Monitoring and Management of Visitor Flows in Recreational and Protected Areas
Conference Proceedings ed by A. Arnberger, C. Brandenburg, A. Muhar 2002, pages 95-101

Integrating Tourism and Grouse Habitat Protection in the Black Forest

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Abstract: This project illustrates methods for combining tourism and conservation. The project area of 8.000 hectares is a popular central European tourist attraction. It is also NATURA 2000 area and habitat of the hazel grouse (Bonasa bonasia L.) and capercaille (Tetrao urogallus L.). Grouse species are used as indicators for environmental features such as diversity, natural character and beauty of the landscape. A catalogue of integrated actions was coordinated in a two-phase method based on detailed inventories of the landscape ecology, tourist use, the habitat and distribution of grouse species:
The first step was to tune the measures for habitat improvement within a spatial concept with rest zones for wildlife in which silvicultural measures should improve habitat structures.
The second step was coordination with local authorities and NGO's to concentrate and improve the tourist infrastructure outside these rest zones.
The result of the project (begun in 1998) has been a win-win-situation: improvement of habitat structures as well as improved offer for tourism. Conservation and the utilization of nature are no longer regarded as contradictory. The dynamic of a spatial concept based on scientific results allows all the various interest parties to work together. The project is supported by EU's "LIFE-Nature" programme.

INTRODUCTION

The Feldberg area is a popular tourist attraction in central Europe. Tourism is the primary source of income for local communities. Besides agriculture and forestry, summer and winter sports and other recreational activities lead to a variety of environmental impacts. In addition, the Feldberg area in the southern Black Forest must be seen within the context of nature conservation of special significance. In this area, rare subalpine flora and fauna have found unique sanctuaries outside the Alps. Hazel grouse and capercaille, endangered species in central Europe, also still live here. A large refuge and an EU bird preserve (SPA) have been established to protect this valuable landscape. It has also been suggested that the whole region be granted NATURA 2000 status.

User conflicts develop between species and habitat protection on the one hand and tourism on the other. The central aim of the project was not to simply to leave tourism and conservation as contradictory viewpoints but to harmonise them. In the Black Forest, hazel grouse and capercaille are used as indicator species for such environmental factors, and thus for the extent that nature has remained intact. If abundant numbers of these species can be maintained on a long-term basis, a successful harmonisation between natural environmental and cultural touristic use would be implied. Such a combination could be considered as a fundamental requirement for tourism and sports in the countryside.

A project programme was designed to realise these objectives. Supported by the EU's LIFE programme, the "Integrated Habitat Protection for Grouse in the Black Forest" project was established. It is co-ordinated and conducted by the Forest Research Institute (FVA). It was approved by the European Commission in 1998 and was set up to last for four years. Actual implementation is to be exclusively supported with various grants. Support from forest owners and the representative organisations of interest groups is needed for long-term activities extending far beyond the immediate project goals. The current grant consists of financing from the EU's LIFE Nature programme (50%), the State Forest Service via FVA (40%), and the Conservation Service in Freiburg (10%).

THE PROJECT REGION

The project region is in the southern Black Forest around Feldberg. The total area of 8,500 hectares is about 80% forest. All types of forest owners are represented: 50% is state-owned forest, 38% council forests, and 12% is privately owned. The lowest areas have a height of 630 m above sea level, while the 1,493-metre-high Feldberg itself is the highest point.

The forests mainly consist of spruce and beech, characterising the landscape in the most varied of

combinations. These mixtures are mainly enriched by fir trees and, in younger forest stands, through a variety of deciduous trees. Pine and other conifers are less commonly present.

The Feldberg massif is also one of central Europe's most intensively used regions for tourism and sport tourism. In summer, the region is extremely popular among hikers, mountain-bikers, and others seeking recreation and relaxation. An all-season ski-roller facility with a biathlon shooting range is available for competitive sports. In winter there are numerous ski-runs and lifts for the alpine skiers. The region also has a dense network of cross-country ski-runs on which numerous national and international Nordic ski competitions, including biathlons, are organised. Winter hiking and snowshoe hiking are forms of recreation carried out in some parts of the region.

