

Protecting Landscapes in a Man-Made Environment

David SCHUHWERK

University of Applied Sciences Weihenstephan

Conservation and preservation of biodiversity plays a major role for the environment, but also ensures production possibilities for man in presence and in the future. Therefore, among the resources on our planet which are most worthy for protection are not only commodities, but also naturally evolved landscapes and environment altered by human activities.

Even a highly utilized and densely populated area as Central Europe contains a sizeable number of habitats which are of utmost significance because of their special features, endemic species, biodiversity and also for aesthetical reasons.

This paper emphasizes the relevance of forests and forest-related landscape types as Central Europe, in particular Germany would naturally be composed only of several forest communities aligned to the respective sites and conditions. It also provides a short introduction about the actual situation and possible approaches for conservancy issues.

Bavaria – A rough overview about the landscape features and forestry

Bavaria is located in the south east of Germany and is the largest federal state of Germany by area, forming almost 20% of the total land area. Within the total area of 70,548 square kilometres live almost 12.5 million inhabitants, which results in an average density of about 177 inhabitants/km².

Bavaria consists of highly diverse landscape types and can be roughly structured into four main categories: The Bavarian Alps in the southern part, the foothills of the alps and the fertile tertian hills up to the river Danube, the lower eastern mountain range and the Jurassic stratified landscape.

As a result of the different geological features and climatic conditions there can be derived several major and many special forest communities. According to the last forest inventory, forested landscape types in Bavaria are covering about 36% of the area with a total number of 2.558.461 ha, which ranks above the average forest cover of 31% for entire Germany.

The ambitions of forestry in general varied strongly from previous centuries up till now. After the catastrophic devastation of the forests in Central Europe in the medieval times through over logging, wood pasture, litter removal and several other reasons, there slowly developed a principle of sustainability. Nowadays there exists a striving towards the significance of forests beyond a mere economical resource, but also for ecological and social functions. Among these must be regarded the special responsibility for the modern forestry to ensure the protection of species, soils, climate and water.

According to the commitment to the so called “sustainable forest management” in Europe in 1993 it was defined as “the stewardship and use of forests and forest lands in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfil, now and in the future, relevant ecological, economic and social functions, at local, national, and global levels, and that does not cause damage to other ecosystems”.

However there can be alluded many problems concerning the forest conditions as for instance the lack of forest communities orientated by nature, environmental damages and losing of habitats and attached species.

Short introduction about legal regulations for protecting nature and landscapes

There are several layers of laws and regulations which are concerned with conservation issues. For example the Bavarian and the German forest law are setting certain standards and obligating the forest owner to “manage according to proper and sustainable principles”

A more specifying regulation offers the Bavarian Law on Nature, especially with its chapter IIIa which consists of several crucial paragraphs: Among these it is important to mention the special protection for the so-called "special sites"(Article 13d at the Bavarian Law on Nature Conservation), which protects important and valuable associations, areas and habitats. Among the areas falling under this category are several rare and endangered habitats and biotopes as for instance certain alpine forest types, riparian areas and peat lands.

In combination with the European system called Natura 2000 the Bavarian Law on Nature provides a strong and comprehensive instrument not only to protect certain endangered species, but rather entire habitat complexes and ecosystems. Natura 2000 is an ecological network of protected areas in the territory of the European Union. In May 1992, governments of the European Union adopted legislation designed to protect the most seriously threatened habitats and species across Europe. This legislation is called the Habitats Directive and complements the Birds Directive adopted in 1979. These two Directives are the basis of the creation of the Natura 2000 network for protected areas. The Birds Directive requires the establishment of Special Protected Areas (SPAs) for birds. The Habitats Directive similarly requires Special Areas of Conservation (SACs) to be designated for other species, and for habitats.

The Beech (*Fagus sylvatica*) – Mother of the European forests



On the one hand this paper wants to draw the attention towards the naturally developed forest –communities as they evolved after the last glaciated period under rather undisturbed conditions.

For instance the Beech forest communities (*Fagus sylvatica* – *Fageta*). For this community Europe holds a special responsibility because it is an endemic and the main dominant stands forming species in the western part of the continent and therefore many different organisms are attached to its occurrence. Among an enormously high number of wildlife species there exist about 5000 insect species, for example approximately 1400 deadwood related beetles and a high diversity of fungi in the Beech forests. Several different unique and endemic Beech communities with specific species are important elements of the FFH directive.

