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Tabellen.

Dear participants of the Symposium,

It is a great pleasure for me that following the successful research symposia in the years 1996 and 2001 this year Kaprun Castle once again hosts the encounter of scholars from the vast field of protected areas research.

I am very proud to be the member of the Salzburg provincial government responsible for the largest protected area in the Alpine Space. Our endeavours in the field of nature conservation in the Hohe Tauern National Park require extensive ecological know-how which needs continuous adjustment on the basis of research findings. The appropriateness of targeted public funding, too, has to be justified and confirmed on the basis of scientific findings. And finally society is ready to protect only what it deems to be valuable. This assessment, again, is based on the unprejudiced knowledge of scientific facts and ecological interrelations.

In addition to the aspect of conservation, in my national park policy I've always been advocating the use of the park. It becomes increasingly clear that it is in this very field that research work and its findings can provide valuable input. Socioeconomic aspects have become topics of increasing interest for scientific analysis in protected areas research.

Research works in the fields of natural, social and economic sciences alike make an irreplaceable contribution to the further development of protected areas management in the Hohe Tauern National Park on a sound basis. And this is our ultimate goal when it comes to strengthening the position of the Hohe Tauern National Park as a recognized model region for sustainable development.

Doraja Eberle
member of the provincial government
in charge of national park policy

Dear colleagues and partners,

We are very glad to welcome you to the first transalpine Symposium of research in protected areas and the third Symposium organised about Research in the Hohe Tauern National Park. It was a wish from numerous protected areas managers to have an intensive exchange about research in the natural and protected areas of the Alps. That's why we are very satisfied to have a competent and well experienced partner for the organisation of this event with the Hohe Tauern National Park. The Symposium is part of ALPENCOM, a communication and exchange project between alpine protected areas and for public information within the INTERREG III B Alpine Space Programme.

It is the first time that this transboundary cooperation in research of and in mountain protected areas is organised as well with the contribution of numerous international experts. We hope that the Symposium will increase the awareness of the importance of internationally harmonised research programmes. The establishment of a basement for the use of common tools and methods as well as the comparison of the results of the research activities of our parks and protected areas is one of the goals of this event. We hope to create a larger transparency of the ongoing and planned research activities and to give a large overview about research and management activities in the protected areas. The cooperation of the alpine protected areas in scientific fields will be as well a very important contribution to the Alpine Convention which is defining in the Nature Protection Protocol some research priorities for the protected areas.

We wish a very pleasant, interesting and future orientated exchange and constructive discussions to all the participants of the Symposium.

Dr. Guido Plassmann
Director
Alpine Network of Protected Areas

Introduction

The Hohe Tauern National Park and the Alpine Network of Protected Areas are proud to provide you the conference volume to the Third Symposium for Research in Protected Areas being held at the Burg Kaprun from September 15th to 17th, 2005.

Scientists and nature conservationists use the opportunity to exchange valuable information, new ideas as well as common interests, reaching far beyond boundaries of protected areas, countries and subjects.

Encouraged by the immense success already in 1996 and 2001 and the positive feedback give us pleasure again to offer sufficient time and space for the presentation and discussion for the numerous areas of interest of current research in protected areas in an extraordinary setting.

The Idea

Supported by the co-operation of the alpine wide Interreg IIIB project ALPENCOM which is managed and led by the Alpine Network of Protected Areas and which aim is to develop effective communication strategies among the alpine protected areas, we were looking for input from the entire alpine alliance of protected areas.

Along with scientific questions, various aspects of the wide spread field between the practical purposes of management and the scientific exploration of the natural and cultural landscape of protected areas should be illustrated.

Can research in protected areas offer a socially relevant contribution to a future orientated environmental science?

Does the flood of data, as well as the current methods and standards really help the practitioners and those who are responsible?

What results does research in Protected Areas need to achieve to be useful for Protected Area Management at the best?

Did the remarkable scientific achievements of the protected areas successfully anchor in the minds of the general public?

...were questions we raised which should stimulate all participants to enrich the current discussion.

The actual conference programme was established out of all received contributions. The programme should offer a broad variety of research projects and strategies in the alpine wide alliance of protected areas. 34 speeches and 32 posters from eight different countries are presented during the conference. Sincere thanks are due to all active participants.

Take much pleasure in reading the conference volume.

**For the Hohe Tauern Nationalparkrat and
the Network of Alpine Protected Areas**

Mag. Kristina Bauch, Dr. Guido Plassmann

I m p r i n t

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Long-term Fire History and Remote Sensing Based Fuel Assessment: Key Elements for Landscape Management in the Swiss National Park

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Abstract

Swiss Federal law protects all natural processes occurring within the borders of the Swiss National Park (SNP). Natural wildland fires are counted among them and should not be extinct. Strict nature conservation represents the top goal of the SNP (IUCN category I) and does not allow any mitigation measures being undertaken unless the park is put at risk in its very existence. However, for societal reasons all fires are put out at present regardless whether they are of natural or human origin. Ninety years of strict nature protection have triggered fuels to build up in the boreal type forests of the SNP reaching the point where natural fire cycles could come into play again.

With field-based fuel investigations and high-resolution Remote Sensing (i.e. LIDAR and Imaging Spectroscopy) we get a very good picture of the present forest and fuel structures, allowing us to predict potential fire behavior. On the other hand pollen and charcoal analysis show us that fire has been an important and regular disturbance factor in the SNP area, shaping vegetation succession long before men became a dominant factor in this remote landscape. All these elements are input to the fire management policy of the Swiss National Park.

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Monitoring modification of alpine environments: New techniques and perspectives

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Abstract

The modification of high alpine environments due to climate warming was a topic of increasing importance of research in the 90`s of the last century and is the main objective of research in recent years. Several disciplines use different techniques to draw a comprehensive picture of environmental dynamics. Terrestrial laser scanning is a quite new technique for monitoring glaciers and natural hazards. The ability to acquire high-resolution 3D data of surface structures makes long-range laser scanners a very interesting instrument for measuring geomorphodynamics. The Pasterze glacier in the Hohe Tauern National Park (Central Alps, Austria) is object of a comprehensive monitoring network beginning in 1879. Since the middle of the last decade the glacier retreat increases dramatically, as a consequence a massive modification of the proglacial areas is in progress. To quantify these landscape dynamics with an accurate resolution, terrestrial laser scanning has been used the last years beginning in 2001. In 2004 we started to increase the temporal resolution with two measurements in the summer period to get a better picture of the interannual ablation dynamics.

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Emas application in the Euganean Thermal Basin

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The EMAS project was started at the beginning of 2003 as an initiative of the Euganean Hills Regional Park with the joint signing of a Commitment Protocol by the Euganean Hills Regional Park, as the activities coordinator and promoter, five municipalities in the Euganean Thermal Area (Abano Terme, Battaglia Terme, Galzignano Terme, Montegrotto Terme and Teolo), the Province of Padua, the Regional Agency for Environment Prevention and Protection (ARPAV) and the Regional Agency for Agricultural, Forestry and Food Sectors (Veneto Agricoltura). It represents an implementation of the requirements stipulated in European Regulation No. 761/2001 - EMAS (Eco Management and Audit Scheme).

The main objective is to implement five Environmental Management Systems in the five municipalities concerned, which are to adopt an Environmental Policy of observing legal prescriptions, commit themselves to introducing measures for the concrete and continuous improvement of environmental performance and put into effect transparent communication with stakeholders.

The first phase of the project provides for the Initial Environmental Analysis study applied to the five municipalities, identifying direct and indirect environmental aspects relating to municipal activities and evaluating their effects as potential impacts on the environment, checking environmental legislative conformity with the aim of precisely identifying the responsibilities and methods necessary to ensure conformity with the law.

The second phase of the project, which is based on the Initial Environmental Analysis results and on the strategic content of the Environmental Policy, provides for the organization and the implementation of five Environmental Systems, the definition of methods and responsibilities for managing activities relating to environmental aspects and the setting of specific indicators for monitoring environmental performance as it relates to municipal structures and to the territory, with the object of providing a complete picture in order to support decision-making and specific active programmes of action aimed at environmental protection and conservation.

The third project phase is intended to improve stakeholders' awareness through the circulation of the document called "Environmental Declaration". In fact, as the EMAS Regulation requires, the municipalities must guarantee to provide public information on their Environmental Policy, on environmental objectives and targets fixed in advance and on their own environmental impact and performance, by means of the periodic publication and distribution of a checked and validated document.

The environmental improvement finds its highest expression in the research into even more ambitious environmental objectives and in a commitment to the improvement of the territory's careful management - which is why the project agreement has, as its ultimate aim, not only the achievement of EMAS registration of the 5 municipalities but also the growth of environmental awareness in the municipalities and the extension of the stakeholders' active involvement to encompass the entire territory.

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Climate change and possible impacts on alpinism: a case study on the Nationalpark Hohe Tauern

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Abstract

Besides its importance for nature conservation as the largest protection area of the Alps and for scientific research, the Nationalpark Hohe Tauern (NPHT) represents a major tourist attraction in the central part of the Eastern Alps. Mountaineering in many forms, especially high alpinism has a long tradition in the region. Several economic branches (e.g. hiking tourism) depend on tourism. Studies from Switzerland show that climate change and subsequent effects (e.g. glacier and permafrost retreat) can have a considerable impact on those and related alpinistic fields. The results of such studies do of course depend on the region. Therefore the recent climate change and the glacier retreat in the Glocknergruppe/Goldberggruppe in the NPHT have been examined. Furthermore an opinion poll has been undertaken, addressing mountain guides, mountain huts and alpine clubs, regarding their perception of and reaction to climate change. The compiled results of a sample of more than 100 participants show that most of the respondents are concerned over the issue of climate change. Besides new information on impacts on certain routes and huts, there is common sense in each focus group that an adaptation of current strategies is already in progress or will be necessary in the future. Problems resulting from permafrost retreat or from changed water supply may lead to substantial financial issues for singular huts and also for maintenance of routes, especially in an area of conflict with strict regulations in protected areas.

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Using MM5-derived wind fields for the modelling of snow transport processes

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Abstract

In the last years different research groups emphasized the importance of wind-induced snow transport on the variability of the snow cover. Knowledge about the causing processes saltation is important for determining the temporal dynamics of the snowmelt runoff. Furthermore interception losses induced by snow transport can have reasonable effects on the water balance. In addition wind induced snow transport can lead to a reasonable avalanche risk in deposition areas.

For accurate modelling of the snow pack preferably good climatologic parameters are alienable. There are two major factors which influence the quality of these input data a) the closeness and the temporal resolution of the meteorological network and b) the suitability of the parameters to be interpolated over a given area. It is a known problem that in high-alpine terrain wind fields can not be provided by a simple interpolation of station recordings. Therefore we use a modified version of the PSU/NCAR Mesoscale Model MM5 with a multiple nesting approach to derive wind fields for a 24 x 19 km area at a target resolution of 200 m. The wind fields are validated by station data. In a last step the modelled wind fields are used as an input for a snow model bond (PROMET and SNOWTRAN3D). The modelled snow cover will then be compared with measurements made in the National Park of Berchtesgaden and with remotely sensed data.

