by an incident in 1997 during which a herd of 70 elephants destroyed a large pineapple farm, resulting in the death of 2 elephants at the hands of the farm owners. Several measures were employed by national park authorities and local villagers in order to avoid confrontation and to reduce damage on the farm land. This included the construction of electric fences, posting local guards during the night, setting fire to drive the elephant back to the forest etc. The conflict situation, however, remains problematic.

## Methods

In 2004, the WWF Greater Mekong, Thailand Country Programme initiated the project entitled "Strengthening Management for a Key Population

of Elephants at Kuiburi National Park in the Tennasserim Range". The expected end-result of the project was a management plan that can be used as a tool to resolve conflict between local villagers and the elephants while strengthening conservation of elephants in the long run. The project activities included scientific studies to provide necessary information for management planning and employing of several techniques such as public meeting, focus group meeting, key contact, etc. to involve local people in a planning process. The objectives of scientific studies were: 1) To determine territory and home-range of elephants and their behavior; 2) To determine the area impacted by elephant movement and to assess the severity of damage on agricultural land; 3) To determine factor(s) stimulating movement and destructive behavior of elephants on the farms; and 4) To conduct socio-economic studies of local villagers, including a study on their attitudes toward the situation and conflict resolving measures.

## Results

The study found that in the past year, some elephants walked across park boundaries to agricultural lands 905 times or about 2.5 times per day. The disturbance on agricultural lands was more frequent in dry season than in rainy season due to inadequacy of food in natural forest during the dry season. The elephant movement tracks were mapped by WWF's research team in cooperation with staff of the national park and local villagers in order to allocate intensive patrolling zones.

The socio-economic study included 309 households from 10 villages completed. The study found that the majority of villagers or about 92% did not want to move from their current residence despite the high rate of conflict. About 75% of villagers reported impacts from elephant disturbance to some degree and 45% rated the damage as high or moderate. About 64% of villagers believed they had sufficient knowledge about wild elephants. Most people viewed the elephant as a symbol of the area and felt it needed to be conserved. However, almost all villagers said that permanent measures to stop movement of those elephants into farm lands must be intensively implemented and monitored.

Four focus group meetings were completed in 2005. The meeting participants were staff of Kui-buri National Park, staff from the central office in Bangkok of National Park, Plant, and Wildlife Conservation Department (NPWC), staff of WWF-Thailand, local government officers, and local villagers. All parties positively responded to the meetings. The discussion came up with a set of mitigations designed to push the elephants back to the forest and to reduce possibility for human-elephant confrontation. Activities that stimulated aggressive behavior of the elephant such as setting fires were also prohibited. Rehabilitating elephant habitat and food source in natural forest was initiated along with the negotiation with some local villagers to sell their agricultural land to the government for buffer zone development. An environmental education program was initiated to enhance knowledge and build positive attitudes toward the elephant.

## **The Current Problems with the Historical Existence of Chalets in the Core Zone of the Krkonose Mts. National Park, Czech Republic**

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*Keywords: Core zone, conflict, mountain chalets, nature protection, farming period.*

### **Introduction**

The farming period of the 17th to 18th century plays an important role in the history and in the present appearance of the Krkonose Mts. The first importance of these mountains had been mainly in sources for mining of ores, ironstone and for timber mining. At the end of the 16th century these activities went down because the sources were running out, The Thirty Years War ended and the historical conflicts of the land's border were finally solved. The local people were then forced to look for a new "daily bread" and the farming became the most important way of living. Settlers started to graze cattle, founded meadows and made hay. First shelters for animals, for people working in forest openings and close the timberline were built during that time. First shelters were later rebuilt into seasonal dwellings or year-round chalets; this way of colonizing land was supported by the owners of noble origin too. Important changes in agricultural usage of this land have happened. The grazing became later very intensive, but typical and valuable florid meadows of Krkonose have arisen in that period (Stursa 2003, Sykora et al. 1983).

The first visitors were coming to the Krkonose Mts. since the end of 16th century. They were mostly scientists, priests or notable people around the monarch. Later, at the end of the 18th century, more and more people came to visit the mountains following the ideas of J.J. Rousseau declaring a comeback to nature. Locals quickly reacted to the new situation by supplying hospitality to pilgrims. The majority of mountain chalets were rebuilt to tourist lodging houses, villages in valleys

changed into tourist centers during the 19th century. The visit rate was quickly increasing: at the beginning of 19th century ca. 2,000 visitors/year, 20th century ca. 0,5 million visitors/year (Stursa 2003) and at the beginning of 21st century ca. 5,4-6 million visitors/year (Kolpron 2003) are reported. Many of the mentioned historical chalets are furthermore run as hotels or pensions today and are very valuable from the historical view. The Lucni chalet (since 1623) is also considered to be the oldest in the Krkonose Mts.

To save this unique place, the National Park of Krkonose Mts. was founded in 1963. Soon, however, the ideology of the Communist politics gave higher priority to the demands of working people's leisure time than to the protection of nature phenomena. Several new monumental objects designed for the mass recreation of "working people" were built within that time – luckily in the current core zone only the Labska chalet arose. The existence of other bulk objects in the most valuable parts comes from the beginning of the era of tourism; the objects were also often rebuilt to e.g. barracks or a meteorology station according to situation of certain era. After the change of the political regime in 1989, the park area was divided into zones with a specified extent of protection. The core zone is mostly made up of the upper parts of the mountains due to the existence of the tundra-alpine biotope. These problematic chalets very soon became private. Without any previous experience nobody could have foreseen their future development at the beginning of the new age. For example, the Labska chalet (a typical Communist monu-

ment) was even closed for a certain time, the object dilapidated and its demolition was considered. But after several years almost all chalets found their investors and owners. The chalets set in the core zone show a huge conflict between nature protection and money making today. The administration of the national park cannot reduce the capacity and functioning of these chalets because the objects are private and our law system doesn't allow it. Their existence facilitates a safe tourist flow in these upper areas, tourists can refresh or spend a night there (Stursa 2002, Stursa 2003). The biggest actual problems are: 1) historical chalets are often very monumental and their running is very expensive, while the state system stopped supporting them financially, 2) chalets can hardly earn a living themselves today, much of the money must be reinvested into restoration or improving of the comfort, 3) current owners are not locals but often people who come with the idea of fast enrichment, 4) the status of the national park has its strict rules of the nature protection hindering the commercial development.

## Methods

The core zone has many restrictions but the administration of the national park made certain exceptions for the owners: e.g. possibility to use park roads for logistic transport and collective transit of accommodated visitors provided by owners – the upper parts are connected by non-primary routes at several places and the traffic there is prohibited except for several subjects. The administration of the national park runs a grant program enhancing the management of the neighboring parcels of several chalets, makes publicity for the site and so on. The localities in the core zone have generally one disadvantage: there is no other kind of entertainment (except beautiful nature). The demands of the present visitors have changed very much – the unique nature is not enough? Current visitors thus prefer accommodation in the lower parts of the mountains. There they have the possibility to come all the way by their own car and it is easy to visit various kinds of entertainment. Owners of chalets set in virgin nature feel harmed and raise demands for the release of strict park restriction.

The ways of attracting people to spend their money in chalets situated high are various. The most problematic for us is the Lucni chalet today. Its last owner tried to rebuild the object into apartment flats for sale. This change would not have meant just several owners of one property but mainly more cars going through the national park and their parking in the core zone. Such situation was luckily stopped at its beginning. In these days the same owner organizes evening concerts in her chalet (see [www.lucnibouda.cz](http://www.lucnibouda.cz)). The concerts themselves would not present any problem, but the offered private transport by a snow mobile or a car becomes a big problem. The use of chalet owners' vehicles has also some restrictions and the transport of 300 evening guests at one time up and after two hours back every two weeks is not acceptable. Moreover the snow vehicle used does not correspond with the width of the road and damages the neighboring shrub pines. Such a thing does not correspond with the idea of a national park. This conflict is being solved in an administrative way during these days and no more concerts are permitted till the conflict has been solved.

The actual situation is very difficult for both sides. The administration of the national park tries to enable the existence of these objects (often in accord with the nature) but on the other hand there are some rules set. The administration of the national park also organizes meetings for chalet owners and park people (twice a year), where they can present their demands for change. The park staff can also notice a concern of particular owners to course of events. A true fear is that during some time these areas could change to places with mild nature protection. It is a real apprehension because the current political and social climate is alien to nature protection more than a few years ago. Currently some people have become rich quickly and they want to invest their money. The easy solution doesn't exist in these days. From the view of nature protection the best vision would be tops of the mountains without any large objects; just some small refreshment places could stay there, but canceling such historical buildings would bring down the major displeasure of the Czech society.

## Results

In these days the employees of the national park try to achieve some compromise and support owners who respect the rules. Some of the rules are not popular and their following is not yet common in this country. The observance of given rules or even changing people's priorities will certainly take a very long time in this country.

## References

- Kolpron, CZ (s.r.o.) (2003). Stanovení aktuální návštěvnosti biosferické rezervace Krkonoše a její celoroční dynamiky (final report). Deposited in the Administration of the Krkonoše National Park. Vrchlabí.
- Stursa, J. (2003). Encyclopedia Corcontica. The Administration of the Krkonoše National Park. Vrchlabí.
- Stursa, J. (2002). Impacts of Tourism Load on the Mountain Environment (A Case Study of the Krkonoše Mountains NP - the Czech Republic). In: Arnberger C., Brandenburg C. & Muhar A. (ed.), Monitoring and Management of Visitor Flows in Recreational and Protected Areas, Conference Proceedings, Institute for Landscape Architecture and Landscape Management (IFL), Bodenkultur University, Vienna.
- Sykora et al. (1983). Krkonoský národní park. The Administration of the Krkonoše National Park. Vrchlabí.

# "Naturschutzdienst BL": Experiences from a New Project in the Canton of Basel-Landschaft, Switzerland

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*Keywords: Rangers, management project, visitor information, protected areas, nature reserves, Switzerland.*

## Introduction

As many other nature reserves the protected areas in the canton of Basel-Landschaft are visited very frequently. Accordingly, the pressure on nature is high, especially since violations of the nature reserve rules by the visitors occur quite often. To avoid damages of protected organisms and areas the department «Nature and Landscape» of the «Amt für Raumplanung», the agency responsible for the regional development planning in the canton of Basel-Landschaft, established a ranger service in the three nature reserves, where the pressure is highest.

The cantonal office hired two agencies – Hintermann & Weber AG in Reinach/BL and Locher, Schmill, Van Wezemaal & Partner AG, Basel – to organise this ranger service for a first period of three years.

The aim of the ranger service, which is called «Naturschutzdienst BL», is to better protect the nature reserves by informing visitors about the existing nature reserve rules. Additionally, the rangers patrol the areas regularly. Besides this, the rangers maintain and monitor selected species in the three areas.

## Methods

To begin, a team of twelve persons had to be formed and trained. Instructions in taxonomy and ecology, as well as communication skills were part of the training program. While the ranger team was trained, the means of communication were created: a logo and uniform that identify

the Naturschutzdienst-Rangers; a website ([www.naturschutzdienst-bl.ch](http://www.naturschutzdienst-bl.ch)) as an information platform; a brochure, which is handed out to visitors; information panels to inform about the new service.

To inform the public about the management project, a media conference was organised at the launch of «Naturschutzdienst BL». During the whole pilot phase, the media regularly informed the public to improve the acceptance of the «Naturschutzdienst BL».

The ranger-team roams the area about 1700 hours per year. That is about one day per week. Normally, there is always a team of two in action.

## Results

The main problem faced during the last three years was people who walked dogs into nature reserves, where dogs are not allowed, or let them walk unleashed, where a leash is required. Other problems included people who left the trails or people who didn't respect the driving ban. At the end of the pilot period the new management project has reached a lot of its aims:

- Violations of the rules became a lot less frequent.
- The «Naturschutzdienst BL» is well accepted by the visitors.
- No severe destruction was observed during the last three years
- 17 species were monitored. The annual development of the populations is observed.