METHODS

In order to achieve the project objectives, a broad interdisciplinary approach was chosen, consisting of the following elements.

1. Inventories of the habitat structure, the occurrence of grouse, the touristic infrastructure.
2. Mapping, data management and evaluation using geographical information systems (GIS).
3. Development of a catalogue of integrated measures co-ordinated with the Forest Service , local authorities and NGO's.
4. Implementation of integrated measures involving concepts of silviculture and visitor steering, in particular.
5. Control verification of results and monitoring.

GIS application

The numerous questions posed by analyses of ecological systems required rapid access to large amounts of data, the automation of problem-oriented evaluation levels, and the display of results in thematic maps and tables. Geographical Information Systems (GIS) fulfilled the demands for evaluation and the display of results. The digital collection and evaluation or display of space-related data was carried out by means of ARC-INFO by ESRI, and IDRISI. The data obtained was laid down in an Access database that converted information from cards into digital form and integrated the appropriate subject data in the database. The type and intensity of land use was derived from Landsat-5 data and from the state surveying department's topographical cartographic information system (ATKIS).

Habitat analysis

Mapping of the habitat structure involves collecting habitat-determining structural parameters. These were derived from both the characteristic forest structures and the specific habitat requirements of the hazel grouse and capercaille regarding food and cover.

A two-stage process was developed:

- First, the selected habitat parameters were collected without influencing their evaluation.
- In the second step, the habitat parameters were linked to one another depending on the particular question involved and submitted to an evaluation matrix.

Thus this method differs from other evaluation processes that directly carry out evaluation-oriented mapping of forest areas as suitable or unsuitable. The procedure developed consists of the following steps:

The area under investigation was divided up into "habitat patches", as far as possible not <1 ha or >50 ha. That part of the habitat of a species that was homogeneous with regard to the habitat factors to be evaluated was defined as a habitat patch. When possible, delineation of these patches was oriented upon the official borders of the forest stands.

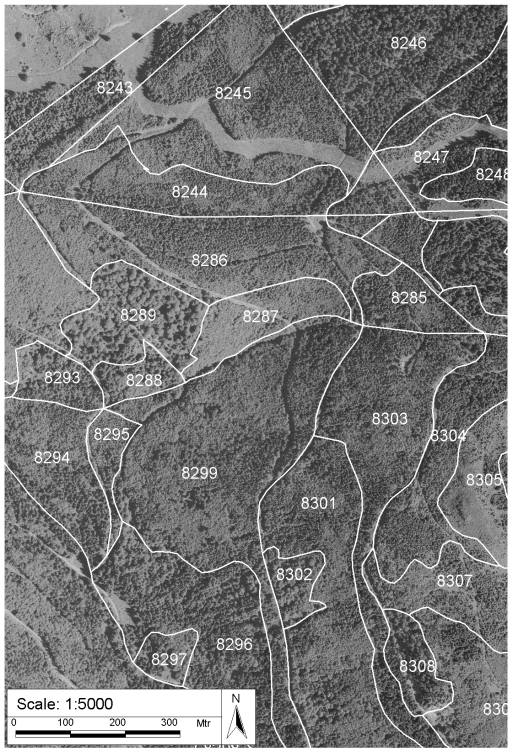

Figure 1.: Habitat analysis by habitat patches (Suchant, 2001)

The method used can be described as follows:

- The habitat parameters of each habitat patch were collected terrestrially.
- The geometrical data were obtained in the GIS. Each habitat patch was assigned a number, allowing both linkage to the parameter data of the habitat structure mapping and to other project data.
- The parameter data was brought together in the form of an ACCESS file.
- Coverages could be created for each habitat parameter by linking the geometrical data with the parameter data.

- The calculations were carried out using STATISTICA statistical software.