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Research activities in the Mont Avic Natural Park: Interreg IIIA "COGEVA-VAHSA": project experience

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Abstract

"Cogeva-Vahsa" Interreg IIIA, a project which involves Italian and French protected areas management subjects (Mont Avic Natural Park; Regione Autonoma Valle d'Aosta; ASTERS), is focused on different scientific research activities and on the communication of their results to general public.

The recent Mont Avic Natural Park widening gives the needing of a revision of its management plan articulated on three actions. The first action outlines the development of research activities to get a capillary knowledge of both environmental and anthropogenic issues of the park, allowing a homogeneous distribution of information between the old and the new park areas.

In 2003, from the Environmental Management System (Regulation EC 761/2001, ISO 14001 standard) raised the individuation of the most important environmental themes in terms of nature conservation. Because of the needing to preserve such themes, the second action involves the implementation of monitoring activities mainly linked to biodiversity conservation and water management strategies.

The third action concerns public communication of the results coming from these activities in different ways, depending on target categories.

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Vegetation exposure to ozone and atmospheric depositions: monitoring in remote sites in the Mont Avic Natural Park

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Abstract

The impact of tropospheric ozone and atmospheric depositions on forest ecosystems is of considerable concern in Europe. Monitoring the dynamics of such pollutants in remote sites is a way to understand how uncontaminated areas are exposed to diffuse atmospheric composition alterations coming from elsewhere.

Since spring 2005 two different ozone and deposition monitoring sites are operating in the Mont Avic Natural Park. The aim of this research activity is to compare pollutants exposition in open field and through canopy sites. The ozone concentration is measured by passive samplers on a weekly basis from May to October, while atmospheric depositions are evaluated on bulk samples collected with continuously exposed collectors.

The impacts of ozone concentration and atmospheric depositions on forest ecosystems are evaluated with weekly chlorophyll fluorescence measurements made on needles of mountain pine, *Pinus uncinata* (MILLER), the most widespread tree species in the Mont Avic Natural Park forests.

The monitoring results will be disseminated through the park communication activities, with the aim of highlighting that even places which are generally deemed as uncontaminated, are affected by alterations in the atmospheric composition.

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How to manage a national park?

Asking the right questions to manage an alpine protected area: les Ecrins

Hervé CORTOT

The National Park les Ecrins

Created in 1973, the National Park les Ecrins has a special place in the Alps: it is the largest park in France located between the North and the South Alps. The central area (91.800 ha of protection) and the peripheral area spread over 270.000 ha with approximately 30.000 inhabitants. The National Park Les Écrins is a public establishment and employs one hundred of persons.

The Écrins territory is organised around a series of high mountaintops: Meije, Écrins, Pelvoux, Bans, Olan, and Sirac. Some of the mountain sides cover an altitude range of more than 2000 m. Long and deep valleys meet at the core of the crystalline massif. To the North and especially to the South, the relief is less rough: sedimentary mountains open on wider valleys, with far-reaching plateaux that allow the development of high pastures. Mountain passes make the exchanges between valleys easier. Today, the Cols that are easy going and easy to set up are used as road crossings in particular: the main Cols are the Col Bayard, the Col d'Ornon and the Col du Lautaret.

High mountains (from 800m to 4102 m, the top of les Écrins) have a significant part of mineral, glacier and grass. Lots of valleys are faced with a decreasing agriculture.

For over 30 year, the National Park benefits from tools on managing information. To gain knowledge and experience in the field is essential for the National Park' missions:

- ◆ The rangers (50) are well motivated and qualified. They are long-made up of inhabitants and naturalists.
- ◆ There is currently a staff of 7 scientific workers. This staff is advised by a scientific committee. By the way, we are please to work with people on the long view.
- ◆ Two universities are not so far: Grenoble (100 km) and Marseille (180 km).

30 years and such a work!

- ◆ Strong inventories: ordinary for a protected area: flora, fauna but also geology and geomorphology. Landscapes have been studied within the "DELPHINE" method". Special work on lakes and groves has been carried with Universities. In social studies, the work on the National Park history and on Archaeology are in progress.
- ◆ The following step has been the monitoring: of rare plants, populations of chamois, gallineous birds, golden eagles, but also glaciers and physical parameters. The more original is the health monitoring for wild fauna, air pollutions, the visitors management, flying over mountain...
- ◆ Main points of this period:
 - the growth of biodiversity (by introducing the alpine Ibex, for instance)
 - the partnership with farming on 3 types of landscapes: alpine pasture, reaped meadows and hedged farming.
 - the symbolic creation of the Lauvitel Reserve with a special scientific program
- ◆ After 30 years, it is an important core which is diversified, with different quality, useful for:
 - official documents: regional development program, local planning management, atlas, Natura 2000 sites ...
 - databases
 - information for visitors centres
 - training for the National Park employees

This knowledge is a resource for the scientific research in the territory and an important source of information for visitors and inhabitants.

Challenges for the future

The question is: what kind of information on the long run?

To be exact:

- ◆ What is of importance to survey and to monitor?
- ◆ Which external links? international or national networks?
 - *In France, an attempt is currently in progress to create real exchanges between French National Parks.*
- ◆ Which is the public targeted? How to relate back the information?

These questions have been examined, collected and organised by three axis (during the choice for the regional development program 2005-2010 meeting):

- ◆ to consider global factors acting on the territory development
- ◆ to measure the environmental changes to use management tools and practices
- ◆ to plan out conditions to preserve species
- ◆ to give elements concerning the territory memory

After a discussion and a debate, the scientific committee and the board of directors made the following choices:

- ◆ to continue the monitoring with priorities
- ◆ to start working on biogeographical data by environment (monitoring species – temporal and space)
- ◆ the operating of the space (environment and species)
- ◆ monitoring and evaluation of human activities (winter tourism, sport pollutions ...)
- ◆ going with disturbances (wolf , wild boar)
- ◆ to develop long term monitoring (flora, fauna)
- ◆ to develop knowledge on water
- ◆ to keep up the National Park culture (changes of rangers generation)
- ◆ to collect cultural knowledge

Some thoughts

- ◆ **Expert or heckler?** If a better knowledge is necessary to legitimate the National Park (useful for communication and for the territory management), the actors of the territory can be embarrassed. "More we know, more it's difficult to integrate obligations and to make choices" for politics.
- ◆ **Scientific knowledge, popular knowledge.** How to integrate popular information and to contribute for the preservation of cultural diversity? How to understand the local culture without local staff ?
- ◆ **To relate back our information on the territory.** It is necessary for the acceptance and the development not only for inhabitants, but also for the technical public and visitors. It's not the same level of knowledge.
- ◆ **Sciences and alpine protected areas:**
A little research on this particular territory and on protected areas problems. We are concerned by the disappearing of the naturalists able to help us.
- ◆ **Long term information:**
Which information can be useful in the future to preserve and to manage our space? A large amount of work has to be done on the processing of our data.
- ◆ **Networks, a chance for protected areas?**
Today, it's a stake to share our knowledge, our methods and to move on together.

In a world more and more standardized and planned, a National Park is moving, it changes, it goes forward. It's a real dynamic... May be it is like our knowledge where it's possible to get lost and to find back, as in the Écrins territory!

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The Biodiversity Database of the Hohe Tauern National Park

Wolfgang Dämon, Patrick Gros

Abstract

The biodiversity database of the Hohe Tauern National Park is a multi-functional information system which documents all available data on the biodiversity of the Hohe Tauern region. The database, maintained at the "Haus der Natur" Museum of Natural History in Salzburg, is designed to integrate distribution data on all animal and plant species, while including parameters specific to certain systematic groups. Unit-level data originate from various sources such as field studies, museum collections, literature, and privately maintained databases provided by biologists. Unit-level data are referenced to comprehensive metadata concerning taxa, sites, collections, literature, and contacts. Many ways exist to access the information stored in the database. Possible applications of the biodiversity database are manifold and are of large interest to biologists, teachers, practitioners, politicians, and all who relate to the Hohe Tauern region.

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Aerial image interpretation within the Interreg IIIB project "HABITALP"

Walter Demel, Ulrich Kias

Abstract

Eleven protected areas from all over the Alps are working together in the project HABITALP to derive habitat-data from aerial images. This proceeding gives an overview on the approach, the status of the activities and future trends in remote sensing which may be important for monitoring in protected areas.

Summary

The project HABITALP started with the goal to create a standardised data basis for eleven protected areas in the Alps by the use of aerial image interpretation. Even if the project was temporary endangered because of delayed flights the result for research in alpine regions is already a success by now: Due to the perennial co-operation standards could be created ranging from multilingual bidding documents to a shared interpretation key on an internet platform.

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**Aspects of sports ecology and wildlife biology in high mountain
regions of the Alps
Interactions between outdoor sports and rock ptarmigans
(Lagopus mutus helveticus) in arctic alpine zones**

Heinz Dungler

Abstract

In this project sports ecology combines sports sciences and wildlife biology for research in high mountain regions. The relationship of sports and nature is the main theme of sports ecology. The example of rock ptarmigans shows interactions between outdoor sports and wildlife. Abundance and parts of behaviour like attraction, habituation, sensitisation and avoidance are examined to show effects. Philosophical aspects of sports ecology make us think about the value of wilderness. The educational part of sports sciences and several other institutions like protected area management can realise the results. The basic research is done in the area of Nationalpark Hohe Tauern.

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Towards an international protected area : Lessons from the transfrontier interdisciplinary research network for the protection of the Mont-Blanc

Barbara Ehringhaus

Project aims

The multiple goals of the research network are to further cooperation between scientists across borders and fields and to popularize scientific results and predictions for decision-makers and the general public. In spite of MB's importance as the cradle of earth sciences and mountain research there is still very little cross-national and inter-disciplinary exchange of research in this region. Furthermore, solid scientific arguments needed to be assembled in order to lobby local and national authorities in respect to their responsibility towards this iconic mountain range. Scientific input is also necessary to demonstrate the massif's outstanding environmental services, the specific threats and their impacts, and the consequent needs for protection. Also, in view of a potential World Heritage nomination the uniqueness and the exceptional features of MB have to be specified in comparison with other similar sites of the world. Most urgently, ProMONT-BLANC wants to assure scientific input into the highly politicized « Sustainable Development Scheme » which is currently being prepared by Espace Mont-Blanc as an EU-INTERREG III project.

Though the local population around the MB is very proud and knowledgeable of «their» mountains, much better communication is needed on pros and cons of different PA alternatives and on research data of complex issues such as climate change and tourism trends to motivate and mobilise them towards active participation in protection efforts. For unlike earlier PAs, today the protection status can neither be imposed by the state, nor by international institutions, but has to be supported by local stakeholders and authorities, who need to be better informed about the issues at stake.

