

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

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Abstract

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

National parks and other wide protected areas have a high status for the preservation of lichens and for the lichenological research. Lichens are in common long-lived symbiotic organisms which are a considerable component of the vegetation in some regions with natural and near-natural landscapes.

Lichens consist of a fungus (mycobiont) and one or more species of green algae or Cyanobacteria (photobiont). The hyphae of the mycobiont are closely interlinked with the cells of the photobiont and they form a so called symbiosis. The interaction between the two partners is very well balanced so that they are very resistant to natural stresses like cold, heat and drought. The symbiotic organisation of the lichens enables them to settle habitats in extreme environments like cold deserts, hot deserts and rocks at the seaside. But they are very sensitive to anthropogenic influences like air pollution and short-term microclimatic changes caused by exploitation of forests (TÜRK & WUNDER 1992).

Lichens live extremely frugally. They are poikilohydric organisms, the water status of their thalli depends immediately on the water supply of their environment. Their metabolism is only active when the humidity in form of liquid water, dew, fog or vapour is sufficiently available. When the thalli dry out, they turn into dormancy. The physiological functions of most of our native lichens are dependent on the permanent change of imbibition and dehydration of the thalli. Generally they grow very slowly and they are at a disadvantage against the competition by higher plants. Thus their habitats are in areas with only a weak competition by the fast growing herbaceous plants or shrubs. This is the reason why lichens prefer sites in extreme environments as habitats. In mountainous regions they play an eminent role as pioneer organisms on eroded surfaces on soil, on rocks in the outwash plains of glaciers and on boulders or on slowly moving scree. Also living and dead trees, wooden roofs, fences and others are extreme sites with regard to microclimate and substrate. In near-natural landscapes lichens form a conspicuous vegetation on free standing trees or on trees in humid, closed forests.

Anthropogenic influences like air pollution, the sudden or gradual destruction of micro- and macrohabitats following the different forms of cultivation, exploitation and utilization reduce the vitality and the possibilities for surviving of lichens in many cases severely. The construction of forest roads, of lifts in forestry areas, of golf courses causes e.g. changes of the environmental conditions which can lead to the complete extinction of sensitive lichen species (TÜRK & WITTMANN 1986, TÜRK & HAFELLNER 1999).

Thus national parks and other wide protected areas are important habitats under the aspects of nature and species conservation for the threatened lichens and also of great interest from the point of scientific view. In Europe most of the national parks and of conservation areas are situated in regions with almost naturally or near-naturally structured biotopes and ecosystems.

Many questions on the function of the single organisms in natural ecosystems, on their interaction and the dependence on the structure of ecosystems can be solved only in national parks and wide protected areas. This is valid all the more so for lichens, since they are organisms with a long term live cycle, which need long phases of undisturbed development.

A high amount of dead trees and woody litter is a feature of high quality in national parks in woodlands. The woody litter and the erect stems of dead trees are of great interest for lichenologists. The various phases of decomposition of wood are the substrates for a high diversity of lichens (TÜRK & WUNDER 1999; GLOBNER & TÜRK 1999).

The high number of lichens species occurring in national parks can be explained by the presence and the preservation of biotopes with natural and near-natural structures. These structures exist in old forests from the colline to the montane step outside the Alps and in the montane to subalpine zone in the Alps and also in near-naturally managed fields and pastures. In regions with a high amount of these structures the diversity and abundance of lichens is high, also of birds, reptiles, amphibia, insects and other invertebrates. In the following table 1 the number of lichen species in some national parks and Natura-2000-areas is shown.

National Park or Natura 2000-area	Province	Altitudinal zone	Number of lichen species	Authors
Berchtesgaden	Bayern	montane to alpine	716	Türk & Wunder 1999
Nockberge	Kärnten	montane to alpine	580	Wittmann & Türk 1990
Hohe Tauern	Kärnten	montane to nival	650	Türk & Hafellner 1993 Hafellner & Türk 1995
Ranna-Tal	Oberösterreich	colline to montane	420	Berger & Türk 1995 Berger 1999
Hochschab- Massiv	Steiermark	montane to alpine	640	Hafellner et al. 2005
Thaya-Tal	Niederösterreich	colline	436	Hasler 2005
Hainich	Thüringen	colline	125	http://www.nationalpark-hainich.de/index.php?page=3_14
Bayerischer Wald	Bayern	Colline to montane	218 (nur Epiphyten)	Macher 1992

Tab. 1: Number of lichen species in some selected National Parks and Natura-2000-areas in Austria and Germany

Important prerequisites for the diversity of habitats and lichens are the altitude zonation, the relief of the landscapes, the diversity of outcrops and the number of microhabitats. The knowledge of the diversity of lichens is dependent on the willingness of the administration of national parks to support projects for the research into diversity of the plants, fungi and animals. The number of lichens in the National Parks Hohe Tauern, Kalkalpen and Bayerischer Wald could be much higher, if the research would be intensified.

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