Research on ecological and social sustainability of nature tourism in northern Finland

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Abstract: We present preliminary results obtained from a project concentrating on sustainable nature tourism in Northern Finland. Our aims have been to provide information on the ecological and social sustainability of nature tourism by investigating the tolerance of vegetation to recreation and by surveying the attitudes of local people towards nature conservation and nature tourism. According to our results, even low levels of recreational activities have obvious effects on vegetation cover and species diversity. Attitudes towards nature conservation are positive as long as the opportunities of local people to continue the use of natural resources are not restricted, while opinions towards nature tourism are in general positive in the survey areas. To keep nature tourism at both ecologically and socially sustainable level, close cooperation between stakeholders, such as administrators, planners, researchers, and local people is required.

Introduction

The right of public access has largely shaped the development of recreation and nature tourism throughout Fennoscandia. Known popularly as 'everyone's rights', this allows for free access to and use of both public and private land, provided no harm is caused to people, animals or vegetation. To maintain the increasing tourism activities at ecologically and socially sustainable level, effective methods and indicators based on scientific results are needed. Sustainability requires understanding and the consideration of the motives, interests and values of all users and stakeholders. Management planning should be targeted simultaneously at ensuring biodiversity and healthy environment, at providing nature resources in an economically sustainable way, and at ensuring the social acceptability of management actions. To achieve this multifaceted aim, close cooperation between researchers, administrators, planners, and local people is crucial.

Research on the ecological impacts of recreation and nature tourism started in Fennoscandia during the 1970's (e.g. Wielgolaski 1978), which is considerably later than e.g. in North America and Great Britain, where vegetation studies were carried out already in the 1930's (Bates 1935). By today, there is a remarkable amount of research on recreation impacts in Finland, but most of the studies are still unpublished or available only in Finnish. The studies published for international researchers have been principally carried out in southern or central parts of the country (e.g. Kellomäki & Saastamoinen 1975, Kellomäki 1977, Nylund et al. 1979, Malmivaara et al. 2002), while the number of such studies concentrating on northern Finland is smaller (Hoogesteger 1984, Tolvanen et al. 2001).

A strong interaction exists between nature conservation and nature tourism, since both concern the use of natural resources, and an essential part of nature tourism concentrates on protected areas with pristine environments. Even though several theoretical models and predictions have been made considering the relationship between nature conservation and tourism (e.g., Budowski 1976), only a few empirical studies have been conducted to investigate this relationship (see e.g., Fiallo & Jacobson 1995, Macleod 2001). Also in Finland, empirical studies have surveyed attitudes of local people towards either nature conservation or nature tourism (Järviluoma 1993, Rauhala 1994, Mäkinen 1998, Autto 1999, Malinen 1999, Vanhamäki 2003, Rämet et al. 2004 unpubl.), but the relatioship between these actions has not been much discussed.

This paper reviews preliminary results obtained from a project concentrating on sustainable nature

tourism in Northern Finland. This is a joint project by researchers from the University of Oulu, Finnish Forest Research Institute and Finnish Forest and Park Service. Firstly, we aimed at providing information on the ecological sustainability of nature tourism in order to develop ecological principles for the management of protected areas, for trail network planning, and for the restoration of severely damaged habitats in northern Finland. Further, we focused on investigating social sustainability of nature conservation and nature tourism from the perspective of local residents in order to estimate how well planning has fulfilled the needs of the residents and to detect problematic issues arising from conservation and tourism. These aims have been approached by ecological field studies investigating the tolerance of vegetation to recreation, and by surveying the attitudes of local people, respectively.