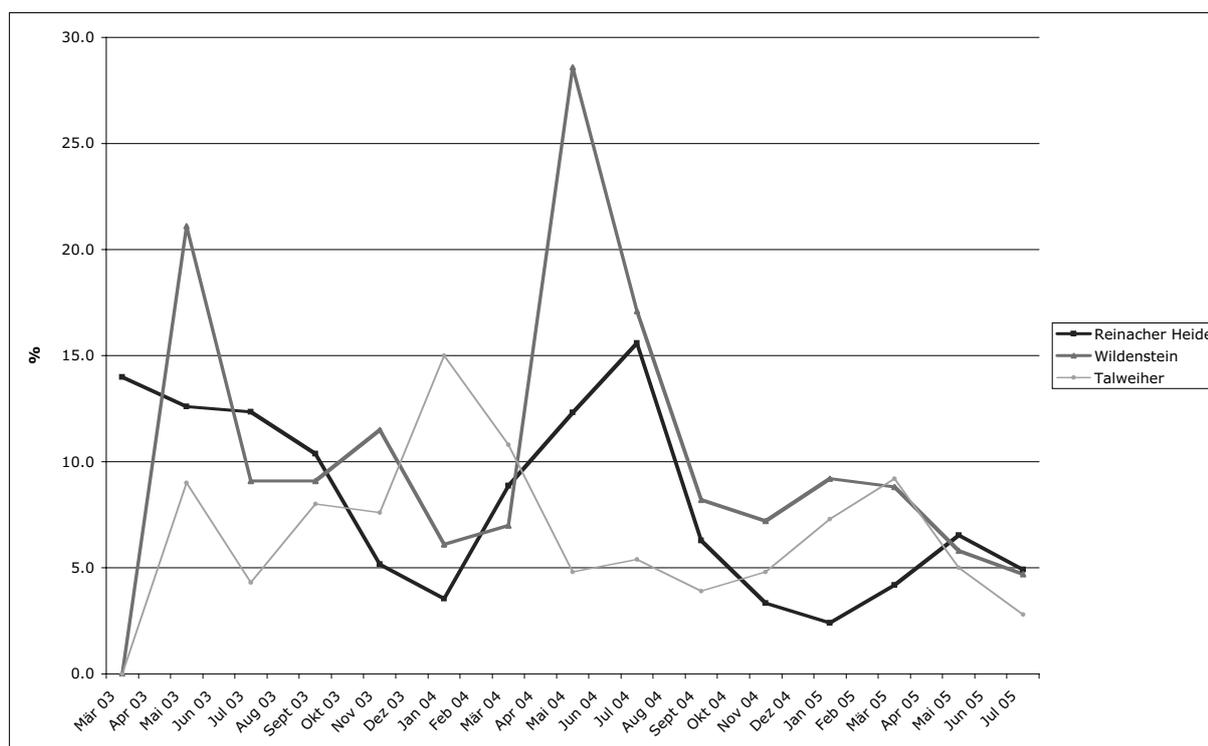


Figure 1: The percentage of visitors who did not respect the nature reserve rules declined in all three nature reserves.

But, as an evaluation by the University of Basle (see references) shows, there are still improvements to make. Three students of the program MGU (people – society – environment) surveyed the ranger service. During the summer of 2005 they asked 185 visitors of the nature reserves about their opinion of the ranger service, the acceptance of the nature reserve rules and what they would like to improve in the areas.

Surprisingly 90 % of the persons questioned, accepted the nature reserve rules well. Improvements that were mentioned quite often were «more information» or «better control of the nature reserve rules». But most of the persons want to change nothing.

Yet, only 15 % of the persons questioned know about the ranger service. The knowledge of what the rangers do and who they work for is very vague. Often the «Naturschutzdienst BL» was confused with other Swiss nature organisations. But those who have already met the rangers have a good opinion about them.

## Conclusion

The canton of Basel-Landschaft decided to continue the ranger service for the next three years. In this period we have to make the «Naturschutzdi-

enst BL» more widely known by even better informing the public, but also by optimizing the action periods in the nature reserves thus increasing the efficiency of the rangers work.

## References

- Plattner, M. & Steiner Ly, Y. (2005). Naturschutzdienst BL – Rechenschaftsbericht über die Betriebsphase 2005. unpublished. Reinach/Basel.
- Jäggli, C., Marti, C. & Samuel, R. (2005). Evaluation der Pilotphase des Naturschutzdienstes Baselland 2002-2005. Unpublished. Programm MGU, Universität Basel.

# Quantitative and Qualitative Monitoring of Public Attendance in Natural Preserves on the Southern Shore of Lake Neuchâtel (CH): A Necessary Tool to Manage Public Information and Prevent Infractions.

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*Keywords: Eco-meter, tourism, attendance, natural preserve, bicycle paths, infractions, information, public.*

## Introduction

The Southern shore of Lake Neuchâtel (CH) is well known for the beauty of its landscape of wetlands and natural surroundings of national and international importance, but also for its shallows, much appreciated for pleasure sailing, which are fueling an increasing touristic interest since 50 years. Some 5100 docking places, 3500 camping sites and 1000 second homes contribute in summer to a tenfold population increase for some communes. The creation of seven type IV (IUCN) preserves was planned for long time. However, nearly 20 years were needed for implementation, owing to oppositions by local collectivities and populations. Human activities are since regulated and, in most sensitive places, public access is limited to foot- and cycle paths.

Forecasting conflicts, the Group for Study and Management has initiated since 1995 a series of qualitative and quantitative surveys to better understand the profile of potential visitors, their awareness of rules to adopt in a protected areas, as well as their expected impact.

## Methods

A large-scale survey allowed interviewing 456 persons between May 15 and October 20, 2002. Counts were also performed to quantify the flow

and time distribution of visitors on different paths. Three counting devices were tested between 2001 and 2004, two of which automated and one manual, requiring staff presence in the field.

Between 2001 and the end of 2005, 73 days of manual counting were carried out on four different sites. Furthermore, pedestrian automatic counting installations were installed in four sites, adding up nearly 1300 days of uninterrupted counting. A test of automatic counting of bicycle traffic on one site was also achieved during 11 days.

## Results

From our surveys, the majority of the people using pathways were regular customers from the region or neighboring cantons (>75% had already been there "more than once"). A little more than half were here only for a day (53%), a third (30%) were staying from a few days to more than 2 weeks, the remaining being residents. Visitors were equally distributed among loners, couples, families and groups. Half the people came by car. The option chosen for hosting was camping for 37%, while 14% possessed a second home in the vicinity. Finally, 77% were between 30 and 70 years old, while 5% only were below 20.

Automatic counts realized on pathways have shown that preserves are mainly visited by day, from late morning to late afternoon, up to late evening dur-

ing summer. Attendance varies strongly depending on the month. Outside holidays, visits are more frequent during weekends but vary with climatic conditions. Depending on place, attendance ranges from 45 to 125 persons per day (annual mean), being maximal in summer (91 to 242 persons per day, July/September mean).

From our manual counts, the share of bicycles may reach 50% on authorized pathways, and up to 78 - 98% on cycle paths Attendance is also significantly larger during the weekends than during working days (respectively 518 and 355 passing per day).

Between 2/3 and 3/4 of interviewed people declared to come here to promenade and to enjoy the

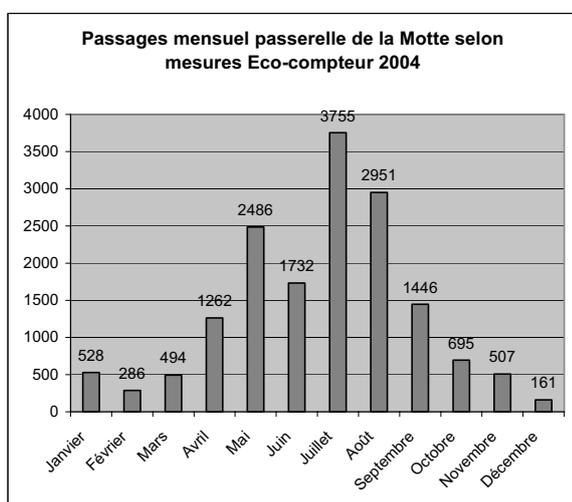


Figure 1: Eco-meter measurements: monthly passages on the elevated pathway.

tranquility and natural character of the shore. Depending on the place considered and access to the Lake, 10 to 15% of people declared to come first for sport and swimming, not for nature.

## Conclusion

A conclusion from our 2002 survey is that, despite the high number of information panels installed in natural preserves, 58% only had seen and read panels, 24% had seen but not read them, while 18% had not seen them. As a result, public awareness of rules of behavior was often limited. Though 45% mentioned “do not disturb fauna”, only 12% knew that dogs must be on leash, as corroborated by the listing of infractions in 2002: out of 3200 infractions noted during 4000 hours of supervision, 845 had to deal with unleashed dogs.

A similar conclusion is reached concerning beach equipment and bathing, the impact of which on fauna is largely unknown by the public, leading to more than 1400 infractions during the monitoring period.

Counting allows controlling the possible impact of the public on the sensitive species by obtaining information on the periods of disturbances and the importance of these disturbances. Moreover, they allow identifying the zones of major public frequentation. This information will be of primary importance for the future actions of conservation of the sensitive species as well as the management and the maintenance of the infrastructures in the Grande Cariçaie.

## References

- Strehler Perrin, C. et al. (2003). Evaluation, prévention et contrôle des impacts d'Expo 02 sur les milieux naturels riverains des Trois-Lacs. Yverdon-les-Bains.
- Aubort, M.-N. (1996). La Grande Cariçaie entre mésange à moustaches et ski nautique. Mémoire de Licence. Institut de géographie, Université de Lausanne.

# Visitor Monitoring in Tatra National Park

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*Keywords: Tatra National Park, High Tatras, monitoring of visitors, research inquiry, motoring charge.*

## Introduction

The main objective of the paper is an analysis and comparison between density of visitors on both sides of the Tatra mountains (on Slovak and Polish side). Manual monitoring of visitors was realized for the first time in history of both national parks on August 5–7, 2004 by recording of visitor's frequency on the whole mountain chain and comparing the sizes of tourist's charge on both sides of border. Objects of monitoring were actual data about numbers, detailed structure of visitors, time and spatial dynamic. The monitoring serves for the need of nature conservation, science, research e.g. by providing regulation of tourist activities, by planning maintenance of tourist trails and their facilities, intensifying of ranger services, as well as for tourism experts.

## Methods

Detailed counting of visitors in the national park, including bottom entries to Tatra, was realized in a project of the Tatra National Park Administration and town High Tatras in 1981. Thenceforward since 2004 similar monitoring has not been realised. Monitoring of motoring charge was performed on 12 positions, where number of vehicles, number and nationality of visitors were recorded. Monitoring of visitors in high mountain environment was realised on 33 positions. One of the factors, which has been monitored for a long-time, are the weather conditions and their influence on visitors. A research inquiry on the territory of TANAP was created by set of questions detecting the visitor's opinion on the state of the natural environment, nature conservation in the visitor's mind,

services for people as well as the visitor's viewpoint on rangers. In total, more than one thousand inquiry leaflets were given away there.

## Results

Total input of 108845 visitors using 37387 vehicles was recorded during monitoring of motoring charge. Personal motor-cars created 90% of vehicles; the most charged sector was the road II/534 and time between 10:00 and 11:00. 17988 visitors used railway transport with the highest peak between 11.00 and 12.00. It means, that totally 126833 visitors came to HT area during the three sampling days, which means the average 12457 vehicles and 42278 visitors per day. The comparison with the year 1981 is interesting, the increase of visitor numbers and vehicles can be observed, but also the decrease of shared transportation by railway and the efficiency of vehicles' utilization. An important fact telling us about reason of visits is that 62% of visitors remain below the mountains and 38% of them consecutively enter to the high mountain environment. Monitoring of visitors in high mountain environment showed us, that 17651 visitors entered the high mountain environment on Slovakian side of Tatra on the 6th of August, 2004. For comparison, 25282 visitors were on the Polish side in the same date. Traditionally the most visited parts on Slovak side were e.g. Strbske Pleso - Popradske Pleso and Morskie Oko on the Polish side. For comparison on the Slovak side of Tatras 661 km and on the Polish side 245 km marked tourist's footpaths are registered; the density of networks of tourist's footpaths is higher in Poland (1,19 km/km<sup>2</sup>). In high mountain environment there were about 40% visitors from Czech

Republic, 30% from Slovakia and 19% from Poland. From the interesting results of the research inquiry it could be mentioned, that 79% of the people have visited territory of Tatra national park several times and 75% are satisfied with state and number of tourist's footpaths. Inquiry confirmed the trend on the Polish territory of the Tatras - higher visiting of the third high mountain zone, which presents at the same time the most significant natural values and special sensitive environment.

