

„ Unique veldt in the middle of Europa ... “

II) The Austrian biosphere reserves

Neusiedler See

Year of approval by UNESCO: 1977

Federal province: Burgenland

Main focus: Conservation, management, tourism

Total surface: 25.000 hectares (see map on page 38)

Core zone: 4330 hectares

(identical with the core zone of the national park)

Elevation: 114 to approximately 480 metres

Additional protection status:

1982: Nomination of the lake and the saline area of the Seewinkel („Lacken“) as Ramsar wetlands (60.000 hectare);

1993: Foundation of the bilateral national park Neusiedler See-Seewinkel (surface approximately 100 sq km in Austria and 230 sq km in Hungary);

2000: Nomination as Natura 2000 site (41.735 hectares);

2001: Nomination of the cultural landscape Fertő/Neusiedler See between Hungary and Austria as Cultural Heritage Site of the UNESCO

Management scientist

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Background

When the MAB science programme was initiated in the early 1970s, the International Biological Programme (IBP) was about to be wound down. Under the IBP extensive research was undertaken in the reed belt and in the lake itself. The MAB programme was intended as a framework for continuing and extending the IBP research. The initia-

tive for setting up a biosphere reserve on Neusiedler See therefore came from committed scientists such as Prof. Heinz Löffler. They made sure that the relevant application was made to UNESCO.

Geographical position

The Neusiedler See is a large lake situated in the northern part of Burgenland province, i.e. in the easternmost part of Austria, on the border with Hungary. The unique steppe landscape on the Eastern fringe of the Alps forms the western edge of the Little Hungarian Plain.



Geology

The region around Neusiedler See is a transitional area between the Alps and the Little Hungarian Plain, the westernmost steppe landscape in Europe. The hills of the Hainburger mountains and the Leitha mountain range which rises approximately 440 m above sea level are the last (visible) spurs of the Alps. They form the northern and north-western edge of the Neusiedler Basin. At the lowest point of the Little Hungarian Plain lies Neusiedler See at approximately 113 m above sea level in a shallow trough without an outflow. Initially, the fringes



As head of the Biological Reserach Station Prof. Alois Herzig is responsible for the biosphere reserve.

of the Mesozoic sea (Tethys) covered the Vienna Basin and the Little Hungarian Plain. When the sea retreated 13 million years ago, an inland water formed. Salt content dropped and enormous amounts of sediment were deposited. It was not until tectonic subsidence occurred in the region 13.000 years ago, that troughs and basins formed and filled with water from post-glacial feeder streams and precipitation. Thus an inland water came into being that is greatly influenced by changes in climate. From 1865 until 1870, lake Neusiedler See was completely dried out. Today the steppe lake with a depth of one to two meters extends over an area of 320 square kilometres. North of the lake are the flats of the Parndorfer Platte, which was formed from Danubian gravel fields during the most recent Tertiary epoch. Next to that, east of the lake, the plain of the Seewinkel consists of glacial Danubian gravel to a thickness of some 10 to 15 meters. Along the Ruster range which borders on the lake in the west, one finds, surprisingly, limestone, the so-called "Leithakalk". This marine sediment provides stone for building and decoration, which has been quarried in the Roman Quarry of St. Margarethen. To the south-east, the Hanság (fen), a former bog and marsh land, which has partly been converted into moist meadows, extends into the Hungarian biosphere reserve of Fertő.

Climate

The climate in the northern Burgenland is predominantly continental. Situated in the precipitation lee of the Alps means that it gets little annual precipitation, approximately 600mm. The summer months are hot and dry. On average, 61 summer days with temperatures above 25 degrees Celsius are recorded. The region therefore counts as the warmest in Austria. There are winter months during which the temperature does not fall below zero and the daytime high reaches 17 degrees Celsius. The effect of the huge area of water as a buffer for temperature vacillations is most pronounced in the immediate vicinity of the lake. In the main wind direction (north-west) the lake, on cooling during the night, passes on warmth and humidity to the plain of the Seewinkel, thus contributing to a long vegetation period of around 250 days. This creates ideal conditions for growing wine. The eastern shore of Neusiedler See is among the windiest areas in inland Europe. The almost continuous reign of the north-westerly wind is occasionally interrupted by a gusty south-easterly. On the plain of the Parndorfer Platte the biggest modern wind farms in Austria have been set up. The combination of little precipitation, high temperatures and continuous wind causes so much evaporation that during parts of the summer and autumn the conditions could be called semi-arid. In some soils this leads to a superficial concentration of salts (mainly sodium carbonate). These saline soils are

naturally treeless. The Seewinkel features approx. 35 flat pools that dry up periodically and are called „Lacken“. Seasonally their depth vacillates between 0.7 m and completely drying up.

Natural habitats and ecosystems

In a mountainous and wooded country like Austria, the open steppe-like landscape of the Seewinkel comes across as exotic. However, this highly diverse, species abundant habitat is by no means natural but is the result of human intervention. Initially, dense oak forests covered the region around Neusiedler See, except for a few extremely dry or salty locations. Human settlement brought with it forest clearances. The regulation of the water levels made it possible to use the pastures more intensively and to mow the hay meadows. Today the human landscape consists of a patchwork of habitats. A reed belt that can be up to 5 km wide surrounds the shallow lake, which is on average only 1.2 m deep. Towards the east it is followed by treeless saline soil with flat pools called "Lacken" that dry up occasionally. The Hanság (fen), originally an extended lowland moor and carr woodland to the south-east on the border to Hungary, has been drained and turned into an area of moist meadows. The biosphere reserve Neusiedler See consists only of the lake area on the Austrian side with its reed belt. Until the middle of the 19th century, this reed zone did not exist. It was only with the regulation of the water levels and the inflow of nutrients from agriculture that ideal conditions for the reed (*Phragmites australis*) emerged. Despite the dominance of one type of plant, the reed belt is rich in biotopes. Protected from the wind, the still water is a suitable habitat for water bugs, insect larvae and small crayfish. The drainage ditches are teeming with Danube Crested Newts and Common Newts (*Triturus dobrogicus* and *T. vulgaris*). But it is the bird life that benefits the most from the reed belt. Colo-



The saline soils originated from fossils of a former ocean. Repeated evaporation has accumulated the concentration of salt further.

Photo: National park Neusiedler See-Seewinkel

The reed belt emerged only 100 years ago. Today it is up to five kilometres broad and covers a surface of approximately 178 square kilometres.

Photo: National park Neusiedler See-Seewinkel





Photo: National Park Neusiedler See-Seewinkel

Egrets are breeding frequently in the reed belt of the lake.

nies of Great White Egret (*Egretta alba*), Purple Heron (*Ardea purpurea*), Grey Heron (*Ardea cinerea*) and Spoonbill (*Platalea leucorodia*) have grown up there. Here, thousands of reed singing birds such as the Moustached Warbler (*Acrocephalus melanopogon*) or the Bearded Tit (*Panurus biarmicus*) nest. Among the main species of aquatic birds in the reed are water hens and the rare Ferruginous Duck (*Aythya nyroca*). The Marsh Harrier (*Circus aeruginosus*), which is the most common raptor on Neusiedler See, breeds among the reeds.

Special features of flora and fauna

From a biological perspective, Neusiedler See is a border area, shaped by elements from a variety of landscapes. As a result, one can find here a fascinating diversity of species in a natural space of special importance for Central Europe. The mild and dry climate enables southern and eastern types of steppe to exist here. The area of the shallow pools, the “Lacken”, is home to numerous salt-loving plant species, among them Holly Wormwood (*Artemisia santonicum*) and the Herbaceous Seepweed (*Suaeda maritima*). In the salt-free dry meadows, the Green-winged Orchid (*Orchis morio*), Flax (*Linum austriacum*), *Astragalus excapus*, Murple Mullein (*Verbascum phoeniceum*) and Dwarf Iris (*Iris pumila*) flower. For the birds the mix of diverse habitats provides the most excellent conditions: Kentish Plover (*Charadrius alexandrinus*), Avocet (*Recurvirostra avosetta*), Common Tern (*Sterna hirundo*), Redshank (*Tringa totanus*), Black-tailed Godwit (*Limosa limosa*), Curlew (*Numenius arquata*), Yellow Wagtail (*Motacilla flava*), Short-eared Owl (*Asio flammeus*), Montagu’s Harrier (*Circus pygargus*) and White Stork (*Ciconia ciconia*) are just a few of the many species that can be found here. Even the Great Bustard (*Otis tarda*), an endangered species, breeds around the lake. During the bird migration between Europe and Africa more than 150 different species of birds stop in the national park. Each autumn, thousands of geese gather at the shallow pools and at the lake before flying on southwards. Neusiedler See therefore has become a Mecca for bird enthusiasts from all over the world. The world of insects too is particularly diverse in the Seewinkel. 1.500 kinds of butterflies alone have been identified to date. There are more than 40 species of mammals, including the Eurasian Ground Squirrel (*Citellus citellus*) and the Steppe Polecat (*Mustela eversmanii*).



In autumn a magnificent spectacle can be observed – the migration of the geese. Gray geese stop at the lake on their way to the South.

Photo: National Park Neusiedler See



Thermophilic insects like the praying mantis survive in the mild climate of the veldt.

Photo: National Park Neusiedler See

Settlement history

As early as the 7th century BC there were human settlements along the shores of the lake. 200 years later Celts migrated into the area south-west of the lake near Sopron. Roman settlements reached as far as the southern tip of the lake, but were conquered in the 4th century by Germanic tribes. With the big migrations in Europe many different peoples entered the region. The 11th century saw the formation of the Hungarian state. In the Middle Ages German speaking settlers started moving in. During the Turkish siege of Vienna (1529), the region of Fertő-Neusiedler See was also laid to waste. Around that time, Croats began to settle in the area, the population figures, which had taken a dive, started rising again. The 18th century saw an economic upswing, combined with much building activity. Ornate mansions and town-houses date back to that period. The population made their living to a great extent from agriculture, animal husbandry, and viticulture. After the First World War, a borderline was drawn through the lake, dividing it up between Austria and Hungary. The real isolation, however, did not set in until after the Second World War, when the Iron Curtain was drawn. The entry of Hungary into the European Union in March 2004, however, has made a coming together of the region a distinct possibility.

Population and communities

Within the actual biosphere reserve there are no human settlements. 14 towns and villages border directly onto the reed belt of the lake, among them Apetlon, Illmitz, Podersdorf, Gols, Neusiedl am See, Weiden, Jois, Winden am See, Breitenbrunn, Purbach, Donnerskirchen, Oggau, Rust and Mörbisch. Approx. 35.000 people live in the region around Neusiedler See. Viticulture and tourism are among their main sources of earning. Podersdorf am See with 400.000 overnight stays per year is the biggest tourist resort in Burgenland.

Land use

The biosphere reserve itself is made up of the lake with its reed belt. About 20 species of fish live in this inland water, among them pikeperch, carp, pike, catfish and tench. The local population makes a living from fishing and reed cutting. Reed may be harvested in 10 to 15 percent of the area. It is used for thatching and plastering. The lake-side areas in particular have been intensively used by man. As early as the 18th and 19th centuries, the Hanság, which used to be part of the lake, was being drained via drainage ditches. As a result, hay making supplanted fishery as an important source of income. Until 50 years ago, animal husbandry was an important economic factor. Large herds of cattle, horses and pigs were grazing on common pastures, the so-called “Hutweiden” (from the German word “hüten” for “herding” animals). Little by little, agricultural use was intensified and restructured, with viticulture and farming taking



Reed is used to cover the roofs of the houses.

Photo: National Park Neusiedler See-Seewinkel

over. The establishment of the Neusiedler See national park, however, ensured the continued existence of some cattle herds. The Seewinkel had always profited from its particularly mild climate. Today, Burgenland province is well known for its excellent wines. Nowhere else in Austria is it possible to achieve such a high sugar content in the grapes over such a large cultivation area. Since 1965 the wine-growing areas have increased, especially to the east of the Neusiedler See. The grapes cultivated here are mainly for high-quality white wines (Welschriesling, Müller-Thurgau and Pinot Blanc). In farming wheat and rye dominate, as well as the oil crops rape, sunflower and soybean. For decades the farmers from the Seewinkel have been supplying the Viennese markets with fresh vegetables (lettuce, cucumber, tomatoes, etc.). Today the most important economic factor for the region is tourism, which started in the 1960s. The Neusiedler See, “Vienna’s beach”, today offers seven bathing beaches, numerous sports and leisure facilities, a wide range of excursions and walks for nature lovers and cultural highlights like the “Festival on the Lake in Mörbisch” to attract people of all tastes.

Eco-awareness activities

Within the framework of the biosphere reserve no educational activities are taking place. The administration of the national park however has numerous guided tours, adventure days, and nature events on offer. The trips are organized around certain groups of animals or plants or around selected habitats. The range includes walks focusing on bird song, observing amphibians, watching the mating rituals of the Great Bustard and guided searches for medicinal herbs.

Cooperation with universities

The bulk of research activity is being carried out by members of the University of Vienna. Other examples of cooperation include those with the Austrian nature conservation association “Naturschutzbund”, “Birdlife Austria” and the WWF.

Research activities

The research activities are coordinated by two bodies: the administration of the national park and the „Biological Station Neusiedler See“. Prior to the research institute that exists today, there was a wooden construction in the middle of the reed belt, which was destroyed by fire in 1960. The provincial government of the Burgenland decided in 1971 to rebuild the station on firm ground and chose a site between the lake and the shallow pools within the communal boundaries of Illmitz. The station reports to the environmental officer of the provincial government of the Burgenland. It is headed by limnologist Prof. Alois Herzig. The research station currently employs 23 people and is equipped with a laboratory where data on the water quality of the lake are being analysed regularly. Research in the national park is focusing on practical questions of management, conflicts of use and environmental protection. Topics include the monitoring of pastures, fish biological investigations, cessation of eel fishing and monitoring the development of heron colonies and rare bird populations. So far only one MAB-funded project was carried out at Neusiedler See, in the 1980s. It focused on the influence of agriculture and tourism on the over-fertilisation of the lake.

