

ANNE-SOFIE FORFANG

Nature conservation in forest management planning: A four level approach



75

Arguably the most effective nature protection within many forested areas is not to touch the forests at all; but in most cases this is not an option, as humans want to put forests to a variety of uses.

Thus in multi-purpose forests the target is to utilize forest resources in ways that are compatible with nature conservation. Good management planning can ensure that this is achieved as far as possible.

This article explores how the integration of nature conservation into the management planning of individual forest estates can be achieved at four separate levels: • Conservation of key habitats and species • Choice of nature-friendly silvicultural systems • Operational guidelines • Overall land use planning.

Each of these levels of planning has its own bearing on biodiversity conservation and responsible forest management needs to consider them all in this context.

CONSERVATION OF KEY HABITATS AND SPECIES

A first step in nature-friendly forest management is to obtain basic knowledge of the habitats of high nature conservation value and rare or endangered species, and plan for their conservation in the widest possible extent. Key habitats are areas or structural elements of exceptionally high nature value; normally they only cover a small proportion of the total area of an estate or district but have a disproportionately large importance for biodiversity and therefore constitute natural priorities for nature conservation. In areas of low conservation value, the aim may instead be to encourage the development of key habitats.

A special Nature Conservation Plan will often need to be produced. The actual form of such a plan may vary according to the forest's size and importance for wildlife. It may be fully or partially integrated into the general forest management plan or produced as a separate document, and it may be more or less elaborate. In any case, usually the plan would include the following sections as a minimum.

1. Presentation and assessment of available ecological data. Any Nature Conservation Plan is based on some sort of knowledge about existing natural val-



Well-managed forest edges benefit both timber production, forest health and resilience, game, and biodiversity. (Photo: Nepenthes/Carsten Brandt).

ues in the area. The quality and completeness of these data will normally be closely correlated with the quality of the Nature Conservation Plan.

The Plan should describe available knowledge on habitats and species within the area, and assess its quality. It naturally makes a big difference if the available knowledge consists of a few known facts about rare bird species, or if solid data from a range of sources exist and are available in a systematic form. If existing knowledge is scarce, additional data should be gathered, for instance through key habitat inventories and nature value assessments (see article on page 61).

A thematic nature value map showing important habitats should be produced, including both larger habitats such as old-growth forests, lakes and meadows, and micro-habitats such as very old trees, important nesting sites, and smaller non-obvious areas which are habitats for rare species.

The habitats should also be mentioned in the stand tables along with the special requirements necessary to maintain them. Finally, the Plan should indicate which micro-habitats must be demarcated in the field: For example, a patch of soil where endangered fungi grow may easily be overlooked during forestry operations if the fungi are only recognisable by experts, or can only be spotted during the period when the fungi have fruiting bodies.

2. Objectives of nature conservation. The Nature Conservation Plan should set up relevant short-term and long-term goals, for instance:

- Protection of existing key habitats.
- Percentage of set-aside areas, grazed forest, open spaces, and so on compared to the total size of the estate.
- Improvement or restoration of damaged natural habitats.
- Improvement of the conditions for certain species.
- Ecological education and instructions for staff.
- Provision of ecological data.
- Monitoring of existing nature values.

The goals should be presented in measurable terms, and they should be prioritized.

3. Guidelines for nature conservation management of the area. This section is the heart of the Nature Conservation Plan as it specifies how the goals set up will be achieved. The guidelines should include all the special management procedures necessary to maintain the values of existing important habitats. Examples of subjects which the nature conservation guidelines may treat are:

- Demarcation of habitats left untouched
- Management of buffer zones around sensitive habitats.
- Preservation of especially rare or vulnerable single species.
- Management of areas in need of active care, e.g. burning or grazing of heaths, pollarding or coppicing of old cultural forest, grazing or mowing of meadows, etc.
- Restoration of damaged natural areas.
- Improvement of the physical coherence between

habitats, e.g. widening of roadsides and rides to become corridors of open habitats.

A thematic nature conservation map showing for example non-intervention areas, micro-reserves, buffer zones, and areas in need of active care is an essential management tool.

4. Strategy for data improvement, monitoring, and education of staff. If data are insufficient, it is important to decide how and when supplementary data will be provided.

Moreover, nature is not static, and therefore the status of natural habitats should be monitored regularly and plans adjusted accordingly. The Nature Conservation Plan should specify how necessary data on natural values will be gathered and how monitoring of nature values and the effectiveness of active conservation management will be carried out. The Plan may also present targets and plans for the education of staff and the public on environmental issues.

What a Nature Conservation Plan does not cover.

Even if the Nature Conservation Plan does fully ensure the survival of key habitats in the area over the short term, the management of the remaining vast majority of land is crucial for the long-term dispersal and survival of species as well as the general capacity of the area to support biodiversity in a broader sense. The next three levels of planning are concerned with the management of areas outside key habitats.

