Conference Volume | **4th Symposium of the Hohe Tauern National Park for Research in Protected Areas** September 17th to 19th, 2009, Castle of Kaprun | pages 177-182

Terrestrial habitat-mapping within the Hohe Tauern National Park - methods and results

Christian Keusch, Hanns Kirchmeir, Michael Jungmeier

Summary

In the course of a large scale biotope mapping which took place between 2006 to 2008 within 9 Pinzgau municipalities, also a large part of the Hohe Tauern national park was mapped. Based on the mapping manual of the federal state government of Salzburg (NOWOTNY et al. 1994), more than 12.000 biotopes and 200.000 vegetation data within the national park was collected. 146 different biotope types and 876 plant species were found in the national park, including several endangered species. It was the very first time a biotope mapping of this scale was carried out in Austria, with 39 mappers and a digital method to collect data of the area.

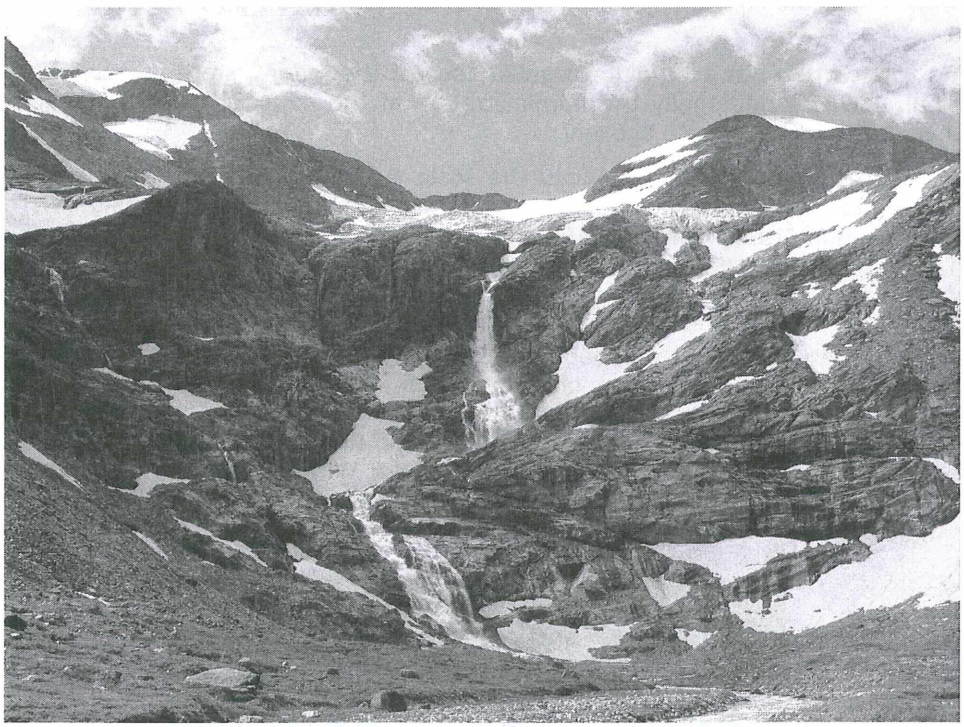

Figure 1: Head of the Kaprun valley (Author: D. Bock)

Keywords

terrestrial habitat-mapping, biotope mapping, vegetation ecology, digital mapping

Aims

The aim of the survey was to carry out a complete spatial collection and description of all relevant biotope types in regard to nature conservation, according to the Salzburg biotope mapping manual. This also included all current complements of the Natura 2000-habitat types. The spatial borders were defined according to the results of the air photo interpretation of the Hohe Tauern national park -Habitalp (BAUCH et al. 2006). The field survey was carried out in 2006 and 2007. The results were presented in 2008 to the municipalities.

Altogether the biotope mapping took place in 9 municipalities of Pinzgau and covered an area of more than 1114 km², of which about 526 km² concerned the Hohe Tauern national park. The present evaluation will only focus on the areas within the national park.