International partnerships

In 1979 the Hungarian part of the Neusiedler See was designated as the biosphere reserve Fertő. The two countries are cooperating within the framework of an Austro-Hungarian commission.

Funding

There are no funds available for managing the biosphere reserve. Scientific work is being commissioned in close cooperation with the national park and is funded from the national park funds and from related research and project funding.

Special aspects

The national park Neusiedler See - Seewinkel is the dominant protection category of the region. 25 employees are working on management concepts for the sustained conservation of the habitat, informing the public about national park activities and are offering fascinating glimpses into the fauna and flora of the region through numerous guided excursions. Only few people know of the existence of a biosphere reserve. An extended biosphere reserve could provide a meaningful link between the numerous protection categories in the region (see contribution on page 75).

Web site: www.nationalpark-neusiedlersee.org



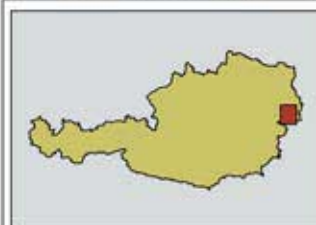
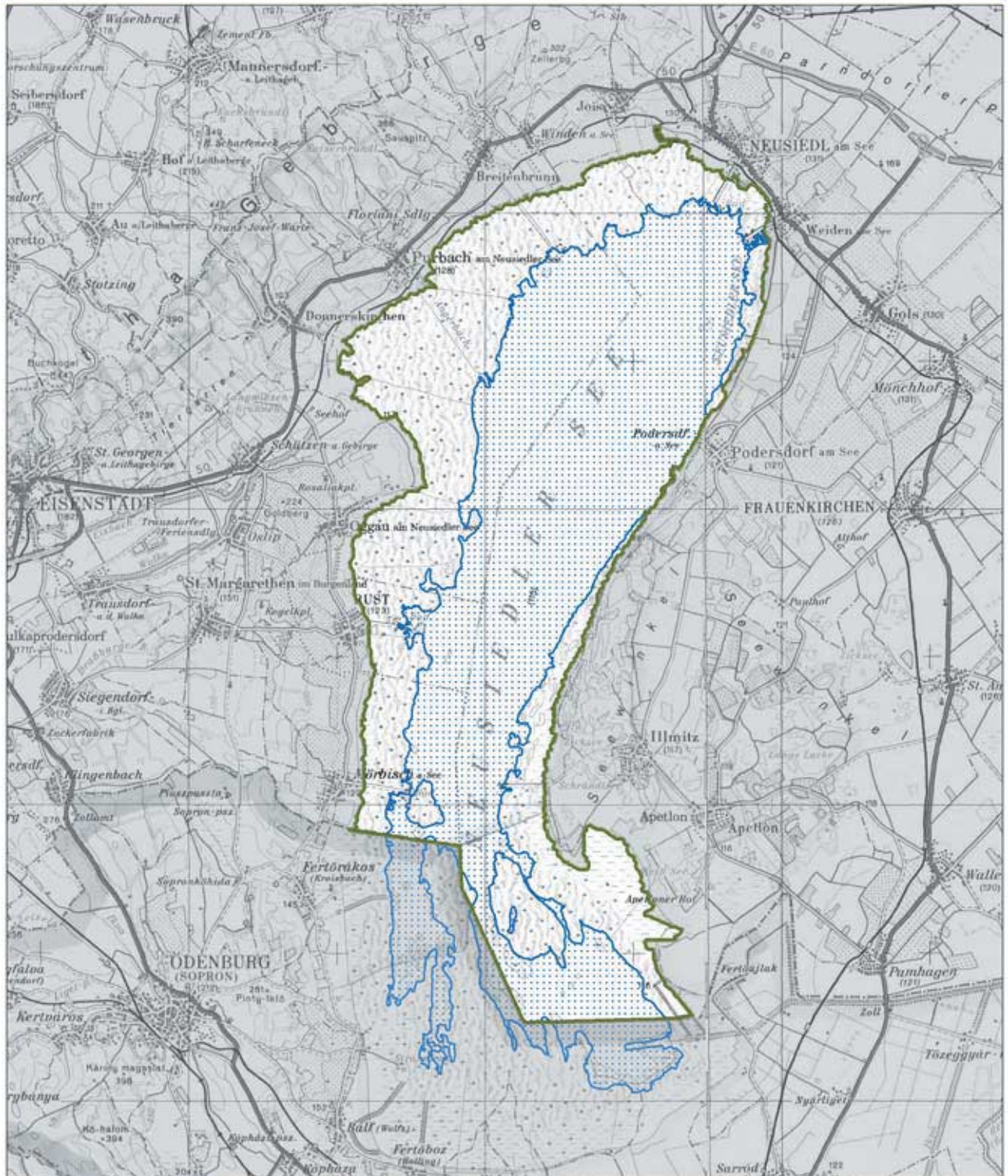
Investigations concentrate on fish and bird populations.



The photo shows two avocets.

Photo: National Park Neusiedler See-Seewinkel

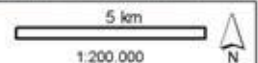


Biosphere Reserve Neusiedler See



-  Neusiedler See
-  External border of the biosphere reserve

Background: ÖK200



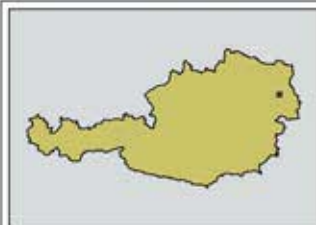
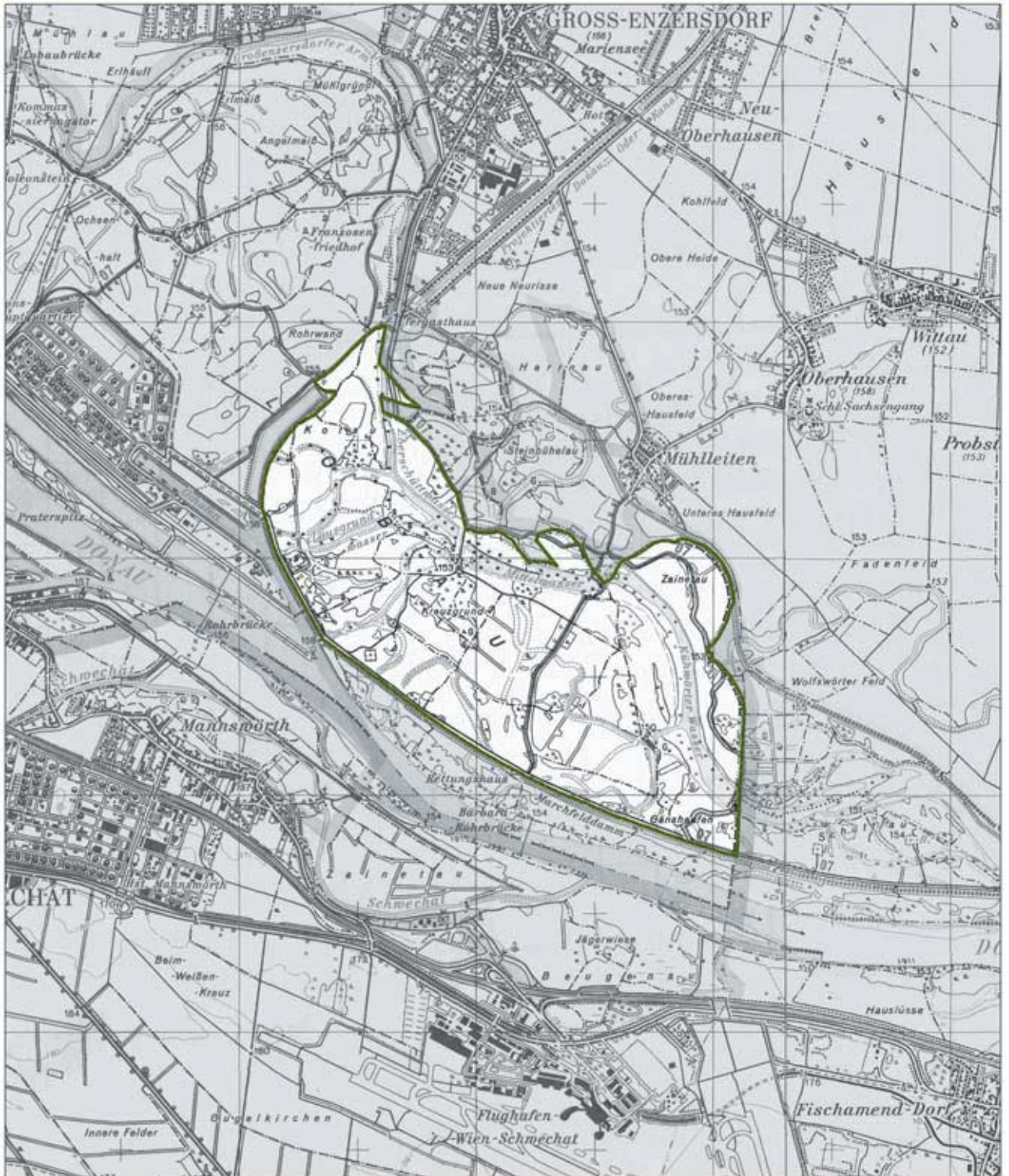
Data basis: BEV and Provincial Government of Burgenland, Department Nature Protection


Status: 09/2004

Elaboration: 

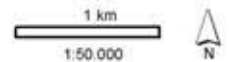
E.C.O. - Institut für Ökologie, Kinoplatz 6, 8020 Klagenfurt, www.e-o.at

Biosphere Reserve Lower Lobau



 External border of the biosphere reserve

Background: ÖK50

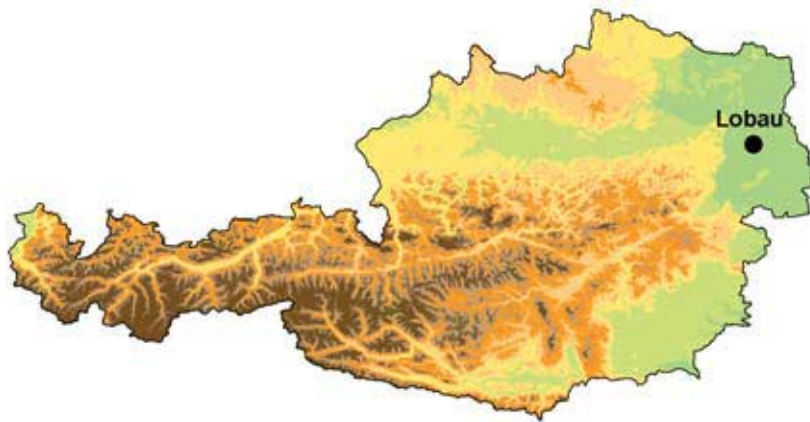


Data basis: BEV and Municipality of Vienna, MA 22 - Nature Protection

Status: 09/2004

Elaboration: 

E.C.O. - Institut für Ökologie, Kinoplatz 6, 1020 Klagenfurt, www.e-c-o.at



” Experiencing nature in a magnificent water meadow... “

Lower Lobau

Year of approval by UNESCO: 1977

Federal province: Vienna

Main focus: Conservation and recreation in the national park „Donauauen“

Total surface: 1.037 hectares (the borders are not precisely fixed, there is no zonation; see map on page 39)

Elevation: 150 to approximately 155 metres

Additional protection status:

In 1978 the whole area of Lobau became a nature conservation area; 1983 Lower Lobau became a Ramsar wetland; the national park „Donauauen“ was established in 1996 – the park area ranges from the federal province Lower Austria to the border with Slovakia (since 1997 category II of the IUCN criteria); the Lobau area was also nominated a Natura 2000 site.



Forest official Mag. Gottfried Haubenger lobbies for the biosphere reserve just outside of Vienna.

Management

Municipality of Vienna, MA 49: Forest management Lobau, Dr.-Anton-Krabichler-Platz 3, A-2301 Groß-Enzersdorf

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Information centre

A centre of information was established in the forest management department in Groß-Enzersdorf. There, visitors obtain information on the landscape and conservation history of the area. In June 2005, the national park service opened a visitor centre in Schloss Orth along the Danube.

Responsible office at provincial level

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Background

In the Lower Lobau too the initiative for establishing a biosphere reserve came from natural scientists researching in the area. Taking advantage of a UNESCO conference in Vienna, limnologist Prof. Heinz Löffler organised an excursion to the water meadows of the Lower Lobau. The participants expressed great interest in the area, which triggered the idea of including the Lobau in the worldwide network of biosphere reserves.

Geographical position

The Lobau is a water meadow covering 2160 hectares east of the federal capital Vienna. Since the Danube was regulated, riverside forests in the Vienna region occur mainly on the left bank of the Danube. The Danube-Oder-Canal (built 1939 - 1941) divides the area into the upper (Obere) and the Lower (Untere) Lobau. The biosphere reserve is situated within the Lower Lobau. During the biosphere declaration process no precise demarcation was carried out. The riverine landscape was formed by flooding and sediment of the Danube and finds its expression in the name, which literally means “water forest” (Old High German Lo=forest, i.e. forested riverside).

Geology

The Lower Lobau is situated in the Vienna Basin, which subsided more than 20 million years ago and was covered by a sea. When this sea silted up some two million years ago, the sea sediment was covered by sands and gravels. Approx. 500.000 years ago, the Bisamberg was being pushed up and the Danube carved its way eastwards through the gate of Vienna “Wiener Pforte” (between Leopoldsberg and Bisamberg). At the same time the Vienna Basin subsided further and the Danube dug into its own sediments. The landscape of the Lobau comprises the most recent gravel deposits of the Danube, which are eight to ten metres thick. The area is mainly flat, but alluvial deposits and erosion within a dynamic riverine wetland have formed an intricate system of terraces of a few metres’ difference in height. The soils are grey riverside soils on top of gravel sediments from the Danube.

Climate

The Lobau is situated in one of the driest areas in Austria. The climate is mainly continental sub-pannonic. Annual precipitation is in the region of 500 to 700 mm, falling mainly in summer, with little precipitation in autumn and spring. Despite the rain peak in summer, warm easterly winds are causing a pronounced dryness in the middle of the year. The hot, dry summers are followed by moderately cold winters with little snow. Mean July temperatures are 20 degrees Celsius; the winter mean is just below freezing. The dominant climatic features, however, do not effect the development of the riverside forest ecosystems much. So close to the river, the conditions for the vegetation are dominated much more by the ecological conditions caused by the river.