CHOICE OF SILVICULTURAL SYSTEM

Since timber production is notorious for being one of the most serious threats to forest wildlife, it is important to select a silvicultural system which keeps damage to an absolute minimum.

A large number of studies indicate that in order to conserve woodland biodiversity, the impact of silvicultural practices on the natural structure and processes of the forest should be minimized (e.g. Hansen *et al.* 1991, Ferris-Kaan 1995). In most of the nemoral zone of Europe, continuous cover forestry thus seems to be the best option (Leibundgut 1993). The features of a close to nature forest - permanent tree cover, native site-adapted species and mixed, uneven-aged stands - ensure a resilient forest ecosystem, which is not disrupted by large clear-fellings or degraded by an unnaturally homogenous forest structure and excessive use of exotic tree species. However, even this more gentle silvicultural approach does not in itself fully protect biodiversity; for instance, the protection of key elements such as old and hollow trees is not part of the silvicultural system.

In some areas, clearfelling regimes may mimic naturally occurring processes better than selective felling, and the size of clearfelled areas may be scaled to mimic the natural situation more closely. Especially in boreal areas naturally influenced by re-occurring forest fires, the controlled use of fire as part of the nature conservation management is essential (Liljelund *et al.* 1992).



Holly Ilex aquifolium was once a common woodland species in Denmark, but its distribution range has become much reduced due to modern forestry. (Photo: Nepenthes).

OPERATIONAL GUIDELINES

In non-protected areas, guidelines for forestry operations and other activities are a good tool for avoiding accidental damage to the environment. The operational guidelines may be produced as a leaflet or booklet which is handed out to everyone working in the forest. The guidelines may concern a wide range of subjects, for instance:

- Thinning, logging, and hauling of timber: How to minimize damage to soil and vegetation and how to avoid damage to open water ecosystems.
- Soil preparation: When to use it and when not to, and specification of techniques that minimize impacts on soil and vegetation.
- Buffer zones: Special regards to be taken.
- Forest edges: Special guidelines ensuring stability and a high biological diversity.
- Protection of a certain specified number of old or dead trees per hectare.
- Regeneration harvest/thinning: Leaving spontaneously occurring, non-commercial trees and bushes for the benefit of wildlife.
- Use of pesticides: If they are allowed at all, it is crucial to provide guidelines that minimize their environmental impact and ensure the safety of workers.
- Harvest/thinning/hauling: Timing of activities in relation to breeding seasons of various species groups, e.g. fish or birds of prey.
- Pollarding, shredding and coppicing: Techniques should be appropriate to the local biological and cultural history conditions.
- Establishment/maintenance of roads, trails, ditches and culverts: How to minimize impacts on watercourses and the natural hydrology.

LAND USE PLANNING

Overall land use planning has consequences for biodiversity conservation in at least three ways: 1) the shape of the overall landscape has implications for the natural dispersal of species, 2) establishment of infrastructure may influence natural habitats, and 3) use of land for various purposes, e.g. timber production, grazing, recreation, and shooting, may have negative as well as positive impacts on natural habitats.

Ecological coherence. Physical coherence of the various wildlife habitats is an important factor in the distribution of specialized species with low dispersal abilities. Even the coherence between natural areas found on the estate and similar areas outside the forest fence may be crucial for their long-term survival. When planning the overall land use within a forest district or estate, it is important to consider opportunities for creating additional biological corridors as well as risks of creating barriers for the dispersal of woodland species. Watercourses as well as inner and outer forest edges are some of the landscape features which may be used for creating biological corridors.

Infrastructure. Environmental infrastructure planning may be essential for the preservation of a range of habitats and the natural hydrology of the site. For instance, all roads and trails should be kept at a good distance from important natural and cultural values which are vulnerable to damage by vehicles. This is especially true of watercourses, which may be seriously damaged by the bad planning of roads (see Forestry Commission 2000 for further guidelines). Also, skidding trails should be carefully planned in order to avoid damage to soil and ground-living species (see box).

Integration with other land uses.

The use of various parts of the forests for purposes such as timber production, agriculture, shooting, picnicking and walking may often be planned so they can be in accordance with aims of nature conservation. Interestingly, conflicting interests can be turned into positive interactions through integrated planning once the points of conflict and overlapping interests become clear. Some examples are:

- When designating areas for the conservation of biodiversity, the planner may favour areas which have both a high biodiversity potential and a low production potential.
- Special care to preserve rare plants may be taken in a corner of a production stand, at little or no cost.
- Forest edges can be managed in order to support the forest's storm resistance as well as provide excellent habitats for a wide range of species.
- Natural regeneration may sometimes be more economic than planting.
- Use of site-adapted native species benefit both biodiversity, forest stability and long-term forest economy.
- Walking paths may be established in order to avoid disturbance of vulnerable species, and instead go through more robust areas containing both educational and aesthetic values.
- Riverine meadows may be actively managed not only in order to benefit the game, but also to form biological corridors for a range of other species including flowering plants and insects, and may at the same time provide exceptional scenic beauty for the visitor

Obviously it is not always possible to unite these interests and the manager will sometimes have to make hard choices between nature conservation and timber production or other interests; the goals and guidelines of the Nature Conservation Plan may have to be adjusted according to economic resources

A minimal drainage policy may result in nature restoration: This pond was recreated by the break-down of a drainage channel. (Photo: Nepenthes).



available or as a compromise with conflicting interests. However, in making the choice it is still an advantage to have a clear picture of the various management options and their consequences not only in terms of economy, but also in terms of biodiversity.