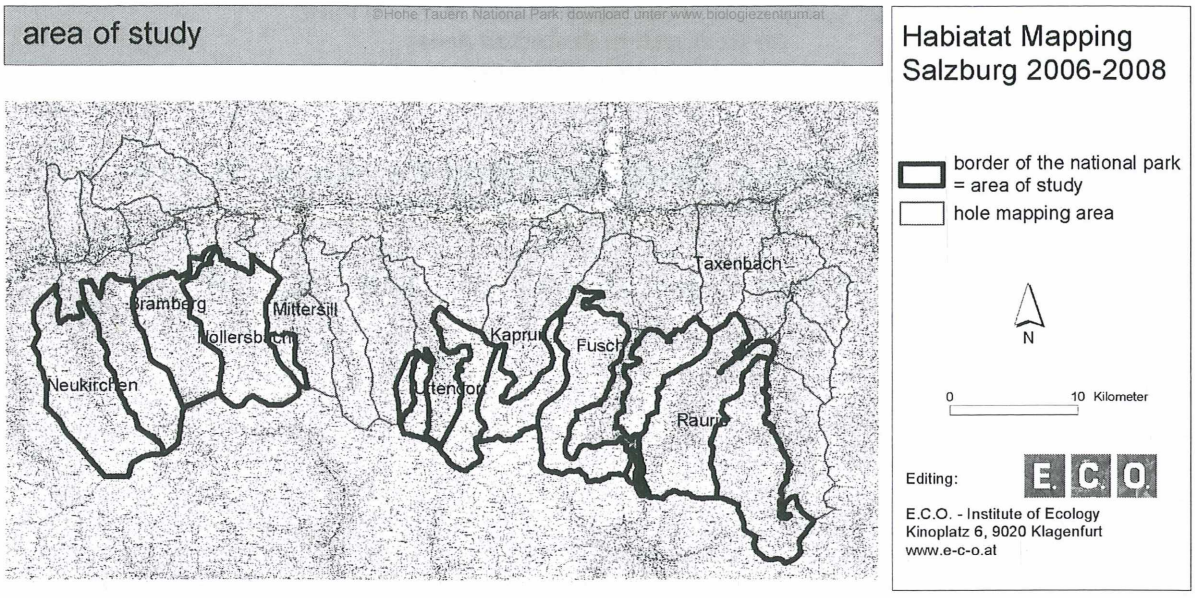

Figure 2: Area of study

Methods

The mapping was carried out according to guide lines of the federal state government of Salzburg (NOWOTNY et al. 1994). Additionally the administration of the national park had special guidelines which also needed to be taken into account.

Terrestrially the mapping was carried out in the scale of 1:5000. Basis for the mapping provided results of the aerial photographic interpretation (Habitalp), the moor mapping (WITTMANN et al. 2007) and aerial photographs taken in 1993 and 2003. The data of the moor mapping was not available in 2006 and could therefore not be taken into account until 2007.

A total of 39 mappers were assigned during the 2 years of field work.

For the first time in Austria a biotope mapping of this scale was carried out using a digital method of collecting data. Each mapper was equipped with a hand-held computer (Personal Digital Assistant – PDA) to input delineated data. Input of data was carried out on a specially programmed input screen. With this method it is possible to make the first controls and most notably to verify the completeness of the data already at the field survey. With a complete and correct input, the time consuming and error-prone input of the analogue mapping sheets after field seasons, could be avoided.