Natural habitats and ecosystems

The Danube is the lifeline of the Lobau. In former times an intricate system of main, side and old river arms existed. The flooding dynamic of the river constantly formed and reformed the landscape, but regulation of the Danube started as early as 1869 to facilitate navigation. Since the 1950s, an almost uninterrupted chain of hydroelectric power stations has been erected, a total of 58 power stations along the Danube and its tributaries as far as Vienna, ten of which are in Austria. Only the area near Wachau and the riverine wetlands along the Danube east of Vienna have been preserved as free flowing sections. Near the river, where flooding is more common, a so-called “softwood riparian forest” is spreading. Fast growing softwood species such as willow, alder and poplar tolerate frequent flooding. Further away from the riverbank ash, lime, and elm make up the “hardwood riparian forests”. Here the water table vacillates only slightly. Flooding only occurs as part of bigger floods and only for short periods. Such fairly constant environmental conditions put the slower growing hardwood species at an advantage. Since around the year 1900, when a dyke was built to protect the area of the Marchfeld against flooding, the major part of the Lobau has been safe from regular flooding. Only when the Danube is really high can water run back into the Lobau through an opening in the dyke, the so called “Schönauer Schlitz”, some 9 km east of the oil terminal. The former areas of the softwood riparian forest today depend mainly on groundwater. For the Lobau this means a slow but steady transition from softwood riverside forest to dryer hardwood riparian forest. The regulation of the river has increased the number of xeric habitats on old relict gravel banks. Dry habitats developed on sand and gravel banks with extremely free draining soils. These steppe-type landscapes are home to plant species not normally associated with riverine wetlands: English Hawthorn, Sea Buckthorn, and rare types of orchids. The Praying Mantis, an insect adapted to extremely dry

conditions, can also be found here. Even centuries ago humans created meadows among the Danube riverside forests. The meadows on the river side of the dyke (Marchfelddamm), which get flooded regularly and are rich in nutrients must be mown regularly or be used as pastures in order to retain their typical species mix and to prevent the invasion of wooded species.

Special features of flora and fauna

The Lobau and the Danube riverine wetlands to the east of it are the last complete riverine wetlands of this magnitude in the whole of Central Europe. They are habitat and retreat for numerous endangered plant and animal species. The riverside waters teem with some 60 species of fish and 13 species of amphibians including the Danube Crested Newt (*Triturus dobrogicus*) and the nearly extinct Fire-bellied Toad (*Bombina bombina*). The conditions here are ideal for the European Pond Turtle (*Emys orbicularis*), which is endangered everywhere because of shrinking wetlands and the increasing pollution in the remaining wetlands. The reeds are breeding grounds for ducks, several kinds of water hen, and singing birds such as the Reed Warbler (*Acrocephalus scirpaceus*), Reed Bunting (*Emberiza schoeniclus*) und Savi's Warbler (*Locustella luscinioides*). Herons are fishing along the banks; Common Kingfishers (*Alcedo atthis*) are making breeding caves in loamy banks. For several years now efforts have been made to reintroduce the White-tailed Eagle (*Haliaeetus albicilla*). White Storks (*Ciconia ciconia*) are looking for food on the flood plains, which are also home to the rare Corn-crake (*Crex crex*). The xeric habitats on old relict gravel banks in particular are abundant in species. The calcareous grassland is home to many types of orchids such as early Spider Orchid (*Ophrys sphegodes*), Burnt Orchid and Military Orchid (*Orchis ustulata*, *O. militaris*). A wide variety of insects



In the flood-plain meadows storks still find plenty of food.

Photo: National Park Neusiedler See-Seewinkel



The water meadows of the Lower Lobau originated from flooding of the Danube. Verbally, „Lobau“ means „water forest“.

Photo: Municipality of Vienna, MA49 (Forest management)



The Spider Orchid (Ophrys sphegodes) is an endangered orchid. In the xeric habitats on the old relict gravel banks it still finds ideal living conditions.

Photo: National Park Neusiedler See-Seewinkel

including more than 50 species of wild bees come here. Suitable measures such as letting sheep graze occasionally on this veldt grassland on gravel accumulation can prevent shrub invasion.

History of settlement

Originally the Lobau was an island in the unregulated Danube. As part of a land donation it came into the possession of the Bavarian monastery of Weihenstephan. Later it was ceded to the bishopric of Freising. In 1485 Emperor Maximilian was granted permission by the Bavarian bishops to hunt in the Danubian riverside forests. The Lobau became a popular hunting ground for the imperial court. In 1745 Empress Maria Theresia endowed a “fund for the poor” with the area, which was later administered by the city of Vienna. The proceeds from forestry and agricultural use funded provisions for the poor. In May 1809 Napoleon, having occupied Vienna, struck a camp for his army in the Upper Lobau. At Aspern and Eßling he suffered the first defeat in his military career. In 1926 the city of Vienna opened the Upper Lobau for the “general populace”. The area was fenced in and entry was only allowed from Easter until All Hallows on payment of a fee. The Lower Lobau at that time was still an imperial hunting ground and only became freely accessible twelve years later. From 1939 – 1941 an oil terminal with refinery and pipeline was built. Aerial bombardment caused considerable damage during the Second World War.

Population and communities

Within the area of the biosphere reserve Lower Lobau there are no human settlements except a few isolated hunting lodges. The contiguous municipalities include Groß Enzersdorf, Mühlleiten and Schönau with a total of 9.635 inhabitants. Groß Enzersdorf, the so-called “Gate to the Marchfeld”, is where the forestry administration (Vienna City Council, MA 49) responsible for the management of the biosphere reserve is situated.

Land-use

Fishing and hunting have always been among the traditional uses of the Lobau. Still, until far into the 19th century the riverine wetlands were an almost untouched natural landscape with the Danube being able to flood unrestrictedly. In 1870 first attempts were made to regulate the river and to facilitate navigation. Around 1900 two dykes were built (Hubertusdamm and Marchfeldschuttdamm) which cut the Lobau off from regular flooding. Riverside forests were turned into farmland or exploited for wood. In the 1950s electricity production took centre stage. Numerous hydroelectric power stations produce roughly a quarter of all publicly produced Austrian electricity. It was not until the 1970s that environmental protection for the whole area became a matter for concern and the remaining riverine wetlands of the Lower

Lobau were designated a biosphere reserve. Today the riverine wetlands are mainly used as recreation area for the population of the region. The vicinity to Vienna with its 1.5 million inhabitants has meant intensive recreational use of the Danube riverine wetlands. A visitor stream analysis for the year 1999 counted 600.000 people in search of recreation and approx. 15 percent of them in the Lower Lobau. Walking, cycling and bathing (particularly in the designated natural beaches of the Upper Lobau) are among the main leisure activities. In times of drought the Lobau also provides drinking water for the population of Vienna. The constantly changing water levels of the free flowing Danube ensure high quality of the groundwater immediately next to it (bank filtrate). Horizontal filter wells of between five and 20 m depth yield clean drinking water, rich in oxygen.

Eco-awareness activities

The forest management Lobau and the administration of the national park offer numerous excursions and informative events on the topic of Danube riverine wetlands, but mainly in the area of the Upper Lobau. The forest management Lobau also organises free adventure trips for schools. 20 trained wardens are available for such activities. A variety of outdoor events are scheduled for the national park camp. From May until October visitors can come from the city centre by national park boat for a short walk through the riverside forest. All these activities however are solely a matter of the national park. The issue of the biosphere reserve does not get much attention.

Co-operation with universities

There is close co-operation with the Institute of Ecology and Environmental Protection of the University of Vienna, in particular with the Institutes of Conservation Biology, Vegetation and Landscape Ecology as well as Limnology. This is where a national park GIS, which forms the cartographical basis for all planning is being put together. The Limnology Department of the Swiss Federal Institute of Technology in Zurich (Switzerland) is working on the hydrochemical and limnological basis data in the waters. Issues of game ecology are dealt with by the Veterinary University of Vienna. BirdLife Austria has a consultative role in declaring resting areas for rare species of birds. The researchers around Dr. Arne Arnberger of the Institute of Landscape Development, Recreation and Conservation Planning at the University of Natural Resources and Applied Life Sciences in Vienna is analysing the visitor streams in the national park. Limnologist Prof. Fritz Schiemer is the main coordinator of the natural-scientific research activities in the Danube riverine wetlands and heads the scientific advisory board of the national park Donauauen.

Research activities

For many years the special ecological importance of the Lobau and the designation of the riverine wetlands as a nature protection zone in 1978 triggered numerous natural-scientific investigations on water fauna, bird life, forest and meadow vegetation. Some of these studies date back quite a bit and do not represent up-to-date findings. One of the major initiators of scientific studies is the Department of Environmental Protection – MA 22 of Vienna City Council. Since the creation of the Danube National Park Donau-Auen in 1996, the focus has been on applied research. With the participation of the Scientific Advisory Board, a research concept for the general direction of research in the national park was drawn up in 1998.

It focussed on the management of the respective natural landscapes as well as on long-term monitoring. All research projects are coordinated with the national park organisation and granted by the MA 22. No MAB-relevant research is being undertaken. Current projects include the development of management concepts (natural landscape, hunting and fishing), studies of the interconnection between water flows in the Lower Lobau, studies of the neophyte problem (introduced species that were able to establish themselves in Austria), mapping the xeric habitats on old relict gravel banks and supporting the establishment of the Corncrake and the European Pond Turtle.

International partnerships

There are no partnerships with the biosphere reserve Lower Lobau. The Danube National Park Donau-Auen is cooperating with international organisations such as Europarc, IUCN and with other national parks.

Funding

There is no funding for the management of the biosphere reserve or for research issues relevant to the MAB programme. 50 percent of the running costs of the National Park Donau-Auen are covered by the Austrian state and 25 percent each by the federal provinces of Vienna and Lower Austria.

Special features

The National Park Donau-Auen dominates all activities. Locally there are signs pointing out the existence of a biosphere reserve, but hardly anything is known about the protective designation as biosphere reserve.

Web site of the national park: www.donauauen.at



Mainly applied research is carried out in the Lower Lobau. Scientists develop management plans for the respective ecosystems and investigate the populations of the corncrake and the pond turtle.

Photo: Municipality of Vienna, MA49 (Forest management)



” Environmental monitoring
in the smallest biosphere
reserve in the world... “

Gossenköllesee

Year of approval by UNESCO: 1977

Federal province: Tyrol

Main focus: scientific investigation

Total surface: 85 hectares (see map on page 47)

Elevation: 2413 to 2828 metres

Additional protection status:

Tyrolean environmental legislation puts lakes with a surface area of more than 2000 sqm (0.2 ha) and a surrounding land area of 500 m width under special protection. Any intervention requires special authorisation.

Management scientists

There is not official management for Gossenköllesee. Prof. Roland Psenner, head of the Limnological Research Station, is responsible for administrative issues with respect to the scientific activities.

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Background

In 1959 Otto Steinböck set up the “Limnological Research Station Kühtai“ at the southern bank of the “Vorderer Finstertaler See”. After operating for 16 years the research station had to make way for a hydroelectric reservoir and was rebuilt

in 1975 with the help of power generator Tiroler Wasserkraft AG (TIWAG) on the other side of the valley, on the banks of lake Gossenköllesee (2417 m). In an effort to secure long-term scientific research into the high-mountain lake, the catchment area for the lake was declared a UNESCO biosphere reserve. Federal Governor Wallnöfer signed the international declaration in 1977. Since then research activities on Gossenköllesee have focussed on studying the effects of global ecological change on catchment areas for high-Alpine waters. In 1994 the station was modernised to ensure emission-free operation.

Geographical position

The high-mountain lake at the foot of the Pirschkogel (2828 m) is situated at 2417 m above sea level in the middle of the Stubai Alps. From Kühtai, a ski-resort some 30 km west of Innsbruck, one can reach it on foot in about an hour.

Geology

The Stubai Alps are part of the Central Alps. Granites, gneisses and crystalline slate make up the bedrock. In Mesozoic times the whole area was covered with glaciers. When the ice receded, numerous lakes formed. Four of those still exist today, of which the Gossenköllesee is the largest. In a moraine to the southwest of the lake soil and rock material was deposited as the glacier receded. The earth dam protects the lake and the limnological station from the gaze of walkers and skiers, who can take a lift up to the edge of the biosphere reserve. In geological terms, the moraine consists of amphibolites, granite gneisses and micaceous slates. The blue-green colour of the water indicates a low nutrient content in the high-mountain lake (oligotrophous). Its maximum depth measures 9.9 m. Eight months of the year the water surface is covered by an ice and snow layer that reaches a thickness of one to two meters. This has a major effect on light levels and exchange of nutrients. The Gossenköllesee has no discernible in- or outflows on the surface except for a small outflow when the snow is melting.



For decades
Prof. Roland Psenner
has been investigating
how global change influ-
ences high mountain eco-
systems.

Climate

The Central Alps enjoy a predominantly continental climate. Compared to the more humid Alpine fringes precipitation is low, only about 1200 mm a year, roughly half of it as snow. Cold winters with lots of snow alternate with dry, warm summers. The mean air temperature is between zero and one degree Celsius, with a rising trend.

Natural habitats and ecosystems

The Gossenköllesee has a surface area of 1,6 hectares and an average depth of 4,6 meters. It is situated in the Alpine zone of the Stubai Alps and as such above the tree line. Rock formations and moraine hills dominate the landscape around the lake. Only 10 percent of the catchment area is covered with thin soil, home to a sparse vegetation of lichen and typical plants of Alpine grassland and ericaceous dwarf shrubs. The Gossenköllesee is usually covered with ice from the beginning of November until the end of June. But the snow cover, which can be up to two metres thick, is teeming with life. Micro-organisms such as bacteria, algae and protozoa make up a Lake Ice Microbial Community or LIMIC for short.