Habitat evaluation

First, indicators were evaluated for suitability as a food-base and for providing protective cover. The defined indicators were then linked to one another and aggregated in a second stage.

Varying habitat requirements, related to gender and season, were taken into account during the first evaluation by differentiating between 3 variants ("capercaille winter", "cock summer" and "hen summer"). Differentiation between cock and hen in summer is necessary as hens need more food and protective cover during the incubation and rearing periods. The indicators were not weighted but classified as suitable or unsuitable. Patches that were neither suitable nor unsuitable were labelled as neutral habitat patches.

Surveying grouse distribution

In the project area, regularly collected recording forms are used for the information obtained directly and indirectly by the various forest managers and other observers. The recording process involves the forest managers passing on the observations on the recording forms every six months in June (for the winter period from 01.12. to 31.5.) and December (for the summer period from 01.6. to 30.11.). This type of systematic recording has been in action since summer 1996.

In addition to the direct observation of an animal, indirect proofs can be obtained. These methods include dusting places, feathers, tracks and droppings. Provision of the location allows an unambiguous and thus also cartographic representation of the recorded event, so that it can be allocated to the habitat patches of the habitat mapping. This also permits the success of measures for habitat design to be assessed with a locational reference.

The touristic infrastructure and its use

Surveying, representation and analysis of the existing touristic infrastructure, and its use in terms of time and space was also carried out with the help of a GIS. To this end all point, line and elements of tourism infrastructure within the project area were first identified and digitalised. In the process, a distinction was made between summer and winter use. A further differentiation was carried out regarding the type of touristic use: cycling, hiking, winter hiking, cross-country skiing, alpine skiing and cross-country skiing tours. Furthermore, all hotels, cabins and lodges, etc. and all car parks were registered. Topographical and thematic maps were involved in addition to our own mapping.

As mentioned above, the intensity of use was determined in addition to surveying the use of space. Photoelectric switches were used to gain 24-hour, year-round values for use intensity at frequently visited recreational nodes. The distribution of visitors in the project area was determined using the multi-moment recording method developed by KARAMERIS (1982). Moreover, a visitor questionnaire styled on ATTESLANDER (1995) proved effective in determining the times of recreation, motivation and aims. Surveys and observations made by the locally responsible regional managers were validated using the results of POLENZ (2000), who in Autumn 1999 carried out a visitor questionnaire and moment recording in the project area. In addition, a study by the Workgroup for Landscape and Environmental Planning (AGL) (1995) on the temporal and spatial use of the Feldberg peak within the project area was evaluated. Its results confirm the trends observed in our own surveys and by POLENZ (2000).

Grouse Species as Indicators

An important aim of the project is to continue using the incidence of the grouse species as indicator species for a high level of biodiversity and as characteristic species for the individuality and beauty of the natural landscape in the Black Forest. The significance of the capercaille as an indicator for a high level of **biodiversity** was demonstrated by SUCHANT (2001), who treated the varied structure of its habitat as an indicator for diversity and not the incidence of the species itself.

The importance of grouse as an indicator for the **individuality of the natural landscape** is a reference to the characteristic forest habitats of the capercaille and hazel grouse. When one considers the entire European distribution of the two species it is clear that they are mainly present in the large closed forest areas of boreal climatic zones. In central Europe their distribution pattern correlates with areas of highly forested mountain ranges. According to SUCHANT (2001) there is a strong horizontal differentiation of incidence in mountain ranges. Capercaille in particular are most heavily concentrated in montane and high montane locations. The project area includes such highly forested montane and high montane sites of a central European mountain range. Thus the incidence of the grouse can be taken as an indicator for this area of forest that, as a result of local climatic conditions, exhibits specific forest structures.