### Conclusion

Visitor monitoring realized simultaneously on both side of High Tatras allows to record frequency of visitors in the whole Tatras and compare visiting on both sides of the border. Results of monitoring are part of the management plan with limits based on indicators of environment quality. In history, thanks to data from monitoring, free movement of visitors in the national park was limited, the visitor's charter got regulations about moving only on marked tourist trails, some areas were closed because of non-respectable visiting, as well as the maximum quota of visitors who can ride mountain transport facilities were determined. The main goal of the questionnaire was to find out the sociological characteristics of tourists, which are very important from the viewpoint of safety, information and tourist infrastructure. On the Slovak side inquiry underlined finding the tourist opinion on the status of the environment and services related to tourism. In contrast to the Slovak side, the number of visitors in Zakopane (Poland) and surrounding communes doesn't directly correlate with visiting of the Tatra mountains, which is especially the re-

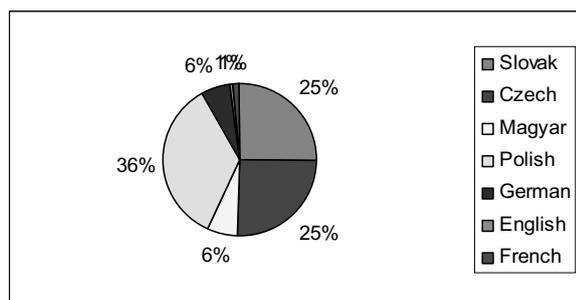


Figure 1: Identifying of visitor's nationality in high mountain environment (Zdiar - Monkova dolina, 5.8.2004, 5.00-20.00).

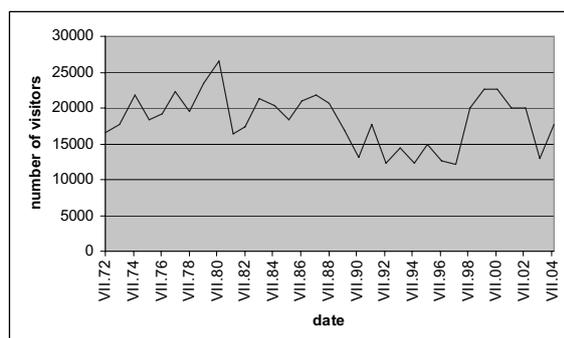


Figure 2: Number of visitors in high mountain environment on a specific day during the period of 1972 – 2004.

sult of the fact that residential centres are found outside of the park. Therefore, monitoring of monitoring charge was provided only on Slovak side.

### References

Ladygin Z. & Chovancova B. (ed.) (2005). Visitor's monitoring in the Tatra mountains 5th-7th August 2004. Zakopane.

# **Decision Support System for Sustainable Management Planning of Nature-Based Recreation Areas in Thailand**

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*Keywords: Decision Support System (DSS), Recreation Resource Potential, Recreation Opportunity Spectrum, nature-based recreation area, Thailand.*

## **Introduction**

The project “Decision Support System for Sustainable Management Planning of Nature-based Recreation Areas” was a 5-year project funded by Thailand Research Fund aimed at developing standard protocol and models to assess recreation resource potential, recreation opportunity spectrum, and the acceptable limit of change of resource-base from uses, and to develop a recreation monitoring system for the nature-based recreation areas in Thailand. The project was divided into two phases. The first phase of the project covered a two-year period beginning from October 2003 to September 2005. The second phase began in October 2005 will continue until September 2008. This paper presents a summary of results from phase one of the project, which had 2 specific objectives. The first objective was to develop a recreation resource potential assessment system. The second one was to classify the recreation opportunity spectrum of nature-based recreation areas that are compatible with site characteristics and use patterns within the country. The end results of the project included a full technical report and computer software developed to enable recreation area managers to easily assess resource potential and define opportunity classes for the recreation sites under their supervision.

## **Methods**

Nature-based recreation areas in this project were classified into 9 types based on ecosystem differences. The 9 types of recreation areas were waterfalls, rivers and lakes, caves, hot springs, geo-morphological sites, scenic areas, nature trails, islands, and beaches. The study began with compiling existing databases on nature-based recreation areas in Thailand. The total number of individual recreation sites recorded was 1,504 sites. 119 sites around the country were selected as the study samples, based on their distribution and their diversity in size and use patterns. The sample sites included 27 waterfalls, 10 rivers and lakes, 14 caves, 10 hot springs, 10 geo-morphological sites, 10 scenic areas, 13 nature trails, 10 islands, and 15 beaches.

Indicators for recreation resource potential and the recreation opportunity spectrum were developed primarily based on related literatures (Clawson, 1968; Clark & Stankey, 1979; Chubb & Chubb, 1981; Eagles & McCool, 2002) and empirical data from within the country. A focus group meeting of in-country academics and practitioners was conducted to obtain opinions on those indicators. The final set of indicators was composed of 10 groups for recreation resource potential indicator and 7 groups for recreation opportunity spectrum indicator. Each indicator had multiple indices. Number of indices was different from one type

of recreation area to another. The total number of

Table 1: List of indicators and indices used for the assessment of nature-based recreation resource potential and the classification of the

<b>Indicator</b>	<b>Index / Measurement detail</b>
<b>Recreation Resource Potential</b>	
1. Distinctiveness of the plant community	1) quantity of trees with 100 cm. girth at breast height 2) completed tree structure 3) crown cover
2. Opportunity for wildlife sighting	1) amount of bird species 2) amount of small and medium sized animals 3) amount of large mammals
3. Physical uniqueness of key resource	1) width of waterfall base 2) number of waterfall level 3) number of months waterfall contains at least half water quantity 4) average width of river/lake 5) width of the largest room within a cave 6) accessible cave depth 7) presence of stalagmite and stalactite within a cave 8) size of overall area of hot spring 9) size of overall area of geo-morphological site 10) height of view point 11) diversity of trail topographic characteristics 12) reef size 13) assessable beaches at an island 14) width of beaches 15) length of beaches 16) beach type
4. Scenic quality of landscape	1) Overall quality of natural landscape within the recreation site evaluated in 5-point rating scale
5. Significance for resource interpretation	1) Overall distinctiveness of natural resources within the recreation site that can be use to develop interpretive themes and sub-themes evaluated in 5-point rating scale
6. Suitability for certain types of recreation activity	1) size of accessible swimming area at a waterfalls 2) water turbidity 3) river length 4) depth of rivers/lakes 5) amount of rapids in a river 6) number of months with sufficient water for recreation 7) slope of cave floor 8) ventilation within a cave 9) wetness of cave floor 10) size of activity area at a hot springs 11) sulfurous stink at a hot springs 12) size of activity area at a geo-morphological sites 13) size of overlook area 14) trail slope 15) trail loop 16) length of trail (short/long hiking trail) 17) percentage of live coral 18) diversity of coral species 19) diversity of living things at reef 20) water transparency 21) slope of beaches 22) size of tree shed at beaches
7. Site resistance	1) resistance of soil to trampling 2) soil shear strength 3) type of plant community 4) slope of the area 5) presence of endangered species 6) reef location compared to wind direction 7) presence of endangered sea animals
8. Proximity of the site to others	1) distance to next nearest recreation area 2) number of recreation areas within 80 km.
9. Safety	1) likelihood of touching toxic plants 2) likelihood of encountering dangerous animal 3) likelihood of natural disaster (landslide, flash flooding, etc.)
10. Suitability of climate	1) temperature 2) relative humidity 3) number of rainy days
<b>Recreation Opportunity Spectrum</b>	
1. Access	1) road/trail access conditions 2) distance from mainland to the site (island) 3) number of months site is accessible
2. Remoteness	1) distance of the site from motorized area 2) visitors' perception of the remoteness of the site
3. Naturalness	1) percentage of areas left in their natural state
4. Opportunity for social encounter	1) number of other visiting parties encountered within the site
5. Evidence of human impact	1) amount of litter 2) amount of broken tree branches along the trail 3) percentage of broken stalagmites and stalactites within a cave 4) amount of scars on trees 5) visibility of soil erosion on trails 6) length of trail with exposed tree roots
6. Site management	1) quantity and size of facilities within the site
7. User management	1) direct surveillance and control by staff 2) indirect control by interpretive programs

indices for resource potential was 63 and for the opportunity spectrum, 16 indices. A list of all indicators and indices is presented in Table 1.

Biophysical resource inventories and visitor surveys were conducted at each site, based on the developed indicators and indices. GPS and associated forest engineering tools were used in site inventories. Questionnaires were used for the visitor surveys. The number of site visitors who participated in the survey was 1,550 persons. Descriptions of each indicator were provided in the questionnaire. The survey participants then were asked to subjectively evaluate recreation resource potential and recreation opportunity classes based on the given indicator descriptions. Descriptive statistics as well Ordinal Regression Analysis and Logistic Regression Analysis were used in the process. Opinions on resource potential and the opportunity class of each site of visitors with post-graduate education were put together with the opinions of the research teams and used to develop initial equations to assess recreation resource potential and recreation opportunity spectrum for the sample sites.

## Results

Biophysical resource inventories and analysis found that most recreation areas had moderate levels of distinctiveness of plant communities, while the opportunity for wildlife sighting was low. The majority of recreation sites had moderate levels of physical uniqueness of key resources, scenic quality of landscape and significance for resource interpretation. The suitability for certain types of recreation activity and site resistance were mostly moderate to high. The potential for connection of the site to others, safety, and climate were high.

In assessing recreation resource potential, the research team separated the analysis into 2 parts. In the first part, ordinal regression analyses were employed to develop equations to assess "Basic recreation resource potential (Brrp)". "Site Resistance" (SR) was separately evaluated. The research assumption was:

Overall Recreation Resource Potential (ORRP) = f (Brrp + SR)

Different Brrp equations were used for different types of recreation area due to the differences in number of indicators and indices used to assess the resource potential of each type of recreation area. The total number of equations developed was three, as follows:

Equation 1: To be used for waterfalls, caves, hot springs, geo-morphological sites, scenic areas, and nature trails

$$Y = 4.716 + 0.515X1 + 0.187X2 + 0.868X3 + 0.837X4 + 0.541X5 + 0.044X6 + 0.146X7 + 0.070X8 + 0.471X9 \quad (R^2 = 0.610)$$

Where Y = Basic resource potential  
 X1 = richness of plant community  
 X2 = opportunity for wildlife sighting  
 X3 = physical uniqueness of resource-base  
 X4 = scenic quality of landscape  
 X5 = significance for resource interpretation  
 X6 = suitability for certain types of recreation activity  
 X7 = proximity of the site to others  
 X8 = safety  
 X9 = climate

Equation 2: To be used for rivers/lakes and beaches

$$Y = 4.320 + 0.356X1 + 0.903X2 + 0.911X3 + 0.724X4 + 0.031X5 + 0.143X6 + 0.032X7 + 0.455X8 \quad (R^2 = 0.599)$$

Where Y = Basic resource potential  
 X1 = opportunity for wildlife sighting  
 X2 = physical uniqueness of resource-base  
 X3 = scenic quality of landscape  
 X4 = significance for resource interpretation  
 X5 = suitability for certain types of recreation activity  
 X6 = proximity of the site to others  
 X7 = safety  
 X8 = climate

Equation 3: To be used for islands

$$Y = 4.241 + 0.955X1 + 0.976X2 + 0.817X3 + 0.032X4 + 0.169X5 + 0.011X6 + 0.469X7 \quad (R^2 = 0.596)$$

Where Y = Basic resource potential  
 X1 = physical uniqueness of resource-base  
 X2 = scenic quality of landscape  
 X3 = significance for resource interpretation  
 X4 = suitability for certain types of recreation activity  
 X5 = proximity of the site to others  
 X6 = safety  
 X7 = climate

The factors strongly influencing basic resource potential for most types of recreation areas, taken from the equations, were physical uniqueness of resource-base and scenic quality of landscape.