Special features of flora and fauna

High-mountain lakes with their extreme conditions naturally harbour only few species. Algae dominate in the lake. A special feature of the Gossenköllesee is the occurrence of a siliceous species of algae of the genus *Fragilaria*, which has not been found in any other high-mountain lake in the world. One must also mention the existence of brown trout. Around 1500, emperor Maximilian I. set out to colonise many Tyrolean mountain lakes with trout and char. A study by Dr. Steven Weiss found that today practically all of those populations are mixed forms whose genes show traces of Atlantic as well as Danubian ancestry. The trout in Gossenköllesee are the exception and come only from the Danubian catchment area. Large rocks and moraine hills around the lake provide shelter and habitat for marmots, chamois, foxes and vipers.

Population and communities

No humans live in the catchment area of the Gossenköllesee. The nearest village in the valley is Kühtai, one of the best-known ski-resorts in the Tyrol. Situated at an altitude of 2020 m, Kühtai is not only the highest winter sports village in Austria; with its 13 inhabitants it is also probably the smallest in the country.

Land use

There is no land use within the area of the biosphere reserve. Occasionally sheep are grazing in the catchment area of the lake. As recently as the Middle Ages, the lake received considerable nutrients from intensive grazing. When the "Schwaighof", an Alpine settlement near the Gossenköllesee was sold to the Earl of Spaur in 1675, land use dwindled more and more and the settlement was

abandoned completely in 1890. Towards the end of the 15th century, emperor Maximilian I. had trout put out in the high-mountain lake, which changed the ecosystem of the lake drastically. At the moment a completely different conflict of use is endangering the area: there are plans to build a ski lift across the Pirchkogl. The new lift track would cross the catchment area of the Gossenköllesee and thus the tiny biosphere reserve.

Eco-awareness activities

The biosphere reserve Gossenköllesee is exclusively used for scientific research. Educational activities take place only in form of excursions, for instance for the Club Arc Alpin, the ScienceWeek, schools and universities (Konstanz, Hamburg).

Cooperation with universities

There is close cooperation with the University of Innsbruck, which runs the Limnological Station at the shores of the lake. Up to six researchers can live and work there continuously. Since its modernisation in 1994 the station is equipped with telephone, modem and electricity. Climatic and hydrological data are gathered here automatically. Due to the research station the biosphere reserve Gossenköllesee has become a centre of Alpine research within the EU. Since 1992 the Gossenköllesee has been part of various EU projects (ALPE, MOLAR, EMERGE). It was also integrated into the EUROLIMPACS project as part of the "Network of Excellence" ALTER-NET within the 6th Framework Programme of the EU. The studies focus on the ecology of high-mountain lakes as well as on long-term environmental monitoring.

Research activities

For 30 years the Institute of Zoology and Limnology of the University of Innsbruck has been studying the Gossenköllesee. Central to these activities is the limnological basic research of Prof. Roland Psenner (Division of Limnology). This includes



Sheep are grazing in the catchment area of the high mountain lake which results in an elevated nutrient input.

Photo: Astrid Zauner

The well-equipped Limnological Research Station turned the Gossenköllesee into an important centre of high-mountain research in Europe.

Photo: Roland Psenner





500 years ago Maximilian I. initiated the stocking of the high-mountain lake with trout. The research team of Prof. Psenner investigates how these trout protect themselves from the dangerous UV-radiation.

Photo: Roland Psenner

investigations into how ice bacteria survive in sub-zero temperatures or how trout protect themselves against the high UV-radiation. More important for humanity is the function of high-mountain lakes as indicators of global environmental changes. Long-term monitoring of the natural catchment areas is essential for describing the connection between the climate getting warmer and the lakes becoming more acidic or for tracking stress levels through atmospheric pollutants. The Gossenköllesee played a central role within the international research project „MOLAR“ (Mountain Lake Research, 1997-1999), which compared 13 European high-mountain lakes. It is the only high-mountain lake in Europe with a well-endowed research station, where equipment-intensive measurements can be taken. This special infrastructure made the Gossenköllesee the place of choice for participation in a research cooperation between the UNESCO MAB programme and the Mountain Research Initiative (Switzerland) (GLOCHAMORE). It envisages setting up monitoring stations in mountain regions all over the world, to serve as early warning systems for the effects of global climatic change or change in pollutant capture.

International partnerships

Apart from cooperation under the umbrella of the UNESCO such as BRIM and GLOCHAMORE, the research activities are integrated in EU-wide networks. Active partnerships exist with universities in the US (Montana), Spain (Barcelona), with research institutions in Germany (MPI Bremen, MPI Marburg), the Czech Republic (Academy of Science, Budweis), the University College London and many more.

Funding

There is no funding for the biosphere reserve. An official from the provincial environmental protection agency is officially responsible for the administration; the coordination of research is undertaken by the University of Innsbruck. All research activities are funded via the University of Innsbruck, third-party funding and project funding.

Special features

The 85-hectare Gossenköllesee is the smallest biosphere reserve in the world.



Sampling in winter. Usually the lake is covered with ice and snow for 8 months, from November until June.

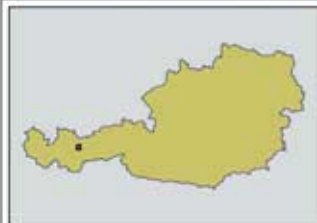
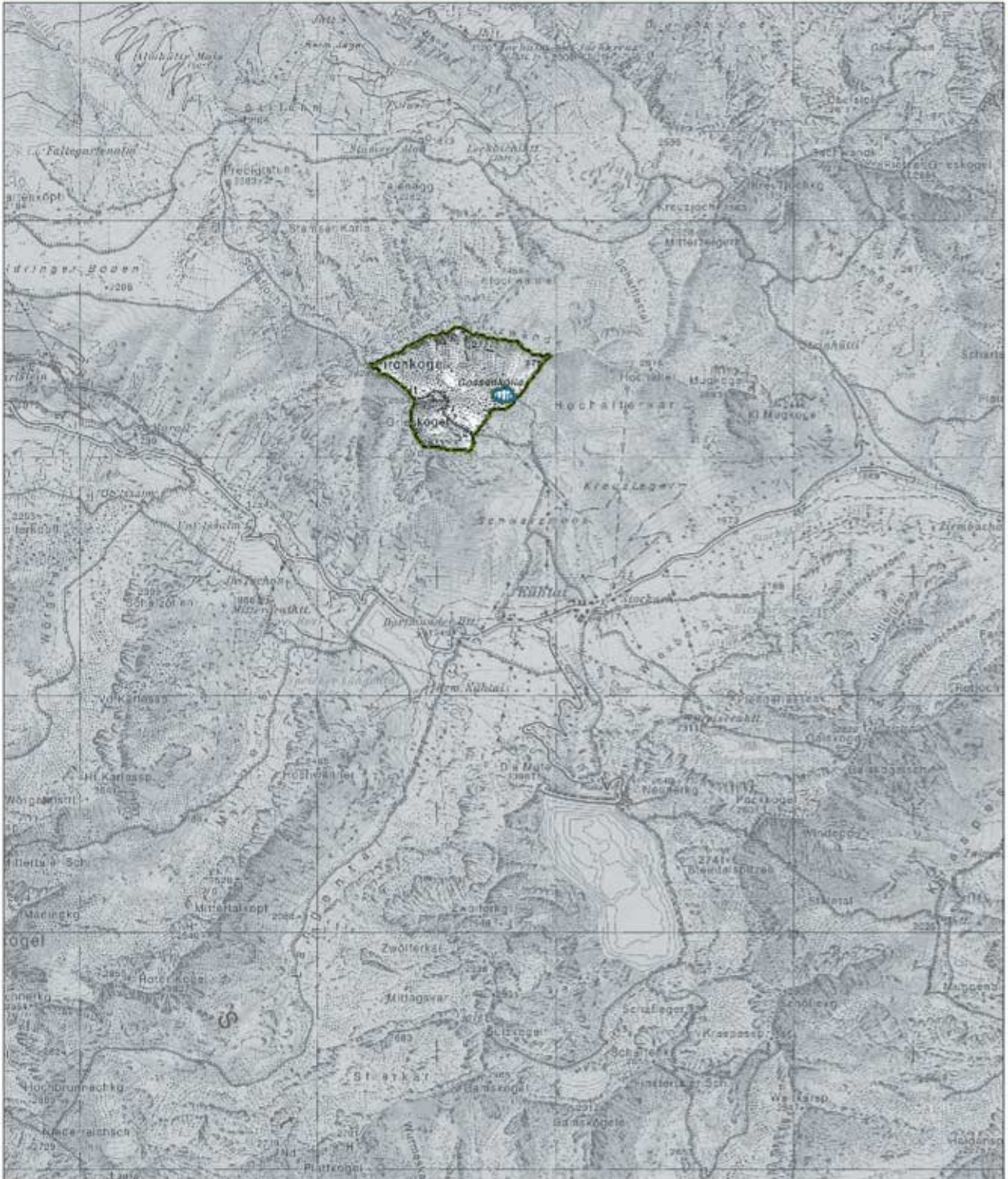
Photo: Roland Psenner





The research team of Prof. Psenner has been investigating the chemistry and biology of Gossenköllesee for 30 years.

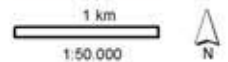
Photo: Roland Psenner

Biosphere Reserve Gossenköllesee



-  Gossenköllesee
-  External border of the biosphere reserve

Background: ÖK50

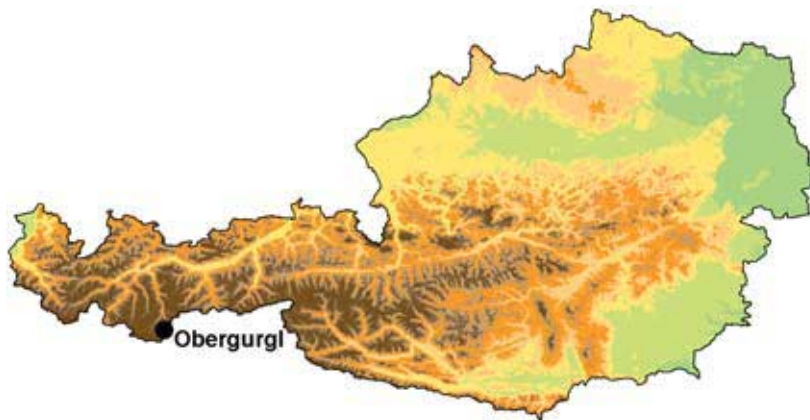


Data basis: BEV and Provincial Government of Tyrol, Dept. Environment

Status: 09/2004

Elaboration: 

E.C.O. - Institut für Ökologie, Kinoplatz 6, 9020 Klagenfurt, www.e-c-o.at



„Environmental monitoring
in a high mountain
ecosystem of the Alps...“

Gurgler Kamm

Year of approval by UNESCO: 1977

Federal province: Tyrol

Main focus: Investigation

Total surface: 1,500 hectares, no zonation
(see map on page 53)

Elevation: 1900 to 3400 metres

Additional protection status:

90 percent of the biosphere reserve are located within the tranquillity zone („Ruhegebiet“) of the Ötztaler Alps which was established 1981



Mag. Thomas Schmarda, executive secretary of the association „Nature Park Ötztal“, is also responsible for the biosphere reserve „Gurgler Kamm“ which is located within the natural park.

Management

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Background

The biosphere reserve Gurgler Kamm came into being as a result of research activities of the Alpine Research Station in Obergurgl, an extramural centre of the University of Innsbruck. In the 1960s, as part of the „International Biological Programme“ IBP (1965-1975) studies were carried out of the Hoher Nebelkogel (3184 m). By 1971, the availability of comprehensive data and increasing human pressure on the habitats had led to a new project about the effects of the booming tourism in the Ötztal valley and about future devel-

opment options. In 1973, these research activities culminated in the “MAB-6 Project Obergurgl” (see Research activities below) and prepared the ground for nominating the ridge of the “Gurgler Kamm” as biosphere reserve. In 1977 Prof. Moser, then director of the Alpine Research Station Obergurgl, made an application to the UNESCO in Paris.

Geographical position

The biosphere reserve „Gurgler Kamm“ is located in the south-eastern part of the Ötztaler Alps between the valleys of Königstal and Rotmoostal. Its north-western boundary is the road from Obergurgl (1927 m) to Hochgurgl (2150 m), in the south-east the area reaches to the border with Italy.

Geology

The silicate-rich, metamorphous bedrock puts the Ötztaler Alps firmly among the Central Alps. Grey gneisses make up the bedrock of the mountain ranges. Within the area of the biosphere reserve, they are interspersed with granite gneisses, tonalites and amphibolites. Near the Italian border more colourful seams of micaceous slate, slate and quartzite occur. Apart from the silicate-rich bedrock there are areas with calciferous marbles (Schneebergerzug), which enable the comparative study of the vegetation cover on the different soils. The high-mountain region of the Gurgler Kamm has mainly been shaped by glaciers, particularly by the “Rotmoos” and “Gurgler” glacier. Here too the effects of global climatic change can be observed. Since the middle of the 19th century, the glaciers throughout the Alps have been receding. On Rotmoos glacier the shrinkage has been especially pronounced over the last few decades (see picture on page 30).

Climate

The climate in the Ötztaler Alps is predominantly continental. Compared to the more humid Alpine fringes that catch the rain, the precipitation here is a meagre 700 mm a year. Over the course of a year the Gurgler Kamm experiences extreme temperature vacillations. Cold winters with lots of snow are followed by hot, dry summers. In high altitudes

the mean temperature is lower, with more frequent precipitation.

