

# History and principles of close to nature forest management: A Central European perspective



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*Throughout history, the development in forest management practices has reflected the trends in overall society; the last few decades are no exception. Thus, the increasing public focus on environmental protection has led to a change in forest management objectives from production of wood for industrial purposes towards the supply of a variety of products including nature conservation, recreation etc. Consequently, the focus on forest management systems that can integrate multiple functions has increased, as has the interest for close to nature forestry.*

The interest in close to nature forestry has increased tremendously during the last 10-15 years, but the corresponding silvicultural principles have a long history and tradition going back to the beginning of organised forest management in the middle of the 18th century. Since then close to nature forestry has gone through periods of popularity and neglect.

## THE INTRODUCTION OF A ORGANISED FOREST MANAGEMENT

In the middle of the 18th century, the deforestation in central Europe reduced forest cover to a small percentage of the land area. This has led to severe problems with soil erosion, sand drift and decline in agri-

cultural production. In addition a lack of wood for fuel and industrial purposes arose. This situation made it clear, that it was of great importance to develop management systems that would secure a sustainable production of wood.

## CLEAR CUT SYSTEM: THE SCHEMATIC SOLUTION

The deforestation was a consequence of centuries of uncontrolled logging and grazing, and it was therefore necessary to introduce organised management systems that made it possible to control wood production and harvesting (Otto, 1993a). The development of such systems was mainly based on experiences from agricultural production, and focused on setting up production forms that were technically simple, rational and easy to control and manage (Gayler 1959 and 1978, Leibundgut 1984, Mlinsek 1992).

Among others, Cotta and Von Langen introduced the "normal forest" concept. The basic idea was to make a schematic division of a forest into stands of monocultures, i.e. same age and species, that were clear cut when it reached the rotation age. As species and age classes were separated in space, the production of each unit could easily be modelled and predicted so the planning process became simpler (Otto 1993a, Janssen 1990, Heyder 1986). This development was supported by the progress in economic and mathematical models which were used in the forest management. In this way silviculture was subordinate to theoretical models and parameters such as rotation age, age class, normal forest etc. (Kremser 1977, Schoepffer 1983, Glück 1984, Leibundgut 1984, Otto 1993a).

The clear cut system was widely adopted, but as it expanded to large forest areas increasing problems of soil degradation, insect attacks, aggressive grass invasion, frost and unsuccessful reforestation of clear cuts were experienced. From around 1850, this led some foresters to abandon the traditional clear cut system in favour of systems with permanent forest cover or small scale clear cuts. These initiatives formed an alternative tradition in which the protection of soil productivity and forest climate played an important role. Silvicultural systems, such as the shelterwood strip system and wedge system, are examples of systems trying to integrate both the rational methods of clear cuts and the protection of forest climate and soil productivity by minimising the sizes of clear cuts. However, as these systems were based on monocultures and clear cuts and consid-

*In age class forestry, monocultures of even-aged trees is the rule (Photo: Nepenthes).*



ered each stand as the smallest management unit they were not fundamentally different from the traditional clear cut system (Schoepffer 1983, Otto 1993a).

#### Close to nature forestry - an alternative solution.

From the beginning, the schematic clear cut system was opposed by foresters who believed that the stability and growth problems experienced in those systems occurred as a consequence of the monoculture and clear cut methods. They considered forestry based on ecological principles as the most stable and sustainable forest management (Otto 1993a) and therefore clear cut systems were not implemented in some old forest areas. Instead foresters continued old silvicultural systems based on permanent forest cover and natural regeneration (Fleder 1984). This was mainly the case in mountainous areas and especially in Switzerland where forestry based on structurally and species diverse stands was practised on a large scale by the end of the 19th century (Otto 1993a).