In the second part, the results from Brrp and SR analysis were used to develop a matrix of management alternatives, yielding five different management alternatives. Different management alternatives recommend different solutions for site management and impact prevention. Different management recommendations were made for each group of recreation areas. The final assessment found that the majority of recreation areas was in group 2 as presented in Table 2. As for the classification of the recreation opportunity spec-

Site Resistance: SR						
Basic recreation resource potential: Brrp		Very high	High	Moderate	Low	Very low
	Very High	Group 1	Group 1	Group 2	Group 3	Group 3
	High	Group 1	Group 1	Group 2	Group 3	Group 3
	Moderate	Group 2	Group 2	Group 2	Group 3	Group 3
	Low	Group 4	Group 4	Group 4	Group 5	Group 5
	Very low	Group 4	Group 4	Group 4	Group 5	Group 5

Figure 1: Matrix to group recreation sites based on their basic recreation resource potential and site resistance.

trum, seven recreational setting indicators were included in the inventories and analysis. It was found that access to most recreation areas was by dirt road that could be easily used during the dry season. The majority of the sites had a low level of remoteness. They were left, to a moderate degree, in their natural state and had a moderate to high level of opportunity for social encounters. The evidence of human impact found in most sites was moderate. Most recreation sites had moderate to high physical development and visitor control.

Logistic regression analysis was employed in order to develop the recreation opportunity spectrum classification equation. The same equation was used for every type of recreation area. The final ROS equation was:

$$Y = 3.762 + 0.462X_1 + 0.677X_2 + 1.073X_3 + 0.483X_4 - 0.162X_5 + 0.308X_6 + 0.189X_7 \quad (R^2 = 0.631)$$

Where Y = sum of recreation experience to be gained from visiting recreation area in each ROS

- X1 = access
- X2 = remoteness
- X3 = naturalness

Table 2: The results from final recreation resource potential assessment.

Grouping	Number of site	%
<u>Group 1:</u> Very high to high basic recreation resource potential and site resistance	18	15.13
<u>Group 2:</u> Very high to moderate basic recreation resource potential and moderate site resistance	59	49.58
<u>Group 3:</u> Very high to moderate basic recreation resource potential with low to very low site resistance	29	24.37
<u>Group 4:</u> Very low to low basic recreation resource potential with very high to moderate site resistance	11	9.24
<u>Group 5:</u> Very low to low basic recreation resource potential and very low to low site resistance	2	1.68
Total	119	100.0

Table 3: The results from final recreation opportunity spectrum classification.

ROS class	Number of site	%
Primitive (P)	5	4.20
Semi-primitive Non-motorized (SPNM)	36	30.25
Semi-primitive Motorized (SPM)	41	34.45
Modified Natural (MN)	20	16.81
Urban (U)	17	14.29
Total	119	100.0

X4 = opportunity for social encounters

X5 = evidence of human impact

X6 = facilities and site management

X7 = visitor management

From the equation, factors that highly influenced the differences in opportunity class were naturalness, remoteness, and opportunity for social encounter, respectively. The ROS for nature-based recreation areas in this study was classified into 5 classes primarily based on the results from recreation diversity analysis, recreation motivation in particular. The five 5 classes were: Primitive (P); Semi-primitive Non-motorized (SPNM); Semi-primitive Motorized Area (SPM); Modified Natural or Rural (MN); and Urban (U). The final classification found that the highest number of recreation sites (34.45%) was in the SPM class, as presented in Table 3.

At the final stage of the project, the research team developed simple Decision Support System (DSS) computerized programs by using Visual Basic language and GIS applications. This program was produced to assist recreation area managers in Thailand to assess recreation resource potential and to classify the recreation opportunity spectrum of the recreation site under their supervision. Prior to the utilization of the DSS program, resource managers had to collect data and perform basic analysis following the guidelines specified by the research team. Following the implementation of this program they could input the data into the DSS program to get the final results of the assessment and classification. General recommendations to manage recreation sites with different recreation resource potential and recreation opportunity spectrum were also provided to all DSS users. The overall results from this research and de-

velopment project were beneficial to the country of Thailand though follow up assessment is still needed in some areas.

## References

- Clawson, M.L. (1968). *Land and Water for Recreation*. Chicago.
- Clark, R.M. & Stankey, G.H. (1979). *The Recreation Opportunity Spectrum: A Framework for Planning, Management and Research*. USDA.
- Chubb, M & Chubb, H. R. (1981). *One Third of Our Time? An Introduction to Recreation Behavior and Resources*. Canada.
- Eagles, P. J. & McCool, S.F. (2002). *Tourism in National Parks and Protected Areas: Planning and Management*. New York.

# Is Maritime Antarctic Ready for the Impacts of Commercial Tourism?

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*Keywords: Antarctica, tourism impact, environmental change indicators, monitoring program, indicator species.*

**Abstract:** Antarctica has been turned into a tourist destination and this situation requires understanding how tourism activities and increased visitor numbers affect to wildlife. Some areas, as Maritime Antarctic, present higher sensitivity to this threat and that is the reason why many researchers have focused their studies on this area. Our paper reviews their work and proposes some discussion points.

## Antarctic tourism trends

Currently, tourists can visit Antarctica as easily as any other part of the world, though visitors are not everyday vacationers. Scenery, wildlife, adventure and a unique sense of remoteness are strong attractions to thousands of tourists. From small beginnings, around the 1920s, a substantial tourist industry has grown handling by ship 30232 visitors in 2004-05 season (IAATO 2006). Tourists, who pay large amounts of money to experience Antarctica, are exceedingly motivated to

preserve what they have come to see, but their numbers are becoming worrying (ASOC 2000, 2002).

## State of the art: assessment of environmental impacts of Antarctic tourism

Antarctica symbolizes the last great wildernesses, so it is understandable that much research has focused on the effects of tourism activity.

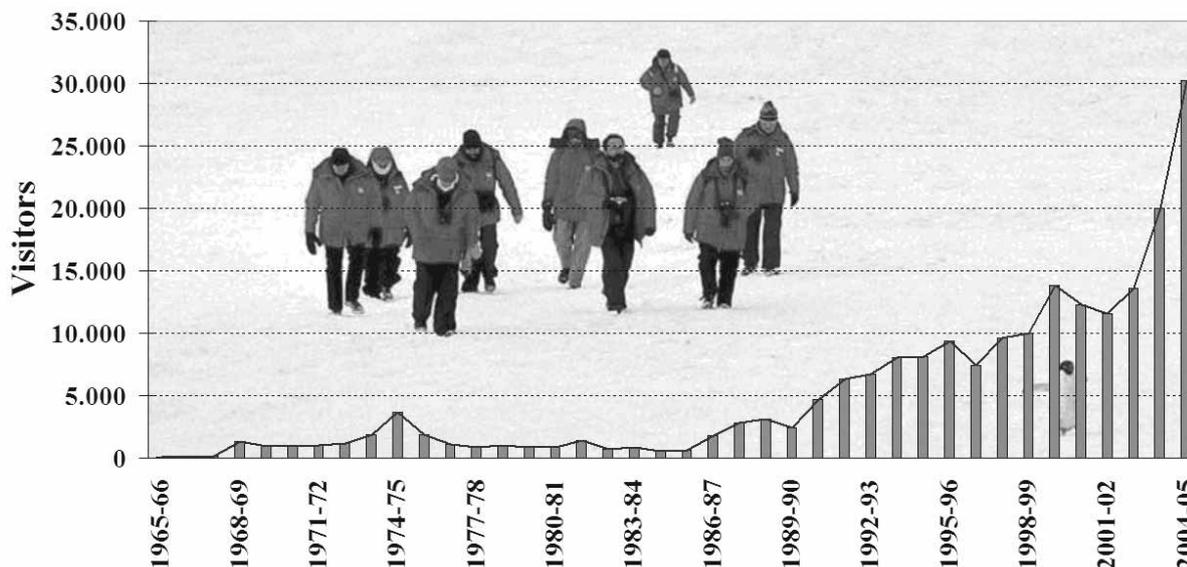


Figure 1: 1965-2005 Antarctic shipborne tourists trends. Chart doesn't include flight passengers (Bauer 2001, IAATO 2006).

But the assessment of environmental impacts of tourists and their activities in this region is still at its first stages. Potential negative impacts are often highlighted in the literature (table 1), and even though there are many descriptive surveys, very little quantitative data are provided. The main obstacle has been the absence of an initial environmental reference state. Some baseline data on specific visited sites are beginning to be compiled through initiatives as the Antarctic Site Inventory Project, operated and managed from 1989 to 2004 by the nongovernmental organization Oceanites, Inc. At 570 visited sites, the Inventory routinely collects (Naveen 2005):

- Basic Site Information, which includes descriptions of key physical and topographical characteristics: latitude and longitude, distribution of flora, seal haul-out and wallow locations, and discrete groups of breeding penguins and flying birds.
- Variable Site Information and Data, which includes weather and other environmental conditions (sea ice extent, cloud cover, snow cover, temperature, wind direction and speed), biological variables (number of occupied nests, number of chicks per occupied nest, ages of chicks), and the nature and

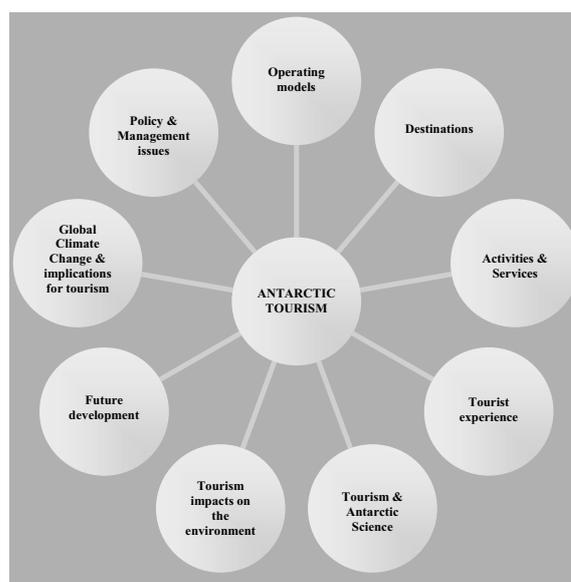


Figure 2: Conceptual framework of Antarctic tourism components. It is essential to have a correct understanding of these components before discussing the effects of tourism activity. We recommend as a first report the particularly noteworthy Bauer's (2001) *Tourism in the Antarctic: Opportunities, Constraints and Future Prospects*.

extent of any observed visitor impacts (footprints or paths, cigarette butts, film canisters, and litter).

- Maps and Photodocumentation, which portrays the main features of each site, particularly the locations of colonies and assemblages of resident fauna and flora.

Table 1: Antarctic tourism impacts (IUCN 1991, Inskeep 1991, Mason & Legg 1999, Kriwoken & Rootes 2000, Bauer 2001, Hofman & Jatko 2001).

#### Positive impacts:

- Conservation of important natural areas and archaeological and historic sites.
- Improvement and monitoring of environmental quality.
- Increasing environmental enhancement; visitors gain a great enhanced appreciation of Antarctica's global importance and they act as an *Ambassador to Antarctica*.
- Scientific activities may also benefit since tourist visits can provide a useful link with the outside world and strengthen political support for Antarctic Science.
- Tourists are taxpayers and as such are the funding source of the research that is carried in Antarctica.

#### Negative impacts:

- Pollution: water, air, noise, visual.
- Waste disposal.
- Ecological disturbance at wildlife breeding sites.
- Trampling of vegetation (e.g. moss takes over 200 years to regenerate).
- Introduction of non-native species: microbes, plants and animals. These organisms could turn into invasive species because of the global climate change.
- Environmental hazards of accident with an elevated cost of cleanup operations.
- Damage to historic sites.
- Land use problems: disruption of routines at stations and of scientific programs.
- Non scientific collection.

This initiative has allowed to establish potential indicator species of environmental change, including seals, penguins, seabirds and flora, although the Inventory has focused on taking a census of four penguin species (gentoo, Adélie, chinstrap, and macaroni) and five species of flying birds (blue-eyed shag, southern giant petrel, kelp gull, and Antarctic brown and south polar skuas). There are great steps forward after more than ten years of Antarctic Site Inventory data collection (Naveen 2003): establishment of a methodology for a coordinated Antarctic monitoring program; the selection of indicator species to monitor; and the baseline to ascertain whether populations of these indicator species are being impacted directly or cumulatively. Nevertheless, even counting on these improvements, it is very unlikely to find a direct causal link between tourism activities and impacts in the ecosystem as a whole. If changes are detected, complex questions related to prey availability, reproduction, climate change and breeding territory make complicated to distinguish if it is human presence or other factors the ones behind these fluctuations.

