

# SILVA GABRETA – monitoring of mountain ecosystems

## Editorial

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The Bohemian Forest represents the most extensive forest landscape in central Europe. Mountain old-growth forest remnants, glacial lakes, peat bogs, and mountain secondary grasslands occurring in the trilateral border landscape of Bavaria, the Czech Republic, and Upper Austria, are home to various communities of plant and animal species. This region is a significant part of the Natura 2000 network, which was established to protect the most endangered habitats and species in Europe, as defined in both the Habitats Directive (1992) and the Birds Directive (1979). The centre of this area is protected as the Bavarian Forest National Park (Bavarian Forest NP, 242 km<sup>2</sup>) and the Šumava National Park (Šumava NP, 680 km<sup>2</sup>); the Šumava Protected Landscape Area (Šumava PLA, 1 000 km<sup>2</sup>) serves as its buffer zone.

These protected areas offer unique opportunities to investigate and learn from the nature. Especially now, in the time of rapid environmental changes, it is a source of important knowledge covering enormously wide variety of themes. As permanently protected ecosystems in a process of near-natural development, the national parks serve as extremely valuable “control” areas for long-term ecosystem research and monitoring. Many research and monitoring activities are conducted in this region for decades. More and more research and monitoring projects are operated transboundary following the natural distribution of biotopes, as well as natural migration of wild animals in the region of the both National Parks, which are not respecting the borders either. Transboundary cooperation and coordination of research activities offer new opportunities and improve our knowledge.

There is a long history of successful cooperation between the Bavarian Forest NP and the Šumava NP and a common Czech-German LTSER (Long-term socio-ecological research) platform *Silva Gabreta* has emerged recently. The name of our common LTSER platform was adopted from this scientific journal *Silva Gabreta* (which indeed followed an original Roman name of the mountains) published since 1996. Results of many interesting research projects from the entire Bohemian Forest region have been already published there.

To improve our cooperation, better coordinate research activities, and optimise methodologies, the INTERREG Czech Republic–Bavaria project No. 368 “SILVA GABRETA – monitoring of mountain ecosystems” has started in January 2015. The main goals of this project are: (i) to evaluate previously implemented monitoring in the Šumava NP and Bavarian Forest NP; (ii) to create a metadatabase of previously acquired data and analyse data; (iii) to define gaps and create a common design of monitoring in this transboundary region; and (iv) to organise case studies with the main aim to optimise common methods of monitoring.

Besides of many different activities conducted under the project we could also prepare an inventory of main monitoring projects (Table 1). We can conclude that projects focus on monitoring both abiotic and biotic conditions. Several types of research activities can be distinguished: meteorology, atmospheric deposition and forest dieback, monitoring of forest, water, and wetland ecosystems, and monitoring of effects of deicing salt used for winter maintenance of the roads in the NP region. We found that there are several projects, which are implemented transboundary and the same monitoring designs and methodologies are used (i.e. monitoring of glacial lakes, stream water chemistry, and effects of deicing salt).

**Table 1.** Overview of all recent monitoring programmes in the Šumava NP and the Bavarian Forest NP.

<b>Šumava NP</b>		
	location	period
<b>Meteorology</b>		
meteo stations	Churáňov (1122 m a.s.l.)	since 1973 till now
mesoclimatic stations	6 mesoclimatic stations, GPS coordinates available	since 2007 till now
<b>Atmospheric deposition and forest dieback</b>		
headwater catchments	Čertovo and Plešné lakes	since 1997 till now
hydrology	10 small experimental catchments in the upper Vydra basin	since 2005 till now
stream water chemistry	200 sites, GPS coordinates available	1990, 2004, 2010, 2015
<b>Forest ecosystems</b>		
biodiversity	no complex monitoring of biodiversity in NPŠ till now	
forest regeneration and inventory	Biomonitoring – a network of 1111 permanent plots in non-intervention areas of NPŠ, GPS shape file available	since 2008 till now
operation inventory	a network of research plots in permanently managed areas of NPŠ, GPS shape file available	2004 pilot project, since 2005 till now
large-scale inventory	a network of research plots across NPŠ, GPS shape file available	1999–2002, 2013–2014
<b>Aquatic ecosystems</b>		
glacial lakes	Černé, Čertovo, Prášílské, Plešné, and Laka	
<b>Wetland ecosystems</b>		
stream restoration	Hučina, Jedlový Potok, and Žlebský Potok	since 2011 till now
hydrology, chemistry, and vegetation of restored and non-intervention mires	10 permanent sites within mires of Modravské Slatě, Vltavský Luh, and Křemelná, GPS shape files available	since 2005 till now, some hydrological data since 1995
<b>Effects of deicing salt application</b>		
soil chemistry and vegetation	12 permanent study sites, GPS coordinates available	since 2003 till now

**Table 1.** Continued

<b>Bavarian Forest NP</b>		<b>Comments</b>
location	period	
Waldhäuser (945 m a.s.l.)	since 1972 till now	
6 climatic stations, GPS coordinates available	since 2000 till now	
Große Ohe	since 1977 till now	for details, see VRBA et al. (2015) and BEUDERT & GIETL (2015), respectively
		for details, see LANDHAMMER et al. (2015)
65 sites, GPS coordinates available	2015	for details, see HRUŠKA et al. (2015)
BIOKLIM – 4 transects covering the whole elevational gradient, 331 (147) plots	2006 (2016)	for details, see BÄSSLER et al. (2015)
572 permanent plots in a 200×200 m grid, subalpine range of the Rachel–Lusen area	1991, 1996, 1998, 2000, 2005, 2010	for details, see ZENÁHLÍKOVÁ et al. (2015) and HEURICH (2009), respectively
permanent transects in mountain and lowland spruce forests, and in mixed forests in the Rachel–Lusen area	1992, 1997, 2002, 2009, 2014	
Großer Arbersee, Kleiner Arbersee, and Rachelsee		for details, see VRBA et al. (2015)
no stream restoration monitoring in NPBW		for details, see BOJKOVÁ et al. (2015)
no complex mire monitoring in NPBW till now		
9 permanent study sites, GPS coordinates available	2011, 2012, 2015	for details, see ZÝVAL et al. (2015)

Other projects are carried out only in the Šumava NP, or in the Bavarian Forest NP, but the neighbours have analogous projects with partly different monitoring designs. The monitoring of effects of atmospheric deposition and forest dieback in both the catchments of glacial lakes and the Grosse Ohe catchment, or the monitoring of forest regeneration are examples of such analogies. We also found that there are well-designed monitoring projects, which are operated only in one of the national parks so far. The BIOKLIM project focusing on the biodiversity monitoring in the Bavarian Forests and the long term monitoring of mires in the Šumava NP are projects delivering very important results but transboundary aspects are missing till now. The transboundary implementations of these projects are our biggest challenge for the future. A new project, which is going to use these well-tested methodologies in our common transboundary region and improve our knowledge, is already under preparation.

This special issue of *Silva Gabreta* brings papers describing most of the main monitoring projects (for their list, see Table 1) conducted in the Bavarian Forest NP and the Šumava NP. The project guarantors were asked to describe in details their study sites, project goals, monitoring design, used methodology and main project outputs. Several authors could use parts of their already published papers or project reports but many others had to start with a clean paper. We appreciate very much that most of the project guarantors have responded to this challenge with honour, regardless lot of field work during the summer season.

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