PROJECT SUSTAINABLE FOREST

The present article has been written on the basis of various experiences with forest management guidelines. One of the most important examples is "Project Sustainable Forest".

During the years 1994-1996, this project was developed and carried out by the Danish company NEPCon on behalf of the Danish Forest and Nature Agency. The aim of the project was to develop operational guidelines for sustainable forestry at the forest estate level, and to test and assess the guidelines by applying them to selected forest areas.

In order to develop the guidelines, a forum consisting of all stakeholders was established. The forum included representatives of forest owners and authorities as well as various NGOs concerned with the environment, outdoor life, and hunting. The task of the stakeholder forum was to develop operational guidelines for sustainable forestry through discussions.

In addition, expert groups were formed working with the three main aspects of sustainability: Sociology, ecology, and economy. The task of these thematic groups was to assess the consequences of the operational guidelines developed by the stakeholder forum.

The project developed several methodologies which had not been applied in Denmark before. These included key habitat inventory methods based on Swedish examples, and expanded forest inventories which — in addition to the traditional parameters such as standing timber volume, crown cover, etc. — took account of features relevant for close to nature forestry, such as the extent of natural regeneration of site-adapted tree species in each stand.

The developed guidelines were tested on four Danish forest districts, of which two were privately owned and two were public forests. In these four areas, key habitat inventories were carried out, and visible cultural remains, aesthetic values and features of importance for outdoor life were noted in the field. Existing knowledge of the ecological, recreational and cultural values was sought from a range of sources, including old and new maps, local authorities, the forests' personnel, and species experts with some experience of the areas. Forest inventories were also carried out and soil types were mapped covering all stands in the four selected areas.

On the basis of these inventories, forest management plans were produced. Three major outcomes of the planning process were nature conservation plans, land use plans and timber production plans, which took into account the inventories and their results. In all four districts, the timber production plans entailed a conversion from traditional age class

forestry to close to nature forestry, and for each stand a specific method of conversion was decided on and integrated into the plan.

The analysis by the thematic groups showed that implementation of the plans would have overall positive effects in the areas of sociology and ecology. With respect to biodiversity conservation, the positive effects were especially pronounced. The calculations of the economic consequences of the plans showed that the conversion from age class to close to nature forestry would demand some investment over a 40-50 year period, whereas in a long term perspective the situation would be as economically feasible or even better as the traditional age class forestry.

The exact size of the investment needed was uncertain, as the calculations were based on a number of hypotheses. However, since the conversion would benefit society as a whole, it was concluded that there might be a rationale for establishing incentives or subsidies for forest owners wanting to convert to close to nature forestry.

Since then, several subsidies have been established by the Danish Forest and Nature Agency supporting development in this direction, and today Danish forest owners are offered subsidies to have key habitat inventories carried out. The guidelines developed by the project have formed the basis for the Danish FSC (Forest Stewardship Council) guidelines of sustainable forest management (see article on page 80).

THE ADVANTAGES OF NATURE CONSERVATION PLANNING

<p>Good actions are done, and harmful ones avoided: Nature conservation planning ensures that necessary actions are taken to protect and maintain natural habitats and species. Also, with good planning and careful instruction, forest workers and others are less prone to commit harmful actions by accident.</p> <p>Continuity of good</p>	<p>practise: With a well-developed and updated nature conservation plan, a minimum of experience, ideas and knowledge will be lost when one manager stops and another takes over.</p> <p>Baseline for monitoring success: The nature conservation goals set up in the management plan form a clear</p>	<p>baseline for monitoring the success of the selected strategy.</p> <p>Transparency and dialogue: Nature Conservation Plans and Land Use Plans together with matching thematic maps present the ideas of the management in a clear and coherent way. As such, they are useful tools in the dialogue with various interest groups.</p>
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SKIDDING SOME ENVIRONMENTAL CONSIDERATIONS

<p>The provision of permanent skidding trails is one distinguishing feature of nature-friendly infrastructure planning. Soil compaction and extensive driving may damage the habitats of fungi</p>	<p>and flowering plants, and may also lead to a decrease in forest growth potential and thus timber production. The skidding trails should be planned with a maximum distance between them, in order to</p>	<p>maximise the area of undisturbed soil. Also, the trails should follow the landscape, and moist, soft or otherwise vulnerable soils should be avoided. Use of horses may be contemplated on steep or vulnerable areas.</p>
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