Natural habitats and ecosystems

The Gurgler Kamm is made up of the silicate bed-rock typical for the high-mountain landscape of the Central Alps. The area runs from an altitude of 1900 m up to proud peaks such as the Granatenkogel (3318 m) or the Hochfirst (3403 m). This means that the biosphere reserve starts roughly at the tree line, which in the Central Alps is formed by the Stone Pine. This tree species climbs higher than any other woody plant. It is only with the help of symbiotic root fungi (mycorrhiza) that it can absorb the necessary nutrients from the thin soil. The seeds are spread mainly by nutcrackers. At the southern edge of the village of Obergurgl the famous stone pine forest of the “Obergurgler Zirbenwald” spreads at an altitude of 1950 to 2180 metres and covers an area of some 20 hectares. For centuries this forest was protected by the local population and in 1963 it was designated a natural monument. In higher reaches it is followed by dwarf shrub heathers formed by the Alpine Rose (*Rhododendron ferrugineum*). On steep slopes there are Dwarf Mountain Pines, in moist runnels grow clumps of Green Alder. Distinctive for the landscape along the Gurgler Kamm however are the Alpine grasslands above the tree line. They consist of various sedges including mainly *Carex curvula*. In the scree only few higher plants survive, for instance the Glacier Buttercup (*Ranunculus glacialis*). For the last 150 years the area in front of the Rotmoos glacier has been free of ice and is being conquered by species such as *Achillea moschata*, Matgrass (*Nardus stricta*) or Dwarf Willow (*Salix herbacea*).

Special features of flora und fauna

The Obergurgler Zirbenwald is one of the botanical attractions. The stone pine is sometimes called “Queen of the Alps” and climbs higher than any other tree species. It grows mainly at altitudes of between 1500 and 2200 m. In Obergurgl some of the specimen trees are over 400 years old. In the middle of the stone pine forest a bog formed after the glacier receded. Typical peatland plants such as Peat Moss (*Sphagnum*), Cotton Grass (*Eriophorum*) and the Round-leaved Sundew (*Drüsera rotundifolia*) find ideal habitat conditions here. The area of the Ötztaler and Stubai Alps is well known for its abundance of game. In the high-mountain area, walkers and climbers mainly come across Chamois (*Rupicapra rupicapra*), Marmot (*Marmota marmota*) and Golden Eagle (*Aquila chrysaetos*). With a bit of luck one might meet the shy Ibex. The tranquillity zone Ötztaler Alps is also an important habitat for grouse such as the Rock Ptarmigan (*Lagopus mutus*), Hazel Grouse (*Tetrastes bonasia*), Black Grouse (*Tetrao tetrix*) and Capercaillie (*Tetrao urogallus*). Even the very rare and strictly protected “Matterhorn-Bärenspinner” (*Orodemnia cervini*) can be found here. This brown-speckled butterfly was able to

survive the last ice age on non-glacial peaks and is bound to these extreme habitats until this day.

Settlement history

Like several other valleys in the Tyrol, settlement in the Ötztal did not start at the valley mouth but from the Alto Adige (Itlay), i.e. from the other south side of the Alps. The settlers crossed at the Timmelsjoch pass, the lowest non-glacial notch in the main Alpine ridge and arrived in Obergurgl. The trail led from Merano into the Passeier valley and on via the Timmelsjoch through the Ötztal valley into the valley of the river Inn. This ancient route made neighbourly trading possible and was also of great religious importance. On certain feast days, pilgrims came to the pictures of the Virgin Mary in the Ötztal valley and vice versa into the Passeiertal valley. As early as the Bronze Age, miners arrived in the area in search of ores. For many years they successfully mined for copper. In the mediaeval times and early modern times a boom started for the higher situated mines and the marble quarries. The oil shale deposits were being exploited and semi-precious stones were being collected. Herders and farmers too settled in the Ötztal valley. Compared to the boggy riverine soils of the valley of the Adige, the basin of the higher lateral valley was more suitable for farming and animal husbandry. Findings such as the famous “iceman” at Tisenjoch prove that the areas above the tree line in the Ötztaler Alps have been settled for many thousands of years.

Population and communities

No humans live in the area of the Gurgler Kamm. The well-known ski-resort of Obergurgl is situated at an altitude of 1927 m and in the north borders on to the biosphere reserve. The village is an air and high-altitude spa with a population of roughly 400 and part of the municipality of Sölden.

Beautiful mountain scenery: Rofenkar-glacier in the biosphere reserve Gurgler Kamm.

Photo: I. und H. Schatz



The Swiss stone pine forest of Obergurgl - in reality (top) and sketched by Wolfgang Klotz, a pupil from Obergurgl (below).

Photo: Christian Plössnig

Land-use

Man has used the Alps for thousands of years. The Ötztal valley is a prime example for reckless clearing and lumbering to create high-Alpine pastures, for mining, and the production of salt. To stop this ruinous exploitation a law, the so-called “Imperial Forest Act” (Reichsforstgesetz) was passed in 1852 regulating the economic use of the forest. The montane forest however, never recovered fully, so that today the tree line is lower than it could be naturally. Until the beginning of the 20th century the families in the Ötztal earned their living predominantly as farmers. For more than 5000 years, sheep, goats, cattle and horses have been driven from the Alto Adige across snowfields via the Hochjoch (2.875 m), Niederjoch (3.019 m) and the Gurgler Eisjoch (3.152 m) to the juicy green high-mountain pastures of the Ötztaler Alps. Even today, at the end of June, spectacular migratory movements of more than 3000 sheep across the Timmelsjoch are taking place. This relic of an ancient form of land use is known as „transhumance“. After the Second World War, tourism was discovered as an important economic factor for the region and triggered a building boom: hotels, ski-pistes and lifts left their mark on the landscape. Linking the skiing areas of Obergurgl and Hoch-



The so-called transhumance, a seasonal transfer of grazing sheep from South Tyrol via the Timmelsjoch (above) to pastures in the Ötztaler Alps (below), has a long tradition.

Photos: Hans Haid

gurgl eventually created a skiing region with 23 lifts and 110 km of pistes that reach into the biosphere reserve. The Ötztal is among the most intensively touristy regions of the entire Alps.

Eco-awareness activities

Within the biosphere reserve Gurgler Kamm no educational activities are taking place, but there is a nature trail through the ancient rock pine forest at the southern edge of Obergurgl. Its 22 stations tell the visitors interesting facts about the history, ecology and special features of this forest. As part of an environmental competition, the Alpine Research Station produced a walking guide for the rock pine forest area in co-operation with the pupils of the primary school in Obergurgl. It contains information about the area as well as artwork and comments from the children.

The association “Pro Vita Alpina” created themed trails on “Nature and Cultivation in the Ötztaler Alps”. An illustrated folder contains information about the settlement history, traditional forms of land use, old myths and traditions, as well as flora and fauna along the chosen routes. Plans are afoot to put up informative signs in the area. In 1991 the “iceman” from the Tisenjoch (3280m) put the Ötztaler Alps into the headlines all over the world. The find triggered further investigations into the earliest cultures in the Alps. Today there is a trail to the archaeological sites, which runs along the ancient connecting trails between the Austrian Tyrol and the Italian Alto Adige. The trail is marked with the letter “A” and a stylised axe like the one the iceman carried with him. Brief descriptions are put up on site. A folder describes the whole run of the walk. Both publications can be obtained from Pro Vita Alpina (Dr. Haid) for a small fee. Currently work is being done on a new, updated and expanded edition.

Cooperation with Universities

For decades the University of Innsbruck has been carrying out research on the Gurgler Kamm. In 1951 it set up an institute for research into high altitude locations, the “Institute for High Mountain Research”, and built the Alpine Research Station in Obergurgl. The listed building is situated at an altitude of 1940m, only five minutes’ walk from the centre of the village. It contains four conference rooms and accommodation of more than 100 beds, ideal conditions for scientific seminars, conferences or courses. For a long time the studies on the Gurgler Kamm focused on how flora and fauna adapt to the extreme conditions of high altitude locations. Later on the research into habitats, human activities and archaeology were co-ordinated into a networked structure.

Research activities

With regard to MAB research, the biosphere reserve Gurgler Kamm deserves a special mention. While the central concept of MAB research, i.e. interdisciplinary investigation into the relationship between humans and the environment, has not been put into practice to any great extent in any of the other Austrian biosphere reserves, the Project Obergurgl (MAB6) was started here in 1973. Case studies served to investigate the effect of humans on their natural environment. Natural, social and economic scientists worked together on the creation of a computer model to predict reactions of the ecosystems on the future development of the tourist boom. Interested inhabitants of Obergurgl were integrated into the project. Due to lack of funding the project had to be abandoned in 1979 (see article on page 78). From the 1980s onwards no significant research activities have taken place in the biosphere reserve Gurgler Kamm.

It was not until the discovery of the iceman on the main ridge in the Ötztal that new impulses came into the area (see information on the right). Since 1994 the model study "Ötztal – Landscape history in a high-mountain environment" led by Prof. Gerold Patzelt has been trying to trace the development of natural and cultivated space in the Alps since prehistoric times, taking the Ötztal as an example. Pollen analyses show that the high-altitude pasture of the Gurgler Alm (2240 m) has been used to graze animals since about 4300 BC, i.e. for over 6300 years.

„Ötzi the Iceman“ from the Tisenjoch

In September 1991 a sensational discovery made the headlines worldwide: On their descent from the Finailspitze (3514 m) Mr. & Mrs. Simon from Nuremberg came across a preserved human body in melting firn snow at the Tisenjoch. The unique find turned out to be a fully preserved male body from 5300 years ago, complete with internal organs, sometimes known in Britain as "Fred" and in Austria as „Ötzi“. He was equipped with a copper axe, bow and arrows, a carrying basket and a knife. The find was the first proof that hunters, herders and merchants had been crossing the daunting Alpine ridges for thousands of years. In 2003 an Australian research team was able to prove the descent of the iceman. According to an article in the "Science" magazine (vol. 302), investigations of the dental enamel of the canine teeth proved that the famous glacier man had come from the Isarco valley in the far north of Italy. All of his life the iceman had been living in an area between where he was found and a maximum of 60 km south of it. The preserved iceman is on public display in the Archaeological Museum in Bolzano (Italy).



In September 1991, the discovery of the glacier man „Ötzi“ at Tisenjoch caused excitement worldwide.

Photo: Gerlinde Haid



The region of perpetual ice: Rotmoos glacier in the biosphere reserve Gurgler Kamm.

Photo: I. and H. Schatz

Under the leadership of “Pro Vita Alpina” the biosphere reserve Gurgler Kamm was involved in a bi-national EU-project realised between 1999 and 2001 in cooperation with nature park Texelgruppe (northern Italy), tranquillity zone Ötztaler Alps and nature park Kaunergrat-Pitztal (both Tyrol, Austria). The objectives of the project were a close collaboration in the fields of public relation, information campaigns and mapping.

Since 1995, the Tyrolian scientists, Dr. Rüdiger Kaufmann (Institute for Zoology) and Dr. Brigitte Erschbaumer (Botanical Institute), both from the University of Innsbruck, are investigating the recolonisation of the open areas which originate from the retreat of the Rotmoos glacier. Pioneer species, such as the Musk Yarrow (*Achillea moschata*) or the Common Kidneyvetch (*Anthyllis vulneraria*), colonise the area immediately in front of the glacier itself, which is continuously shrinking due to global warming. Over time, these pioneers are replaced by other species. Since 1999, the two high-mountain researchers have also been comparing alpine grassland habitats above the treeline with man-made pastures and ski-slopes. Such long-term monitoring should provide answers about the impact of different land-use forms.

Biosphere reserve Gurgler Kamm is also part of the research initiative GLOCHAMORE, Global Change Research in Mountain Biosphere Reserves. 26 biosphere reserves have been chosen worldwide for observing the influence of global change, such as global warming, and to establish an early warning system. The research project is coordinated by the “Mountain Research Initiative” (MRI) and UNESCO’s MAB programme (see also information on page 78).

International partnerships

The biosphere reserve Gurgler Kamm is a member of the Network of Alpine Protected Areas (ALPARC) located in Gap, France. There is also an exchange with the biosphere reserve „Julische Alpen“ in Slovenia.

Funding

There are no funds available for the biosphere reserve. Financial means for projects are often provided by the European Union (Interreg Programme). The research project „Obergurgl“ was financed by the Austrian MAB Committee.

Extension possibilities

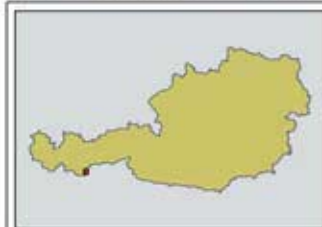
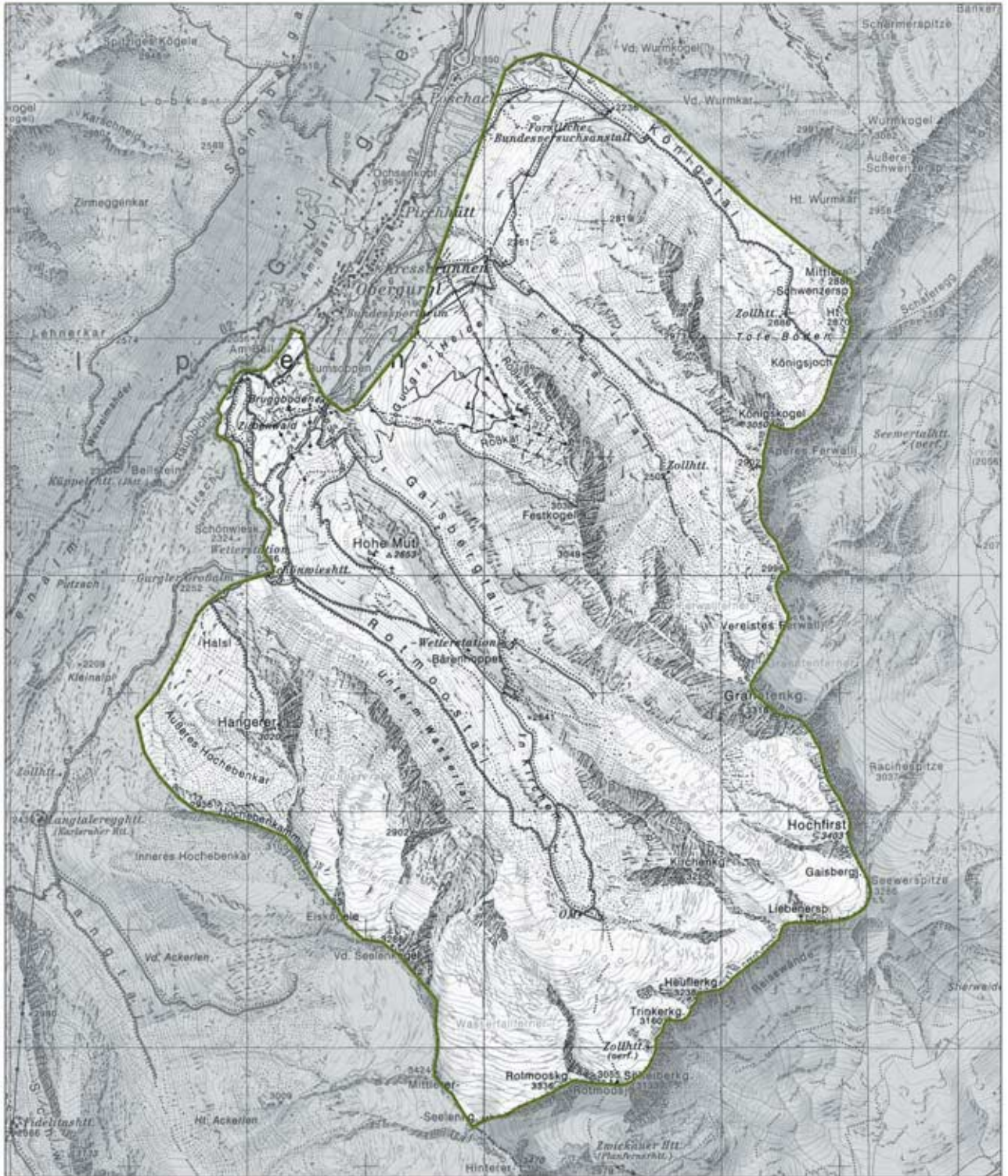
In order to adapt the biosphere reserve Gurgler Kamm in line with the UNESCO criteria, an expansion in the direction of the tranquillity zone Ötztaler Alps would be desirable. Moreover, the possibility of creating a cross-border biosphere reserve between North and South Tyrol needs to be looked at.