Outlook

While ProMONT-BLANC was successful in bringing together researchers from the three concerned countries in a creative dialogue and in engaging them in the lobby for a PA status, the biggest challenge for MB's transfrontier protection still lies ahead: How to bridge the wide gap between the exemplary wealth and level of scientific achievements on the one hand and the decisions of local people and their elected representatives on the other. Specifically, this process now needs to strategically deploy research into creating a significant PA which is actively promoted by local, regional and national decision-makers and supported by the wide array of local and non-local stakeholders. This requires that local authorities of «Espace Mont-Blanc» become convinced that protection of their natural capital, the basis of their current prosperity, will have to be protected adequately in order to achieve realistic long-term sustainable development of tourism, mountain farming, as well as cultural and natural landscapes. In particular, issues such as environmental risks and services both for the region itself and for the wider downstream area, offer an opportunity to engage a broader set of decision-makers and stakeholders in a PA debate and to develop and implement protection schemes with people rather than in opposition to them. As one step to address these challenges we currently search for scientific journalists capable of summarising the results in a non-scientific format for political decision-makers and a popular version for the general public, primarily in French, but also in Italian, German and English.

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Global Change Impact – Projects in the National Park Berchtesgaden

Helmut Franz

Abstract

The National Park Berchtesgaden was founded in 1978. Protection of nature, research focussed on observation and monitoring of biocoenoses and recreation as well as environmental education, are the most important tasks, defined by the Bavarian Parliament. Research and long term monitoring will support understanding of ecological processes. The natural und man made changes will be identified for the whole area. Research in National Park Berchtesgaden is applied research. It supports the management measures as well as the long term development tendencies. This is defined in the National Park plan and put into force by the Bavarian Ministry of Environment in 2001 (StMUGV 2001).

The tasks of the research and monitoring distinguish between topics in natural and near natural ecosystems of the core zone and topics in human influenced ecosystems in buffer zone. In addition to these topics, the development of ecosystems, which are no more used by human activities, should be worked out in core zone. The results of these syntheses should be compared to the present expectations.

Summary

1. Research and long term monitoring are central areas of responsibility of a national park (cf. decree of implementation of the national park, § 6(1))
2. On behalf of the NP Berchtesgaden, the Free State of Bavaria accepts responsibility for the alpine region within the scope of the national and international framework
3. National park administration will concentrate on long term monitoring, especially on the integrated environmental monitoring concept, developed in the biosphere reserve Rhön
4. At the same time, this work can support the duties for the Natura 2000 duties of the European Union
5. At last, the management measure will be validated by this concept of long term monitoring

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Alpine Streams – Natural Ecosystems as Indicators of Environmental Change

Leopold Füreder

Abstract

Streams are common features of alpine landscapes, and the attention given alpine streams has increased recently in response to increased recognition of the important role that these headwater streams play in major river systems throughout the world, and the vulnerability of these streams to local and regional environmental change (e.g., associated with changes in adjacent land use, acid and nutrient deposition, global climate patterns). Current climate change scenarios indicate proportionally more detectable impacts at both high altitude and latitudes. In recent investigations we have been focusing on the large variety of natural freshwater ecosystems in the Hohe Tauern Nationalpark, as their importance is often recognised in their dominating appearance in the alpine landscape, their re-creating and formative, sometimes threatening natural dynamics, but also in their progressive decline within the Alpine countries. Since lakes and rivers are highly driven by climatic, catchment and thereof dependent internal processes they are considered to be sensitive ecological systems and may serve as models to examine the consequences of environmental changes. Our results from various investigations in high mountain landscapes help to understand how alpine running water systems and their biota can be regarded as catchment-scale integrative monitors for a set of hydrological, thermal and biotic variables. In that sense, Alpine running waters can be regarded as research foci in the context of environmental change. These investigations in larger protected areas provide essential contributions for a forward-looking environmental research.

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Remote sensing based monitoring of the Natura 2000 site Niedere Tauern

Heinz Gallaun, Claudia Praschk, Peter Sackl, Mathias Schardt

Abstract

Information on alpine Natura 2000 sites frequently fails to meet decision-makers' requirements, since comprehensive, systematic and comparable data acquired over longer periods of time are available only in exceptional cases. The present project thus focused on developing remote sensing based methods tailored to the mapping and habitat assessment of large-scale alpine protection areas. These methods were implemented in the Natura 2000 site "Niedere Tauern" designated as a SPA according to the EU Birds Directive. The following results are now available:

- ◆ Criteria catalogue for comprehensive data coverage
- ◆ Colour infrared orthophoto mosaic
- ◆ Land cover map at 1:10,000 scale
- ◆ Knowledge-based habitat models for 13 bird species listed in Annex I of the EU Birds Directive
- ◆ Remote sensing based monitoring system for the assessment of habitat changes
- ◆ Natura 2000 decision support system for the Niedere Tauern protection area

The developed methods can easily be adapted for application in other alpine protection areas.

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Research becomes public: The use case of WebPark

Ruedi Haller, Christophe Rhin

Abstract

Thanks the EU research project „WebPark - Geographically relevant information for users in protected areas“, the Swiss National Park (SNP) has established a mobile digital visitor information system called WebPark²⁰⁰⁵. The system was developed as prototype and could be a model for protected areas. The overall aim of the system is to provide visitors in protected areas with location based information. A common personal digital assistant (PDA) with an integrated GPS is used.

The current version of WebPark²⁰⁰⁵ integrates the following applications: A topographic map and a profile of the selected trail allow the cartographic overview. On request, a “search around” tool lists the available information around the current position. This tool integrates thematic map information (e.g. distribution of mountain ungulates) as well as general information (e.g. general description of the selected animal). A interactive tool allows the visitor to store and send their own observations to a server in the National Park house. If wanted, the observation can be submitted to other online users of the system. This tool is used for survey purposes by the administration staff as well. Moreover, a virtual natural trail on wildfire and a classification key for butterflies has been integrated.

The integration of existing GIS data and information was an explicit task of the project. The huge knowledge from research could be offered to the guests, obviously filtered and redesigned.

WebPark was a successful project, not only due to the completion of a number of technical tasks. As important as the technical work was the work on additional components like the accurate definition of user needs and the continuously collaboration with the staff of the protected areas. The combination of nature and high technology was on interest for media. Due to the overall positive feedback it was possible to find sponsors for the next years to maintain the system in the SNP without project support. Further development shall integrate tourism relevant information too.

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Long-term ecological research in protected areas: the example of Alpine ibex in the Gran Paradiso National Park

Achaz von Hardenberg, Bruno Bassano

Abstract

As an example of a successful Long Term Ecological Research (LTER) in a protected alpine area, here we present the main results of the long term researches on Alpine ibex (*Capra ibex*) in the Gran Paradiso National Park (GPNP). More than 45 years of regular censuses permitted to test the relative importance of density-dependence and climatic factors on ibex population dynamics. Using an out-of-sample prediction test it was possible to assess the long-term predictive power of a simple model incorporating snow depth and population density. The long-term systematic collection of ibex skulls, found dead for winter starvation, permitted the discovery that horn growth is a good predictor of the onset of senescence in males. The repeated measurement of body weights of individually tagged ibex, using a remotely controlled platform scale, and the regular monitoring of fecal egg counts of nematode parasites over many years, are providing new insight on the individual variability in these life-history traits. The ongoing LTERs on Alpine ibex in the GPNP are providing essential information on the factors influencing the population dynamics and life history of this species.

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Toward a Guiding Principle "Recreational Use" The Protected Area Berchtesgaden National Park within the Region

Sabine Hennig ⁽¹⁾, Michaela Künzl ⁽²⁾

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Abstract

Nature conservation and recreation are two purposes of protected areas. The relationship is complex and sometimes adversarial. To avoid and minimize conflicts visitor guidance is relevant. According concepts must be based upon general conditions of e.g. natural landscape, cultural history, social-economy and human needs. Understanding of recreation is also relevant. Another aspect to consider, national parks can give drive to, is regional development. However, management objectives shall not only lead to singular visitor management concepts. Important is one guiding principle as a concrete picture of the desired future state. To concretise a guiding principle data and information about recreation e.g. infrastructure and visitors is essential. The acquisition needs support of institutions located in the surroundings of the protected area. In this context the importance of recreation within the region can lead to development and expansion of a culture of collaboration. An exemplary project is worked out for Berchtesgaden National Park. Although the park plan adopts guidelines focusing on recreation it includes no guiding principle. To achieve this, listings of recreational infrastructure and use as well as visitor numbers and characteristics must be acquired. As a part of the EuRegio Salzburg - Berchtesgadener Land - Traunstein the German Berchtesgaden National Park borders the Austrian Bundesland Salzburg. Thus it must be strived for international-regional collaboration.

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Building-dwelling bats in the Nationalpark Hohe Tauern (Carinthia, Salzburg, Tyrol)

Maria Jerabek, Ulrich Hüttmeir, Josef Kreuzberger, Anton Vorauer,
Christoph Walder, Guido Reiter

Abstract

We studied the species composition of bats in the higher altitudes of the Nationalpark Hohe Tauern in the Austrian Alps in 1998 (Salzburg), 2002 (Carinthia) and 2003 (Tyrol). 457 buildings at altitudes between 1000 and 2000 m above sea level were surveyed. The following species were found: *Myotis brandtii*, *Myotis mystacinus*, *Eptesicus nilssonii*, *Vespertilio murinus*, *Pipistrellus pipistrellus/pygmaeus* and *Plecotus auritus/macrobullaris*. Bats were found in 7.6 % of the checked buildings, faeces of bats in 22.2 %. In Carinthia 37 % of the buildings had been used by bats, in Salzburg 32 %, in Tyrol only 12 %. Overall, whiskered bats dominated (*M. mystacinus/brandtii*), followed by *Eptesicus nilssonii*, and some individuals of *Pipistrellus sp.*, *Plecotus sp.* and *Vespertilio murinus*. *Myotis brandtii* was not recorded in Tyrol, whereas *Vespertilio murinus* was only found in Tyrol. Within a species, individuals were found at higher altitudes in the southern parts than in the northern parts of the national park. As the roosts in the national park predominantly hold single individuals the potential threats for the bats are not as eminent as in the surrounding valleys. The valleys and villages at the edge of the national park, however, are very important for the bats of the region, especially in Salzburg.

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The IPAM-Toolbox: An Expert System for Integrative Planning and Managing of Protected Areas

**Michael Jungmeier, Hanns Kirchmeir, Martin Kühmaier,
Iris Velik, Johann Wagner**

Abstract

“Experience is growing by sharing it”. The paper presents a newly developed expert system that shall support planners, managers and consultants of Protected Areas (PAs) by a system of self-assessment, focused recommendations and a comprehensive knowledge base. The interactive “toolbox” provides substantial information on integrative management of PAs by means of new information technologies. Developed in cooperation with international partners and organisations this expert system aims to be an important backbone for the future development of PAs in Middle and Eastern Europe.