The **beauty** of the natural landscape is judged according to anthropogenic standards of evaluation. The capercaille and hazel grouse are considered to be the "remnants" of an original and thus "more beautiful" nature. The symbol of the so called "majestic cock" symbolises, as almost no other animal could, a natural forest landscape, not destroyed by mankind. These associations were made clear during a meeting of experts that took place within the framework of the project. On the question of why capercaille, in particular, should be protected there was unanimous agreement among

all the experts present: "We protect capercaille because we like them"!

Not least is the consideration that given all the anthropogenic utilisation of forests (wind power generation, tourism in all its forms, buildings, etc.) grouse in their areas of incidence can be used as indicators for the destructive potential of human intervention in nature.

Co-ordination process

A two-stage approach was developed for project implementation: First, as a result of its prime importance, the relationship between grouse population development and the existence of sufficient suitable habitat structures was demonstrated. Building upon this, the problem of superimposing the spatial and temporal use of forests by wild animals and, simultaneously, by humans seeking recreation, relaxation and sport. It was, however, assumed that a certain level of disturbance represented no threat to populations of grouse species in the presence of sufficient suitable undisturbed habitats.

A two-stage process for solving conflicts was developed based on these considerations (Fig. 2):

- During the first phase, the Forest Service was won over as a partner for implementing habitat improvement over a large area. Private and community forest owners were convinced of the need for implementing habitat-improving measures by means of a trust-building information campaign and visits to demonstration tended areas. As a result, the implementation of measures could be started on straight away.
- A visitor steering concept was worked out jointly by all the project partners, i.e. with representatives from the areas of sport, tourism, local institutions, conservation and the Forest Service. The agreed aim of this concept is the creation of ideally suited quiet zones for wild animals and the simultaneous steering and concentration of touristic use of space in particular areas, within which the particular touristic infrastructure is to be improved. Visitor steering is thus qualitative and not restrictive.

As a result of the collaboration with the Forest Service, and the agreement on all the measures for steering visitors with the above-mentioned project partners, the interests of all those organisations concerned with protecting and using the area could be integrated.

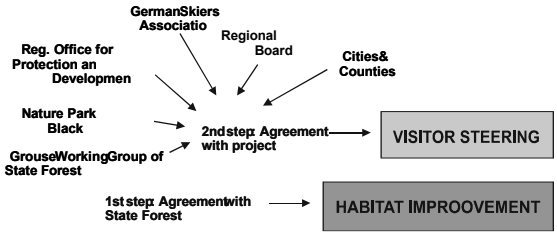

Figure 2. Two-stage Co-ordination

SELECTED RESULTS

Habitat Analysis

A first overview of the existing habitat structures was provided by assessing the types of tree species present in the area (Fig. 3).

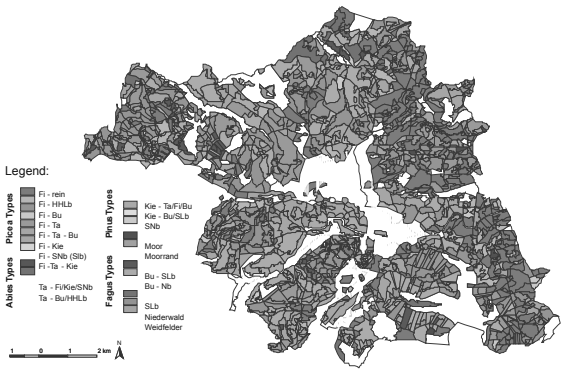

Fig. 3: Tree species distribution

The illustration provides information on the following properties:

- The variety of stand types with widely differing mixtures of tree types.
- The mosaic structure with highly varied individual patch sizes.
- The heterogeneous distribution of the stand types: there are concentrations of similar stand types in certain areas, e.g. beech-dominated stands in the west and the spruce-dominated in the east.
- No dominance of one stand type over larger areas.

The evaluated habitat parameters could all be displayed in a similar way. A habitat evaluation differentiating between summer and winter was carried out in order to gain an overview of the suitability of habitats for the capercaille and hazel grouse.