Ecological sustainability

Field study regions

Our studies concentrate in the Pallas-Ounastunturi National Park and Oulanka National Park since the late 1990's. The number of tourists has increased considerably in these national parks during recent decades: annual visitor numbers are approximately 100,000 at Pallas-Ounastunturi, which is 2.5 – 4 – fold compared with the situation 20 years ago (Penttilä et al. 1998). The Oulanka National Park had 162,000 visitors in 2002, which is 2.7 times as many as ten years previously. At Pallas-Ounastunturi National Park it is estimated that 40% of tourists come during the summer season and 60% in winter (Tervo 2003), while at Oulanka the emphasis is on summer recreation. Recreation has an impact on the environment throughout the year, but in the form of different activities, which are often concentrated within different areas.

Pallas-Ounastunturi is the first Finnish national park where large-scale surveys have been repeatedly carried out to investigate the condition of hiking trails (Y. Norokorpi, unpublished material). Additional experiments were carried out in order to estimate the tolerance of vegetation and soil to various factors of trampling, such as the intensity and timing of trampling (Pesonen 2003, Törn et al. unpublished). Impacts of hiking and skiing have also been compared (Tervo 2003). An underlying issue in all surveys and experiments has been the identification of the most sensitive and the most tolerant vegetation types.

Impacts of trampling on vegetation

The major effect of recreation is mechanical trampling of vegetation, which leads to changes as well in microclimate, as in the physical, chemical and hydrological properties of the soil (e.g. Chapin & Shaver 1981, Kevan et al. 1995, Forbes et al. 2001). Ecological changes are inevitable even after slight and short-term trampling. The overall tolerance of vegetation to trampling depends on the combined resistance and resilience of each species and the rate of regeneration after disturbance (Cole 1995a, b). The negative impacts of hiking on vegetation show usually non-linear patterns and at some threshold the loss of vegetation is total (e.g., Hammit & Cole 1998). Reductions in density and cover of vascular plants occur quickly at relatively low trampling intensities, but as either the intensity or the frequency of trampling rises the rate of deterioration becomes much slower (Pesonen 2003). Recreational impacts vary also between vertical layers within vegetation types, i.e. ground cover, shrubs and saplings and mature trees (Hammit & Cole 1998) from which we focus here on ground cover and shrubs. Depending on the vegetation type, visible trails form as soon as 10 – 25 persons using a same route, and a threshold level of a significant disturbance to vegetation cover seems to occur after between 75 and 200 passes (Tolvanen et al. 2001).

Plant responses to trampling varies in terms of both life form and morphology. Many graminoids and deciduous dwarf shrubs have high rates of photosynthesis and growth, and large belowground organs for carbon/nutrient storage (Chapin 1980, Bryant et al. 1983, Karlsson 1985). These characteristics help such plants to regenerate after disturbance and gain competitive advantatage over less resilient species, such as evergreen dwarf shrubs. Plant morphology, considering the amount of belowground meristems protected from trampling, may override the importance of life form in the regeneration. In a short-term trampling experiment three species groups relative to their regeneration rate could be identified: graminoids and forbs recovered most rapidly, rhizomatous deciduous and evergreen dwarf shrubs of *Vaccinium* spp. were intermediate, while the non-rhizomatous shrubs, such as the evergreen *Empetrum nigrum* and deciduous *Betula nana* recovered most slowly (Tolvanen et al. 2001). In a longer-term trampling experiment, where repeated trampling was applied, similar results were obtained, except that the forbs were almost entirely destroyed during the course of the experiment (Pesonen 2003). This indicates that the tolerance of forbs was lowered by their weak resistance to trampling.

'Delayed action' responses are common in studies considering trampling impacts on vegetation (Forbes et al. 2004). For example at subarctic Kilpisjärvi, Finnish Lapland, plants of *Empetrum nigrum* continued to die one year, and *Betula nana* well into the second year, after one-time experimental trampling treatments (Forbes et al. unpubl). Our observations from northern boreal Oulanka National Park support the delayed responses of mosses, while vascular plants seem to react more rapidly to trampling: after 100 passes applied once on the experimental trails, the relative cover of vascular plants decreased to less that 50% of the original cover. Similar reductions in

the relative moss cover required approximately three to four trampling occasions of 300 or 100 passes, respectively (Figure 1, Pesonen 2003). The delayed response of the mosses to trampling was apparently caused by the buffering impact of the field layer, which is reduced by the death of the vascular plants.