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Glacier monitoring by means of terrestrial photogrammetry: A case study in the Hohe Tauern National Park

Viktor Kaufmann, Richard Ladstädter

Abstract

Glaciers respond to changes in climate. Mass gain and loss change the geometrical and also the kinematic properties of a glacier. Their monitoring and quantification are of great interest to glaciologists, because these properties, i.e. glacier area, surface elevation, position of terminus and surficial flow velocity, can be linked to mass balance. During the first half of the 20th century terrestrial, i.e. ground-based, photogrammetry was the only means to efficiently map glaciers and their changes in space and time. Modern remote sensing techniques, i.e. airborne and spaceborne photogrammetry, airborne and terrestrial laser scanning, and differential SAR-interferometry, have pushed away terrestrial photogrammetry. In this paper we want to show that the availability of low-cost high resolution digital (consumer) cameras opens up new perspectives in glacier monitoring. A case study was carried out at Goessnitzkees, which is a small debris-covered glacier located in the Schober group of the Hohe Tauern range, Austria. Terrestrial photographs (stereo pairs) of three different periods (1988, 1997, 2003) were evaluated by means of digital photogrammetric techniques. As a result, glacier retreat could be mapped and quantified numerically. The potential of a fully digital approach using a low-cost digital consumer camera is highlighted.

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Terrestrial laser scanning for glacier monitoring: Glaciation changes of the Gößnitzkees glacier (Schober group, Austria) between 2000 and 2004

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Abstract

Monitoring of glacier behaviour is an important task in environmental research. For detailed detection of glacier surface and volumetric changes terrestrial laser scanning is a very effective and cheap observation method, due to the ability to acquire high-resolution 3D data. Since summer 2000 this method is applied at the Gößnitzkees glacier, a small debris-covered glacier located in central Austria (12°45'E, 46°58'N; size c.0.75km²). More than 60% of the glacier is covered by a prominent debris mantle. So far, five terrestrial laser scanning campaigns have been carried out focusing on the central part of the glacier including the glacier terminus (07-2000, 08-2000, 07-2001, 08-2001, 08-2004). These measurements allow the comparison of three different time scales (intermonthly, interannual, four years). The results demonstrate that accumulation and ablation (snow/firn/ice) can be monitored very accurately. The debris cover reduces net ablation at the glacier surface by up to 75% whereas the amount of incoming solar radiation is less important. A highly active feature is the retreating steep ice wall at the glacier terminus. Supraglacial meltwater causes further increase of local net ablation due to heat exchange at the meltwater-ice interface. It is shown that by use of this method it is easily possible to detect small changes on a glacier surface (clean and debris-covered) relevant for glacier-climate modelling but also for aspects in hydrology and natural hazard management.

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Ecological Network and NATURA 2000

Yann Kohler, Guido Plassmann

Spatial network of protected areas

The subject of transboundary protected areas and spatial connections (common surfaces, ecological corridors) between the protected areas in the Alps has a central place in the implementation of the Nature Protection Protocol of the Alpine Convention. Several articles refer directly or indirectly to such connections between protected areas (article 3, 11 and 12). The article 12 foresees the creation of an ecological network. Based on this article the Alpine Network of Protected Areas has contributed since 1995 to the application of the Alpine Convention as thematic network, involving the Alpine protected areas in joined actions and creating a common identity. Now, based on the work of this thematic pool, a network with a higher spatial dimension should be realised.

Aims

The creation of a network of protected areas with ecological connection elements and an adequate minimum protection of surfaces in-between has to be a long term aim. The general purpose has to be the creation of dynamic processes between the different protection forms and the implementation of the different possible measures that have an impact on the whole territory. The existing areas have to be group and connected in small associations to create in this way larger unites for wildlife refuge. Since the creation of new large protected areas is not to expect due to the political and economic circumstances in the Alps, the existing areas have to be connected in a way that they could take to role some large areas had to play. The so formed complexes improve the situation and the network can be enlarged by the time according to the changing situation.

The article 12 requires a network on a national and a transboundary level. This means connections between protected areas including elements which are not under protection yet but are important for the network. The expectations go further than the limits of the protected areas. And it way to go: the coordination of aims and measures of transboundary protected areas.

It is important to notify that the experiences made in protected areas in the fields of special species management, measures of sustainable development of land use and cooperation between different stakeholders can be useful in non-protected areas and contribute to the creation of an ecological network.

For the long term implementation of such a concept that represents a fundamental point of the Alpine Convention, further efforts have to be done. First of all, the existing measures and planning instruments in the different Alpine countries have to be synchronised. This can only be realised in large spatial units to reduce the expanding fragmentation and to reinstall a living landscape. The different protocols of the Alpine Convention propose a common way as they are the only ones that are valuable beyond borders of the protected areas for the whole alpine territory. This naturally in combination with the national and regional legislations and the general rules for nature protection.

Perspectives

The Alpine Network of Protected Areas promotes the creation of a alpine ecological network between protected areas by proposing suggestions of possible corridors in places where these makes sense. Create connections and corridors where this seem appropriated in reason of different criteria, such as special migrations routes for wildlife, geographic proximity, extensive land use, low human impact. Focus efforts on this zones, concentrating the application of measures and programs, using NATURA 2000 site protection programs to establish the network.

The thematic network of protected areas exists and cooperates with success in many different domains. The creation of a spatial network creating connections between the different alpine protected areas is a challenge for the future. An big defy but also a major chance for the preservation of the alpine landscape and the biodiversity in the Alps bringing profit to every involved protected area.

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A lab above the clouds (I)

NO₂ measurements at the Sonnblick Observatory

Martin Koller, Anne Kasper-Giebl

Abstract

A discontinuous method for measuring nitrogen dioxide (NO₂) on a daily average basis is to be adapted to the background ambient at the Sonnblick Observatory. Originating from the basic Saltzmann method (Saltzmann 1954) it uses a solid sorbent, based on the findings of Ferm et al. (1984) consisting out of sodium iodide (NaI) and sodium hydroxide (NaOH).

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**Nature conservation evaluation of alpine pastures
in the Gesäuse National Park (Styria, Austria)
by means of the bioindicators spiders, leaf- and planthoppers
(Arachnida: Araneae; Insecta: Auchenorrhyncha)**

Christian Komposch, Werner Holzinger

Abstract

Faunistic investigations in alpine grasslands in the Styrian "Gesäuse National Park" (Ennstaler Alps, Austria) should show the effects of grazing for nature conservation aims. The two bioindicator groups Araneae and Auchenorrhyncha were collected by means of pitfall traps and a G-Vac suction sampler in the vegetation period 2004: a total of 9.100 specimens were recorded, belonging to 82 epigeic spider and 53 leaf- and planthopper species. Twenty percent of the spider species are more or less endangered, one Auchenorrhyncha is new to Austria, and remarkably 10 spider- and 4 Auchenorrhyncha-species are new to Styria. The densities (G-Vac suction samples) varied from 2 to 30 specimens per square metre in spiders and 7 to 100 adults in leaf- and planthoppers. Suggested measures in nature conversation management include, among other things, a continuation of extensive grazing in selective meadows, the reduction of the densities in intensively grazed meadows, the cessation of grazing in sensitive wetland-biotopes and the increased consideration of biotopes without plant cover.

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The medium-term management plan for the Berchtesgaden National Park

Volkmar Konnert

Abstract

In the years 2002 to 2004 the Berchtesgaden National Park elaborated a medium-term management plan for the forests with the help of the Geographical Information System (ArcGIS), the CIR-mapping of the biotopes based on aerial photographs, the site mapping, the data of the forest inventory and other digital data available. The geometry of the CIR-Map served as basis for the geometry of the forest management map.

The project derives from the collaboration between the "Fachhochschule Weihenstephan" (departments of forestry and landscape architecture), the department of forestry of the National Park Administration and the Forest Planning Unit of the Regional Forest Office of the State Forest Administration.

The forest management database and the description of measures was compiled from the forest management map, the stand description and the results of the recent forest inventory.

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Multifunctional Assessment of Alpine Pastures

Daniel Kreiner, Lisbeth Zechner

The National Park Gesäuse in Styria (Austria) with an area of 110 km² includes 8 pastures which are still grazed, and 4 pastures which have been abandoned since the 1960es. In 2003 we started with the area-wide assessment of the quality and quantity of pastures and the first zoological and vegetation surveys in the "Sulzkarm", which, with 180 ha, is the biggest pasture in the National Park. In 2004 we continued with two additional pastures (Haselkar, Scheuchegg) and one occasionally grazed pasture (Hueflinger alm). In 2005 three abandoned pastures are being investigated in cooperation with the BAL Gumpenstein (BOHNER A.) within the frame of an EU-project which analyses the effects of abandonment on biodiversity.

Data collection concerning the intensity of grazing is done with a digital evaluation system. The data is collected with PDA and GPS-module in the field and gets implemented in Arc View 3.2 (HÜTTENBRENNER K., EGGER G., BAL GUMPENSTEIN, BERGLER F., SCHWAB M.). Data of special habitats in alpine pastures (i. e. FFH-habitats, forests, wetlands, special structures, karst formations etc.) is gained area-wide. Analysis of vegetation is the basis for the assessment of nature conservation quality. Springs, wetlands, bogs and small ponds belong to the extremely sensitive habitats and are therefore mapped intensively. The main focus is placed on selected animal groups, i.e. Plecoptera, amphibians and reptiles (HASEKE H., NHMW, WEIGAND E.).

Information on biodiversity of selected study areas with different pasture types is collected for selected animal groups (bugs, cicadas, spiders, grasshoppers and small mammals).

The suitability of these groups for the assessment of open habitats at this altitude and the survey methods are evaluated within this project. Additionally, a census of breeding birds in the investigation areas completes the information on diversity. The results are the basis for the formulation of management measures (KREINER D., Ökoteam, FRIEB T., DERBUCH G., ZECHNER L.).

Furthermore in 2005 intensive investigations concerning habitat parameters and vegetation have begun (analyses of nutrient quality and soil, indicator values etc.). The study areas are part of a long term investigation system, which should allow the long term assessment of measures in alpine pastures (BOHNER A., KREINER D.).

The investigation of the historical use of pastures brings important knowledge concerning the development of cultivation of alpine areas. The basic economic conditions were reasons for the varying intensity of grazing (HASITSCHKA J.). In the EU-project concerning the abandonment and effects on biodiversity, data of the Gesäuse is also included (KREINER D.).

The data of these studies should bring important basic information on biodiversity of alpine pastures, also in connection with abandonment of pastures. Apart from the basic research the implementation of the results, i.e. changes in intensity of grazing or protection of sensitive habitats, is also important and will be done in cooperation with the farmers. This approach to a manifold and difficult issue could be a model for other regions or protected areas in the Alps. In addition, intensive public relations with presentations, excursions with farmers etc. should inform the farmers and the public about the objectives and aims of the project.