The results are: 10 % of the patches offering neither food nor cover. On the other hand, the proportion of habitat patches offering both food and cover in winter is very low (10%) while in summer, with more than 1/3 of the patches, it is clearly higher. Correspondingly, the amount of neutrally evaluated habitat area is very high (winter 82%, summer 58%). This indicates a very high improvement potential for improving food-bases and / or protective cover.

Grouse distribution

A total of 875 cases of capercaille evidence were found during the 8 survey periods: 460 for cock capercaille (52% of all sightings), 200 for hen capercaille (23%) and 215 proofs of indirect evidence (25%). In addition 14 chick groups were observed.

The distribution of direct sightings can be characterised as follows. There were always more observations of cocks than hens. There were strong fluctuations in the number of observations made during the different periods. Thus 98 capercaille observations were recorded in summer 1996, but only 12 in winter 1999.

There were between three and four evidences of chick groups during each of the survey periods. The relationship between hen : chick groups observations, however, varies: summer '96: 12:1, summer '97: 6:1, summer '98: 9:1 and summer '99: 10:1.

If one relates the sightings to the observation location it becomes clear that in the majority of habitat patches there were only one or two capercaille sightings in the 8 survey periods (cock, hen or indirect evidence). Only in 16 habitat patches were there more than 10 sightings in the 8 survey periods. The maximum number of sightings in one habitat patch during one survey period is 25.

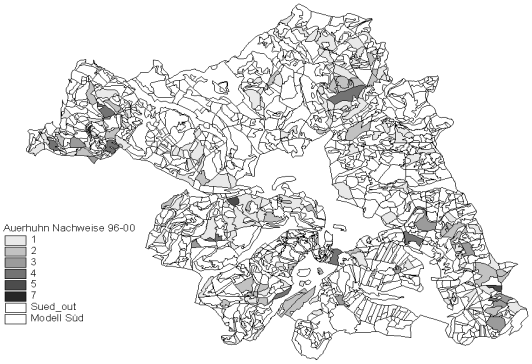

Fig. 4: Spatial distribution of grouse proofs

Fig. 4 shows how the capercaille sightings are distributed. There is also a correlation between sightings and altitude in the model region. Thus, for example, 31% of sightings were made between 1200 and 1250 m above sea level. In comparison only 16% of the habitat patches of the entire model region are found at this height level. The vast majority of sightings (approx. 95%) took place at above 1050 m, i.e. roughly in the model region's high montane areas. Below 1050 m there were very few and below 950 m only single sightings. Spatial relationships to touristic use can also be seen in this distribution dependent on high altitudes. Touristic use too is almost exclusively to be found in the highest locations.

The touristic infrastructure and its use

As a result of the opportunities presented by GIS evaluation it was possible to show seasonal and annual spatial and temporal touristic utilisation in the project region separately according to the various types of use and, in a further step, to superimpose upon it the results of the habitat structure mapping and the stand monitoring for the grouse species. This allowed overlapping use, and the resulting conflict potentials and improvement potentials for conservation and tourism, to be clearly shown.

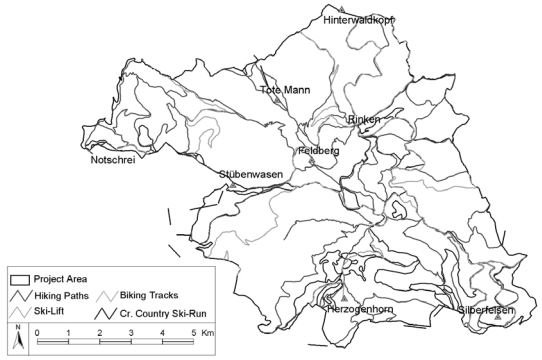

Fig. 5: Touristic infrastructure

With regard to the spatial distribution of touristic infrastructure shown in Fig. 5 it is worth noting that

- there is a closely meshed network of paths (182 km long = 21 m / ha),
- numerous additional mountain-bike routes run through the region (71 km = 8 m / ha),
- the cross-country ski-runs totalling (92 km = 11 m / ha) are, to some extent, already very well concentrated,
- the centre, and thus the highest point, of the region is characterised by alpine ski sports.

