

## Preservation and dynamics – The charge of conservation in national parks in reflexion to autogenous processes

Wolfgang Scherzinger

### Abstract

Taking the natural development of woodlands in Bavarian Forest National Park as an example, this contribution points out the role of undisturbed stands of old growth forest, to preserve species of the "forest-interior-climate", which are mostly stenoecic. But on the other hand it also discusses the significant potential of creating habitats by disturbances of ecosystems (like wind throw, insect infestation), which are essential for the diversity of the "forest-exterior-climate". Constancy and catastrophe are positioned at the extreme ends along a scale of natural development, which are represented by the "climax"-phase of mature old-growth-stands and by large clearings, created by destruction of former tree stands respectively. On the one hand, the "preservation" of the typical diversity of whole the system is only conceivable under the influence of the "dynamics" of natural disturbance. On the other hand, characteristic species and even a whole biocenosis could be threatened locally or even eroded regionally by disturbances of catastrophic dimensions! Therefore, preservation requires a balance and a connection between the various phases of development in natural forest, so that locally displaced organism may evade and retreat to alternative patches of suitable habitats within the diverse mosaic of tree stands.- Demonstrating the high importance of large areas, of length of time, and of a compounding network of habitats for preserving the typical biodiversity, the topic is of high relevance for conservational planning, but also opens new fields for ecological monitoring of self-organizing ecosystems.

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### Keywords

climax, disturbance, catastrophe, self-organization, biodiversity, preservation.

In accordance with the guidelines of IUCN (1994) national parks as reserves of category II fulfil quite complex charges, as they should preserve – at a level first priority each – a natural development of ecosystems, free of human influences, as well as the biodiversity, typical for the area and in a state as natural as possible. The idea of founding such large-scaled reserves reaches back for 130 years already, when Yellowstone area was designated as a national park in 1872, aiming at the conservation by suffering autogenous development – as "hands off"-management. During the last part of 20<sup>th</sup> century the "philosophy" became enlarged, and as a consequence secondary habitats got included also, which were altered by human utilization and management, as far as they indicate a potential for "retrogression" to a landscape with secondary naturalness. The new conception of "developmental national parks" made foundations of such reserves possible even in Central Europe, where man partly used and shaped the landscape for 5.000-6.000 years.

As one of the first national parks of this new type the Bavarian Forest National Park was founded in 1970, for preserving a characteristic section of mountainous forests and their local flora and fauna, at the south-western slopes of "Bohemian Massive" Forests in this reserve, covering 130km<sup>2</sup> for the first time and 240km<sup>2</sup> after enlargement in 1997, are logged since medieval times at least, but timber harvest of economic value started 150 years ago only. Therefore the woodland stands out for relicts of primary forest as well as for representative parts of mountainous forests in a state near to nature. In the years of establishment the management of national park was according to the "climax-thesis" of classical theory of ecosystems. According to the expectation that any autogenous development of forests teleologically will follow in concern to the conception of the "potential natural vegetation", even man made ecosystems should change to divers and stable systems at the highest level of naturalness, as soon as man retreats from management. Due to this natural determination an additional preservation of endangered species will be superfluous, and therefore the conception of "doing nothing" should be the safest and cheapest way to develop a "primary forest for tomorrow"

Since 1972 the census of various organism confirm the high value of old growth tree stands, as they are distinguished from commercial forests by special structures and by richness of dead and decaying wood. Their long lasting constancy of development and lifespan is a preposition of high diversity and high abundance in fungi, lichens, mosses, and especially in xylobiotic insects, and in vertebrates dwelling in tree-caves as well (like bats, woodpeckers, small owls). The results seem to be in accordance with the expectation, that even tree stands of formerly used forests possess the ability to develop secondarily to a "primary forest", with a high constancy of growing, a natural age-structure in trees, and a high stability of stands.