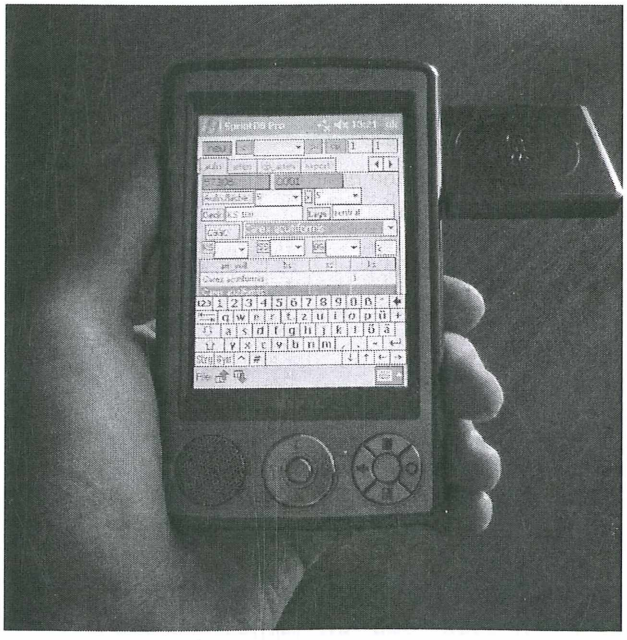

Figure 3: PDA with input screen of the vegetation survey

Additionally all PDAs were equipped with aerial photographs, mapping area borders and existing protected areas and Habitalp-borders. With help of these data as well as an integrated GPS the PDA could be used for orientation in field.

Following parameters were collected in field:

Cadastral municipality
Biotope type
Identification /Description
Name of editor
Date
Slope
Relief
Exposition
Geology
Description
Official protection, targeted
Obligated protection, actual
Obligated protection, targeted
Surrounding biotopes
Natural threat
Anthropogenic threat
Measures, actual
Measures, targeted
Function
Evaluation
Comments
Biotope structure parameter
Subsumed biotope types
Vegetation coverage
Location of mapped vegetation
Plant species list/mapped vegetation
List of animal species

Following parameters were addtionally supplemented via the Geographical Information Systems (GIS):

Municipality number
Object pointer
Surface
Altitude from to
Parcel numbers
Obligated protection, actual
Date of protection

The demarcation of the biotope borders in the field was made on analogue maps in A4-format. In connection to the field work these location data were transmitted to GIS. The external borders of the mapping area were additionally compared with existing biotope mapping data. After a detailed control of the data these were handed over to the Salzburg federal state government in the format of ESRI-shape files and ESRI coverage-files.

Figure 4: Example of a route map for the field work with preprinted Habitalp-polygons

Results

Presentations for the municipalities together with corresponding open house days of all mapping areas took place in 2008, and the official part of the project was successfully completed. The result was an extensive/selective mapping from valley to the summit regions.

12014 biotopes were collected inside the national park area. The biotopes are situated on an altitude range from 953 to 3640 m sea level. With a total area of 455,34 km² the mapped biotope area equals about 86 % of the total examined national park area. Whereas the core zone of the national park with 93% biotope area offers a higher amount than the buffer zone with 73%. According to the biotope catalogue of the mapping guide lines of the Salzburg federal state government 146 different biotope types were found in the project area.

Within the mapping there are 876 different vascular plant species, with 112 of these on the red list of Salzburg for endangered ferns and flowering plats (WITTMANN et al. 1996). Many of these 112 species are critically endangered. Some of these are even threatened with extinction.

Figure 5 shows the agreement and disagreement between terrestrial biotope mapping and the interpretation of infrared aerial images carried out in the Interreg IIIB Project HABITALP. About 98,5% of the biotope borders (outlines) could be taken from the HABITALP-Data. In most cases, several polygons of the HABITAL-Dataset were merged into one biotope-polygon. It should be noted that capacious studies about the qualitative agreements are still missing.

Figure 5: Comparison of the air photo interpretation and the terrestrial biotope mapping (black HABITALP, grey: Biotop border coincident with HABITAL, white: new biotope boarders)

Discussion

The result of the biotope mapping indicates the high level of nature in the national park. The total area of the 12014 biotopes mapped in the national park cover almost 86 % of the national park surface. Even though mapped areas of the national parks are on higher levels, a total of 146 different biotope types were collected. Therefor more than half of all biotope types surveyed in Salzburg (255) were found. Including almost all watercourse – , wetland habitats, alpine grass communities and biotope types of the high alpine/nival zone and numerous dwarf – shrub moores and forest types. The large diversity of biotope types and the high diversity of species gives the area a unique scenic nature. With 261 moor areas this national park houses several of the endangered and valuable habitats.

In recent times biotope mapping is enforced by the nature protection work (KICHMEIR et al. 2008, KIRCHMEIR et al. 2009). Especially in the case of protected areas, which are interested in carrying out a complete spatial collection and description of all relevant biotope types. Special attention relies on the modern spatial information systems because of there influence on natural resources management. Knowledge about the existing biotope creates a basis for decision- making actions and implementations.