An often-mentioned example could illustrate these difficulties: the research focused on the Adélie penguin rookery at Cape Royds, Ross Island. This population had a relatively constant bird number between its discovery in 1904 by Scott and Wilson and 1956. By 1962, the penguin population was almost halved. Many researchers attributed this decline to helicopter operations and other disturbances to birds by visitors. Overflight of the colony was prohibited and restrictions were placed on the number of visitors allowed in the area and their activities. As a result, the colony returned to its former size. Nevertheless, a strict cause-effect relationship has not been established: increases since 1968 have been in accordance to trends in colonies throughout the region.

It is possible to find other similar examples, as the study designed to examine tourism impacts on Adélie penguins near Palmer Station, western Antarctic Peninsula (Fraser & Patterson 1997). Within the context of a regional decrease in Adélie penguin populations, researchers considered the next question: are colonies in the Palmer Station area visited by tourists decreasing faster than non-visited colonies? After sampling for nine seasons, signif-

icant differences based on disturbances produced by visitors were not obtained. It seems that colony-specific differences in population trends are based on interactions between breeding habitat geomorphology and the effects of increasing snow accumulations during winter and spring due to climate warming in the Antarctic Peninsula (this region is one of the fastest warming places on the Earth with  $\sim 2.5^\circ\text{C}$  rise in temperature over the past 50 years). Detecting the effects of human activity on Antarctic wildlife populations is beyond our current abilities to quantify and understand the natural variability in spatial and temporal scales manifested by these populations.

### **Is commercial tourism the principal threat over Antarctica?**

It is necessary to put Antarctic tourism activities into perspective before befall into pessimism. It needs to be reminded that the effect of this industry on the Antarctica may be considered insignificant if we compare it to the damage produced by the construction of permanent bases and summer stations. Headland (1994) estimated that, on the basis of presence days, less than 1% of human impacts can be attributed to tourism. The rest comes from scientists and government staff. Some researchers suggest to increase this percentage due to the large increases in tourist numbers. Moreover, human activities use less than 0.005% of the Antarctica area (the size of this continent is 14.2 million square kilometres, or nearly twice the size of Australia). First conclusion could be that most parts of Antarctica are never visited by tourists, but this is an excessively simplistic reasoning. Coastal areas are more vulnerable since they are free of permanent ice cover and these are the sites used by wildlife (penguins, seals and seabirds) for daily and seasonal activities (Stewart 2005). Antarctic tourist activity is concentrated in the austral summer (November to February), during the period of ice thaw, which corresponds to the breeding seasons of a large number of indigenous species (Mason & Legg 1999).

Other considerable problems such as the Antarctic ozone hole, the climate warming, or the introduction of exotic species are threatening the con-

servation of the Antarctica. Unfortunately, there is a clear association between some of these threats and tourism: the increase in temperature entails more ice free areas during the summer season, which could be visited for a longer period of time. Therefore, exotic organisms carried by visitors could establish permanent populations, or even turn into invasive species, disturbing the actual food web; the risk of transmitting important pathogens among wildlife sites by tourists would become greater, and so on.

### Why do we have to give priority to Maritime Antarctic?

Commercial tourism's risks might be aggravated in the Maritime Antarctic region, where the highest accessibility to coastal wildlife is found. First and second tourist destinations in 2004/05 for the entire Antarctic continent were located in this biogeographic region (Whalers Bay and Half Moon Island, IAATO 2006), since it is the easiest access to Antarctica from ports as Ushuaia and Punta Arenas. All tourism products (ship based, land based

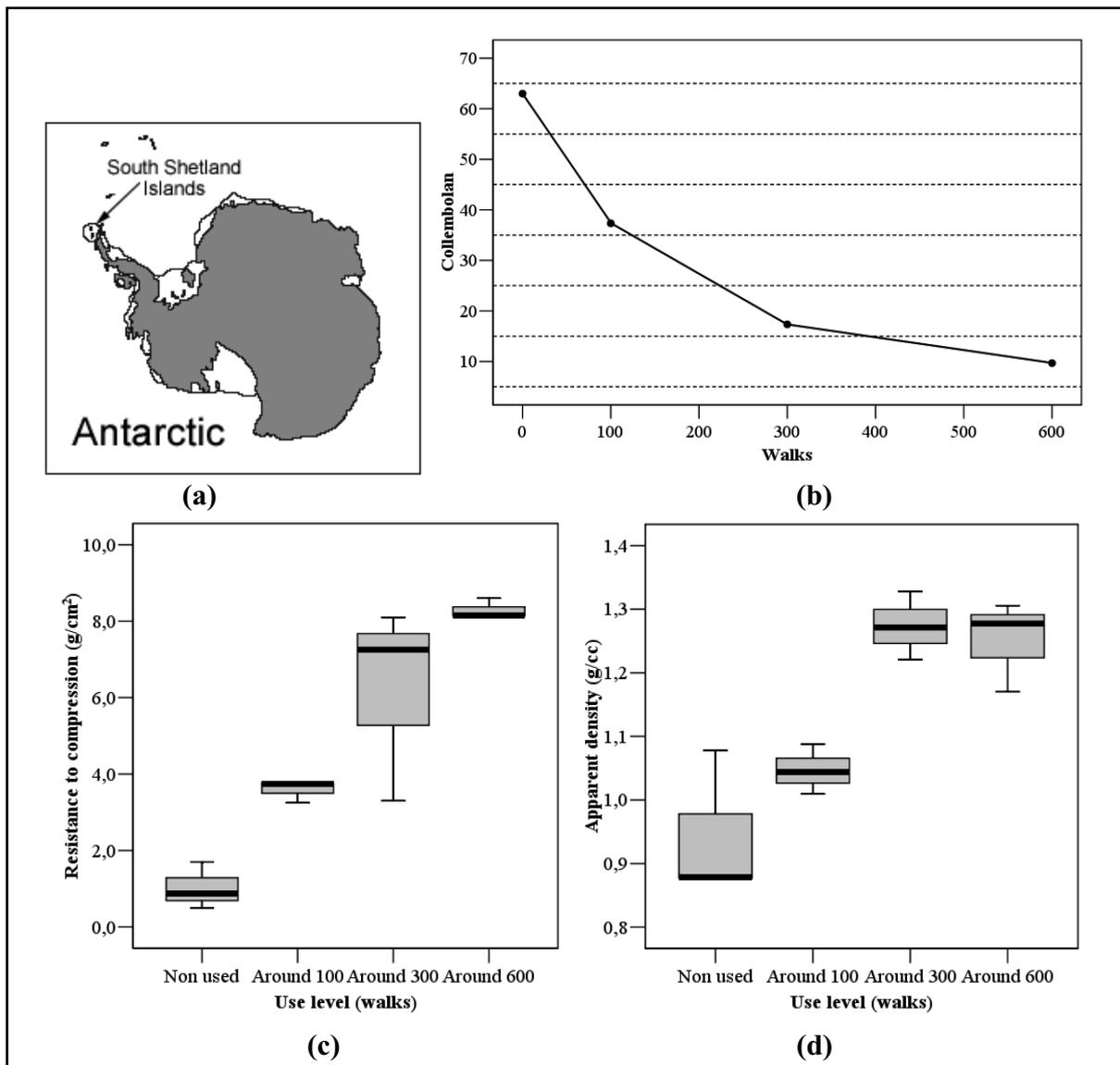


Figure 3: (a) South Shetland Islands, Antarctica. (b) Total collembolan abundance versus number of walks in an experimental area (2004/05 summer campaign). Under experimental conditions, human presence generates an immediate impact on the first centimetres of surface soil, which causes a progressive reduction of collembolans. (c,d) Box-plots by levels of use for resistance to compression and apparent density in the 2003/04 summer campaign. Data show that a minimum human presence is able to disturb physical characteristics of Byers Peninsula soils; nevertheless, a certain level of use is necessary to obtain substantial changes.

with air support, and overflights without landings) are not only present in this area, but they have an upward trend.

In view of it, our research team has developed a pilot scheme into edaphic, physical and biological characteristics as bioindicators for human impact on Byers Peninsula (figure 3). This is the largest ice-free area in the South Shetland Islands (Maritime Antarctic), with approximately 60 Km<sup>2</sup> in ex-

tent (one of the largest in the Antarctic Peninsula region). Currently, Byers forms the Antarctic Specially Protected Area N°126, Livingston Island, due to its paleontological, geomorphologic and biological interest (SCAR 2003). In addition, Byers holds the greatest concentration of historical sites in Antarctica, such as remains of refuges and shipwrecks of early nineteenth century sealing expeditions. Currently, this place has not been subjected

Table 2: The two last decades of research have made possible to produce a series of basic tenets for environmental monitoring (SCAR 1996).

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#### **Concerning the monitoring:**

- Environmental monitoring is only useful when it is firmly tied to an environmental management strategy.
- Monitoring is not the measurement of everything in a haphazard approach to detect change.
- Monitoring should be the precisely targeted measurement of a few key species, processes or other indicators, carefully selected on the basis of scientifically-sound, predetermined criteria.
- A generic hypothesis to cover all environmental monitoring would be “the activity of concern causes unacceptable deterioration of values or resources”.
- Specific hypotheses appropriate to particular locations, the activities occurring at the location, and the values that might be impacted must be generated on a case-by-case basis.

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#### **Concerning the design of monitoring programs:**

- Have a clear question: the thought process should have a question, suggest a hypothesis, select indicators and parameters, create a model, apply statistics and tests of hypothesis, and finally make interpretation.
- Have controls, both spatial and temporal where appropriate.
- Have a balanced design (e.g. similar sampling efforts at each impact level and time).
- Have replicates randomly allocated.
- Conduct preliminary sampling (pilot study) in order to assess the sampling methods used to ensure that they are efficient, don't introduce bias into the study, estimate error variability, include appropriate sampling effort to achieve the desired power, and determine natural environmental patterns to be incorporated into the study design (e.g. stratification).
- If statistical analysis assumptions are not satisfied (they probably will not be) then transform the variables before analysis, use nonparametric methods or use simulation or randomisation methods.
- Accept the results (and do not try to find statistical methods that give you the result you want).

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#### **Concerning the variables, these must:**

- Exhibit changes beyond limits of detection.
- Be directly related to a testable hypothesis.
- Be known or measurable above natural variability (i.e. background levels).
- Give information from which management decisions can be made.
- Be able to sustain the monitoring activity.
- Be able to be sampled within logistical and time constraints.
- Be measurable on samples that can be transported without deterioration or be measurable on-site.
- Be amenable to quality assurance procedures including demonstrable precision, accuracy and repeated measures.

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#### **It is also desirable that the parameters are:**

- Measurable by cost effective, simple and standard procedures.
  - Strongly related by what is believed to be a causal link to a particular activity or process.
  - A direct measure of change in a value of concern.
  - Permit generalisations about causative agents.
  - Definable in terms of limits beyond which changes are judged to be deleterious.
  - Measurable without conflicting with scientific activities.
-

to significant levels of human disturbance, being investigation carried out through the installation of temporary camps or punctual visits the principal activity at Byers. These circumstances made of Byers a privileged observatory to analyse potential indicators of human impacts on a small scale before translating the methodologies to Maritime Antarctic visited sites.

Figure 3: (a) South Shetland Islands, Antarctica. (b) Total collembolan abundance versus number of walks in an experimental area (2004/05 summer campaign). Under experimental conditions, human presence generates an immediate impact on the first centimetres of surface soil, which causes a progressive reduction of collembolans. (c, d) Box-plots by levels of use for resistance to compression and apparent density in the 2003/04 summer campaign. Data show that a minimum human presence is able to disturb physical characteristics of Byers Peninsula soils; nevertheless, a certain level of use is necessary to obtain substantial changes.

### Which should be the future of Antarctic tourism assesment?

It is necessary to develop as soon as possible monitoring programs for tourist activities capable to detect cumulative adverse effects before these activities reach significant levels and generate irreversible disturbances in the Maritime Antarctic (Roura & Hemmings 2002). Initiatives as the Antarctic Site Inventory Project or the CCAMLR Ecosystem Monitoring Programme (Convention for the Conservation of Antarctic Marine Living Resources) have showed the correct guidelines for future research, but there is still a long way to cover.