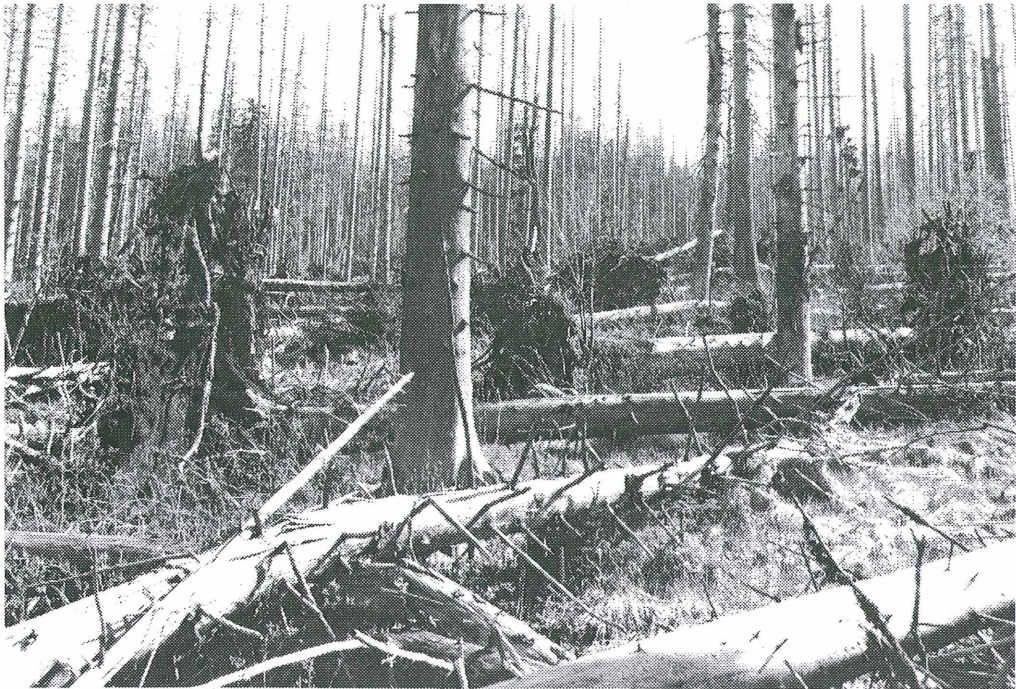


Fig. 1: Disturbance by storm and bark beetle infestation destroyed about 80% of old spruce forest in the highland of Bavarian Forest National Park, what not only induced a turnover of bird species composition, but also increased the risk of extinction in some species.- A strong challenge for management in the reserve! (Photo W. Scherzinger)

After 30 years of non-ruled development of forests, the real occurrence turned out to be much more complex, as natural dynamics do not only follow a linear succession from young rejuvenation to old climax forest, but also may release disturbances of ecosystems, which might change habitat conditions drastically – in a chaotic and unforeseen way: Caused by a wind blow on August 2<sup>nd</sup> 1983 not only 170ha of forest was destroyed, but also the remaining trunks of broken or uprooted trees initiated an insect infestation, resulting in the destruction of far greater parts of the forest. The attack by the bark beetle *Ips typographus* killed about 4.000ha of old spruce stands up to now, mainly in the natural spruce forest at the mountain ridge!

For monitoring the effects of this abrupt change for the fauna, in concern to structures, insolation and nutrition, the turnover of bird species was observed - exemplary – in a control area in highland forest of about 75ha during 12 years (1989-2000, grit-system with 1ha-grit units): For the first time the situation rich on insect prey and dead wood respectively was of profit fore the woodpeckers. Their number of species increased from 2 to 6, the number of individuals from 3 to 30, whereas the Three-toed Woodpecker (with max. 11 individuals), the Great-spotted Woodpecker (max. 8) and the Black Woodpecker (max. 7) used the area regularly. Due to the progressive decay of the canopy and the gradually collapse of the dried trunks the cover was decreasing step by step, what caused the woodpeckers to avoid the catastrophic area after a few years already, although the supply of prey kept quite high! Songbirds living in the canopy were affected especially (like tits and gold crest – as insectivorous species, and crossbill and siskin – as granivor species). This development could increase endanger of Capercaillie, as this grouse species found its gravity of distribution in just this spruce forests of the mountainous highland, where about 80% of its traditional habitat got lost – at least passing by.

	Sommer	Winter
1989	383	
1990	99	
1991	163	
1992	201	
1993	305	
1994	226	
1995	186	
1996	791	
1997	187	
1998	258	
1999	250	
2000	232	

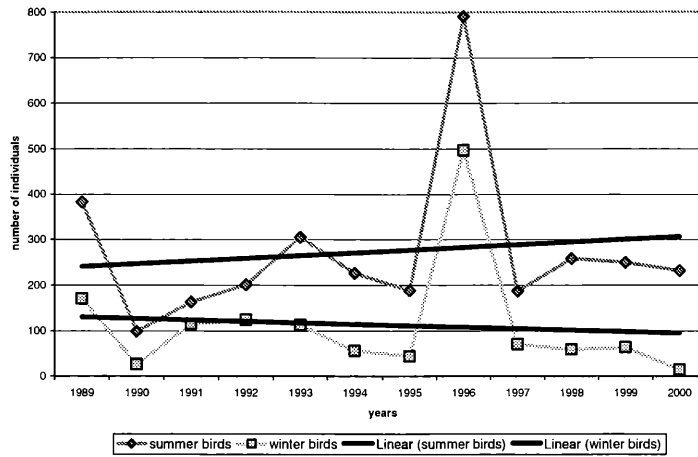


Fig. 2: During the first years after dye back of the spruce stands the bird fauna went through a depression, which continued for the winter situation, when habitat is characterized by great amount of dead wood and high snow cover. But abundance of summer birds is increasing continuously, as soon as herbs, shrubs and tree seedlings get established. The peak in 1996 is caused by an uncommon strong seed mass.