Particularly for large national parks like the national park Hohe Tauern it is essential to organize such large scaled high quality mapping within a manageable time span. For this reason digital mapping has been used to assure a constant quality on high level throughout the project. The first examinations of the datawas done during the collection face outdoors. Due to the constant availability, data can be examined and collected at any time. Therefor the time consumption of inputting data in the field increases a bit, however it highly paid off during no post processing (like submitting data, corrections, etc.) is needed.

This aspect has already been deeply analysed by a project by E.C.O. in cooperation with the Technical University of Graz – department of geoinformation and the Joanneum Research (LIEB et al. 2008).

The project showed that the overall time consumption of this digital method outperforms previous methods. Nevertheless the new digital examination process also brings some slight disadvantages. Therefore staff training and specific instructions are necessary, since limiting factors such as battery life or entering of long texts become evident.

According to actual technical knowledge digitizing the borders within a biotope mapping is not yet possible. (Lieb et al. 2008). But this will be the long-term solution for biotope mapping.

Another important point is the compatibility of the requirement due to NATURA 2000 and the results of the biotope mapping. Due to some post-processing in the results of the biotope mapping, it can play a noteworthy contribution.

The project HABITALP (Bauch et al. 2006) has shown that the spatial borders of the air photo interpretation can be used, in large parts, for the terrestrial biotope mapping, which is more precise in some aspects. Additional studies could also give a qualitative comparison of the two data sets. The results could give rise to more precise combinations and cooperation of similar projects like terrestrial biotope mapping and air photo interpretation.

References

Bauch K. & Seitlinger G. (2006): Local Interpretation Experiences. Aerial Image Interpretation in Hohe Tauern National Park. In: Lotz, Annette (Ed.), 2006: Alpine Habitat Diversity – HABITALP – Project Report 2002-2006. EU Community Initiative INTERREG III B Alpine Space Programme. National park Berchtesgaden, p. 81-90.

Lieb S., Keusch C., Kirchmeir H. (2008): DIGSTER – Digital Satellite Based Terrain Mapping: User Requirements. Bearbeitung: E.C.O. Institut für Ökologie, Klagenfurt, 76 S.

Kirchmeir H., Keusch C., Lieb S. & Jungmeier M. (2008): Kartierungsrichtlinie für die Biotopkartierung Steiermark, Version 1.2 vom 25.1.2008. Bearbeitung: E.C.O. Institut für Ökologie. Im Auftrag von: Amt der Steiermärkischen Landesregierung, Fachabteilung 13C-Naturschutz.

Kirchmeir H., Keusch C., Lieb S. (2009): Naturrauminformationssystem Kärnten NIS-K Kartierrichtlinie. Bearbeitung: E.C.O. Institut für Ökologie. Im Auftrag von: Amt der Kärntner Landesregierung, Abteilung 20 – Landesplanung.

Nowotny G.& Hinterstoisser H. (1994): Biotopkartierung Salzburg. Kartierungsanleitung. Naturschutz-Beiträge 14/94, Amt der Salzburger Landesregierung, Referat 13/02: Naturschutz, 247 pages.

Wittmann H., Pils P. & Nowotny G. (1996): Rote Liste gefährderter Farn- und Blütenpflanzen des Bundeslandes Salzburg. 5. Neubearb. Aufl. — Amt. d. Salzb. Landesreg., Ref. 13/02, Naturschutzfachdienst.

Wittmann H., Stöhr O., Krisai R., Gewolf S., Frühwirth S., Rücker T. & Dämon W. (2007): Erfassung der Moore im Nationalpark Hohe Tauern in den Bundesländern Kärnten, Salzburg und Tirol. Pflanzensoziologische und standortökologische Untersuchung der Moore des NPHT. – Unpublished project report on behalf of Hohe Tauern national park. 389 pages.

Contact

Mag. Christian Keusch
keusch@e-c-o.at

Dr. Hanns Kirchmeir
kirchmeir@e-c-o.at

Mag. Michael Jungmeier
jungmeier@e-c-o.at

E.C.O. Institut für Ökologie
Kinoplatz 6
9020 Klagenfurt
Austria