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Interdisciplinary monitoring project of subalpine mountain hay meadows in Hohe Tauern National Park (Carinthia)

A model for extensive cultivation and preservation of these endangered ecosystems, their biodiversity and their species interactions

Werner Kreisch, Mona Abl

Abstract

This paper presents a management concept for the subalpine mountain hay meadows "Pockhorner Wiesen" developed for the Carinthian Administration of Hohe Tauern National Park. It consists of a proposal for their cultivation by a maintenance plan and a long-term interdisciplinary monitoring concept. A comparison of different mowing intervals is designed to establish how often the meadows should be cut to ensure a maximum of biodiversity with a minimum of labour and to sustain the existing interspecific relationships. The monitoring employs vegetation-ecological and pollination-biological methods. The former document the dynamics in the various phytocoenosis of the ecosystem. The latter are – due to the high numbers of flowers and the great variety of pollinators – perfect parameters for the study of animal-plant relationships in mountain hay meadows.

The ideal conditions for research in Hohe Tauern National Park promote the development of innovative methods for advanced environmental management. The direct application of scientific results in a management concept provides a resource that can be of use both theoretically and practically in the cultivation and conservation of these endangered ecosystems.

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The mire „Gradenmoos“ in the Schobergruppe (National Park Hohe Tauern, Carinthia, Austria)

Robert Krisai, Wolfgang Mayer, Christian Schröck, Roman Türk

Abstract

During the summer 2003 the vegetation, lichens and bryophytes in the mire Gradenmoos were investigated on behalf of the administration of the National Park Hohe Tauern. Also the history of the mire was studied.

The dominant plant communities are *Caricetum nigrae*, *Caricetum rostratae* and moss rich spring fens. In the study area 102 species of lichens were found, also 134 Taxa of bryophytes.

The results of all investigations of the vegetation, bryophytes and lichens display the mire as a biotope worth to be protected. As a further result of this study necessary measures for the conservation of the Gradenmoos are derived. The grazing damages the Gradenmoos severely, it should be ceased as soon as possible. The repeat of the studies is recommendable, because there are only few studies in monitoring areas in the Hohe Tauern.

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Perception of the National Park Stilfserjoch by the Local Population

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Abstract

Several studies confirm the finding that nature conservation can not be successful without the involvement of the local population (COLCHESTER 2004; GRAINGER & GRAINGER 2003; TRAKOLIS 2001; WHITE & LOVETT 1999). Our study was conducted within the Nationalpark Stilfserjoch, which is due to its history and the very complex landscape with high human influence and wide altitude range predestined for an acceptance study (GAFTA & PEDROTTI 1997). In 2001, a representative survey of 1100 residents of the National Park has been carried out in face-to-face interviews, and acceptance has been evaluated considering ecological aspects (attitude towards natural resources and conservation), social aspects (effects of the national park on various groups of people and land use, relevance of and satisfaction with the park authorities), as well as political and economical aspects (management of protected areas, clash of economic and ecological interest).

Only 5.6% of the interviewees were against the Nationalpark Stilfserjoch, but we determined restricted support among 41% of the interviewees. By discriminant analysis, we elaborated the significant influence factors, which led to restriction of the protected area. The results exhibit a great importance of personal and general welfare. We further detect a high influence of culture and also of the attitude towards nature protection in general. With this knowledge it will be possible to develop instruments for politics and administration to increase acceptance.

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Education for sustainable development in protected areas in Europe - Evaluation of educational concepts -

Marion Leng

Abstract

This research project focuses on education for sustainable development, a concept fundamental to the realization of sustainable development. It analyses educational approaches taken by large protected areas in view of their potential contribution to sustainable development. As a theoretical framework, the project uses a specific educational theory. The advantage of this theory is that it allows concrete criteria to be established for assessing educational concepts in the protected areas. It includes two dimensions. The first is based on the definition of sustainable development set out in the "Brundtland Report" (WCED 1987). The second describes ways to engender active participation in sustainable development and stresses various fundamental competencies. This study combines both dimensions and sets out concrete competencies necessary for implementing sustainable development.

The study focuses on 24 large protected areas, comprising 8 National Parks, 8 Natural Parks and 8 Biosphere Reserves. The main geographical focus is on the alpine region and covers the four European countries Switzerland, Austria, Germany and France. The study is based on qualitative assessments and relies on interviews and data gathered in the protected areas. As a substantial result of the study, a kind of "manual" or "guide" will be developed which should enable protected areas to evaluate and build or extend their educational concepts with a view to education for sustainable development.

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Alpine Habitat Diversity - HABITALP

Towards an integrated spatial development in the Alpine Space

Annette Lotz

Abstract

The preservation of natural and cultural landscape diversity is an essential demand of the Alpine Convention. The protected areas of the Alpine Space are the preservation centres for the most precious habitats and an important part of the European NATURA 2000 network. The preservation tasks for these habitats (e.g. European Habitat Directive) require transnational strategies and applications integrating the different national approaches on the basis of a common landscape dataset.

Based on colour infrared aerial images HABITALP will contribute to the integrated spatial development in the Alpine Space by developing standardized methods for the census and analysis of landscape diversity.

Under the leadership of Berchtesgaden National Park these methods will be applied to 11 protected areas of the Alpine Space and allow for a common vision on surveillance and management questions. The resulting comparable landscape datasets and their accessibility through a common alpine database will create a considerable potential for further transnational activities. The standardization of methods will enable both repeated application for monitoring purposes and transfer to further alpine areas.

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Pollutant-related mapping of lichens on the Integrated-Monitoring-site Zöbelboden in the Reichraminger Hintergebirge, Oberösterreich, Austria

Wolfgang Mayer, Roman Türk

Abstract

An intensive research station of the Federal Environmental Agency for Air Quality Control is situated at Zöbelboden in the Reichraminger Hintergebirge. After a basic study in 1993, a repeated investigation of epiphytic lichens was carried out in 1999. Samples of lichen vegetation on a total of 81 trees were taken by various methods and evaluated in regards to pollution levels. This study will be repeated again in summer of 2005.

A comparison of the species found during the pollution related mapping study with the potential lichen vegetation shows a severe reduction in epiphytic lichen vegetation on the sample trees in the biomonitoring project area. Macrolichens frequently show clear limitations in vitality. While the coverage of nitrophilic and toxitolerant species increased, the coverage of more sensitive species was reduced.

A multifaceted analysis was also carried out on the results of 1999. On the whole, there has been a measurable decrease in air quality in the period between 1993 and 1999.

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Trout Exam-Invest

The resettlement of the Danubian clade of brown trout in the region of the National Park Hohe Tauern

**Nikolaus Medgyesy⁽¹⁾, Reinhard Lackner⁽¹⁾, Bernd Pelster⁽¹⁾,
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Abstract

'Trout ExamInvest' is a project funded by the EU, local governments and private sponsors. Partners are the Department of Zoology and Limnology, Research Centre for Agriculture and Forestry Laimburg, National Park Hohe Tauern, Alpenzoo Innsbruck

Most Austrian waters belong to the Danube drainage system. Autochthonous trout is therefore expected to be of Danubian mitochondrial haplotype. During an extensive search for autochthonous brown trout six populations of homogenous Danubian haplotype could be found.

Successful reproduction of the population from the Anraser See (2538 m) was the basis for stocking experiments. Twenty seven months after stocking a high mountain brook as well as a lowland brook the recapture rate was much higher in the high mountain brook. In addition, growth rate of fish in the high mountain brook by far exceeded the growth rate of brown trout in the lowland brook. This indicates that fish reproduced from relic population like that in Anraser See are well adapted to high Alpine areas and ideal for restocking of remote waters like that in the National Park Hohe Tauern.

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The use of molecular markers for the characterisation and rehabilitation of indigenous trout populations in the Central Alpine region

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Abstract

The brown trout (*Salmo trutta* L.) represents one of the most differentiated vertebrate species. However, human activities such as habitat alteration, overexploitation and introgression of non-native hatchery fish led to an alarming reduction of population variability. This is particularly evident for vast parts of the highly fragmented alpine area. Because of these facts the Interrreg IIIA-project "Trout-Examinvest" was initiated in order to achieve the following goals:

- ◆ Genetic characterisation of local trout populations
- ◆ Identification of potential autochthonous populations
- ◆ Establishment of indigenous hatchery strains for conservation management

In the framework of our project two molecular techniques were applied: (i) sequence analysis of the complete mitochondrial DNA control region and (ii) analyses of a number of variable microsatellite DNA loci. As was shown in previous studies, mitochondrial DNA revealed to be a useful tool in the screening of frequencies and distribution patterns of the major trout lineages. On the other hand, microsatellite DNA data delivered more detailed information about within-population genetic diversity and population structure as well as about hybridisation between native and introduced trout lineages. Based on these findings we point to the necessity of using a combined approach of molecular analyses to select and establish indigenous trout breeding strains for future stocking and repopulation measures.

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Monitoring of visitor flows and visitor needs as a basis for protected area management

Andreas Muhar, Arne Arnberger, Christiane Brandenburg

Abstract

The objective of this paper is to discuss the research and management needs for monitoring of recreational uses in protected areas, to provide an overview of visitor monitoring methods and to demonstrate their practical application in systematic monitoring programs for three specific protected areas with different character, Dürrenstein Wilderness Area, IUCN Cat. Ia/b, Donau-Auen National Park, Cat. II, and Wienerberg Protected Landscape, Cat. V.

Options for data analysis are discussed using three examples: Analysis of trail use intensity, forecast of visitor numbers based on the weather situation and the day of the week, and identification of the social carrying capacity of an urban protected area.

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Effects of experimental flooding on the River Spöl, Swiss National Park

Uta Mürle, Johannes Ortlepp

Abstract

Following the construction of two reservoirs in the late 1960s, the discharge of the River Spöl, Swiss National Park was reduced and regulated. Elimination of river changing floods caused a degradation of river morphology and of habitat conditions for benthos and brown trout (*Salmo trutta* L.). In 1996 a flood program was implemented to enhance ecological conditions in the Spöl River. Due to the experimental floods (since 2000), most alluvial fans in the channel were scoured downstream, bed sediments were less embedded, and variation in channel depth increased. Macroinvertebrate densities were reduced up to 90%. Recovery to pre-flood densities occurred within few weeks but the species composition changed significantly. Fish abundance was not reduced by the floods and only few fish were killed or stranded. The quality of fish habitat, spawning grounds in particular, was noticeable improved. The condition of trout remained relatively constant, even though food resources were altered to some degree.

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Biodiversity of flower visitors: Enabling and threatening factors for the existence of species – rich communities

Johann Neumayer

Abstract

Many flower visitors have declining populations or are in danger of being extinct and lack of nectar and pollen supply is thought to be a main factor for threatening. For studying the effects of decreased resource supply for the autochthonous visitor community honeybees were introduced temporarily in a naturally honeybee-free valley. In the vicinity of the beehives nectar supply decreased significantly and also abundance and species number of flower visitors decreased. At times with low nectar supply these effects could be measured till distances of more than 800m from the beehives and they can be expected till more than 1500m. Similar effects can be expected in all cases, where competition between flower visiting insects increases. Examples are alpine meadows after end or change of management or alpine pastures after having been overgrown by shrubs. In these cases flower supply as well as species number of flower visiting insects decrease significantly, as can be shown for bumblebees and butterflies.