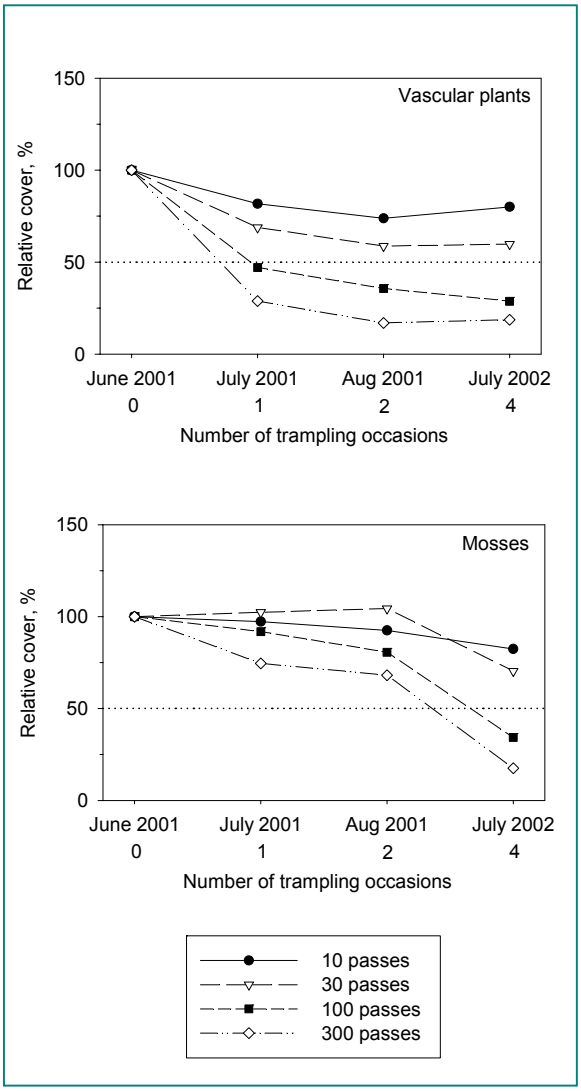

Figure 1. Relative cover change of vascular plants and mosses under repeated trampling, which has been carried out three times during each summer at four intensities. Summary results combined from three contrasting boreal forest site types are presented.

Topography and elevation greatly influence the vulnerability of a habitat to disturbance. Slopes are most sensitive to wear due to the combined influence of trampling and water erosion, the latter occurring especially during snowmelt period. In our experiments, 150 passes on flat terrain caused approximately the same decrease in plant cover as did 25 passes on steep slopes, i.e. the impact of trampling on slopes was six-fold relative to flat terrain (Törn et al. in prep.). Moreover, downward trampling had a slightly greater impact on vegetation than had upward trampling, which is due to the heavier pressure of the steps when hiking downward. When controlled tramping treatments were applied either in June, July or August, there were no differences in the regeneration of plant cover between treatments (Törn et al. in prep.). Early season disturbance could be assumed to be more deleterious for vegetation due to the mobilization of storage reserves from below-ground organs, but this was not observed in our work apparently since the trampling treatments were only applied once.

The influence of contrasting recreation activities may differ considerably due to e.g. the differences in the mechanical impacts on soil and vegetation, and due to different timing and intensity of the activities. Our comparisons on the impacts of hiking and skiing reveal that the direct influence of skiing on soil and vegetation is not as great as that of hiking (Tervo 2003). On the other hand, the influence of skiing is spread over a wider area, since skiing trails are broader and, especially near tourist resorts, maintained by machines, which press and compact the snow and delay the timing of snowmelt. The tolerance of vegetation to hiking and skiing is opposite between the dry and mesic vegetation types: hiking reduces plant cover most in dry vegetation, whereas skiing has a negative impact on mesic vegetation types. Relatively dry forests seem to be most tolerant to both recreation forms (Tervo 2003). The negative impact of skiing is based on a decreased cover of the dominant deciduous dwarf shrubs, which are found to be replaced by evergreen species (Tervo 2003). The great width of the modified area and the time to recover during summer may create opportunities for light-favouring species, such as lichens and evergreen plants to increase on skiing trails (Tervo 2003).

