

Building an Inventory of Life: The Biodiversity Archives of the Nationalpark Hohe Tauern at the Haus der Natur, Salzburg

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Summary

The biodiversity database of the Hohe Tauern National Park is a multi-functional information system which aims to document all available data about 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 groups of animals and plants. All data are stored in one central data repository as to maintain maximum standardisation, yet the specific requirement of certain systematic groups can be accounted for. Unit-level data originate from various sources such as commissioned field studies, museum collections and various published sources, as well as private specimen and data collections. Unit-level data are referenced to comprehensive metadata concerning taxa, sites, collections, literature, and contacts. Possible applications of the biodiversity database are manifold and are of large interest to biologists, teachers, Governmental experts, conservationists, politicians, and all who relate to the region of the Hohe Tauern National Park.

Keywords

Biodiversity, database, digitisation, animal and plant distribution, maps, natural history collections, museum, Salzburg, Carinthia, Tyrol, Austria

Aims

The Hohe Tauern National Park biodiversity database was established with the aim of documenting all available data on the distribution of animals and plants in the Hohe Tauern region in one extensive database. Main data sources for the project are: commissioned projects of the National Park Hohe Tauern and from the state governments, various atlas projects, published scientific literature, natural history collections (specimen), data from amateur-scientists. The database is designed as a multi-functional information system which allows data query relating to specific scientific questions, or spatial extent. Data can be retrieved quickly in any desired structure and format.

The data are collected with the main aim to allow the quick assessment and visualisation of known and potential distribution areas. In compliance with the conservation aims of the National Park Hohe Tauern special attention is given to threatened species as well as species which are defined as conservation targets. The data stored in the database enable us to visualize areas of high and specific biodiversity as well as areas requiring special protection or management actions. The database is meant to be a valuable basis for analysis and publication of biodiversity data. Furthermore, the project can be used to identify those taxonomic groups and those areas within the national park where only insufficient data are available. The database is therefore an integrated and valuable part of the biodiversity conservation strategy of the National Park Hohe Tauern.

Duration

The project started in the year 2000. As nature is constantly reshaped by underlying dynamic processes (natural or non-natural) continual changes in biodiversity are to be expected and the documentation of biodiversity needs to be updated on a regular basis. Hence new data are continuously collected and the duration of this documentation project is infinite.

Area of study

The geographic area covered is the Region of the national park Hohe Tauern, including the core and the buffer zone of the National Park (ca. 1800 km²), as well as the area outside the national park covered by the municipalities in Salzburg, Tyrol and Carinthia that share a part of the National Park Hohe Tauern. Hence the study area covers a natural spatial unit and is not confined to legislative boundaries such as the borders of the national park.

Methods

The Biodiversity database is maintained at the "Haus der Natur" Museum of Natural History in Salzburg. Database management and data entry is carried out by a small team of biologists specialised in the taxonomy and ecology of vertebrates, invertebrates, and plants respectively, and with in-depth knowledge of informatics.

The main software used in the project is "BioOffice" a specialised software package for the documentation of biodiversity data (formerly produced by Biogis Consulting now maintained at the Tiroler Landesmuseum Ferdinandeum). The database program is based on a Microsoft SQL-Server and a client software with integrated GIS functionality (based on ESRI Map Objects). The software allows the adaptation of the database model as well as the user interface to exactly fit the scope and particular needs of each taxonomic group. For each data field content policies and rules for data integrity and consistency have been set up and documented. Accurate and efficient procedures have been developed to guarantee standardised, consistent data.

The database contains comprehensive and standardised taxonomic lists (based on the Fauna Europaea project and from standard botanical references) for all organism groups covered. These include information on higher systematic, nomenclature, name codes, general distribution (in Austria, Europe), national and regional Red Lists, protection status according to European Union Directives.

Unit-level data records (so-called "objects") contain observation data of individuals in their habitat, or information about collected, prepared, and preserved specimens. Sources of unit-level data include published literature, unpublished project reports, distribution mapping projects and expert opinions, private and public collections, and miscellaneous sources of observational data collected in the field and held by many zoologists and botanists (such as traditional paper card indexes, excursion lists and diaries, but also data already digitised in some way). Consequently, the database contains recently sampled data as well as historical data. Before importing data from various sources, the reliability of the information is evaluated and commented by scientists (e. g. with respect to taxonomic identification), assuring a high quality standard.