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Value based decision making process for strategic visitor management in the Natura 2000 area Lech River Valley, Tyrol

Yvonne Pflüger

Abstract

The Lech valley with the river Lech and its tributaries is an alpine river valley in Austria with a considerable amount of naturally free flowing stretches. The ecological and scientific significance of the Natura 2000 area lies in its high biodiversity and the occurrence of numerous internationally endangered species within the dynamic braided river stretches. Apart from that the area contains a high number of recreational and educational values as well. The area, which is situated within day travel distance of the cities Innsbruck and Munich, is renowned for its biking and hiking trails and its unique water sport opportunities. Nevertheless, most intense impact occurs from the daily use of the local population in the densely populated Lech valley area nearby. Due to its long and narrow shape the protected area is very vulnerable to impacts and therefore, to avoid negative impacts on natural values from recreational use, not only a management plan, but also a visitor strategy has been developed as part of an extensive European Union LIFE funded project.

The decision making process for the establishment of the visitor management concept was based on a GIS supported risk analysis: First current ecological and recreational values have been located and assessed. Subsequently hotspots have been defined in areas, where those contrasting values overlay. These hotspots were defined in areas of high ecological vulnerability and high visitor impact from intense recreational use. This hotspot analysis served as a basis for discussion and co-operation with the local population and stakeholders to agree on management solutions. As a result specific management actions were defined and the allocation of visitor infrastructure was planned accordingly. As a response to the need for more detailed information about recreational uses and users a visitor monitoring concept was included in the visitor strategy as well.

This paper describes practical planning policies to highlight the need for strategic planning of recreational use in protected area management based on the comprehensible evaluation of the hazard potential from uses and the vulnerability of ecological values.

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The Black woodpecker (*Dryocopus martius*) as focal species in alpine protected areas

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Abstract

Woodpeckers have a stronger affinity to forest and woodlands than do most of other taxa. Most woodpecker species depend on forest resources as large trees and deadwood, that are very important for other animal taxa, but also the first to be removed from managed forest. Therefore it seems feasible to use woodpeckers as focal species in forest management of alpine protected areas.

In the present study we systematically evaluated the suitability of the black woodpecker (*Dryocopus martius*) as an indicator, in the Italian Alps, of a closer to nature forest condition and as an "umbrella species" for other components of forest biodiversity.

To this aim we performed a habitat selection analysis and a census on relative abundance and number of species of cavity nesting birds and ground beetles, in three protected areas.

Our data show that black woodpecker cannot be used as a reliable indicator of a closer to nature forest condition, since, only in some areas, the presence of black woodpecker for both breeding and feeding was associated with variables as large trees and deadwood.

However, black woodpecker was found to be a predictor of the number and abundance of mountain cavity nesting birds, suggesting for an ecological role as an "umbrella species", though only for few species. Black woodpecker is an important element of forest biodiversity especially where other important forest species, usually used as focal species, as other alpine woodpeckers and Capercaillie are absent.

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LIFE-Nature Projects for the Conservation of the Bearded Vulture in Crete, Greece: Public Awareness Campaign and Results

Michalis Probonas, Stavros Xirouchakis, Kostas Grivas

Abstract

The Bearded Vulture (*Gypaetus barbatus*) is considered as one of the rarest raptors in both Greece and Balkans, since its breeding population can be found only in Crete and the relevant number of breeding pairs of the species is only four. In 1998, DG Environment of the European Commission funded a LIFE – Nature project on the “**Conservation of the Bearded Vulture in Greece**” [B4-3200/98/444], which was implemented by the NHMC and the Hellenic Ornithological Society (HOS) during the period October 1998 – February 2002.

In the framework of the same funding measure of the European Commission (LIFE – Nature 2002), the Natural History Museum of Crete, in collaboration with the Forestry Department of the Region of Crete and the Municipality of Inachorio, undertook the implementation of a new project on “**Conservation Actions for the Bearded Vulture and Biodiversity in Crete**” [LIFE02NAT/GR/8492]. The duration of the project is four years and its implementation started on July 2002. The main objectives of the aforementioned project are the implementation of the most urgent conservation actions for the species in Crete and the elaboration of specific conservation measures in mountainous areas of Crete.

The project LIFE02NAT/GR/8492 aims to the conservation of the current population of the Bearded Vulture (*Gypaetus barbatus*) in Crete, as well as the conservation of the biodiversity of the island, through the confrontation of specific human threats to wildlife (e.g. direct execution and use of poisons, low food availability, desertification of ecosystems and habitat degradation etc.). In addition, the project aims to the environment-friendly development of rural areas, through the promotion of ecotourism and local products at the project sites.

Apart from the conservation of the Bearded Vulture population, the project focuses on the conservation of Crete’s biodiversity. Through the implementation of certain actions, species such as the Griffon Vulture (*Gyps fulvus*), the Golden Eagle (*Aquila chrysaetos*), the Bonelli’s Eagle (*Hieraaetus fasciatus*), the Peregrine (*Falco peregrinus*) and the Lanner (*Falco biarmicus*), which are also protected under Directive 79/409/EEC, are expected to benefit significantly from the project.

A wide public awareness campaign has been implemented all over Crete, since the scientific achievements for the effectively protection of the species is better to be widely disseminated. The main actions of the aforementioned campaign are the following:

- ◆ Design and implementation of an effective warding scheme in the Wild Life Reserves of mountainous Crete from relevant Forest Services and Hunting Associations. Wardens of Crete attended relevant seminars for improving their specific knowledge on raptors’ biology, observation and warding. The seminars were organised by the Natural History Museum of Crete (NHMC) and the proceedings of the seminars are already available in printed and electronic version.
- ◆ Establishment of three Information Centers in Crete and function of a mobile exhibition for raptors’ conservation in upland communities throughout the implementation of the project.
- ◆ Publication of information material, e.g. leaflets, posters, documentaries, stickers, T-shirts.
- ◆ Promotion of environment-friendly agricultural and pastoral practices through a relevant wide campaign for agri-environment regulations of the European Union, and also support for the verification and promotion of local biological products.
- ◆ Organisation of Workshops on: a) Sustainable Farming and Extensive Pastoralism; b) Collaboration with Tour Operators of Crete; c) Conservation of the Bearded Vulture (Network of LIFE projects); d) Avian Scavengers (focusing on Vultures); and e) Balkan Network on the Bearded Vulture.
- ◆ Creation and maintenance of a website for the project (http://www.nhmc.uoc.gr/life_gypaetus/).
- ◆ Environmental education material.
- ◆ Organisation of nature festivals in two mountainous areas of Crete for two consecutive years (2004 and 2005).
- ◆ Promotion of ecotourism in the mountainous areas of the project, which will be based to the particular value of the natural and human environment. The action includes the restoration and signing of old mountainous trails, the construction of bird observatories, the establishment of Information Centres, the organisation of exhibitions and fests, and the production of relevant information material (e.g. ecotouristic guides).

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Development of a nationalpark consistent wildlife management in a model region of the Gastein valley.

Friedrich Reimoser, Richard Zink

Abstract

Within the hunting districts of the Hohe Tauern National Park (NP) methods of wildlife management consistent with IUCN Kat.II criteria have been developed and tested over a period of several years. A monitoring system has been established to: (i) investigate population dynamics of wild ungulate species and their habitat use, (ii) analyse the impact of wild ruminants on the development of forest vegetation, and (iii) enable an objective success control of applied measures. Results are presented.

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A lab above the clouds (II)

Aerosol and trace gas measurements at the Sonnblick Observatory

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Abstract

Within the project "Backgroundmeasurements Sonnblick" major inorganic aerosol compounds as well as the trace gases sulphur dioxide, nitric acid and ammonia were collected with filterpacks at the Sonnblick Observatory (SBO). Daily samples were collected from Dec. 2002 until Oct. 2004.

The major inorganic aerosol compounds nitrate, sulphate and ammonia showed average concentrations ranging from 5,5 to 15 nmol/m³, while the trace gases nitric acid, sulphur dioxide and ammonia range from 2,9 to 19 nmol/m³. The calculations of summer to winter ratio represent the seasonal changes of the concentration values of the individual compounds. The highest ratio is found for ammonia, where differences between summer and winter concentrations are very pronounced. Sulphur dioxide, on the contrary does not present a marked seasonal cycle. Scavenging ratios were calculated to compare aerosol data with precipitation samples. The recent measurements were compared with a data set collected from 1991-1993 and we found good agreement between both series. Another comparison was performed for particulate sulphate determined with the Filter packs and a High-Volume at the same time at Sonnblick and showed good agreement.

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“Leben 2014”: Perspectives for Regional Development in the National Park Region Oberpinzgau/Hohe Tauern (Case-Study) – Methods and selected Results

Thomas Schauppenlehner, Andreas Muhar, Bernard Freyer

Abstract

The inter- and transdisciplinary project “Leben 2014” (= Life 2014) in the Nationalpark region “Hohe Tauern”, Salzburg was a research and teaching project initiated by the BOKU University Vienna and the University of Salzburg. The Project was funded by the Austrian Cultural Landscape Research Program (KLF). During the project time 50 students from six disciplines (Geography, Sociology, Communication Sciences, Landscape Planning, Agriculture and Forestry) supported by 18 researchers from both universities worked on possible futures (scenarios) for the Oberpinzgau region together with more than 300 local participants (FREYER et al. 2004). The project concept was based on the scenario technique adapted for transdisciplinary case studies (SCHOLZ, TIETJE 2002, GAUSEMAIER et al. 1996).

The students and local participants were organised in 6 different inter- and transdisciplinary working groups, so called “polarity fields”. Based on the results of detailed system analyses, each group developed various szenarios for the year 2014, which then were evaluated by local habitants. In a final step the groups elaborated convertible projects in context of the best-rated szenarios. Examples and results were taken from the polarity field “wilderness & culture” referring to the subject of the symposium.

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Preservation and dynamics – The charge of conservation in national parks in reflexion to autogenous processes

Wolfgang Scherzinger

Abstract

Taking the natural development of woodlands in Bavarian Forest National Park as an example, this contribution points out the role of undisturbed stands of old growth forest, to preserve species of the "forest-interior-climate", which are mostly stenoecic. But on the other hand it also discusses the significant potential of creating habitats by disturbances of ecosystems (like wind throw, insect infestation), which are essential for the diversity of the "forest-exterior-climate". Constancy and catastrophe are positioned at the extreme ends along a scale of natural development, which are represented by the "climax"-phase of mature old-growth-stands and by large clearings, created by destruction of former tree stands respectively. On the one hand, the "preservation" of the typical diversity of whole the system is only conceivable under the influence of the "dynamics" of natural disturbance. On the other hand, characteristic species and even a whole biocenosis could be threatened locally or even eroded regionally by disturbances of catastrophic dimensions! Therefore, preservation requires a balance and a connection between the various phases of development in natural forest, so that locally displaced organism may evade and retreat to alternative patches of suitable habitats within the diverse mosaic of tree stands.- Demonstrating the high importance of large areas, of length of time, and of a compounding network of habitats for preserving the typical biodiversity, the topic is of high relevance for conservational planning, but also opens new fields for ecological monitoring of self-organizing ecosystems.