Table 2: The two last decades of research have made possible to produce a series of basic tenets for environmental monitoring.

We need to identify potential stressors for breeding species and record responses to environmental disturbances due to tourists. A population response in terms of reproductive success or colony size (parameters used in current monitoring programs), doesn't allow us to identify the effect of human disturbance. Walker et al. (2005) found that breeding

adult Magellanic penguins (*Spheniscus magallanicus*) in Patagonia appear to habituate well to tourists and breed in an area where about 70000 people visit during the season. In their study, baseline levels of corticosterone returned to normal after exposure of birds to humans. But they also observed that penguin chicks appeared to show a heightened adrenocortical response to handling stress in nests exposed to tourists compared to chicks living in areas isolated from human intrusions. Walker states: "given that developmental exposure to stress can have profound influences on how individuals cope with stress as adults, this potential effect of tourists on chicks could have long-term consequences". About this possibility, Regel and Putz (1997) pointed out that in Emperor penguins (*Aptenodytes forsteri*), human disturbance can result in an energetically costly increase in body temperature that accounts for up to 10% of the daily energy budget during molt. In any case, monitoring behaviour alone is insufficient to identify stressor factors.

As regards to field work, it is desirable to carry out non-invasive techniques to monitor wildlife populations. Remote sampling by aircraft or satellite is possible, but there are other options. For example, conservation physiology can assess the stress responses of animals resulting from apparently benign human activities such as ecotourism. Nimon et al. (1996) used data loggers located in artificial eggs to measure heart rate in nesting gentoo penguins (*Pygoscelis papua*) and determined that human presence as well as behaviours such as movement by humans caused an increased heart rate.

### Conclusions

International Polar Year 2007-2009 could be a great opportunity to start answering to some questions presented by the scientific community about long-term environmental monitoring in Maritime Antarctica (SCAR 1996): Which activities may have unacceptable effects? Which components of the ecosystem may be affected? Which indicator variables need to be monitored? Which values or resources should not deteriorate by tourist activities? The risks caused by all human activities in the Antarctica are greater than anywhere else, and commercial tourism is already coming. We have

to be ready to provide a suitable scientific support from which environmental management decisions can be made.

## References

- Bauer, T.G. (2001). *Tourism in the Antarctic: Opportunities, constraints and future prospects*. New York.
- Fraser, W.R. & Patterson, D.L. (1997). Human disturbance and long-term changes in Adélie penguin populations: a natural experiment at Palmer Station, Antarctic Peninsula. In: B. Battaglia, J. Valencia, and D.W.H. Walton (eds), *Antarctic Communities: Species, Structure and Survival*, p 445-452. Scientific Committee for Antarctic Research (SCAR), Sixth Biological Symposium. New York.
- Naveen, R. (2003). *Compendium of Antarctic Peninsula Visitor Sites, 2d edition: A Report To The United States Environmental Protection Agency*. US Environmental Protection Agency.
- SCAR (1996). *Monitoring of Environmental Impacts from Science and Operations in Antarctica*. Cambridge.
- Tejedo, P. et al. (2005). "Measuring impacts on soils by human activity in an antarctic special protected area". In: *Terra Antarctica Reports* (12), p 57-62.

# Types of Typologies - From Recreationists & Tourists to Artificial Agents

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## Why do we actually group visitors? What for?

In order to successfully manage natural recreational sites, it is fundamental to have a comprehensive understanding of recreational use in the outdoors. Depending on the research question or a management problem to solve, scientists try to identify groups that respond to a certain situation in a similar way. Such knowledge seems to be useful while trying to satisfy visitors' needs and to assure the conservation goals. It is argued that focusing on the visitors themselves and their typological forms helps explain why people are attracted to specific destinations (Jafari 1989, 26–27 in Wickens 2002).

## The concept of a type

Every typology is the result of a grouping process. Lazarsfeld (1937) and Barton (1955) (in Kluge 2000) developed the concept of every type that can be defined as the combination of its attributes. Given objects are divided into some groups or types with the help of one or more attributes. The elements within a type have to be as similar as possible and the differences between the types have to be as strong as possible. In case of artificial agents – individuals, which belong to a certain type share same beliefs, desires and intentions and interact with the surrounding environment according to the identical set of predefined rules.

What characteristics are usually included to describe visitor types?

There are in general three bases for developing typologies: demographic, socioeconomic and psychographic (Johns & Gyimothy 2002). Demographic and socioeconomic characteristics proved to be a poor predictor of tourist behaviour, and attention has turned to psychographic variables. Psychographic variables include attitude, motivation, beliefs, values, attitudes, motives, needs, desires, commitments and so on (Blamey & Braithwaite 1997). Which variables are included in a study, depends very much on the goal of the study. Often studies aim to compare measures of behavioural preferences and other attitudes with socio-demographic characteristics (Johns & Gyimothy 2002). Or, as Saarinen (1998, p 9) states that 'tourists can be conceptualised through the dimensions of experience and activity'. Recently, researchers have started to make visitor behaviour more explicit, such as Farías Torbidoni et al. (2005) who related visitor types to trail typology. O'Connor et al. (2005) state that factors such as a velocity of tourist travel, human way finding logic, crowd avoidance, and other spatially explicit behaviour are not yet well understood and need further exploration.

## What are examples of typologies used in leisure research?

For purposes of this paper, following distinction between typologies is proposed: (1) theoretically driven (and might be empirically tested after-

Table: 1 Overview of typologies.

<b>Theoretical typologies</b>		
<i>Who</i>	<i>Tourist types</i>	<i>Based on</i>
Cohen (1979)	drifter, explorer, individual mass, organized mass	Degree of institutionalization of the tourist
Plog (1973)	Allocentric, near-allocentric, mid-centric, near psychocentric, psychocentric	Individuals; relative focus on their own culture and the one they are visiting
ETOUR (Ankre, 2005; Fredman & Hörnsten, 2004)	Purist, neutralist, urbanist	visitors' attitudes towards management, social factors and physical environment
Lengkeek (2000)	Amusement, change, interest, rapture, dedication	Degree of out-there-ness
<b>Empirical typologies (selected examples)</b>		
<i>Who</i>	<i>Tourist types</i>	<i>Based on</i>
Arnberger & Brandenburg (2001)	Regular visitor, occasional visitor, National Park visitor	Demographic characteristics
Arnberger and Haider (2005)	Crowding-tolerant, crowding-indifferent, crowding-averse	Crowding perception of the urban forest visitors
Sterl <i>et al.</i> (2006)	Family & friends, sports, nature, recreation	Visiting motives
Taczanowska <i>et al.</i> (2006)	Classical visitor, speedy visitor, explorer, shortcut user	Spatial behaviour (route geometry, physical characteristics of path, signage, infrastructure)
Frochot (2005)	Actives, relaxers, gazers, rurals	Sought benefits
Galloway (2002)	Sensation seekers, escape stress, active enjoyment of nature	Degree of sensation sought
Palacio & McCool (1997)	Nature escapists, ecotourists, comfortable naturalists, passive players	Expected benefits
Farias Torbidoni <i>et al.</i> (2005)	Conservationists, casuals, contemplators, active-adventurers	Motivation, reasons for trail choice, environmental perception, demographic data, time spend, knowledge of the park, park access, visiting group, frequency and accommodation
<b>Typologies in modelling studies</b>		
<i>Who</i>	<i>Tourist types</i>	<i>Based on</i>
Elands & Marwijk (2005)	Social & nature hiker	Goal of visit
Gimblett <i>et al.</i> (2000)	Landscape & social recreationist	Desired benefits (landscape appeal, social interaction, physical challenge)
O'Connor <i>et al.</i> (2003)	Visitor types with diverse spatial behaviour (type 1 to type 4)	Sequences of movement

wards), (2) typologies that are derived from empirical studies, and (3) typologies that are used in modelling studies. Table 1 presents an overview of the three groups of typologies, without aiming to be exhaustive, rather to inspire further discussion.

What characteristics are relevant while designing artificial agents in modelling studies?

We claim that aspects of recreational activity, experience and the spatial dimension of both are of high relevance for agent-based models. Two approaches of building typologies considering the spatial context of recreational behaviour are possible:

- Finding generic visitor profiles<sup>1</sup> and linking them afterwards to e.g. trail preferences (e.g. Farias Torbidoni *et al.* 2005)
- Use spatial behaviour as additional feature for defining visitor profiles (e.g. Gimblett 1998, 2000, O'Connor *et al.* 2005, Taczanowska *et al.* 2006)

1 \* visitor characteristics (age, sex, professional status, level of education)  
 \* characteristics of the area (accessibility, lodging facilities)  
 \* time spent in the park  
 \* visit frequency  
 \* type of visitor group (couple, family, or friends)  
 \* main motivation for visiting the area

In any case, following demographical, psychological and physiological elements would be desirable to consider when designing artificial agents:

- Socio-demographic variables (age, distance to area, mode of transport, etc.)
- Knowledge about the area (first time visitor vs repeater)
- Type of activity (speed, basic spatial requirements)
- Preferences related to activity (use value: type of paths/attractions...)
- Recreational experience (wilderness experience: type of nature / solitude, social conflicts: crowding /user-conflicts)
- Spatial distribution of visitor types (e.g. entrance choice: main entrance vs smaller one)
- ...

The list of attributes remains open. We aim to encourage further discussion.

## References

- Ankre, R. (2005). Visitor activities and attitudes in coastal areas: A Case Study of the Luleå archipelago, Sweden (Working paper ). Östersund: ETOUR.
- Arnberger, A. & Brandenburg, C. (2001). Der Nationalpark als Wohnumfeld und Naherholungsgebiet. *Naturschutz und Landschaftsplanung* 33(5), 157-160.
- Arnberger, A. & Haider, W. (2005). Social effects on crowding preferences of urban forest visitors. In: *Urban Forestry & Urban Greening* (3), p 125-136.
- Blamey, R. K. & Braithwaite, V. A. (1997). A Social Values Segmentation of the Potential Ecotourism Market. In: *Journal of Sustainable Tourism* (5/1), p 29-45.
- Cohen, E. (1979). Rethinking the sociology of tourism. In: *Annals of Tourism Research* (Jan/Mar), p 18-35.
- Fariás Torbidoni, E. I., Grau, H. R. & Camps, A. (2005). Trail Preferences and Visitor Characteristics in Aigüestortes i Estany de Sant Maurici National Park, Spain. In: *Mountain Research and Development* (25/1), p 51-59.
- Fredman, P. & Hörnsten, L. (2004). Social Capacity and Visitor Satisfaction in National Park Tourism. Reprint from „Proceedings 12th Nordic Symposium in Tourism and Hospitality Research, October 2nd - 5th 2003“.
- Frochot, I. (2005). A benefit segmentation of tourists in rural areas: a Scottish perspective. In: *Tourism Management* (26), p 335-346.
- Galloway, G. (2002). Psychographic segmentation of park visitor markets: evidence for the utility of sensation seeking. In: *Tourism Management* (23), p 581-596.
- Gimblett, R., Daniel, T. & Meitner, M. J. (2000). An Individual-Based Modeling Approach to simulating Recreation Use in Wilderness Settings. In D. Cole & S. F. McCool (Eds.), *USDA Forest Service Proceedings RMRS-P-15-VOL-4* (pp. 99-106). Ogden, UT: U.S. Department of Agriculture, Forest Science, Rocky Mountain Research Station, USDA Forest Service.
- Johns, N. & Gyimothy, S. (2002). Market Segmentation and the Prediction of Tourist Behavior: The Case of Bornholm, Denmark. In: *Journal of Travel Research* (40), p 316-327.
- Kluge, S. (2000). Empirically Grounded Construction of Types and Typologies in Qualitative Social Research [Electronic Version]. Forum: Qualitative Social Research (1). [http://72.14.207.104/search?q=cache:1xFxJ0gb6G0J:www.qualitative-research.net/fqs-texte/1-00/1-00kluge-e.htm+Lazarsfeld+\(1937\)+and+Barton+\(1955&hl=en&gl=nl&ct=clnk&cd=1](http://72.14.207.104/search?q=cache:1xFxJ0gb6G0J:www.qualitative-research.net/fqs-texte/1-00/1-00kluge-e.htm+Lazarsfeld+(1937)+and+Barton+(1955&hl=en&gl=nl&ct=clnk&cd=1).
- O'Connor, A., Zerger, A. & Itami, B. (2003). Building Better Agents: Statistical and Spatial Analysis of Tourist Movement Data. University of Melbourne.
- O'Connor, A., Zerger, A. & Itami, B. (2005). Geo-temporal tracking and analysis of tourist movement. In: *Mathematics and Computers in Simulation* (69), p 135-150.
- Palacio, V. & McCool, S. F. (1997). Identifying ecotourists in Belize through benefit segmentation: a preliminary analysis. In: *Journal of Sustainable Tourism* (5/3), p 234-243.
- Saarinen, J. (1998). Tourist destinations and attractions - interpretations of the spatiality of tourist motives. <http://www.geo.ruc.dk/NST/NST26/Saarinen26.html>.
- Sterl, P., Wagner, S. & Arnberger, A. (2006). Kanufahrer und ihre Präferenzen für Besucherzahlen - Untersuchungen zur Erholungsqualität im Nationalpark Donau-Auen, Österreich. In: *Naturschutz und Landschaftsplanung* (38/3), p 75-80.
- Taczanowska, K., Arnberger, A. & Muhar, A. (2006). Exploring spatial behaviour of visitors in peri-urban recreational areas: multi-attribute analysis of individual route profiles. Paper presented at the CORP 2006: 11th International Conference on Urban Planning & Regional Development in the Information Society. February 13th - 16th 2006, Vienna, Austria.
- Wickens, E. (2002). The sacred and the profane: a tourist typology. In: *Annals of Tourism Research* (29/3), p 834-851.

