

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

Robert Krisai, Wolfgang Mayer, Christian Schröck, Roman Türk

Abstract

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

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

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

Research area

The „Gradenmoos“ is a typical mountain mire with a length of 250 meters and a width of 100 meters. It is situated in an altitude between 1910 and 1940 m in the Graden valley, a typical glacial U-shaped valley with some terraces in the terrain. The Gradenmoos belongs to the type of a retention meander-mire. Its appearance is characterized by a relative even terrain and a stream in form of a meander. From the south side large alluvial fans extend into the mire, the north side is bounded by outcrops. The surrounding mountains consist of mica slate and transitions to schistous gneiss (VETTERS 1993). The occurring plants prefer siliceous soil.

The climatic conditions at the north-western part of the province of Carinthia are alpine. Only on 90 days in the year the average temperature is + 5 °C. The annual precipitation rates reach 1200 to 2000 mm (HARTL et al. 1992).

The mire is located at the timber line. The slope below the mire is covered with a sparse spruce-larch-forest. Also the alluvial fan on the south side is overgrown with spruce, larch and mountain pine. Apart from some dwarf shrubs there are no woody plants in the mire. Since 1983 the mire is situated in the core zone of the National Park Hohe Tauern.

History of vegetation and actual vegetation

The Gradenmoos exhibits only on relative small areas in the south east and in the north east a considerable formation of peat. On the other areas the vegetation is developed on mineral soils. Probes with the Dachnowski-sampler were possible till to a depth of 220 cm. The history of the mire went changeable. Phases with relative sedate plant growth are followed by disturbed phases caused by covering with sediments, which interrupted the development of the vegetation. From the cores which were extracted with the Dachnowski-sampler probes were gained in a distance of 10 cm and solubilized with the usual practices of pollen analyses. Two samples were dated by C¹⁴-method. The deepest sample has an age of 2.800 years. This corresponds to the end of the Subboreal or the beginning Subatlanticum. The timber line was in the Subboreal in the Alps on the highest level (KRAL 1979; LANG 1994). The content of pollens support these datings, because in the deepest samples the pollens of elm, lime tree and hazel are present, which later disappear. Between 400 BC and 400 AD the formation of an undisturbed layer of peat can be observed. Five hundred year ago a deforestation started in the surroundings of the mire, because the curve of the pollens of the trees decreases clearly. The deforestation can be connected with clearances caused by prospering mining in the Hohe Tauern. The appearance of maize pollen in the top layers points out that the mire in spite of intensive grazing did not cease the growth, although the rate of increase is very low.

In total 30 relevés were taken in the mire according to the method of Braun-Blanquet. The flora of the Gradenmoos corresponds to the vegetation in the higher levels of the Hohe Tauern. The dominant plant communities are *Caricetum nigrae*, *Caricetum rostratae* and moss rich spring fens. *Carex paupercula* is the one species belonging to the red list of threatened plants (NIKLFIELD & SCHRATT-EHRENDORFER 1999).

Lichens

In the Gradenmoos and its proximate surroundings 102 lichen species were found. The diversity of lichen in the mire is relatively low. Between the phanerogams grow *Cladonia arbuscula* ssp. *mitis* and *C. rangiferina*, mainly. The most important substrate in the mire are the boulders. As an aquatic lichen *Verrucaria funkii* occurs on stones in the alluvial fan south of the mire. Aquatic lichens are rare in many regions because they prefer undisturbed substrata in a very clear water. An important substrate for lignicolous lichens is a bridge in the east of the mire, where 12 lichen species occur. In the study area and the surroundings 13 species of the red list of threatened lichens of Austria (TÜRK & HAFELLNER 1999) could be found.

Bryophytes

The bryophyte flora includes 134 taxa, from which 42 species are listed up in the red list of threatened bryophytes (GRIMS & KÖCKINGER 1999; SAUKEL & KÖCKINGER 1999). Within the northern part of the mire the following *Sphagnum* species occur: *Sphagnum capillifolium*, *S. compactum*, *S. teres*, *S. warnstorffii*, *S. russowii* and *S. girgensohnii*; the latter two can be considered as remnants of forest from the time, when the timberline was higher up. In the watercourses patches of *Scapania undulata*, *Hygrohypnum alpinum* and *Hygrohypnum duriusculum* can be observed. On the wet stones besides the water *Anombryum julaceum* and *Brachythecium rivulare* occur. On cow faeces the typical mosses *Splachnum sphaericum* and *Tetraplodon mnioides* can be seen. The rocks in and outside the mire support mosses adapted to slightly drier conditions: *Andreaea rupestris*, *Mielichhoferia mielichhoferiana* and others. On the other side in the spring fens *Philonotis fontana* und *P. seriata*, *Bryum pseudotriquetrum*, *Palustriella decipiens*, *Blasia pusilla* and others can be observed.

Measures for the conservation of the Gradenmoos

As a further result of this study necessary measures for the conservation of the Gradenmoos are derived. A serious problem for the mire is the intensive grazing. This grazing should be ceased or at least reduced. The disappearance of some rare species which were found by Mussnig et al. (1998) is to attribute to the heavy grazing. Also the results of the investigation of the bryophytes display the mire as a biotope worth to be protected. Especially in the spring fens damages caused by steps of the cattle occur, which cannot be repaired during the vegetation period.

Concerning the further development of the mire the establishment of monitoring areas would have a high significance. From the results of these investigations the future measures of management could be derived. Also the repeat of the lichenological studies is recommendable because just the lichens are bioindicators for the air quality and for the hemeroby in different terrestrial ecosystems (PFEFFERKORN & TÜRK 1996).

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Contact

Univ.-Prof. Dr. Robert Krisai
robert.krisai@sbg.ac.at

Mag. Christian Schröck
christian.schroeck@aon.at

University of Salzburg
Department of Organismic Biology
Hellbrunnerstraße 34
A 5020 Salzburg
Austria

MMag. Wolfgang Mayer
wolfgang.mayer@sbg.ac.at

Univ.-Prof. Dr. Roman Türk
roman.tuerk@sbg.ac.at