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Research in Alpine protected areas: importance and issues of international co-operations

Thomas Scheurer

Abstract

Current international projects and co-operations of Alpine protected areas are focusing on three main issues: Visitor information and management, management of biological resources, and global change issues. Examples of successful international co-operation are WebPark, HabitAlp, WWF-Programme „Biodiversity in the Alps“, Glochamore, Gloria, as well as MMV-Conferences and some ALPARC working groups. In future, alpine protected areas should help to build up frameworks favorable for research co-operations such as common monitoring programs, databases publishing current research projects, regular scientific meetings and a new journal specialised on research in mountain protected areas.

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Climate fluctuation in the Alps during the last 250 years

Wolfgang Schöner, Ingeborg Auer, Reinhard Böhm

Abstract

Within EU-project Alp-Imp climate fluctuations in the Alps for the last 500 to 1000 years have been investigated. Beside climate proxy data (tree rings, ice cores) special weight is put on careful analyses of instrumental time series. These data series were quality checked, homogenised and interpolated to a $1^{\circ} \times 1^{\circ}$ lat/long spatial grid for monthly values (HISTALP data base). Longest series of the data base date back to 1750. However, not only the long time span and data quality makes this data base to a unique example of input data for assessment of both climate change and climate impact but also the vertical extent of climate station from low level sites to high mountain observatories offers the opportunity of three-dimensional evaluations. The high mountain observatory at Sonnblick with its multi-elemental series back to 1886 takes an especially important role for the HISTALP data base and related climate change assessment. On short term (inter-annual) time scale the climate of the Greater Alpine Region (GAR) can be described by five sub-regions (derived from principle component analyses of monthly values) which fits well with a subjective spatial clustering of mean annual course of station series. This sub-regionalisation holds for both air temperature and precipitation. On long term scale GAR air temperature series show a uniform trend for the last 250 years whereas precipitation trends are spatially diverse. Since 1890 GAR annual air temperature has increased by about 2°C . The investigation of changes in temporal variability of both air temperature and precipitation show a decreasing trend which coincide with a decreasing thermal continentality of the GAR.

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Natura 2000 management plans specifically designed for the Natural Park Trudner Horn and the Natural Park Fanes Sennes Prags

Conservation measures, issues and future perspectives

Helga Seeber, Renato Sascor

The creation of the Natura 2000 network is often referred to as the "cornerstone of Community nature conservation policy". Article 6 of the Habitats Directive (92/43/EEC) plays a crucial role in the management of the sites that make up the Natura 2000 network. With the spirit of integration in mind, it indicates the various tasks involved so that the nature conservation interests of the sites can be safeguarded.

In South Tyrol, located in the alpine area of Northern Italy, 42 sites have been designated in accordance with the Habitats Directive and 17 sites according to the Birds Directive (79/409/EEC), since 2000. The Natura 2000 sites are presently covering 19.9% of South Tyrol's total area, which corresponds to 147.428 hectares. They include the Nature Park Trudner Horn as well as the one of Fanes Sennes Prags. In both parks the types of natural habitats belonging to the Natura 2000 network have been designated and registered on maps.

From 2004 to 2005, the conservation status, the conservation objectives and possible development measures for the natural habitats were defined and the data were summarized in so-called Natura 2000 management plans. The Natura 2000 management plans were realized by two working groups. As it was for the pilot management plan of the Nature Park Schlern, during the implementation period of both plans, the local authorities and population were involved. Several information meetings were organized as well as gatherings between the working group, the responsible of the natural park and the community of interests, in order to discuss possible conservation and implementation measures as well as critical topics.

After the collection of basic data regarding ownership, the actual hydro-geological, touristical, agricultural and forestry land-use along with the legal dispositions for the protected area, the Natura 2000 habitats, flora and fauna were classified on site by use of specialized literature. Moreover, the actual status of the habitats was evaluated in accordance with the Natura 2000 objectives. The collected data were saved in a GIS data base, in order to facilitate the evaluation of information and to be able to follow future developments as well as to guarantee a faster implementation of further measures. The next steps were the definition of the aims of preservation along with the measures of preservation. These tasks required further discussions that have not yet been concluded. It has already been partially possible to determine how and with which financial means the measures will be carried out. Economic interests, high implementation costs and private interests are currently hindering the establishment of a definitive catalogue of measures.

In the future, solutions should thus be found through EU fundings, whereas conservation measures should also be embodied in laws. Since a well structured Natura 2000 management plan facilitates the implementation of an overall concept of a natural park, the drawing up of environmental impact assessments regarding projects in Natura 2000 sites as well as the writing of Natura 2000 interim reports, in the future it would thus be desirable to integrate it into the natural park plan. Development plans like these ones are not only useful tools for the daily management of natural parks or protected areas; they are also important when it comes to obtain more easily and rapidly funds for certain projects through several programmes, to guarantee funding for nature protection and, as a result, to increase the acceptance of protected areas among the population.

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Weißer Hölle – Hölle Weißsee Forced Labor at 2.300 meters above sea level

Nicole Slupetzky

Abstract

Already during the Habsburg monarchy water power plants were an important topic. In 1913 the first plans were developed to build a water power plant in the Stubachtal. On the contrary 11 km² turned into a national park, in 1921 another 90 km² in the region of the Granatspitzgruppe. Parallel the Austrian Railway Company (ÖBB) built the first dam wall at the Taunermossee which was finished in 1929.

After Austria's "Anschluss" to the German Reich the Stubachtal turned to be a huge construction area of the German Railway Company – Deutsche Reichsbahn. At the beginning many civilian forced laborers from Poland, Ukraine, France for example had to work here. With the beginning of World War II the first Prisoners of War were forced to work here. Through the whole valley wooden huts were built, miserable shelters for the laborers. The working conditions differed extremely depending on the fact where one was assigned for. The worst case was to be assigned to the area of the lake Weißsee in 2300 meters.

The camp Weißsee turned into a concentration camp in 1943 at was officially an auxiliary camp of Dachau. People from different nationalities were forced to work in this area. They had to do heaviest work. Three huts were used for shelter for 450 inmates surrounded by heavy barbed wire, so no one could flee. People suffered without any chance of getting out of hell on earth. In May 1945 American GIs freed the concentration camp Weißsee.

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Glacial changes, water cycle observations and mass balance development on the Stubacher Sonnblickkees in recent years

Heinz Slupetzky, Hans Wiesenegger

Abstract

Since 1981 the Stubacher Sonnblickkees, a small north-west exposed slope glacier in the Granatspitz group, has lost approx. 26 % of its total mass.

It has been monitored since 1959, which makes it the glacier with the longest observed mass balance series in the Hohe Tauern National Park. The yearly mass balances have been calculated by using semi-direct and direct glaciological methods.

As there are only few glaciers worldwide, which have been observed for more than four decades, these long-term observations are a valuable contribution to the understanding of the glacier - climate relationship.

Observing the genesis and the development of "new" lakes around the glacier is also an important part of the monitoring programme, which is sponsored by the Hydrological Service.

In 1990, "Lake Eisrandsee", a small tarn situated at a sea level of 2,500 m between the glacier snout and a rock barrier to the east of the glacier, appeared for the first time and due to constant melting of the Stubacher Sonnblickkees, has continuously grown to an actual length of 203 m and a width of 112 m.

The hydrological system of the recent lake is very complex and in order to understand the ongoing processes, Lake Eisrandsee as well as its two outlets (Keesbach and Eislbach) situated at different altitudes, are being monitored by means of automatic gauging stations.

Daily fluctuations of the lake's water level combined with slightly delayed and different discharge reactions in the two above mentioned streams were also observed as well as the regular water temperature fluctuations which depend on global radiation.

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Research Activities at the Sonnblick Observatory

Michael Staudinger

Abstract

The Sonnblick Observatory at the national park Hohe Tauern developed within the last years in an unique centre of atmospheric research. Conditions at the observatory are undisturbed by any local emissions and the climatic record of the past 120 years gained at unchanged conditions proves to be very valuable in the climate change discussion. Today a number of more than 30 projects are carried out in and around the summit, ranging from aerosols measurements to gamma radiation and permafrost monitoring.

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The importance of National Parks and other protected areas for the surviving of lichens and lichen communities

Roman Türk

Abstract

In the densely populated areas of Central Europe National Parks and protected areas like Natura-2000-Habitats play an important role for the growth and the surviving of lichens. These slowly growing, symbiotic organisms of mycobionts and photobionts need for the colonization, development and growth in most cases undisturbed areas with only slight anthropogenic influences. Thus National Parks and protected areas with a high amount of natural or near natural areas provide many different habitats which are the prerequisite for a high diversity of lichens with special demands on microclimate and substrates. Also for long-term research and monitoring studies on succession of biological soil crusts, succession on decaying wood and the development of vegetation natural habitats are very important. As the results of lichen diversity in various National Parks and other protected areas show, there is a great demand of research in the next century.

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IPAM Toolbox. Tools and Pilot Actions for Management Plans. Management plans for 7 Natura 2000 Sites in Carinthia

Robert Unglaub

Abstract

The project „Management Plans for 7 Natura 2000-Sites in Carinthia (Austria)“ focuses on two focal points. The theoretical part presents and illustrates methods and tools to best management plans. In part 2 these tools and methods are tested in management plans for 7 Natura 2000 sites in Carinthia.

The most important tools of part 1 - according to the main steps of the working process - are:

for data-collection, inventory and assessment:

- ◆ a form for collection of data about the habitats and species of the site including the evaluation of their conservation status
- ◆ the structure and contents of a data bank documenting these data

for planning:

- ◆ a standard map symbols key
- ◆ a list of standard measures
- ◆ a method to find out the ranking of the urgency to implement the different measures

for the report:

- ◆ a standard list of contents

Experience in implementing the tools was in general positive. They were able to raise the quality of the management plans concerning transparency and the “transmission” of legal regulations of the Habitat directive on a technical and practical level.

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The Dolomiti Bellunesi National Park "Fauna" special project

Enrico Vettorazzo

Abstract

The special project "Fauna" is the instrument of fauna planning of the Dolomiti Bellunesi National Park. It concerns: knowledge, detailed check list with commentary about Vertebrates and Invertebrates; the effective proposals of management and preservation of the zoocoenosis; planning of future scientific research; priorities of intervention. All the information about the plan have been georefered and implemented in a GIS.