The record sets documented in the database can easily queried and can then be presented in user-defined reports or in the form of digital maps. Data may also be exported for further analyses in statistical software packages or other GIS software or.

Results and discussion

Currently the database contains ca. 185.000 records (objects) concerning ca. 8.000 species of animals and plants and ca. 9.500 georeferenced sites. The proportional contribution of various organism groups to the overall record set changes from year to year reflecting the fact that each year other organism groups are focused upon. By the end of 2008 birds and butterflies comprise more than 40 % of the data (table 1 and figure 1). On average each record set comprises about 25 data fields (those containing actual information) therefore the total amount of effective information can be estimated as 4.600.000 data. Within the last six years the record set increased tenfold, from 18.810 in 2003 to more 180.000 by the end of 2008. The mean annual data increase was 65 % (figure 1).

The most important data sources which have been integrated in the database so far are: research project reports commissioned by the National Park (e. g. vegetation science, monitoring of eagles, vultures, bats); collections of specimens and data held in the "Haus der Natur" Museum of Natural History; published scientific papers, data collections provided by specialists (of e. g. birds, butterflies and dragonflies); various unpublished research project reports (e. g. private excursions, university projects); various collections of specimens and last but not least research project reports commissioned by the state government (table 2). A significant amount of data originates from private experts who volunteer their time to floristic and faunistic investigations (a big proportion of the specimen collection in the Museum Haus der Natur comes from private collectors).

The spatial distribution of record highlights some areas of special interest. These are regions which are easily accessible (e.g. along the Grossglockner High Alpine Road) and regions that have been researched in more detail (e. g Wildgerlostal or Dorfertal where "Tage der Artenvielfalt" biodiversity days have been organised in 2007 and 2008). On the other hand, the data clearly highlight areas where biodiversity data are scarce and where future research should be focused.

During the last years of database management we clearly experienced the importance of data standardization which becomes even more important as the number of unit level records increases. Hence, the effort needed to administrate the database and to maintain the high data quality grows with the number of integrated data sources.

The biodiversity database now is an integrated tool which helps us to organise the huge amounts of data originally spread over many sources. The database makes those data accessible for further analyses and for the use in day to day conservation work. It serves as a very helpful service for decision makers who have to consider biodiversity in their daily work.

Tables

Table 1: Number of unit level data per organism group recorded in the biodiversity database (as from December 2008).

Organism group	Unit-level data
Mammals	4.511
Birds	32.431
Reptiles and amphibians	1.544
Butterflies and moths	46.132
Hymenoptera (mainly bees and bumble bees)	6.405
Grasshoppers	1614
Beetles	8.350
Dragonflies	589
Spiders	191
Other animal groups	434
Flowering plants and ferns	68.086
Lichens	5.230
Mosses	9.082
Mushrooms	184
Algae	2
Total	184.785

Table 2: Data sources for the Biodiversity database.

	Unit level data
Commissioned work by the NPHT	97.572
Natural history collections at the Museum Haus der Natur	52.483
Published data sources	24.596
Private data-collections	6.434
Unpublished reports form various projects and excursions	1.934
Other specimen collections (private and public)	1.139
Commissioned work by the state government	417
Other data sources	210
Total	184.785