Special features

In 1991, the iceman „Ötzi“ was found only a few kilometres from the biosphere reserve on Tisenjoch (see also picture and information on page 51).

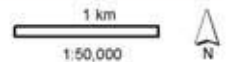
The organisation **Pro Vita Alpina** aims at supporting the cultural, social, ecological and economic development in the Alpine space. Their main focus is the preservation of the Alpine culture, the impact of tourism as well as studies of the different regional dialects. The organisation is led by Dr. Hans Haid, a specialist in Alpine folklore. More information is provided by the web sites: <http://www.cultura.at/pro.vita.alpina> and <http://www.similaun.at>.

Biosphere Reserve Gurgler Kamm



 External border of the biosphere reserve

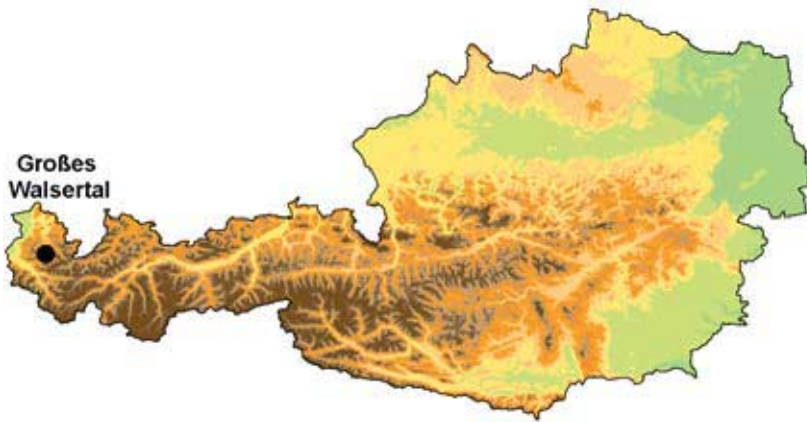
Background: ÖK50



Data basis: BEV and Provincial Government of Tyrol, Dept. Environment
Status: 09/2004

Elaboration: 

E.C.O. - Institut für Ökologie, Knopplatz 6, 9020 Klagenfurt, www.e-c-o.at



„ Let’s make life more enjoyable and work more rewarding ... “

Groβes Walsertal

Year of approval by UNESCO: 2000

Federal province: Vorarlberg

Main focus: Spatial development

Total surface: 19.200 hectares (see map on page 58)

Core zone: 4010 hectares (20 percent)

Buffer zone: 12.366 hectares (65 percent)

Transition zone: 2824 hectares (15 percent)

Elevation: 580 to 2704 metres

Additional protection status:

Nature conservation areas Gadental and Faludriga-Nova (core zones of the biosphere reserves); Natura 2000 site Gadental

Management office

Jagdbergstr. 272, A-6721 Thüringerberg

Contact: Mag. Birgit Reutz-Hornsteiner

Phone: +43-(0)5550/20360

Email: reutz@grosseswalsertal.at

Web site: www.grosseswalsertal.at

Information centre

Information is available from the office in Thüringerberg as well as from the tourism information points in Raggal, Sonntag and Fontanella.

Legal entity

REGIO - Regional Planning Unit Groβes Walsertal:

Association to support the spatial development of the valley; REGIO-chairman: Josef Türtscher

Responsible office at provincial level

Provincial government of Vorarlberg, Department of Environment and Nature Protection

Römerstraße 16, A-6901 Bregenz

Contact: DI Max Albrecht

Phone: +43-(0)5574/511-24511

Email: max.albrecht@vorarlberg.at

Office for development issues (Büro für Zukunftsfragen), Weiherstr. 22, A-6900 Bregenz

Contact: Dr. Manfred Hellriegel

Phone: +43-(0)5574/511-20610,

Email: manfred.hellriegel@vorarlberg.at



Since 2000, Mag. Birgit Reutz-Hornsteiner has been coordinating all activities concerning the biosphere reserve „Groβes Walsertal“.

Background

The region of “Groβes Walsertal” in the westernmost Austrian province of Vorarlberg is often called the „paupers’ valley“. The steep slopes of the V-shaped valley are neither suitable for intensive farming nor for skiing. Ever since an avalanche disaster 50 years ago that claimed 80 lives, more and more people have left their home valley. When the tourism boom of the 1960s and 1970s started to falter as well, the issue arose how to retain the remote valley as a viable space for existing and future generations. It was a lucky piece of timing that in 1997 the UNESCO label „biosphere reserve“ was included as a separate protection zone category in the environmental protection law of Vorarlberg. Turning the Walsertal into a biosphere reserve, so the hope was, would give regional development a positive impetus and boost tourism while retaining the local cultural identity.

In 1998, REGIO chairman Josef Türtscher organised a trip to the German biosphere reserve Rhön and supported the UNESCO concept in various public events. About 60 committed locals worked together to develop a vision for the future development of their valley. Two nature reserves existed in the region already, which could be designated as core zones and which increased support for the plan of setting up a biosphere reserve. In the year 2000 the Groβes Walsertal finally got included into the worldwide network of biosphere reserves.

Geographical position

Groβes Walsertal is a remote, thinly populated mountain valley in the limestone Alps northeast of Bludenz.

Geology

The Groβes Walsertal divides into two geologically distinct sections. The northern part, from Thüringerberg to Fontanella is predominantly an area of soft green mountains of the Vorarlberger Flysch. The bedrock here consists of flat hard layers interspersed with softer, often grey-brown clayslates. The rainwater gathers at the clayslate layer. Above this backwater level loosened and looser rocks start to “flow”. Over centuries this phenomenon has

created a distinctive landscape with many rounded humps, so-called “Rutschbuckel”. The rugged peaks and screes of the southern valley form a strong contrast to the northern part. They belong to the northern limestone Alps and consist mainly of carbonate bedrock. Each layer of carbonate started off as a soft maritime sediment in the Mesozoic sea (Tethys) before hardening to rock. Fossilised shells in the rocks are witnesses of ages from up to 250 million years ago. The varying hardness of the rocks causes variations in the formation of the water system. In the flysch the bedrock encourages water outflow near the surface, hence there are many brooks. In some places they cut very deeply into the rock and create the typical ravines. In the bedrock of the limestone Alps, however, the water seeps through the crevices and emerges in mighty torrential springs like for instance in the Gadental valley. The Trübbachhöhle cave in the Marulthal valley is one of the special geological features of the Walsertal and enjoys special protection as a natural monument. One should also mention the remnants of a former ocean bed at the northern foot of the Schönbühel – the Klesenza Window.

Climate

The climate in Vorarlberg is typically central European, but relatively cool and with higher precipitation. Frequent rain particularly in summer is feeding a large number of springs and many full brooks. In higher altitudes the annual mean temperature falls by 0.5 degrees Celsius per 100 m altitude with precipitation increasing at the same time, thus subdividing the vegetation zones by altitude.

Habitats and ecosystems

The habitats are determined by the geology of the valley with its distinct two parts and also by the respective altitude. Typical altitudinal zoning in the northern limestone Alps would start in the valley with deciduous and mixed forests of beech, ash and maple. A bit higher up fir trees are mingling with the beech. This type of forest is very common in the Großes Walsertal; the undergrowth however shows marked differences depending on the geological base. In the Gadental valley one can find orchids such as the Fragrant Orchid (*Gymnadenia conopsea*), the Brown-red Orchid and the Broad-leaved Helleborine (*Epipactis atrorubens* und *E. helleborine*). The fir tree and beech forests are followed at higher altitudes by montane and spruce forests and later, towards the tree line at around 1800 to 1900 m by thickets of dwarf mountain pine. The forest of Bog Pine (*Pinus uncinata*) in the Gadental valley deserves a special mention. This species (locally called “Spirke”) is a close relative of the Dwarf Mountain Pine, very common in the western Alps, and grows there in the ecologic niches otherwise occupied by the Dwarf Mountain Pine. Above the tree-line calcareous Alpine grasslands rich in species spread upwards towards the permanently snow-covered peak region. It is particularly

at these higher altitude locations that the lush calcareous grasslands of the northern part of the valley, which are determined by flysch, differ greatly from the rugged, sparse peaks and extended screes of the southern limestone high Alps. As a steep V-shaped valley, the Großes Walsertal still contains almost untouched gully woods. Due to the morphology and the dominant water-permeable carbonate bedrock there are practically no bigger high moors. For centuries animal husbandry was the main source of living in the valley, so it is hardly surprising to see a landscape dominated by meadows and pastures.

Special features of flora and fauna

The Großes Walsertal is very rich in species due to its geological and morphological variety. The mountain meadows contain many herbs, among them Arnica (*Arnica montana*), an old medicinal herb to treat wounds, Globe Flower (*Trollius europaeus*) and *Anemone narcissiflora*. Various types of gentian embellish the landscape, including the Spotted Gentian (*Gentiana punctata*), Alpine Gentian (*G. nivalis*), Round-leafed Gentian (*G. orbicularis*) and the Yellow Gentian (*G. lutea*), which is used

A competition was held to find an adequate logo for the biosphere reserve. The chosen motive was drafted by a pupil from the valley.



Mountain scenery in the core zone of the biosphere reserve: the nature protection area Faludrida-Nova; in the front the Alpine rose (*Rhododendron hirsutum*).

Photo: BR Management Großes Walsertal





Tradition is upheld in the valley. Looking at the traditional style of the houses you get the impression that here mankind is still living in harmony with nature.

Photo: BR Management Großes Walsertal

to make schnapps. The meagre calcareous grasslands in Walsertal are ideal sites for the rare Black Vanilla Orchid (*Nigritella nigra*), a small reddish-brown orchid that smells strongly of vanilla. In the meadows above the tree line walkers can hear the shrill whistling of the many marmots (*Marmota marmota*). Alpine Toadflax (*Linaria alpina*), Round-leaved Pennycress (*Thlaspi rotundifolium*) and Saxifraga aphylla flower in the limestone scree slopes. The bright yellow flowers of the Mountain Cowslip (*Primula auricula*) stick out against the grey rock. The Rote Wand, at 2704 m the highest peak of the valley, is home to herds of ibex.

Settlement history

In the 13th century the ancestors of the Walser people immigrated into the valley from the Swiss Wallis. They lived as free peasants and controlled the passes and borders. For a long time keeping animals for milk and meat was the sole basis of their existence. Arable farming existed only at self-sufficiency level. For centuries the people of this remote region were cut off almost entirely. This situation left its mark: to this day the Walsertal boasts a culture and dialect of its own.

Population and municipalities

The Großes Walsertal is very sparsely populated. Only 3500 people live in an area of 192 square kilometres. Six villages lie inside the area of the biosphere reserve: Fontanella-Faschina (population 460), St. Gerold (population 380), Raggal-Marul (population 860), Sonntag-Buchboden (population 650), Thüringerberg (population 685) and Blons (population 340). The two villages at the highest altitude, Fontanella (1145m) and Faschina (1486m), offer fascinating views on to the Lechtaler Alps. Half an hour's walk takes you to the natural bathing lake Seewaldsee. In St. Gerold the hermit Gerold was the first who settled in this valley, some 1000

years ago. The abbey of St. Gerold is the cultural meeting point for the valley. In summer the mountain village of Marul is a good starting point for walks into the protected zone Faludriga-Nova. Buchboden lies at the edge of the biggest nature reserve in Vorarlberg, i.e. the Gadental, with the only bog pine forest in the area. In Sonntag-Boden the "dairy experience" lets you watch people making cheeses and you can book courses learning traditional crafts. Thüringerberg is situated at the southern slope of the Walserkamm ridge and this is where the office of the biosphere reserve is located. It affords a unique view of the surrounding mountains and plains. Blons offers a dolls museum and an avalanche information centre. It also boasts the largest solar power station in Europe with cells that follow the sun and change their position with the sun's angle.

Land-use

The Großes Walsertal is a remote mountain valley without industry. For a long time animal husbandry was the only economic basis for the people living here. Today the farmers have switched to organic farming and ecologically sustainable exploitation of the forests on the steep slopes. Mainly trunks with a higher diameter are cut down. Today tourism plays a major role in the Großes Walsertal. The colourful patchwork of natural and cultivated landscapes invites extensive walking in the summer. In winter there are small lifts for winter sports in the villages of Sonntag, Fontanella, Faschina, Buchboden and Raggal.