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Translated by Mirta Barbonetti

The Implementation of the National Park Idea in Society – The Role of Agenda 21 Processes

Ulli Vilsmaier, Ingo Mose

Abstract

Due to continuous debate, a significant paradigm shift in protected areas research and implementation can be observed, being characterized by a shift from the dominance of protection to an integration of protection and development. As a result, the idea of area protection has been extended to the idea of general protection of nature and the environment. This approach requires a continuous participation of inhabitants and civil society at large. If protection should take place *with* people and not *against* them, it is necessary to promote acceptance, initiate continuous discussion and reflection about the functions of protected areas and organize active participation in their development. Especially during the implementation of protected areas there is a high need of explanation for the necessity of borders and zones to meet the aims of nature protection. Many different models and examples of participatory processes of protected areas, especially national parks, show how successful the integration of regional actors can be. To reach a continuous discussion and contribution of the population, it is necessary to examine the meaning of borders and develop a new understanding of their functions between protected and non-protected areas. Although the border has the role to delimitate, it should contribute to overcome itself and finally make itself unnecessary. Decoding borders of protected areas as restrictions, impulses and measures for man-biosphere-relations, can only happen throughout dialogue. Not simply teaching and studying, but common experiencing and understanding offers a chance for an area protection, that goes beyond national parks and other protected areas and makes room for sustainable development of regions. Local and regional Agenda 21 processes offer an appropriate political and organizational framework to cope with this challenge. By several examples of national parks in Europe the authors will illustrate experiences, possibilities and limitations linked with Agenda 21 models of regional learning processes under the umbrella of nature protection. Their fruitful implementation has only just begun.

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What happened in the Šumava National Park?

Mojmir Vlašín

Šumava is largest National Park in the Czech Republic. It is 69 thousands hectares large, majority of its area is covered by forest. Only about ten percent of forests are ancient ("virgin") stands. The rest is "man - made" - i.e., it had been felled and replanted by humans. However, it does not necessarily imply unnatural species composition.

Activity of bark beetles is a natural process in old Norwegian spruce forests. These beetles (in Central Europe mainly *Ips typographus*) attack old trees, lay eggs into bark, and their larvae feed on underlying phloem tissue. Majority of thus attacked tree dies out. Now, after an outbreak of bark beetles that lasts for 15 years, about 14% of forest cover of Šumava National Park are damaged. There are two hypotheses among the concerned circles:

1. The bark beetle outbreak is a natural disturbing process in habitats of mountainous "taiga" forests. As every natural process, it had begun naturally, and would naturally end up even without interference of humans.
2. The outbreak is a horrible catastrophe, which might last for ever, or at least until the "pests" has eaten whole forest cover of the Šumava NP.

Before establishing NP, area of present NP Šumava was proclaimed as a Biosphere reserve(1990). Core zone (natural zone) included approximately 40 % and formed from 14 pieces. In the beginning (NP was established in the year 1991) the park was divided to three zones (according Nature Protection Act) i.e. natural, managed and recreational zone. First zone (natural) had about 22% of whole area and was divided to 50 separate pieces.

Because in central Europe there is not an example - except the Bavarian forest NP - how to solve bark beetle problem in such type of NP, headquarters of the Šumava NP and Ministry of Environment decided (1995) to divide NP differently into zones. However, only 13 % of the NP area was included into the new natural zone, which was moreover fragmented into 135 separate pieces. That such policy was nonsensical is clearly seen from Table 1, which compares state of zonation in selected national parks in mountains and highland of Central Europe.

Furthermore, there was an agreement that except the natural zones administration of the Šumava NP will implement strict anti- bark beetle management - which means clear felling of all attacked stands. Natural zone was declared as inviolable. It is of interest that all income from logging flows to headquarters of the NP.

In the year 1999, director of Šumava NP asked Ministry of Environment for permission to "manage bark beetle" (i.e. to cut trees) also in natural zone. The crux of the problem is that the administration of the NP was wholly controlled by technocratic-minded foresters. They believe that they are able to rule the development of ecosystems better than nature.

The fragile balance of these ecosystems was constantly threatened under the Park administration's present clearcutting policy. Thanks of the intensive campaign, which included tens of specialists and scientists from the Czech Academy of Science, universities, and the WWF, and thanks particularly to two blockades of clearcutting by Czech NGOs minister of Environment recall previous director an established new director. He has entomological backgrounds and Šumava start changing step by step to the real national park

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The origin of hollow tubes in Alpine quartz crystals

Franz Walter, Karl Ettinger

Abstract

Needle-like hollow tubes penetrating quartz crystals are a particular inclusion phenomenon of Alpine mineral parageneses. From several locations of the Eastern Alps samples of quartz crystals with hollow tubes were investigated to find the previous mineral forming the tubes. In four samples solid inclusions showing the same crystal morphology like the hollow tubes were identified by X-ray and microprobe as anhydrite, CaSO_4 . The formation and dissolution of anhydrite in the hydrothermal system of Alpine clefts is discussed.

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AQUILALP.NET – The Golden Eagle in the Eastern Alps A trans-border monitoring project in the Austrian-Italian Alps

Norbert Winding, Robert Lindner

Abstract

The Golden Eagle is one of the most prominent symbols of the Alps. Yet, excessive hunting and environmental changes caused eagle numbers to decrease dramatically at the end of the 19th century. Today populations are thought to be stable; they are no longer under immediate threat. However human influence still causes a potential threat, thus Golden Eagles are protected under the European Birds Directive. AQUILALP.NET aims to identify and document eagle populations in five protected areas in the Austrian-Italian Alps and to use this information to develop a coordinated trans-border protection strategy.

The project encompasses the national parks Hohe Tauern, Stelvio, Dolomiti Bellunesi, and the nature parks Rieserferner-Ahrn and Fanes-Sennes-Prags. All are part of the European NATURA 2000 network and recognised as core eagle habitats in the Eastern Alps. A co-ordinated recording scheme, regular controls of nesting sites and a standardised methodology allow scientifically exact documentation of populations and comparison of reproduction rates. Additionally, location characteristics of nesting sites were recorded, paying particular attention to present or potential disturbance parameters.

Within the project, a total of more than 70 breeding pairs are monitored and more than 230 nest sites have been documented. The co-ordinated monitoring over an area of 3,200 km² allows us to review the efficiency of the NATURA 2000 Network in the Alps for the protection of this prominent bird of prey.

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Types of Conflicts between Recreational Use and Nature Conservation – a contribution to Conflict Analysis, Resolution and Prevention in National Parks and Biosphere Reserves

Karen Ziener

Abstract

Conflict types provide the possibility of structuring the extremely complex conflict area recreational use – nature conservation in national park and biosphere reserve regions. This conflict typification is based on the findings of spatial and social-science conflict research as well as on extensive conflict analysis carried out in the six areas which were investigated. In this process, both general tendencies in conflict development and resolution as well as specific regional features became evident. In this lecture, the typification will not be dealt with as the result of, but as the starting point for, the analysis of conflicts and the development of strategies for solving and avoiding conflicts. Using several conflict types as examples, the differences between the conflict situations and their resolution will be described and the varying roles of national park and biosphere reserve managements in the conflict process demonstrated. Even though each conflict situation demands an individual, conclusive analysis, they can provide the basis for the discussion of fundamental procedures and generalization of experience.

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Economic Aspect of Sustainable Development in National Park Djerdap

Goran Zikic, Nenad Radakovic, Sasa Nestorovic

Aim of this project

1. Endangered and autochthonous fish species protection; introduction and protection of fish species with large scale of nutrition (these species can reduce process of organic pollution)
2. Autochthonous species fish stocking will make balance between fish species in Danube river
3. Direct fishing to rapacity species with large economic value, species that feed with algae
4. Provide reducing of process of organic pollution though fish stocking with autochthonous species

Importance of this project

As Danube is large International River that flows through several countries, it is not useful to implement this project into one small area and not covers all other area of Danube. If this project shows significant result then this method can be use in other parts of Danube River. Also, methods and results from this project can be used in different water ecosystem, not only rivers, because this can be good example how to protect autochthonous fish species in water ecosystems and how to promote one aspect of eco tourism. Besides, this project can give guide for other water areas not just Danube River, how to reduce organic pollution in water ecosystems and to avoid over production of invasive fish species.

Results until now

Considering that project duration is 3 years, results from first and second year is following: natural reintroduction of fish species was increase for 15% per year and organic pollution was reducing for 15% in first year and 20% in second year.

Social and economic aspect of this project

This National Park is located at the territory of municipalities: Majdanpek, Kladovo I Donji Milanovac in south part of Serbia. This area of Republic of Serbia is one of undeveloped part with lot of social and economic problems. Both commercial and recreational fishing constitutes a major source of employment and contributes significantly to the economy of the global economy. With over fishing occurring at an alarming and disastrous rate, economies and livelihoods are being irrevocably damaged. Large number of inhabitants in this area lives near by the Danube River and main working activity is commercial fishing. The impressive aquatic biodiversity of the Danube River is a key component of the food security of the people. Increasing fishing pressure and alteration of key aquatic habitat are having serious impacts on the fishery.

Also, inhabitants have their own boats and barge that can be used in tourist purpose. If the recreational fishing made some development in territory of National park Djerdap then local inhabitants will have opportunity to development their own business related to the tourism. River, like Danube, clean and pure, with large fish diversity and quantity can give opportunity for local communities to make good quality of live hood. An increase in tourism productivity and competitiveness will necessarily take eco-tourism to protected areas and other places with extensive biological and cultural diversity, it being necessary therefore to take regional measures to manage to maintain these natural corridors.

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Alpine Bearded Vulture Project: If Ending Releases Signifies Success of Project

Richard Zink

Abstract

A hand full of scientists started with the reintroduction project in the year 1978. Today the project has reached international significance with more than a dozen of experts which coordinate more than 5000 voluntary working observers throughout the entire Alps. Thus success control is well based and monitoring is carried out on entire population level, however it needs huge enthusiasm and long term finances to assure high quality of communication flows within the monitoring network. This article shall summarize the knowledge collected within the last 20 year. Methods of project evaluation as well as possibilitys of communication are presented. GIS-Analyses give a better idea of the way the Alps have been re-colonised and enable the interpretation of delayed reproductive success in the northern Alps. The aim of the reintroduction is to stop release! This will be the case if annual reproduction success has reached the average number of birds released every year. In this case one might expect continuous population growth without human intervention. Relying on the development of pair formations this will come true very soon. The issue of alpine bearded vulture reintroduction is a success story: 10 couples started with incubation in the year 2005; continuously new pair formations can be registered. It seems the population shortly will be self sustaining and will replace the contingent of released birds (7 chicks/a).

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Spatial Coincidence Between Habitat Suitability for Bearded Vultures and Protected Areas in the Austrian Alps

Richard Zink, Helmut Beissmann

Abstract

The Network of Alpine Protected Areas built a GIS of conservation areas in the Alps. Within the framework of the International Bearded vulture Monitoring these regions have been compared with the distribution of Bearded vultures. The original data were provided by several institutions (see logos on the poster). Pair formation is a crucial criterion for the increase of the reintroduced population and will take place only within habitats of high quality. The habitat suitability map for the Austrian Alps is derived from ecogeographical variables at the observation points according to the method described by Hirzel (Ecology, 2002).

The main question is about the relevance of alpine protected areas in Austria for the highly mobile birds and to what extent habitats of high quality coincide with these locations.

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