# Estimating Anchor Site Usage and Potential Pollution Loads for Recreational Vessels in Moreton Bay Marine Park Using Aerial Surveys

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*Keywords: Recreational vessels, marine protected area, use, model.*

## Introduction

Impacts from recreational and tourist vessels in marine protected areas are of major concern to all major stakeholders including tour operators, local communities and regulators. Until recently, very little quantitative monitoring information was available about the use of popular anchorage sites in marine national parks near major urban and tourism centres and the annual (and peak and off-peak) pollution loads associated with this use. This study presents results for a popular marine protected area, the Moreton Bay Marine Park, near Australia's fastest growing urban centre – the Brisbane to Gold Coast growth corridor in south-east Queensland, with an estimated population of more than 2 Million people in 2001 (ABS census) and 95 000 registered recreational vessels (2006). The objectives of this study included:

To develop an empirical model for predicting the number of vessels (by type) staying overnight at popular anchorages in Eastern Moreton Bay (EMB) and

To calculate load estimates (seasonal, annual) for N,P and total faecal matter, and Cu associated with recreational and tourist vessels using EMB.

## Methods

A survey protocol was developed to photograph and, later, count recreational and tourism vessels at 20 anchor sites in EMB by aerial surveys from

a light aircraft flown at ~100 knots at 500 ft, and to assign each vessel to one of 9 original categories.

An analysis of preliminary data (49 surveys) were conducted to investigate counts for each anchor site, to develop indices for leisure time availability and boating forecast weather scenarios, and to investigate relationships between independent variables. Based on the preliminary analyses, regression models were developed for interpolating the number of vessels in each category for each day in EMB in 2005 and pollution loads and errors for Cu, N, human faecal matter and urine were calculated using the predicted vessel numbers and data from the literature.

## Results

Over 3600 individual high resolution digital images from more than 55 aerial surveys of 20 different anchor sites and nine classes of vessels were processed (enhanced) and analysed to document vessel usage and to discriminate between visitors and permanently moored craft. Results from this study based on an overall count of more than 18 000 vessels provided governmental regulators, tour operators and members of the local community with the first quantitative figures about the type of vessels and the time of the year for vessel use of popular anchor sites, and of Eastern Moreton Bay (EMB) as a whole. The empirical models developed from vessel counts also allowed esti-

mation of sewage and Cu loads associated with recreational and tourist vessels between Tangalooma and Tipplers in EMB.

The key predictor of boating activity was leisure time availability (lti), which was in line with results from similar work by Widmer and Underwood (2004) in Sydney Harbour and other locations elsewhere (Crompton & Kim 2004, Samdahl & Jekubovich 1997, Dwyer 1988). For weather variables, however, only some aspects were found to influence vessel numbers, and only for certain boat categories. Overall, an estimated 59,000 vessels used the 20 anchor sites investigated during 2005, emitting an estimated 0.6 +/- 0.4 t of Cu from antifouled hulls. Almost 14% of all vessels and their associated pollution loads were estimated to occur during the 2 major peak seasons, Christmas/New Year (~10 days) and the Easter weekend (~3 days). The total load of N released from all vessels using Moreton Bay were likely to be in the order of 5 t per annum, or equivalent to a modern sewage treatment plant (partial N removal) with an average flow of  $2.5 \cdot 10^6$  l/d.

## Conclusion

Findings from this study provided clear evidence for the benefits of ongoing monitoring for efficient management of the potential conflicts associated with such a large number of vessels kept in such close proximity to a marine protected area. Changes to marine pollution regulations limiting the discharge of untreated and partly treated sewage have been implemented and are now being policed by relevant authorities in all pollution hot spots in Eastern Moreton Bay.

## References

- Crompton, J. L. & Kim, S-S. (2004). Temporal changes in perceived constraints to visiting state parks. In: *Journal of Leisure Research* (36), p 160-183.
- Dwyer, J.F. (1988). Predicting daily use of urban forest recreation sites. In: *Landscape and Urban Planning* (15), p 127-138.
- Samdahl, D.M. & Jekubovich, N.J. (1997). A critique of leisure constraints: Comparative analyses and understandings. In: *Journal of Leisure Research* (29), p 430-453.

- Widmer, W.M. & Underwood, A.J. (2004). Factors affecting traffic and anchoring patterns of recreational boats in Sydney Harbour, Australia. In: *Landscape and Urban Planning* (66), p 173-183.

# Nature Park Project "Toggenburg-Werdenberg" in Eastern Switzerland – Common Chance for a Regional Sustainable Development

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*Keywords: Protected areas, regional nature park, sustainable regional development, feasibility study.*

**Abstract:** In the context of the current discussion about the protection of nature, government as well as non-governmental-organisations (NGO) consider introducing a new system of protected areas in Switzerland. New National Parks, Regional Nature Parks and Nature Experience Parks shall complete the Swiss nature and landscape protection management. Depending on local initiatives there should arise one or two new national parks, about ten nature parks and three to five nature experience parks in Switzerland. Different types of park examples of the neighbouring countries as Germany, Austria, Italy and France are holded up as a model. The experience within these areas shows that parks are an important force in sustainable regional development. The process and first results of the actual regional nature park project Toggenburg - Werdenberg (Switzerland) will be discussed in the following paragraphs. A feasibility study has been carried out and several projects could be implemented.

## Introduction

Regional nature parks are areas of high value in nature, landscape and culture, where a lot of efforts were made to protect those throughout the years. With the help of the regional nature park the attractive landscape shall be embedded in the regional economic cycle and of use for the inhabitants and tourism. At the same time it should facilitate an added value for nature and landscape and therefore support initiatives for example in forestry, agriculture or tourism. Existing deficits could be leveled out, landscape preserved and culture as well as tradition supported. The label is a chance for a better marketing and a positive image - for the region itself and its products. In the end the sensibilisation of the population for a sustainable way of using environment and the preservation of landscape should be managed.

At the moment more than 30 projects are in process to fulfill the Swiss national standards and to enjoy the label and the financial assistance by the state. With the help of this instrument the Government wants to sustain rural areas and nature protection at the same time.

One of these projects is the regional nature park Toggenburg - Werdenberg. By the help of Regio Plus (comparable to Leader+) both regions started a developing process in the year 2001 and 2002. As soon as the government of the departement of St. Gallen declared to support only one regional nature park in their area of responsibility, both projects started to work together. The organisation is built up in the way of a private association with a committee, working groups and members out of different interests as for example administration, forestry, agriculture, tourism, economy, education, policy, nature protection etc.



Figure 1: Lovely landscape and vivid tradition in Toggenburg.

## The Situation

The project area is situated in the north eastern part of Switzerland next to the border of Liechtenstein and Austria. The two regions are very heterogenous. Nature and landscape are affected by a mild climate in the Rhine valley with an altitude of about 450 m up to the typical conditions of a mountainous valley with an altitude of about 1'000 m in the Toggenburg valley surrounded by mountains up to 2'500 m.



Figure 2: View from Werdenberg up to the Kreuzberge.

The region of Toggenburg is confronted with a typical scenario of a rural area: jobs in agriculture get lost, a lot of companies fight to survive and the booking of overnight accommodations in tourism decrease. Therefore most of the young people migrate from the region into the big cities. To put up resistance to this development, region, community and economy want to improve the regional value added. In doing so resources such as intact nature and landscape are very important.

In the region of Werdenberg nature and landscape have a high potential too. In contrast to Toggenburg one can find an increasing population growth and an economic strength in trade and service. The situation in agriculture is getting worse too. The more competition the more extensively gainless land is used and the more intensive production on the remaining agricultural land becomes. Because of recreation and tourism the pressure on nature and landscape increase at the same time. The utilization of land rise and the high biodiversity is threatened.

That is the reason why both regions started to build up a nature park. For a start different projects have been realised. For example the “Klangwelt” - a world of culture, tradition and natural music, the “sagenhafte Familienland” - a special offer for family holidays, the “Werdenberger Apéro” - a catering service of local products by farmer women, the education of park rangers, the construction of several nature trails etc.

Besides the realisation of several projects we needed detailed information about the possible park-perimeter. Therefore a feasibility study was worked out.

## Methods

The study was worked out by the University of Applied Sciences in Rapperswil in co-operation with the local project leaders and working groups. The objective of the feasibility study is to show the chances for a realisation of the nature park. That means in detail: Does the area fulfill the standards? What is the park contribution to the local economical, ecological and social development? What are the strengths, weaknesses, options and threats? What about the participation and the acceptance of the inhabitants? Are there any additional limitations for forestry, agriculture, economy or tourism? How much will it cost?

## Working steps

1. Definition of a maximum area of exploration.
2. Accumulation and evaluation of the natural, cultural and economical values, for example high-moor, areas of high landscape and natural monuments, floodplains, game reserve, forest reserve, protected view of place, preserved castle and ruins, inhabitants, demographical aspects,
3. Combination of the different information in a plan and classification of the whole perimeter into different areas – natural, cultural and settlement.
4. SWOT-Analysis of both regions
5. Analysis of the acceptance and participation of inhabitants via interview of stakeholder and feedback of the steering committee
6. Work out of different scenarios and perimeter alternatives

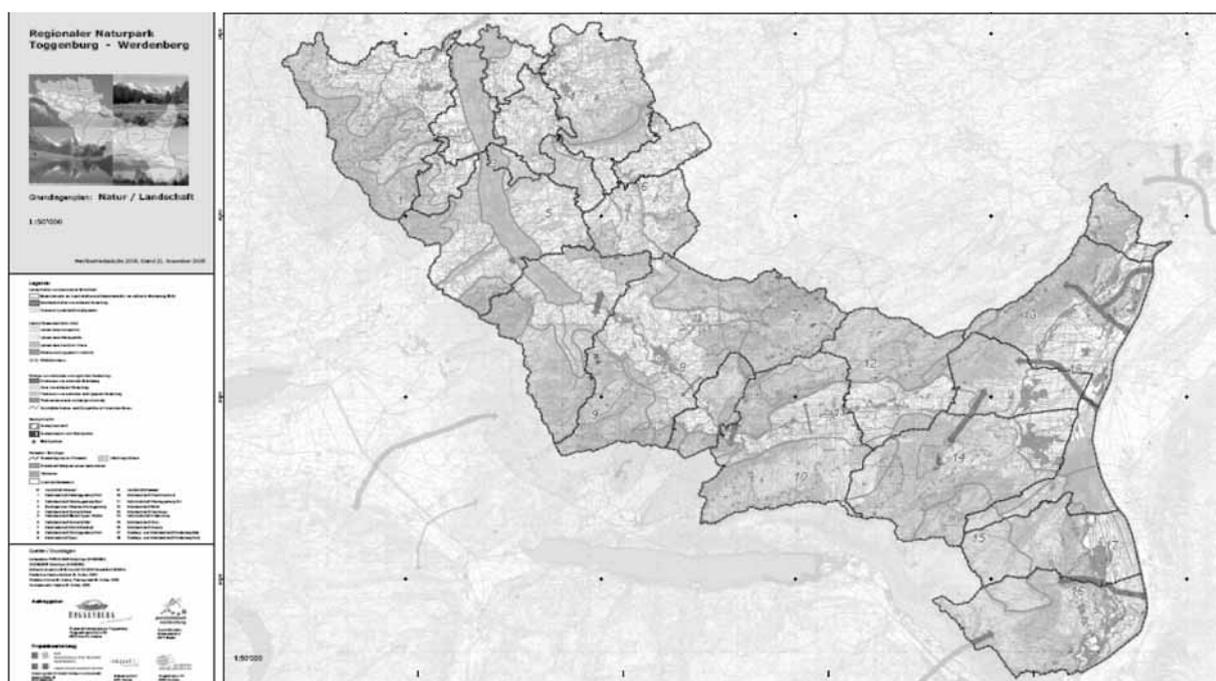


Figure 3: Map of natural and landscape values.