Eco-awareness activities

Under the label "Wilde Walserwege" the management of the biosphere reserve is organising adventure weeks for schools. The holistic concept applied by trained teachers demonstrates the interdependence of nature, cultivation and human economic activity in the Großes Walsertal. Walking through the varied mountain landscape appeals to the intellect and the senses. One week of deepening self-awareness and group dynamics is also meant to be an adventure and fun. At the show dairy in Sonntag-Boden visitors can learn how milk becomes delicious mature cheese. The dairy experience is being offered for families, groups or schools. Themed trails promise interesting strolls. In Faschina there is a nature trail dedicated to flowers and plants of the Alps, in Blons there is an information centre and nature trail on the topic of avalanches. In the Marultal valley a forest nature trail is currently being set up.

Cooperation with universities

None so far.

Research activities

The biosphere reserve is still very young. Hardly any MAB relevant research has been carried out so far. The bulk of publications on the Walsertal valley have a historical and local knowledge focus. In den 1980s Prof. Georg Grabherr (University



The Alpine Toadflax typically grows on limestone scree slopes.

Photo: Peter Schmid



In former times, stock farming was the main way of earning a livelihood. The whole family makes hay together.

Photo: Family Stark

of Vienna) and Dr. Mario Broggi (Office of Environmental Planning) made an inventory of those biotopes in Vorarlberg where conservation was a priority. The Vorarlberg Biotope Inventory is going to be updated in 2005. In 1999 the European Union funded the Landscape Inventory Großes Walsertal. The pilot project provided methodological approaches for gathering data relatively quickly even on very complex landscapes. In 2002 socio-economic data were collected for an assessment of the current situation. It focused on the development of the population over the last 30 years, energy use and changes in economic and tourist structures. What the biosphere reserve still lacks is a coherent research concept. The push is not so much for closing knowledge gaps but for increasing our understanding of the interaction between the natural environment, societal value systems and economic conditions, a field of research for applied and interdisciplinary research. Currently efforts are under way to set up a permanent cooperation with the geography departments of the universities of Vienna and Innsbruck.

International partnerships

Partnerships have been set up via the local authority network “Alliance in the Alps” and the network PREPARE for sustainable tourism. Regular exchange of information with other biosphere reserves such as the ones in Rhön, Entlebuch, Vienna Woods, Vogese and Bavarian Forest is taking place.

Funding

The six villages that joined to form the regional planning unit Großes Walsertal (REGIO) are paying 10 euros per inhabitant into REGIO. This contribution however is not enough to secure the work of the biosphere reserve management in the long-term. Start-up funding came from REGIO, provincial and federal sources. From 2001 until 2004 the project „ECO Monte“ was funded with money from EU LIFE. From 2005 the management receives baseline funding of 100.000 euros from the provincial government of Vorarlberg.

Special features

Vorarlberg is the only Austrian province so far that has provided the designation of biosphere reserves as a separate conservation category in its law on environmental protection and landscape conservation of 1997. Currently the province of Lower Austria is preparing to include such a conservation category in its provincial legislation. The Großes Walsertal was the first biosphere reserve in Austria to be included in the list of UNESCO model regions in 1995. This means that it came about at a time when the guidelines worked out in Seville put sustainable development criteria to the forefront of the MAB concept.

The biosphere reserve has received several awards: Environment and Solar Award Vorarlberg 2002, European Village Renewal Award 2002, Main Award of the Ford Environment Award 2003, Main Award of the local authority network “Alliance in the Alps” 2003, ARGE Alp Prize 2004, EMAS management certification and “3 e” Award in 2004 as part of a programme for energy efficient municipalities.



The lady's slipper, a rare orchid, is found predominantly in mixed deciduous forest.

Photo: Umweltbüro Markus Grabher

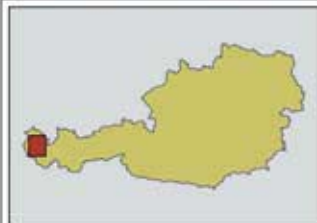
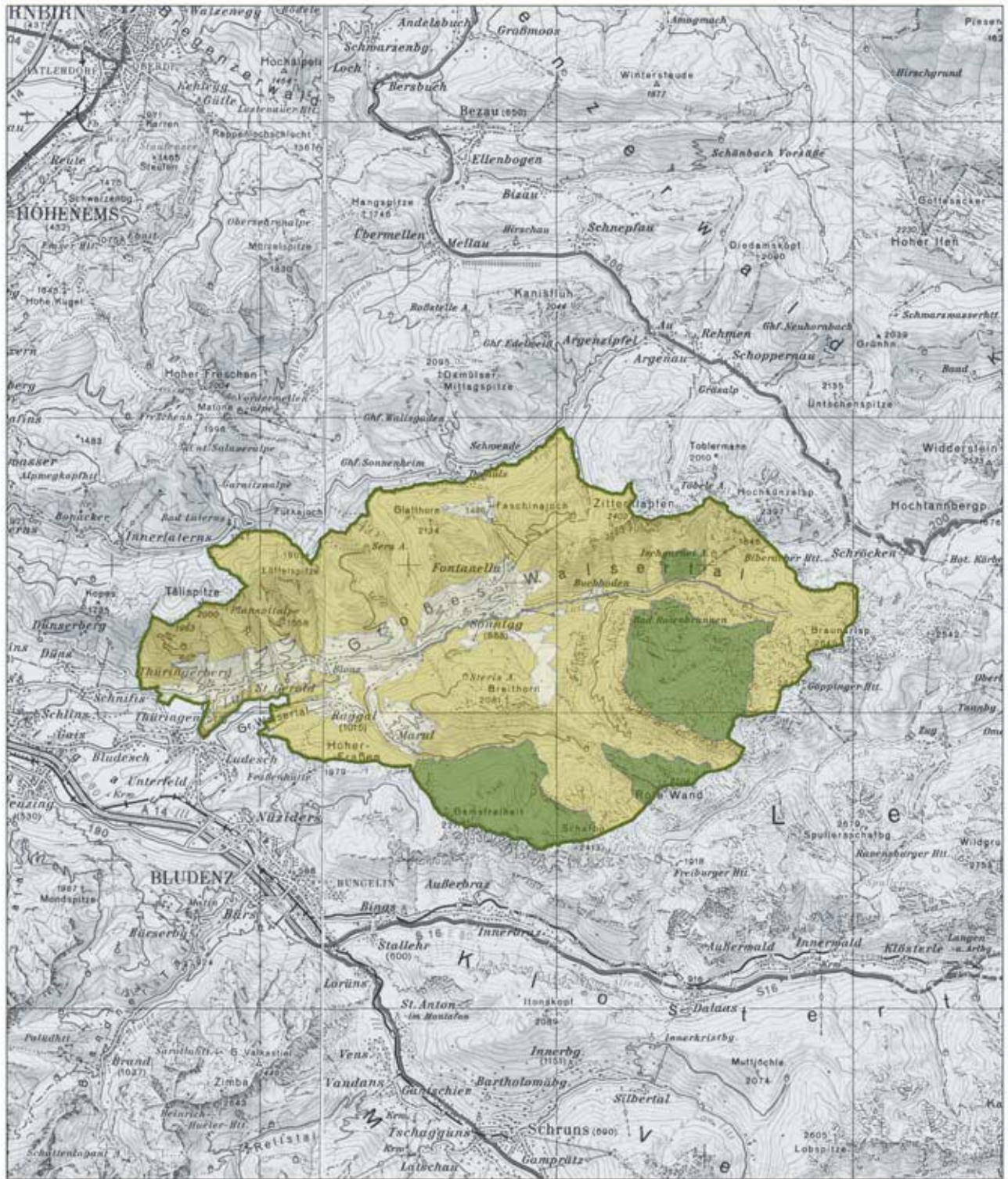


In the biosphere reserve there is a strong focus on environmental education: Children discover nature.

Photo: Biosphere Reserve Management Großes Walsertal



Biosphere Reserve Großes Walsertal

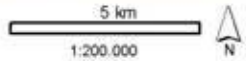


Zonation of the biosphere reserve:

- core zone
- buffer zone
- regeneration zone
- transition zone

External border of the biosphere reserve

Background: ÖK200



Data basis: BEV and Provincial Government of Vorarlberg, GIS, Department of Spatial Planning

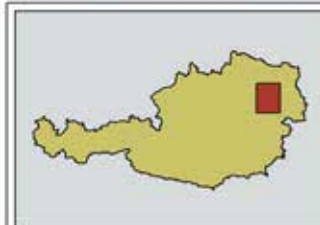
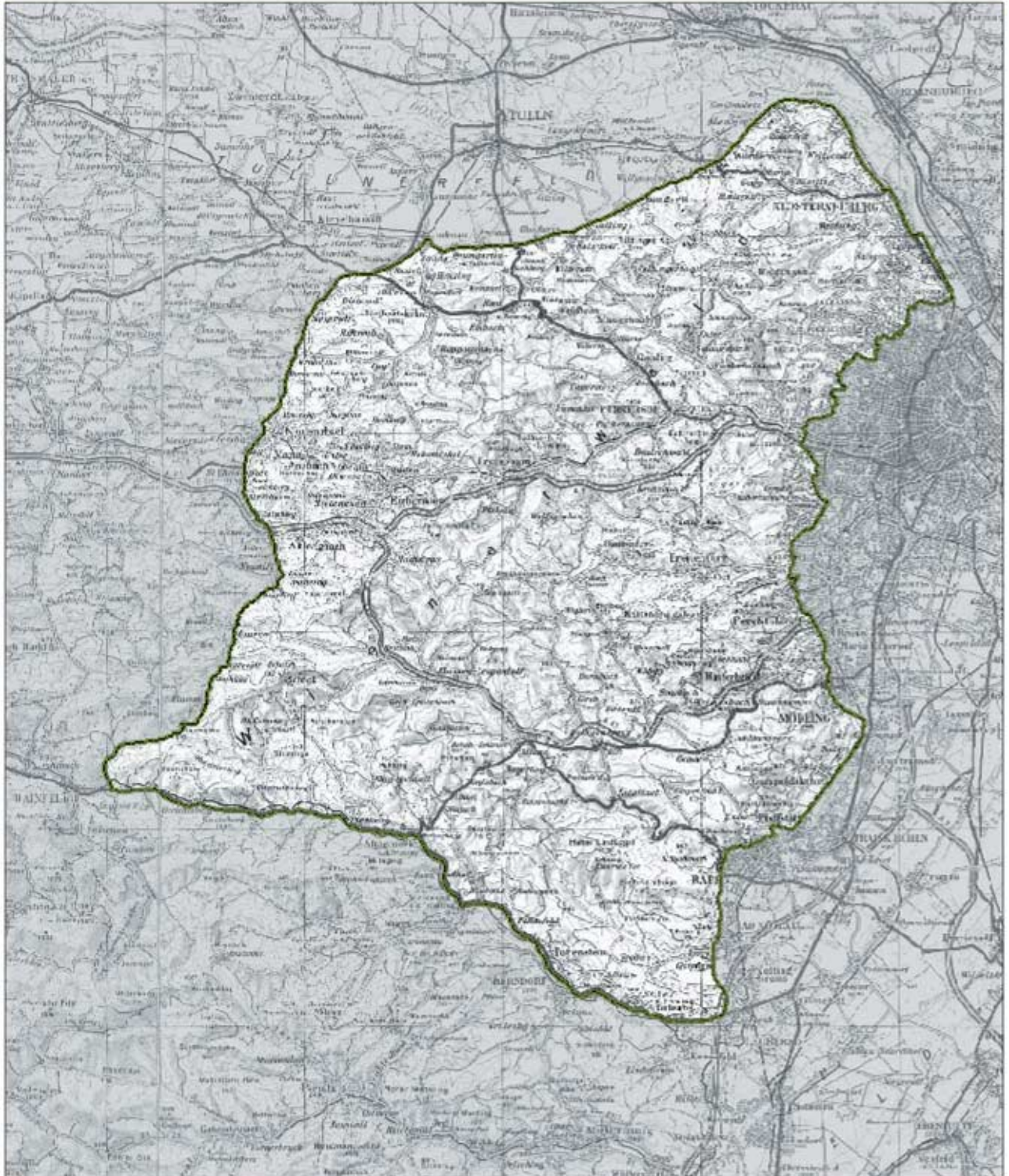
Status: 09/2004


Elaboration:



E.C.O. - Institut für Ökologie, Knopplatz 6, 9020 Klagenfurt, www.e-co.at

Biosphere Reserve Vienna Woods



 Preliminary border of the biosphere reserve

Background: ÖK200

5 km
1:300 000



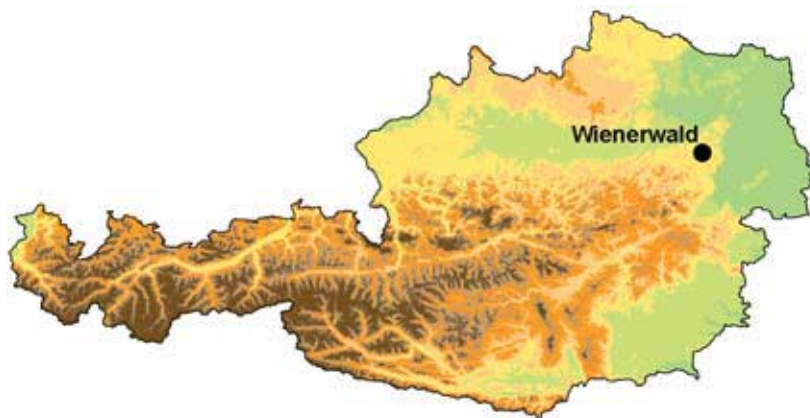
Data basis: BEV and Management of Biosphere Reserve Vienna Woods

Status: 09/2004

Elaboration:

E C O

E.C.O. - Institut für Ökologie, Knopplatz 6, 9020 Klagenfurt, www.e-c-o.at



„ Unique natural and cultural landscape just outside Vienna ... “

Vienna Woods

Year of approval by UNESCO: June 2005

Federal provinces: Vienna and Lower Austria

Main focus: Conservation and sustainable development

Total surface: 105.645 hectares; the core zones are distributed decentrally in the forest areas; the buffer zones are located in forest and grassland areas (see map on page 59).