The potential area of occurrence of pure or mixed Beech stands would naturally stock at about 85% of the forest sites in Bavaria. The current situation of the Beech forests differs severely from that number: Only about 12% of the stands are classified as

natural communities and only a minimal percentage can be described as old or primary growth.

The insertion of tree species not being suitable for many of these sites (especially *Picea abies*), dividing interests of the forest branch and a preference for mono cultural and economic stands can be seen as main causes for the suppression of the Beech, but also historical reasons have contributed to the current conditions. Considering the unique and endemic status from a worldwide perspective, protection and restoration efforts are indispensable.

Special sites – Islands of biodiversity and uniqueness

In Bavaria several small-scaled forest communities can be derived from the frequently changing site conditions and their unique features. The generally increased biodiversity and close to nature features of forest ecosystems compared to other ways of utilization such as settlements or agricultural land, do apply notably for the ecologically extremely valuable and therefore legally protected forest biotopes according to Article 13d of the Bavarian Law on Nature, also known as 13d biotopes .

Interestingly forest management often was the guarantor for the conservation of these biotopes, therefore in most cases these sites can be utilized to the full extend, besides operations which would lead to a destruction or any serious disturbance of the current conditions. Thus it is the obligation of any proper forest management to maintain the contemporary condition or improve its state respectively.

A crucial step for protection efforts of the 13d biotopes is the proper mapping of these habitats according to the suggestions of the regional Bavarian office for forestry and research (Landesanstalt für Wald- und Forstwirtschaft: LWF). The most important tools for the assessment of a 13d site are different mapping backings. For instance the ecological diagrams which divide the associations according to their moisture level and base saturation, descriptions of characteristics and several maps of different content and resolution.

A complete list of 13d sites and communities is provided by the LWF and contains 20 different forest communities, combined into 9 categories.

Biodiversity and cultural landscapes - Habitats created by man

On the other hand it is important to understand that there are several forms of forest related cultivated landscape types which just evolved because of anthropogenic land use. Despite the fact or sometimes precisely because of the artificial origin, these special sites and associations frequently contain a rich composition of often rare or endangered species, providing important habitats and key structures. The cultural landscape in Central Europe has been deeply affected by the agricultural land use until the twentieth century, which led to various habitats and biotopes extremely rich in biodiversity, as for instance traditional and mixed orchards, wetlands and arid grasslands.

Oak associations – A vanishing cultural heritage

An important type of forests, which has to be mentioned at this point, are the Oak communities (*Quercus sp.*).

From medieval times until the nineteenth century Oak forests were an essential part of the basic resources on which human life depended in many areas of Europe and therefore they were strongly extended. The major role as supplier for many vitally important forest products or indirect benefits are hardly conceivable today. The acorns were fed to livestock, particularly pigs, the long-lasting wood was utilized as construction material and the bark was used for tanning leather products. In addition the Oak stands were preferred by feudal hunting methods due to their richness of nutrient supply for certain game species.

The main characteristic forming of Oak stands were either single standing mast trees or a cultivation system which is called “coppice with standards” due to the various requirements these forests had to fulfil. Both occurrences are actually quite rare in our landscape and do hardly play any role in today's forest managing plans.

The interior conditions of typical Oak groves with its light and jagged canopy also provided habitats for many particularly thermophilic species. In fact there are no other domestic tree species which provide habitat and ecological niches for such a variety and number of species than the genus *Quercus* in Central Europe. Depending on the given source, already 300 to 500 wildlife species are known to be specialized in Oaks, i.e. are fairly strong attached or rely on the occurrence of Oaks. Of about the same dimension are the quantity of wildlife species which utilize Oaks in a facultative way.

This living natural and cultural heritage is quite endangered nowadays. Special efforts are necessary to maintain its occurrence, because *Quercus* species are not very competitive and abundant on many sites. Nevertheless the issue is not about restoring the previous significance of oak forests in our cultural landscape, which has ceased a long time ago, but the remainder of occurrence are worth to be conserved for its relevance for numerous life forms and communities, the supply of very durable and valuable timber products and its aesthetic appearance as well as for culturally scenic aspects.