As a whole, the intensive and widespread touristic or sport-touristic utilisation of the project region can be seen very well as a result of this evaluation.

The intensity of utilisation is shown in Fig. 6 using an example.

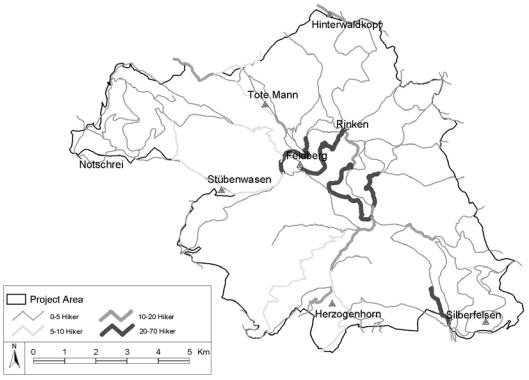

Fig. 6: Intensity of Utilisation in summer 1999 (POLENZ 2000)

The 1272 hikers counted use the region very differently. Thus there is a clear concentration on paths both leading to and on the Feldberg peak. In the Feldberg region it is the higher areas that are

particularly popular amongst hikers. This statement is also supported by the results of the questionnaire. Hikers obviously appreciate the treeless peak of the Feldberg for the views they provide.

When considered as a whole, evaluation of the touristic utilisation of the project area reveals, among other things, the preferred use of the highest areas. Thus the higher locations are preferred by the grouse and by the recreation-seeking and sport-oriented humans. This is what results in the need for an integrative spatially planned solution of possible conflicts. This was implemented in the project by means of a number of interconnected measures.

Planning the measures

The measures were planned on the basis of the answers provided to the following questions:

- Where are the grouse species capercaille and hazel grouse found?
- Where are the suitable season-dependent habitat structures for the grouse species?
- Where is there overlapping between spatial and temporal use by the grouse species and the touristic infrastructure, and it's spatial and temporal use by humans?
- Where are there well-founded conflicts of use between the habitat needs and spatial and temporal use by the grouse species on the one hand, and legitimate forestry use on the other?

In an initial move, using the knowledge gained by answering the above-mentioned questions, zones within the project region where grouse were mainly found were defined (Fig. 7).

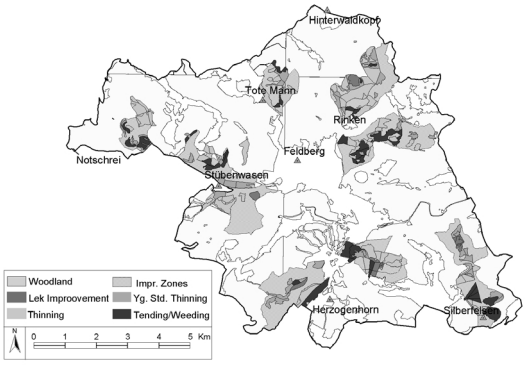

Fig. 7: GIS-based management of silvicultural measurements

On the basis of the results of the habitat structure mapping forest stands were selected in these zones that had only partly suitable or unsuitable habitat structures. For these forest stands concrete silvicultural measures for habitat improvement were derived for the grouse species and translated into work contracts based on the results of the habitat structure mapping. In a second step, conflict potentials were determined by overlaying the digital time- and space-related data on the distribution of the grouse in the project region over the touristic infrastructure and its use. In a further step, GIS-supported scenarios for an optimum exploitation of landscape-related ecological and touristic improvement potentials were developed. These are intended to create ideally suited and undisturbed quiet zones, as well as zones of steered and concentrated touristic activity in areas with qualitatively improved infrastructures, and have led to the creation of concrete planning variants for steering visitors (Fig. 8).