In practise, the numbers of hikers on nature trails are considerably greater than in our experiments, where the maximum number of passes has been 500 (Tolvanen et al. 2001) or 1800 (Törn et al. unpubl.). To be realistic, we have to talk about hundreds or thousands of users during a single summer period. The long-term physical influence of hiking is to compact the soil and reduce the thickness of the soil humus layer. On such trails no vegetation can grow, and the main issue is to keep their physical dimensions under control. Earlier studies have shown that changes in the condition of hiking trails may be rapid: at Pallas-Ounastunturi, during a three-month summer period with fewer than a thousand hikers it was observed that hiking trails can expand by up to 70 cm in width and be worn down by as much as 1.5 cm in depth, with average figures for these types of erosion being 3.1 cm and 0.15 cm, respectively (Koivula 2000). In areas of high wear, complete closure of the trail or artificial structures, e.g. stairs, duckboards, or cover by gravel or pavement, are probably the only methods to protect the environment from further wear.

Introduction of alien species

An essential risk for the biodiversity of protected areas is caused by invasive species, which, once introduced, may spread along roads and trail network and occupy space from local species. In Finland, horse riding belongs to 'everyone's rights'. Besides considerable trampling influence, horse riding poses a risk for protected areas through manure which may spread seeds of alien and invasive species.

We have investigated the impacts or horse riding at Oulanka National Park by trail surveys and controlled experiments since 2001. Our preliminary results show considerable influence by horses on the species composition: seedlings of fast-growing grasses and forbs emerge along trails and horse resting areas. Also in controlled experiments, the impact of horse manure on the emergence of seedlings is remarkable (Figure 2, Törn et al. unpubl.). We do not know yet whether the new species can establish in the area or whether the changes are reversible and can be negated by e.g. the reduction or cessation of horse riding in the area. Our further studies will bring light to the long-term impacts of the horse in the research area.

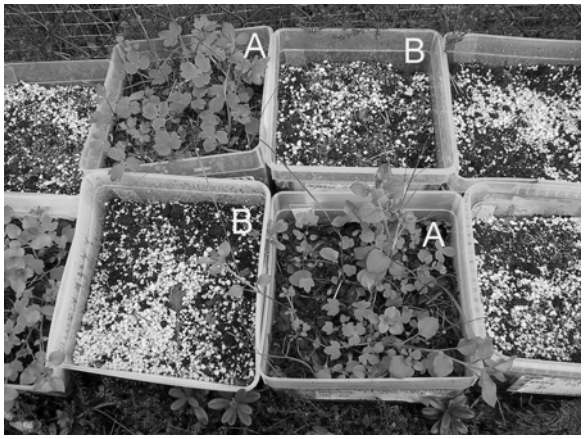

Figure 2. Emegrence of seedlings from forest soil added with perlite and horse manure (A) relative to soil added with perlite only (B).

Long-term ecological impacts of nature tourism

According to our results, recreational activities have obvious effects on the vegetation, even when low levels of pressure are concerned. Long-term disturbance may change the species composition, as vulnerable species disappear from their original habitats while more tolerant species are established in the area. The extreme consequence of trampling on vegetation is complete removal of vegetation, which initiates erosion.

Because the restoration of vegetation to severely damaged habitats is difficult and expensive, the vegetation response of different vegetation types should be taken into account already during the planning of recreational use. Effective methods and indicators based on scientific results are needed to measure and predict the effects of nature-based tourism on different types of environment, and to plan and control the use of natural habitats for tourism.