Key strategies for Oak conservation

Key strategies are to create consciousness about the natural, cultural and historical importance of the Oaks as well as from a biological point of view, particularly considering the biodiversity of Oak communities.

But the expensive and complicated maintenance of Oak stands must leave a margin, especially for private land owners, if the efforts are desired to be sustainable successful. The so called chain of added value is the first of several management considerations and conservation strategies. It describes multiple levels of value adding activities being related to a single product as well as a comprehensive examination of ecological, economical, social and technical aspects. A multifunctional Oak management has to combine these different requirements. This extended approach exceeds a merely forest-related point of view and ensures the best warranty for a successful realization of an Oak conservation strategy. But not only the different products have to be regarded, what is more are the various players who are involved.

Such varying groups as timber companies, municipalities, federal agencies, nature conservation groups and the individual consumer have to be included and the respective needs and requirements adjusted.

The four main fields of action are the natural resources, silvicultural management, timber production chain and communication or public relations.

For instance it is one of the main premises to establish a stable market for Oak timber products to assert the principle of “protecting through utilization.” The market for deciduous trees timber products suffers a general depression all over Europe. The Oak wood with its specific physical attributes has to be promoted in a very accentuated way. One of the main advantages of Oak timber are its various utilization possibilities in many different fields.

Effective organization, coordination and controlling of the timber chain must be perceived as another key aspect and creates competitive advantages for domestic products.

From a nature conservancy perspective one of the most crucial ambitions is the conservation and protection of Oak stands with predominantly environmental and conservation functions. Among these should also be included striking individual trees or groves, which remind at the importance of Oaks in a culturally and historical context. In addition the total area of economically utilized stands has to be increased. Furthermore it is crucial to include conservation aspects into silvicultural management plans, which also have to be adapted to the special necessities and treatment concepts to ensure a sustainable conservation and advanced establishing of Oak forests.

Forestry and practical nature conservation in Bavaria

Furthermore there are also interesting ambitions as the dead-wood management concept or the nature conservation plan by the Bavarian Forest Enterprise (Bayrische Staatsforsten, Bay Sf). The enterprise which turned after the reformation of the forest law into a legal and commercially independent forest company, holds in trust the about 800.000ha of state forest in Bavaria.

In general the Bay Sf has taken up the cause of the concept of the so called nature orientated forest management with ten important cornerstones as there are for instance:

- Tree species of the natural forest communities are preferred predominantly, especially at regeneration or rejuvenating sites
- Unnatural stands with a high percentage of species non suitable to the sites are converted into more natural forest communities
- Regeneration is preferential accomplished through small-scaled, long-term rejuvenation methods
- Protection of biodiversity of the forest ecosystems and awareness of nature conservation aspects

In a recently published declaration the enterprise acknowledges the vast potential and resources for ecologically valuable forests with its various richness in flora and fauna and also determined some intentions and treatments for its accomplishment and results they have to be measured from now on.

One of the main intentions of the declaration was to create a framework that exceeds the standard of forest activities and nature conservation given by the Bavarian forest

law. The ultimate ambition is the conservation and improvement of natural habitats and its accompanied species.

Therefore a classification system was designed that arranges different forest types into certain classes, according to their functional capacity and setting. Old and rare forest associations are the crucial connection between former old-growth and today's economical oriented stands and essential for the conservation of biodiversity and as refuge for endangered species.

Thus all stands which fall into the Class 1 category are under particular protection and to be excluded of the operating activities. Among these stands are for instance Beech forests exceeding the age of 180 years, Oak stands which passed 300 years or autochthonal Spruce (*Picea abies*) forests of the alpine areas which are older than 180 years.

Rare stands are also often forests which have been altered by anthropogenic cultivation or treatment, such as coppice with standards or by the shelter tree system. To maintain important habitat tradition it is predetermined to conserve these old structures and create opportunities for contiguous and providential areas to develop.

An important procedure is to maintain the reserve, especially the proportion of old-growth and already decaying wood, hence this assures the development of different age structures and periods of collapse.