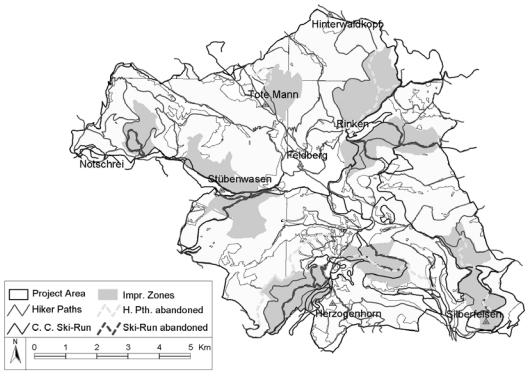

Fig. 8: Planning map of concentration of touristic infrastructure thus improving the situation both for wildlife and tourists

Practical implementation

On the basis of the planning of measures at the forest stand level regarding the main areas of grouse distribution, targeted habitat design measures were undertaken outside the mating season and incubation and rearing periods and before the onset of winter. Each of the forestry measures were modified to meet the special habitat needs of the two grouse species depending on the original state of the forest, and agreed to by the local forest manager responsible. Specialists also gave training courses for the forest managers. The practical implementation of the planned measures was carried out by either the forestry workers of the state's forestry administration, by specially qualified companies, or by voluntary groups. All the measures implemented were, like all the digitalised and other data collected in connection with the project, documented in analogue and digital form at the stand level. This provides the basic foundation for checking the success of these measures later at the stand level.

The following measures have been implemented or initiated during the last three years:

- 300 ha Habitat-Improvement
- 33 km Displacement of hiking / cross country paths
- 15 km Improvement of hiking / cross country paths

CONCLUSIONS AND OUTLOOK

In consequence of the convention of biodiversity in Rio 1992 and the resolutions of the "Conference for the Protection of Forests in Europe" in Helsinki 1993, all signing states have to give proof of the

sustainability of their forest sectors. As a monitoring instrument, 6 criteria and 27 indicators were agreed upon and formally accepted at the "first expert level follow-up meeting" in Genf in 1994. Biological diversity is one of the 6 criteria that should be improved in managed forests, at least kept at the current status quo. Despite the definition of five indicators for the assessment of biodiversity, it is not successfully integrated yet into the monitoring of sustainability in the management of forest ecosystems (ELLENBERG 1997).

This deficit is fairly well-known by silviculturists and is assumed to be compensated by the use of "red data books". Because the use of such lists of endangered species is still lacking applicable temporal and spatial species-related information, the selection of target species and indicator species has gained importance (ELLENBERG 1997, ALTMOOS 1997, FLADE 1994).Capercaille (Tetrao urogallus) is widely accepted as an indicator for high structural diversity and species richness in montane and upper montane mountain ranges in central Europe (ADAMIC 1987; VALKEAJÄRVI and IJÄS 1986; MOSS et al. 1991; BAINES et al. 1995; BESHKAREV 1995; STORCH 1995).

Suchant (2001) shows that the use of habitat parameters of indicator species, e.g. capercaille, offers an operational silvicultural tool to improve and monitor biodiversity in intensively managed forests. At the same time it is not necessary that 100% of a region has to fulfil optimal habitat structures. Depending on the surface area of habitat potential and the targeted number of a minimum viable population a percentage of 30 to 50% of suitable habitat is enough for a viable population.

Therefore it is not necessary, that tourism has to be restricted totally in NATURA 2000 areas, but only in certain zones. Where these zones should be situated depends on the actual situation (habitat structure, distribution of indicator species, landscape ecology, touristic infrastructure, aims of conservation, aims of tourism). At the same time tourism can be concentrated and improved outside these zones.

The presented project shows an example, how the targets of nature conservation, especially biodiversity, and the targets of tourism can be fulfilled in a win-win-situation. Therefore every interest group can agree with the concept. The practical implementation shows the success of such an integrated project. It is an example for the integration of nature conservation and nature use by tourism. Especially within the NATURA 2000 network in Europe such integration is necessary both for conservationists and tourism managers.

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