## 7. Evaluation of the financial facilities and need of resources

### Results

#### Value of nature and landscape

Both regions have a high level of nature and landscape value and biodiversity. You will find several protected areas of national, cantonal and regional interest as well as important bird areas, which will be accommodated by the European emerald network. The actual study of the WWF concerning the priority conservation areas of the Alps mentions this area as very important too. Nearly 2/3 of the region is part of a landscape inventory or protection area.

#### Chances and risks

The most important thing is that the regional nature park is a possibility for the region to both plan and develop the future together with the communities, the different stakeholders and the population. Special chances are:

- sustainable regional development with at the same time increasing value added
- possibility to reach a better position in the market with the help of the label, for example agrotourism and regional products

- cooperation between the two regions, communities, private companies and producer may offer new perspectives and products
- information and communication platform as well as regional, national and international network
- strengthening of the regional identification

Typical further nature park products could be offers in natural experience, culture and music, environmental education and excursions, nature park information center, new products in the field of wood and woodenergy, new products in the field of agrotourism, new products around typical cultivation as for example goats, ecological network projects, etc.

Risks could be

- overestimation of the benefits of the park
- need of professional, efficient and locally accepted park management
- impairment of nature and landscape without effective monitoring systems
- fears of further limitations

#### Participation and acceptance

Interviews of key personalities and workshops with stakeholders show a high interest in the nature park. The acceptance in the population is difficult

to estimate. There are only little public relations yet. A wide information campaign about the issues of a regional nature park is missing. Nevertheless it would be very important to erase false ideas and fears. An intensive participation and information is necessary to sustain the bottom up process.

### The right dimension of the nature park area

To discuss the right dimension of the regional nature park a kind of evaluation of the different aspects and landforms is necessary. So quality and quantity of nature and landscape, man-made environment, villages and potential conflicts were evaluated. Basic requirements are the land use planning of the departement St. Gallen and the minimum standards for regional nature parks:

- minimum area of 100 km<sup>2</sup>
- extraordinary value of nature and landscape
- high ecological and sustainable standards in cultivation and economy
- preservation of cultural buildings and a vivid tradition
- natural and socio-economical basis of the region

The evaluation forms five models of different extension and content. Besides the different nature values one can say that the bigger the park the more coordination and costs, and the smaller the park the less marketing and label effect it causes. The outcome of the poll at the com-

munities is a perimeter, which is in accordance to the most probable variant of the feasibility studie

15 villages out of 23 want to be part of the regional nature park. That means a perimeter about 510 km<sup>2</sup> and 58000 inhabitants, a great variety of landscape and nature protection areas, a high economical capability, important cultural and touristic values and an acceptable balance between effort and gain. Furthermore the existing infrastructure can be easily complemented by additional touristic offers and various regional products.

### Special situation

As the national standard specifies not to dissect the area of a village, it should be provided to factor out special sectors - as far as reasonable and possible. In the following three topics special solutions must be found.

### Agglomeration area

Buchs is the biggest village in the perimeter with about 10000 inhabitants. With all of the industrial establishments and the growing housing estates it is declared as an agglomeration area. The typical rural and traditional architecture and even structure of the village is missing. The space between Ebnat-Kappel and Bütschwil has more or less the same problem. By the demand of the state the majority of the villages have to be outside from agglomeration areas to guarantee the rural character of a regional nature park. On the other hand even the bigger villages try to develop in a sustainable way. Buchs for example has got the label of "Energistadt Schweiz" since 2001, has got a high engagement on ecological architecture and realise ecological revaluation projects in the town every year. Together with community, government and state a special solution should be found.

### Intensive cultivation of the Rhine valley

The land of the Rhine valley is highly productive, which is caused by land improvement, intensive dewatering and drainage in the last 50 years. The value of nature and landscape in that area is very small as a lot of natural structure got lost. The potential of revaluation is very high. A few proj-

Projekt Regionaler Naturpark Toggenburg, Perimeter (Stand: 7. April 2006)

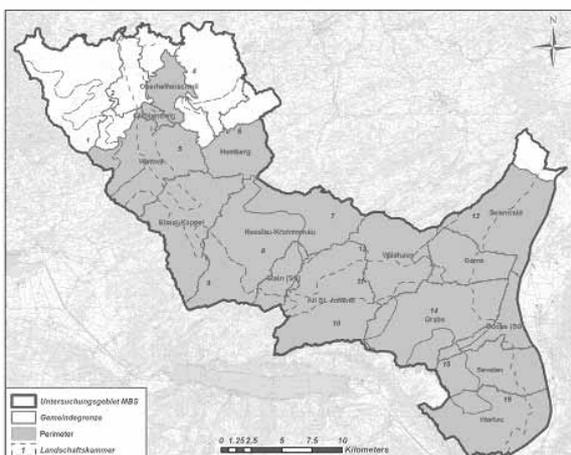


Figure 4: Actual map of the nature park-perimeter.

ects, for example renaturation of turf moor, creation of wetland, extensive grazing with Scottish highland cattle or the construction of dry stone walls, were started with great results. Threatened species found a new habitat or could enlarge their incidence. The nature park represents in cooperation with the agriculture a chance to carry on and to net these revaluation projects.

#### Ski-tourism in the upper Toggenburg

The mountain railways are the engine for the Toggenburg and an important partner for the nature park. Especially the winter tourism attracts a lot of daytourists within a radius of about 150 km (Zürich, Bodensee, Süddeutschland, Vorarlberg). Beside ski-runs, ski lifts and other infrastructure one can find high natural values as moor, dryland and dolines.

A regional nature park doesn't forbid ski tourism and necessary infrastructures in general. The capacity of the skiarea should fit to impacts on the nature area. In this context the state excludes international well known skiareas as Davos, Arosa or St. Moritz. The approval for new projects of the mountain railways are still based on the existing federal laws. One should be aware of that in the future renewing or extension of infrastructure has to be embedded in the landscape. For the ongoing process it is very important to work out the goals and aims of the nature park together with representatives of the mountain railways and to define it in the park charta. An exclusion of the ski area should be avoided, as that would mean a division of the park into two parts and a lost of a main force in the region who wouldn't participate in the sustainable developing process of the region.

#### Financial situation

The amount of cost depends mainly on the size and the scope of projects. According to the regional experience and a perimeter of about 400 - 500 km<sup>2</sup> the expenses for the set-up of the park can be estimated at more or less the same level as the actual regio plus projects. Taking into account that the state is going to pay half of the costs it would mean about five CHF/inhabitant/year. Participation by the departement would reduce the regional financial investment too. The

running of the park may cause additional costs. The state calculates with a total amount of 1.5 Mio CHF/year/park.

### Conclusion - A Regional Nature Park is Possible in the Area of Toggenburg Werdenberg

The result of the feasibility study is positive. The project meets with general approval by the interview partners and stakeholders of the region. The acceptance in the wide population depends on a transparent communication and information. The question of the perimeter and the solution for the difficult areas has to be answered during the process.

Added value for the region: the regional nature park can make a contribution to the strengthening process of both regions as natural relaxing areas and attractive settlements. Further effects of value added can be expected by the local economy, agriculture, forestry and tourism. That could be more than the grant which has to be invested. This aspect is proven by new value added studies in national and nature park areas of Switzerland and neighbouring countries.

Contribution to nature and landscape: many objects with considerable natural and cultural value exist in both regions. There are several nature protection areas of national interest as for example moor, dryland, flood plain forests or river breeding areas of greyling (*Salmo thymallus*) and nase (*Chondrostoma nasus*). The riverside and banks of gravel of the Rhine are eminent as breeding areas for rare birds. The upper Toggenburg and the Säntis is part of the European network for important bird areas (Emerald Network). International studies for example the World Wildlife Fund (WWF) point out that the region of Werdenberg and Toggenburg is one of the priority areas in the alpine space of very high biodiversity, which could be preserved and supported with the help of a nature park. Renaturation especially of the canalised streams and brooks means a high potential for nature revaluation. The wildlife conservation programme for the capercaillie (*Tetrao urugallus*) or the resettlement programme of the lynx (*Lynx lynx*) could be assisted.

Organisation and management: the existing organisation in the way of a private association is suitable to the regional nature park too. Representatives of the different interest groups as well as inhabitants should be members. The steering committee will be dominated by the communities, as they have to agree with the regional development and the payment of the region. The main interest groups may be engaged too. Professional management and execution has to be developed.

### Next Steps

Based on the results of the feasibility study 15 communities have decided to follow up the project. Therefore a public workshop was organised in May 2006 where stakeholders and citizens were invited, the results presented and new working group for the different topics founded. At the moment more than 100 people work out the goals, contents, projects, organisation and management, which should be build up in the following three years. In the beginning of 2007 the motion for financial support has to be finished and should be delivered to the state.

The important part of the project and the management plan is the charter. This charter is an official agreement about the objectives of the park, which is ratified by the communities and the main interest groups. Provided that state, government and region agree to the nature park it is the aim to get the official label of a regional nature park of national interest in 2010. This label is available for 10 years. Afterwards the project will be reevaluated by the state and the park organisation has to point out if and how the intentions of the park and the charter are fulfilled. In case of non achievement of the objectives the state has the possibility to remove the label.

### References

- Mörschel, F. (2004). Die Alpen: das einzigartige Naturerbe. Eine gemeinsame Vision für die Erhaltung ihrer biologischen Vielfalt. Frankfurt am Main.
- Siegrist, D., Zimmermann, U. & Scherrer, H. (2006). Regionaler Naturpark Toggenburg-Werdenberg, Schlussbericht der Machbarkeitsstudie. Neu St. Johann/Buchs.
- Zimmermann, U. (2004). Neue Schutzgebiete in der Schweiz. Das Modell Naturpark als Chance für die Region, vorgestellt am Beispiel Werdenberg. Masterarbeit Studiengang Sustainable Resource Management Technische Universität München.
- Siegrist, D.; Hohl, U.; Aufderreggen, M.; Lintzmeyer, F. & Spiess, H. (2006). Ökonomische Analyse von regionalen Naturpark-Projekten im Kanton Bern. Bern.
- Mose I. & Weixlbaumer N. (2002). Naturschutz: Grossschutzgebiete und Regionalentwicklung. Sankt Augustin.
- Broggi, M., Staub R. & Ruffini F. F. (1999). Grossflächige Schutzgebiete im Alpenraum: Daten, Fakten, Hintergründe. Berlin / Wien.
- Dieterich C., Subotsch N. & Morino S. (2002). Typologie der alpinen Schutzgebiete. Netzwerk Alpiner Schutzgebiete. In: Die Dossiers des Alpinen Netzwerks (8). Gap.
- Job H., Metzler D. & Vogt L. (2003). Inwertsetzung Alpiner Nationalparks. In: Münchner Studien zur Sozial- und Wirtschaftsgeographie (43). München.
- Hammer T. (2003). Grossschutzgebiete – Instrumente nachhaltiger Entwicklung. München.

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On the occasion of the “Third International Conference on Monitoring and Management of Visitor Flows in Recreational and Protected Areas” scientists and park managers from the four corners of the world exchanged the latest research results and discussed how they can be carried out in action. The conference proceedings are concerned with the impacts of tourism use on recreational and protected areas as well as the implications of regional development and nature-based tourism. They address the image of landscape, nature and wilderness, which is the basis of land use and the management of such areas.