Dead-wood Management

Dead-wood, biotope trees and old-growth are essential features to maintain habitat and structures for many species attached to forest landscapes. Of course, the occurrence of these structures is strongly related to increased age. In commonly managed aged-classified forests these structures are almost non existent.

Beside the somewhat weak legal protection of nesting- and cavity trees, the Bay Sf itself established a dead-wood management concept with following ambitions:

In forests classified as Class 2 it is endeavoured to leave 40 m³/ha and in Class 3 forests 20m³/ha, aligned with a general stand age of at least 100 years. The current situation in Bavaria lies at an average value of 12.9m³, but with considerable lower rates in privately owned and managed forests. The aspired goals concerning biotope trees append in average ten trees as a consistent factor in forests of classes 2 and 3. Old-growth are generally excluded of utilization and harvesting operations.

The classification of old-growth is attached to the diameter at breast height.(DBH): Oaks, Firs (*Abies alba*) and Spruce are considered as old-growth at a diameter of 100cm, other species count at 80cm DBH.

The realization of the dead-wood concept is a very challenging and ambitious task, because of the possible dangers to forest workers and visitors. Further education for lumber men and a comprehensive educational promotion for the public is necessary. Especially the population has to be convinced of the importance of these structures for biodiversity and close to nature forest ecosystems. The relation of harvesting operations and the leaving of wood in the managed stands often causes irritations and a lack of understanding or contradicts the competing utilization of wood as fuel by the local population.

It will be interestingly to perceive, if the dead-wood concept is going to withstand the general pressure of utilization of entire trees, including branches, bark and not usable wood for purposes of energy generation.

The general nature conservation and protection concept by the Bay Sf includes several other steps and measurements as for instance the handling of forests within legally protected areas or treatment of riparian sites, bodies of water or protection of species attached to buildings within their property.

Bay Sf's numerous intentions have to be inspected and thoroughly rechecked by its success and compliance with the self proclaimed standards, but the definition of fixed numbers and verifiable values will it make more difficult to escape through any loopholes if the enterprise fails its ambitions and if any inconsistency or problems occur.

Furthermore many observing nature protection agencies (such as BUND or LBV for instance) and the forest administration are also engaged in issues of forest conditions and conservation and should be consulted as permanent partners in any issues of their interest. The integration of research institutions and academical institutes will also alter and strengthen the enterprises efforts from the technical and scientific aspect and raise the public opinion about its sincerity.

Managing biotopes – Alternative strategies

Alternative strategies and instruments to manage several endangered and rare biotopes are mandatory for successful conservation and protection efforts. For instance open pastures and extensive utilized non-forested landscapes are facing several threads which might lead to the disappearance of entire biotopes.

The modern development in agriculture and changed economical conditions have caused a severe loss of valuable opened area biotopes. Especially affected by this progression are also the extensively utilized grassland biotopes and thus the traditional cultural landscapes at large. Reasons can be asserted by significant trends of withdrawal of agriculture, which leads to a wide abandonment of utilization of the formerly extensive farmed areas. On the other hand there occurs large-scaled afforestation on these sites.

It is quite unlikely that all former extensively utilized open areas can be maintained by common nature protection measurements. Therefore new alternatives have to be developed and combined with established conservation methods.

Biotope maintenance, nature conservation contracts, traditional forms of forest pasturage, advancement of dynamic natural processes and management supporting natural disturbances are important key strategies. New approaches are currently developed and have to fulfil certain premises:

- Independent and economically sustainable
- Professional and functional according to the predetermined ambitions
- Practicable and realizable under given ecological conditions
- Accepted and supported by nature conservancy groups, involved parties, policy-makers and the public

Conclusion

Although change of ecosystems and therefore composition of species, disappearance of habitats and cataclysms are part of natural dynamics and hence motor of the evolution, anthropogenic caused alteration has to be excluded out of this cycles because of their velocity and intensity. In consequence we have to take responsibility about our natural heritage, protect endangered species, maintain habitats and ensure sustainable conditions for future generations.

Many initiations for trend-setting and crucial developments are set and with further creation of consciousness about ecological connectivity and the human role, progressive and preserving steps can be taken.

A sustainable conservation of landscapes worthy of protection in Central Europe can therefore only be ensured by a combination of different preservation and protection arrangements and strategies, which have to be engaged on varying levels.

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