Figures

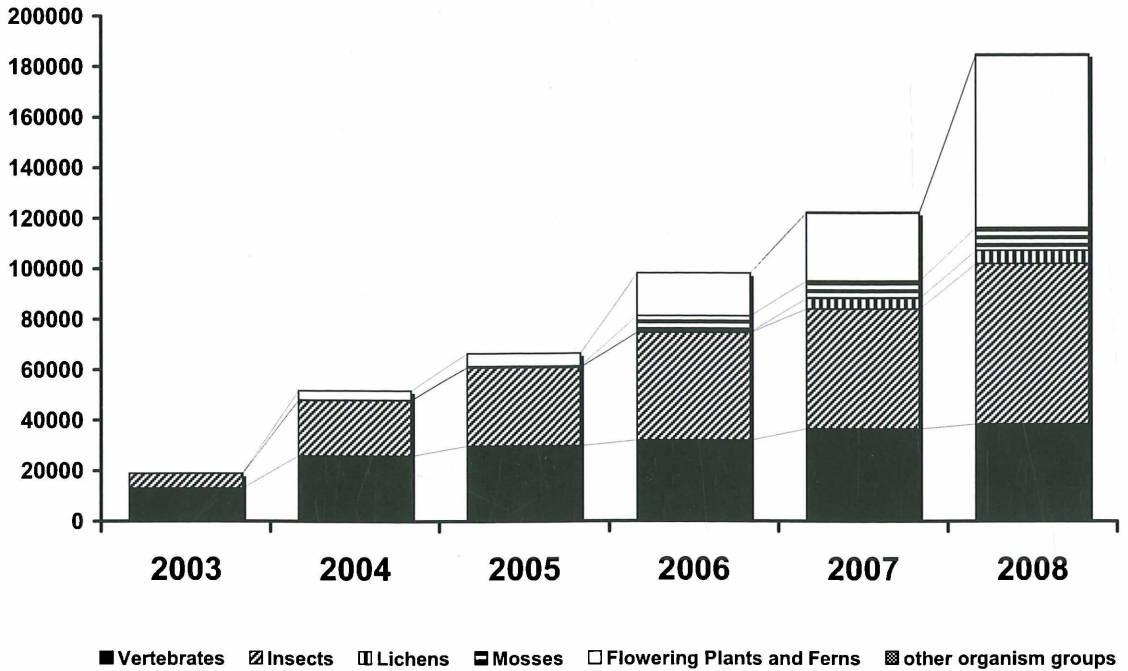


Figure 1: Increase of the number of unit level data recorded in the biodiversity database within the last six years.