Attitudes of local people towards nature conservation and nature tourism

Nature tourism always relies on environmental resources and is strongly interlinked with nature conservation especially in protected areas. Budowski (1976) has classified the relationship between nature conservation and tourism into three categories. (1) Conflicts emerge when tourism has detrimental effects on the environment and when there is little contact between tourism and conservation. Conflicts may also arise from a situation where tourism is a victim of an already deteriorated environment. (2) Coexistence indicates that under certain circumstances, nature conservation and nature tourism may coexist to each other's benefit. For example, coexistence may be attained by dividing areas to different use in time and space. (3) In symbiosis, the protection of environment can be enhanced by tourism, when appreciation towards nature and conservation increases as a consequence of tourism.

In order to estimate how well planning has fulfilled the needs of local residents and to detect specific problems arising from conservation and nature tourism we carried out a survey of the attitudes of local residents towards nature conservation and the development of tourism in Kuusamo and in Pudasjärvi (Rämet et al. in prep., Törn et al. unpublished). Kuusamo area is a suitable focus for this type of study, since it has many protected areas of different sizes and types, each with their own conservation history. In Kuusamo the oldest and the most important protected area is the Oulanka National park. New protected old-growth forest areas were recently designated just south of Kuusamo, after a long and controversial process. Additionally, Ruka, one of the most popular ski resorts in Finland, is located in Kuusamo. In Pudasjärvi, Syöte National Park was established in 2000. Iso-Syöte, a popular tourist resort in Finland, is located in the vicinity of the national park. We included four areas in Kuusamo (North Kuusamo, Ruka area, the town centre and South Kuusamo) and two areas in Pudasjärvi (Syöte and Sarajärvi) for the survey, which was carried out in 2002 and 2003, respectively.

In general, local residents showed a positive attitude towards nature conservation, as long as their own opportunities to continue the use of natural resources, such as picking berries, fishing and hunting, were not restricted. In Kuusamo, most respondents living in the vicinity of protected areas (North and South Kuusamo) regarded that there are too many protected areas in Kuusamo, while respondents

living at town center or close to Ruka tourist resort had a more positive attitude towards conservation (Figure 3). In Pudasjärvi, no great differences occurred in the opinions towards nature conservation between respondents of the two survey areas (Figure 3, Rämet et al. in prep.).

Opinions on the consequences of nature conservation varied considerably among the survey areas. In general, the most positive impacts were seen in the appreciation of the local area within and outside the country, in the attractiveness of nature and in the positive influence of conservation on tourism. Many people living at Ruka and Syöte regions get incomes from tourism, which apparently increased their positive opinions towards nature conservation (Rämet et al. in prep.). Nature protection was seen to affect negatively to the employment and economic life of the area.

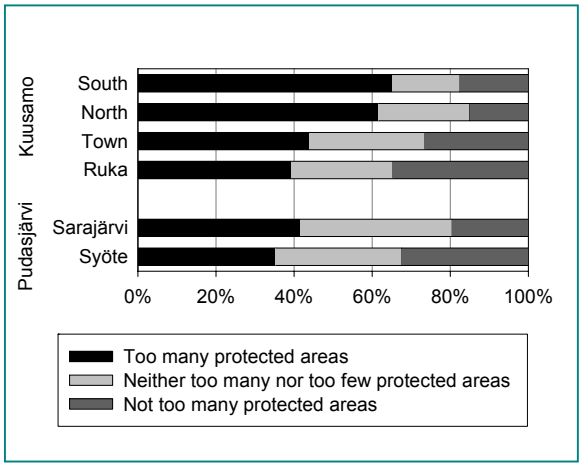

Figure 3. Opinions on the amount of protected areas in the municipality among respondents from Kuusamo and Pudasjärvi.

Attitudes to nature tourism were generally positive. Most respondents were willing to accept an increase in the number of tourists in their municipality (Figure 4). Although they usually accepted the increase in tourism also in their immediate area, the willingness of the increase was always somewhat smaller than at the level of the whole municipality (Rämet et al. in prep.).