But beside the "losers" of this dramatic development also a number of "winners" within the birds can be recognized, as soon as a new vegetation of pioneer plants, like blueberry brush, tall perennial herbs and sapwood, gets established: species hunting on ground (like thrushes), species using the bush-layer (like warblers), and species of tree steppe (like red start and tree pipit). The chaotic supply of uncommon structures (like broken and laying trunks, uprooted trees) supports wren, robin and dunnock. Due to their higher adaptability euryoecious bird species altogether seem to benefit from this situation, whereas the more stenoecious specialists of old growth (like woodpeckers, Capercaillie) are rather handicapped.- Only 22 years after the storm, and 17 years since the emergency of larger areas of bark beetle infestation in this elevation, the rejuvenation of the succeeding tree generation already is in vital progress, so these new habitats in the young openings will get displaced quite soon by natural succession.

Turnover in species composition of forest dwelling birds 1989 - 2000

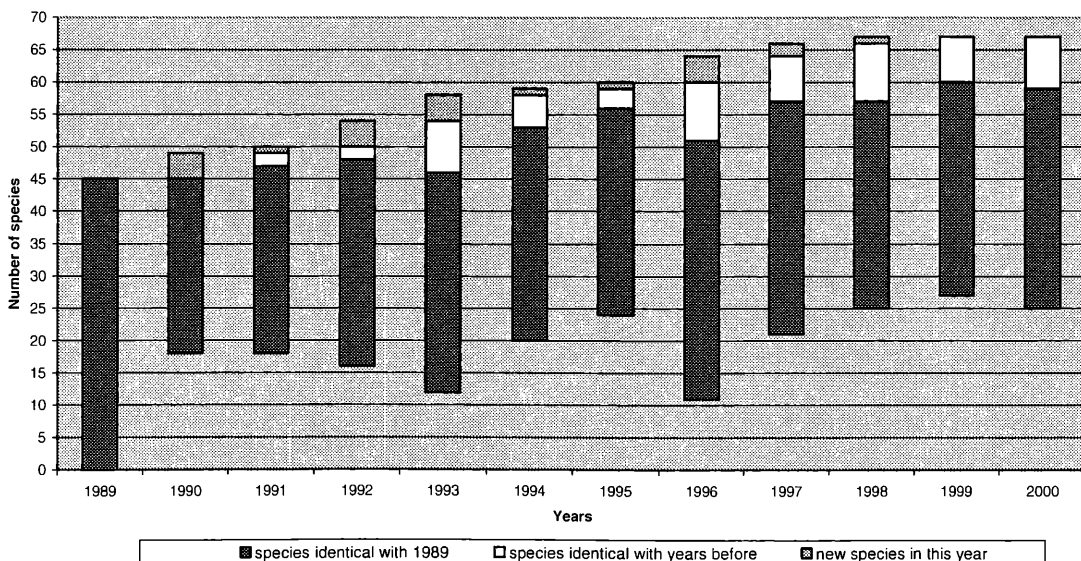


Fig. 3: Within the 12 year period of monitoring, the diversity of species altogether seems to increase from 45 to 67, as each year some species appear, which are new for the mountainous spruce forest. But bird species of the former association get lost every single year also: The result of this turnover is 22 species new, 34 identical with the first year and 11 lost.

When disturbances by storm, fire, flooding or insect infestation were valued negatively and fought – where ever possible – even by conservationists till today, present interpretations of natural processes in ecosystems do recognize such events as essential motor for development of a diverse mosaic of habitats and a rich biodiversity. In consequence preservation of “processes” became the main tool of management in national parks. In accordance with the slogan “*allow nature to act naturally*” the expectation arose, that natural dynamics autogenously will result in a balance between long living stands of old growth and short living patches of disturbance. In such a diverse mosaic of habitats all the organism belonging to the local ecosystem should find sufficient areas for retreat and dispersal. But the example of Bavarian Forest National Park demonstrates strikingly, that size of the reserve, duration of interval and intensity of disturbance make the decision, if the succeeding development will have positive, balanced or negative effects for the concerned species. A centennial event, like the bark beetle infestation in the montane forest, does influence the supply of habitats inside and outside the borders of the reserve, what calls for a clear cooperation in management with the surrounding, to preserve plant and animal species, which are affected especially by dynamic changes.

The paper illustrates, that conservational practice reaches a level of socio-politic relevance, as soon as its conceptions allow nature to act within its own dynamic: the mutualism between chaos and order by self organization requires huge areas, long time and a functional compound with the surrounding environment, and need full acceptance for “wilderness”, developing just by chance.

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## Contact

Dr. Wolfgang Scherzinger  
[drscherzinger@gmx.de](mailto:drscherzinger@gmx.de)

Bavarian Forest National Park  
Guntherstraße 8  
D 94568 St. Oswald  
Germany

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