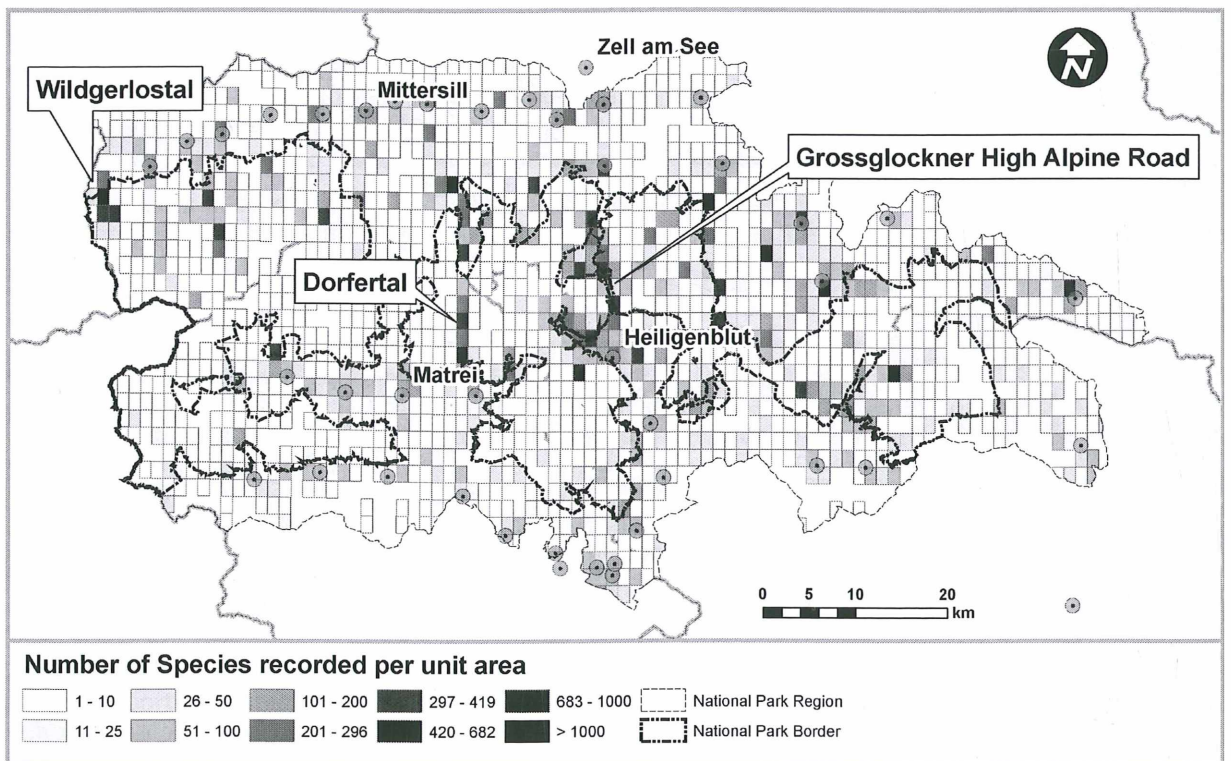


Figure 2: Spatial distribution of animal species records (number of species documented per minute-square) in the region of the National park Hohe Tauern.

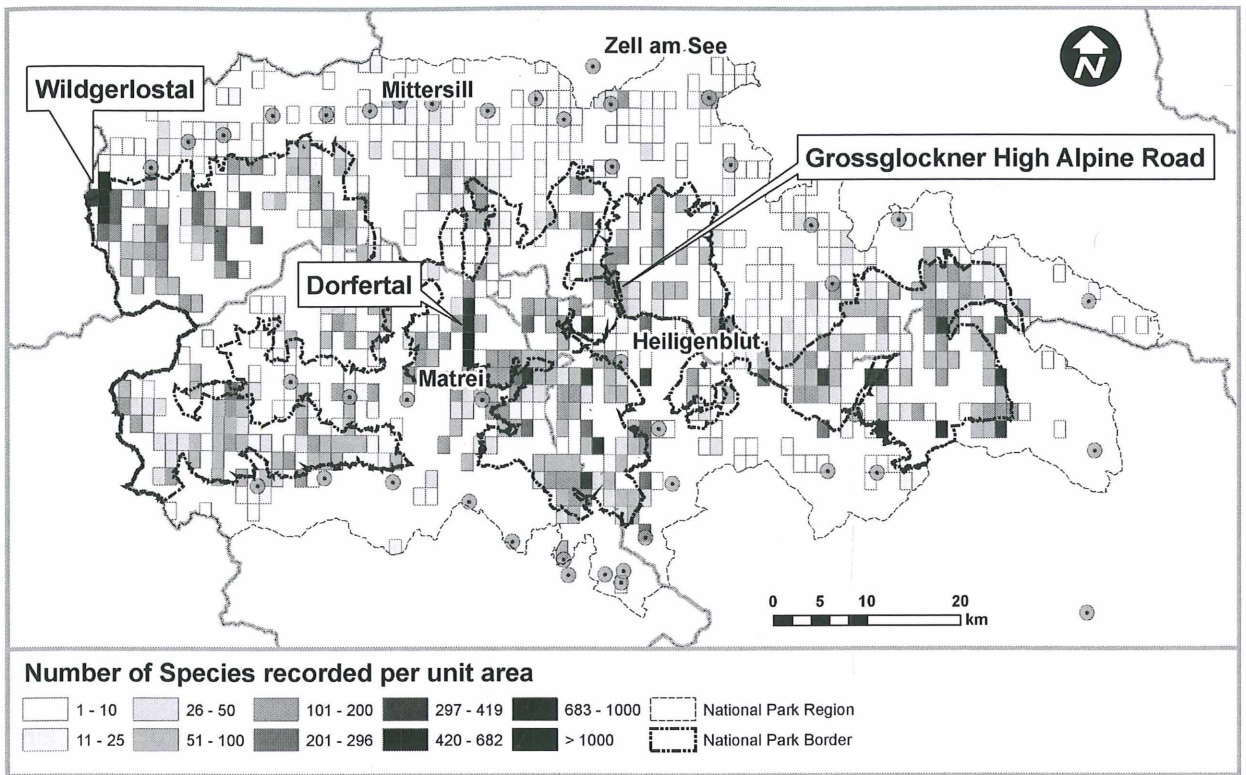


Figure 3: Spatial distribution of plant species records (number of species documented per minute-square) in the region of the National park Hohe Tauern.

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