The most positive impacts of tourism were seen in the improved employment, local services and incomes of people. Besides economic benefits, social benefits were seen in the increased activity of villages and new influences brought by tourists. Respondents with direct incomes from tourism had more positive attitudes towards tourism than those with no incomes from tourism. Opinions on the negative impacts of nature tourism varied considerably among the survey areas. In Kuusamo, the most negative consequences were seen in environmental problems, such as the wear of nature and waste problems. In Pudasjärvi, restrictions in land use were seen as the most 'negative' effects. Contrasting interests or even conflicts between local residents and tourists, and to a lesser extent increased jams were felt as the main social problems of tourism. The investments allocated to the development of tourism at the expense of other livelihood were seen as the main economical disadvantege of tourism among the local inhabitats in Pudasjärvi area. The higher price levels and seasonal changes in employment were considered as minor economic disadvantages.

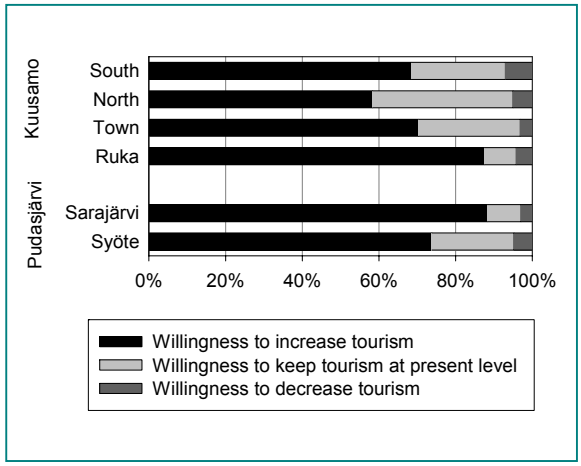

Figure 4. Opinions on the amount of tourism in the municipality among respondents from Kuusamo and Pudasjärvi.

There were clearly conflicting interests among stakeholders within the survey areas, depending on the personal values of the respondents. Most respondents thought that their opinions had not been sufficiently considered during the planning process of tourism in their region. However, the respondents would not be willing to increase their participation in the planning, even if they were given a chance. Hence, even though the results of our survey emphasise the importance of management planning and the participation of stakeholders in rural areas, there seems to be little interest among local people to participate in planning.

Towards sustainable nature tourism

Definitions of sustainable tourism typically emphasise ecological, social and economic elements of tourism in order to achieve a 'wise' use of natural resources. However, defining what exactly constitutes a wise use of resources may depend greatly on the values held by the stakeholders concerned. From an economic viewpoint, tourism brings incomes to local communities, but from an ecological standpoint, tourism poses a threat to sensitive environments. Conflicts can easily arise due to the different values of stakeholders. Co-management is a promising option for the resolution of resource-based conflicts related to the development of tourism (Rämet et al. 2004 in review). A certain degree of conflict may even be required before stakeholders initiate negotia-

tions towards co-management agreements, hence conflicts should be appreciated as opportunities for change. The fundamental assumption is that resource management will be enhanced by the sharing of authority and decision-making, making it more responsive to a wider range of needs. Advantage of the complementary knowledge of different stakeholders is taken; residents and tourists may have experiential 'views' about the area concerned, while officials and decision-makers rely more on scientific 'facts' (Rämet et al. 2004 in review).

If sustainability is not clearly defined and monitored through the use of quantitative and/or qualitative indicators, communities may easily remain unconcerned about long-term ecological and social sustainability in their decisions. In principle, the starting point for any activity that uses natural resources is ecological sustainability. However, nature tourism does not directly use natural resources in the same sense as for example forestry and mining. Nature tourism can benefit nature conservation by increased appreciation of nature, which may increase ecological sustainability of tourism. Similarly, nature conservation benefits nature tourism and, consequently, the economical sustainability of tourism. Hence all dimensions of sustainability are assumed to have their specific roles, which altogether support the sustainability of nature tourism.

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