Elevation: ca. 160 up to 893 metres

Additional protection status:

Landscape conservation area Vienna Woods; Protected Area „Wood- and Meadow-Belt of Vienna“; Nature conservation areas Teufelstein, Eichkogel, Glaslauterriegel-Heferberg and Lainzer Tiergarten; Nature Parks Eichenhain, Föhrenberge, Sparbach and Sandstein-Wienerwald; Natural Forest Reserves; Natura 2000 sites;



Management office

Biosphärenpark Wienerwald Management
C/O Verein Niederösterreich-Wien,
gemeinsame Erholungsräume
Schlossplatz 1, A-2361 Laxenburg
Contact: Mag. Günther Loiskandl
Phone: +43-(0)2236/71225-16
Email: office@biosphaerenpark-wienerwald.org
Web site: www.biosphaerenpark-wienerwald.org

Responsible offices at provincial level

Provincial government of Lower Austria,
Department of Forest Management,
Landhausplatz 1, Haus 12, A-3109 St. Pölten
Contact: DI Hubert Schwarzwinger
Phone: +43-(0)2742/9005-12962
Email: post.lf4@noel.gv.at

City Council of Vienna
M4 49 – Forest Management
Volksgartenstraße 3, A-1082 Wien
Contact: DI Herbert Weidinger
Phone: +43-(0)1/4000-97912
Email: post@m49.magwien.gv.at

Mag. Günther Loiskandl accompanied the region on its way towards a biosphere reserve.

Background

For a long time the Vienna Woods (Wienerwald) have been a contested space, being claimed for environmental protection efforts and increasing utilisation alike. As early as 1994, at the „Vienna Woods Conference“ similar measures for conservation and sustainable utilisation of the unique natural and cultivated environment were being called for as today. In 2002, with Vienna Woods millennium celebrations, public attention focussed on the future of the area. Over the entire year numerous expert discussions and cultural events took place. Starting from the old Vienna Woods declaration of 1987, the members of the Planning Unit East (Burgenland, Lower Austria and Vienna) formulated objectives and measures aimed at maintaining the Vienna Woods for future generations as a natural and recreational environment. Almost all towns and villages of the region as well as those municipal districts of Vienna that include parts of the Vienna Woods signed the declaration and thus joined this initiative. In the same year, the provincial governments of Vienna and Lower Austria ordered a feasibility study to clarify which conservation category would be more suitable for the region, national park or biosphere reserve? The planning region included the landscape conservation area of Vienna Woods (Lower Austria) and the protected area Wood and Meadow belt (Vienna) excluding the Bisamberg. Six months later, in October 2002, the results were presented: a national park could not resolve the problems caused by the multiple utilisation claims on the area. The concept of the biosphere reserve on the other hand provided an ideal instrument for permanently protecting the richly structured forests and grasslands. It takes into account the character of the Vienna Woods as one of the ecologically most important regions of Austria but also their function as traditional recreation area and economically utilised landscape (see contribution on page 29). The feasibility study included provisional zoning suggestions. In 2003 the provinces of Lower Austria and Vienna installed the management of the biosphere reserve Vienna Woods, thus underlining their intention

to implement the international UNESCO guidelines in the Vienna Woods. Planning was coordinated with the provincial forestry authorities of the two provinces, with the aim of applying to the UNESCO for international recognition as biosphere reserve in 2005.

Geographical position

The Vienna Woods spread to the west and southwest of the city of Vienna and therefore cover parts of the provinces of Vienna and Lower Austria. The Vienna basin forms their eastern border, in the south they are edged by the Triestingtal and Gölsental valleys, in the west by the river Große Tulln and in the north by the plain of the Tullnerfeld and the Danube. The Vienna Woods are a transitional space. It is here that the easternmost spurs of the northern limestone Alps peter out into the Vienna basin.

Geology

Geologically, the Vienna Woods are divided into two parts. According to the bedrock they can be split into the limestone Vienna Woods and the sandstone Vienna Woods. The border between the two quite distinct landscapes is a line running from Altenmarkt to Alland – Kaltenleutgeben – Kalksburg – Mauer. North of this borderline the sandstone Vienna Woods extends over some four fifths of the total area. It is made up of flysch and thus shows a uniform picture of broad humps covered in beech. The peaks are getting higher the further south you go. The deep loam does not let the precipitation permeate, resulting in few springs and irregular water systems in the valleys, typical for sandstone regions.

In the limestone Vienna Woods south of Vienna, the spurs of the northern limestone Alps peter out into the Vienna Basin. Steep and rugged limestone and dolomite rock formations and sharply cut gullies dominate the landscape. The limestone dissolves easily, so the precipitation permeates the bedrock and flows away below the ground, creating various features characteristic of karst. The geological fault system at the eastern slope of the limestone Alps towards the Vienna Basin, the so-called “thermal spring line”, runs from Bad Fischau via Bad Vöslau, Baden and Mödling into the city of Vienna.

Climate

The Vienna Woods are two-partite not only in geological but also in climatic terms. They lie in the transitional area between a predominantly Atlantic west and the pannonic climate in the east. The ridges run from southwest to northeast and act as a weather and climate shed. On average the humid, mild west gets 1000mm precipitation per year, while the eastern part is drier with 600mm precipitation a year and the summers are warmer.

Habitats and ecosystems

The Vienna Woods boast a large-scale forest that is unique for Central Europe. The individual woods

are closely interlinked with open areas and special sites and very rich in species. According to a study from 1993 it counts as one of 13 biodiversity centres in Austria. The diversity of plants and animals is particularly pronounced along the thermal spring line. In the limestone Vienna Woods the fragrant Sweet Woodruff (*Galium odoratum*) grows beneath the beeches. Due to lack of light under the dense canopy few other herbaceous plants thrive there. The flysch Vienna Woods, on the other hand, are dominated by forests of oak and hornbeam, to be followed by woodrush and beech at higher altitudes. The ash forests in the peak region of north-facing slopes are a special feature of this area. Typical for the central part of the Vienna Woods are large meadows. Here one can still find extensively farmed open land, mainly seasonally flooded brome grass and rye-grass meadows as well as rich wet meadows in the valleys. Along the many watercourses there are remnants of riparian forests of predominantly ash and black alder.

Special features of flora and fauna

The meadows of the Vienna Woods are particularly rich in species. Many rare and some endangered species of plants flower here, such as the Bug Orchid (*Orchis coriophora*), and grasses such as *Danthonia alpina* or *Sesleria uliginosa*. On the rough meadows one can still admire *Lathyrus pannonicus*, Fringed Pink (*Dianthus superbus*), Late Spider Orchid (*Ophrys fuciflora*) and the large, bizarre Lizard Orchid (*Himantoglossum hircinum*).

In addition to common game such as red deer (*Cervus elaphus*) and roe deer (*Capreolus capreolus*), chamois (*Rupicapra rupicapra*) occur naturally in the area of the Hoher Lindkogel. The small brown Eurasian Ground Squirrel (*Citellus citellus*), which by now has made it on to the Red List of endangered animals, lives mainly in the heathland of the Perchtoldsdorfer Heide. The Vienna Woods are also home to many rare species of bat, such as the Great and the Lesser Horseshoe-bat (*Rinolophus fer-*

Species diversity originates from a dense mosaic of forest and grassland.

Photo: Biosphere Reserve Management Vienna Woods



**BIOSPÄRENPAK
Wienerwald**



rumequinum, *R. hipposideros*), the Greater and Lesser Mouse-eared Bat (*Myotis myotis*, *M. blythi*), the Notch-eared Bat (*Myotis emarginatus*) and the Barbastelle Bat (*Barbastella barbastellus*). Altogether almost 150 species of bird have been spotted in the Vienna Woods. The open areas are essential for the survival of endangered species such as the Corncrake (*Crex crex*), the Red-backed Shrike (*Lanius collurio*) or the Corn Bunting (*Miliaria calandra*). The rugged limestone region offers suitable living conditions for the Peregrine (*Falco peregrinus*), the Eurasian Eagle Owl (*Bubo bubo*) and the Raven (*Corvus corax*). Fans of amphibians too will find many favourites in the Vienna Woods. Some watercourses are teeming with the rare Alpine Crested Newt (*Triturus cristatus*) and the Yellow-bellied Toad (*Bombina orientalis*). Both species were cited as criteria for nominating a Natura 2000 site in the Vienna Woods. The extensively used grassland, the deciduous forests full of deadwood and the warm, dry sites along the thermal spring line are particularly important for the rich insect fauna. Highlights are butterflies such as the Silver-washed Fritillary (*Argynnis paphia*), the Swallowtail (*Papilio machaon*), the Apollo (*Parnassius apollo*), the Large Copper (*Lycaena dispar*) and the Jersey Tiger (*Euplagia quadripunctaria*) as well as bugs like the Longhorn Beetle (*Rosalia alpina*).

Settlement history

In 2002 the provinces of Vienna and Lower Austria celebrated the Vienna Woods Millennium in honour of the first mention of the forest in a document dating back 1000 years. In 1002, the German Emperor Heinrich II. gave the Austrian Heinrich I. large chunks of what are today's Vienna Woods to secure the loyalty of the margrave. In reality the Vienna Woods have been settled for far longer. Finds such as pierced axes in the Rosental valley and on the slopes of the Bierhäuselberg point to

human activity from as far back as the stone age. From 300 BC the Celts and the Illyrians came into the area, later on followed by the Romans. Since dense forests used to be considered creepy and inimical,

the first villages were probably not attempted before the 8th century, at a time when the Slaves and the Avars came into the area. Religious orders like the Cistercians and the Carthusians paved the way for further settling activity. During the time of the two Turkish sieges of Vienna (in 1529 and 1683) the surrounding area was also affected and many villages had to be abandoned. In the 18th century important roads such as the large imperial road and the Western Railroad were driven through the forest. This development facilitated the "conquest" of the Vienna Woods by the inhabitants of the capital Vienna in the course of the 19th century. Aspiring to the ideal of a rural idyll, noble families erected landscaped gardens with temples. Artists too, for example Mozart, Beethoven, Schubert and Stifter were inspired by the Vienna Woods. In 1870 plans were made to cut down parts of the forest. The clever publicity war waged by Josef Schöffel (1832-1910) managed to prevent the implementation of these plans. Today the Vienna Woods are considered an attractive residential area and an important recreational space for the population of Vienna.

Population and communities

The Vienna Woods lie partly in the province of Vienna and partly in Lower Austria. With some 282.000 inhabitants in 51 towns and villages, by far the largest area belongs to Lower Austria. Seven municipal districts of Vienna with a total population of approx. 477.000 are part of the planned biosphere reserve. This means that a total of more than 750.000 people are living in the UNESCO region yet to be designated, a great challenge for



In the Vienna Woods meadows full of orchids can still be found.

Photo: BR Management Vienna Woods



The Silver-washed Fritillary (female) is predominantly found on meadows near forests.

Photo: BR Management Vienna Woods

public relations and the participation of the population in the planning and development processes.

Land-use

Today the predominant agricultural forms of land use include arable farming and grassland farming. The flysch soils in the western sandstone Vienna Woods are not very well suited for arable farming, therefore feed farming and combined agricultural and forestry use dominate there. At the eastern fringe fruit and wine growing complement arable farming. Altogether however the area in agricultural use has shrunk greatly between 1973 and 1990, by more than 25% in some parts. Meanwhile the built-up area is increasing at the same rate. The Vienna Woods are considered an attractive residential area by the Viennese. The areas bordering on the city and along the thermal spring line are favoured for building new housing. In environmental terms, this is a worrying tendency, as the extensively used grasslands are particularly important for the biodiversity. Since the 19th century the Vienna Woods have been used as a traditional recreation area. Two million Viennese and inhabitants of Lower Austria are living in the immediate vicinity of the planned biosphere reserve and are using these for walks, cycling, mountain bike and motorbike tours, for climbing, riding, cross-country skiing and for picnics. The recreational activities are concentrated on the hilltops because the visitors prefer to experience the landscape. Tourism plays a subordinate role in the Vienna Woods. Among the main attractions are the monasteries of Klosterneuburg and Heiligenkreuz, Mayerling, the Leopoldsberg and the Kahlenberg as well as the lake grotto Hinterbrühl.

Eco-awareness activities

Current education strategies focus on future eco-awareness activities such as a joint school project of the management of the biosphere reserve Vienna Woods and the Austrian committee of UNESCO.

Co-operation with universities

As the biosphere reserve is still being set up there is no official co-operation with specific research institutions as yet. The management of the biosphere reserve Vienna Woods has good contacts with departments of the University of Natural Resources and Applied Life Sciences Vienna, both of which are located in or near the area under consideration.

Research activities

The alternating cultivated and natural landscape, the geological transition from the northern limestone Alps to the Vienna basin and the immediate proximity to the large city of Vienna have meant that the Vienna Woods have always been a desirable object for research, but hitherto there has been no central coordinator for this research. Numerous

individual projects have been carried out in parts of the Vienna Woods, for instance in the Lainzer Zoo, on the Eichkogel and in certain natural forest reserves. Large-scale interdisciplinary studies of the Vienna Woods in their entirety exist, but have been as rare as has international cooperation. Thematically the focus has been on exploring the forest ecosystems (beech forest, natural forest reserves), on grassland (management, richness of species in dry grassland) and recreational use. The Vienna Woods were one of 19 areas studied for the Austrian MAB research project „Hemeroby of Austrian Forest Ecosystems“ (1991-1996). Setting up the Vienna Woods as a biosphere reserve includes plans for working out a comprehensive research and monitoring concept for the entire region.

International partnerships

As yet there are no formal partnerships with other biosphere reserves, but there have been visits and contacts with the biosphere reserves in Rhön (Germany), Entlebuch (Switzerland) and Cevennes (France).

Funding

The provinces of Vienna and Lower Austria are taking on joint and equal responsibility for the setting up and funding of the biosphere reserve Vienna Woods. Long-term funding of the management is the topic of the current planning activities.



The rugged limestone rocks in the Vienna Woods are frequently visited by climbers from the capital.

Photo: BR Management Vienna Woods

Vienna Woods – a diverse mosaic of cultivated and natural landscape.

Photo: BR Management Vienna Woods