The objective of these management systems was to optimise the long term productivity of the forest (sustainable yield) by preserving the forest climate (permanent forest cover) and soil productivity. The overall idea was that ecologically sound forestry was a precondition for achieving the best economical result in the long run and so factors such as soil conditions, forest climate, flora and fauna were central factors in the decision making process (Leibundgut 1984, Gayler 1959).

One of the pioneers was Professor Karl Gayer whose ideas are still central to close to nature forestry. In 1886 he published a book titled “Der Gemischte Wald - seine Begründung und Pflege insbesondere durch horst und gruppenwirtschaft” in which he advocates for management systems based on small scale interference and group selection system as the best methods for establishing and maintaining mixed forests. In addition the practical examples and the theory of single tree selection system put forward by Biolley, enhanced the interests of close to nature forestry (Schütz 1990, Gayler 1959, Leibundgut 1983, Fleder 1976, Otto 1993a).

The single tree selection system (plenterwald) has been referred to by some foresters, as the ideal of close to nature forestry as it represents the ideal structure for permanent forest cover (Heyder 1986, Wobst 1954). However, the single tree selection system is not basically a natural structure (Assmann 1950a and 1950b, Lamprecht 1977), and can only be maintained by active thinning (Schütz 1990) and under certain growth conditions (Hassenkamp 1955, Heyder 1986). The single tree selection system has therefore never been officially recognised as the ideal close to nature forest management system. In general most of the foresters working with close to nature forestry did not focus on a certain stand structure as the overall objective, but saw the forest structure as a result of management by the following principles:

- maintaining soil productivity by permanent forest cover and by leaving litter and branches on the site after harvesting

- optimising the wood production by establishing stable stands
- single tree management and abandonment of rotation age
- natural regeneration and prolonged regeneration phases
- permanent forest cover and no (large) clear cuts (Gadow 1982, Mayer 1984)

#### SUCCESS AND FAILURE IN THE 20<sup>TH</sup> CENTURY

During the 18<sup>th</sup> and 19<sup>th</sup> century the interest in close to nature forestry among foresters and scientists was, in general, very low. The reason for this was not only that close to nature forestry seemed less rational from a technical and planning point of view, but also that industrialisation and technological development had fostered the general idea that man could (should) control nature and should not be dictated by it.

**The Dauerwald movement.** The outcome of the First World War led to a state of depression and “creative uncertainty” in Germany as a whole. In the forestry sector it led to a renaissance of the ideas of close to nature forestry (Heyder 1986, Wobst 1979).

A few years after the war, in 1920, Alfred Möller published an article in which he introduced the principle of “Stetigkeit der Waldwesen” which was based on a description of the forest as an organism made up by interdependent elements. He concluded that forest management should not break the links between these elements by creating large disturbances in the forest structure and composition (Leiber 1966, Heyder 1986).

The theory was supported by results from the forest district of Bärenthoren (approximately 100 km southwest of Berlin) where the forest practice had been based on principles of close to nature forest management for 40 years. The results published by Möller showed that close to nature forest management led to an increase in wood production, more fertile regeneration and increased site productivity. Even though these results and conclusions were proven to be biased (by Krutsch and Weck in 1935) it

*Clearcutting and replanting is a common regeneration method within age class forestry. (Photo: Nepenthes).*



did not influence the immediate enthusiasm that Möllers ideas and results caused (Heyder 1986). The ideas were adapted by many foresters and formed the so called Dauerwald-movement, which also influenced forest management in other countries (Möller 1923, Sabroe 1957). The reasons for the success of the Dauerwald-movement were that Möller advocated the system in a scientific context and that the principles were closely linked to a concrete example that seemed to prove the advantages of the silvicultural system.

However, the success of the Dauerwald-movement lasted only a few years. Thus, in three years the atmosphere at the forestry meetings changed from "Dauerwald all-überall !" to "Dauerwald with great care !".

It was both the objective criticism of the principles as well as misuse of the principles that lead to this rapid change in attitude. Möllers article had led to an expectation of rapid improvement of the economic outcome of the forest management which, in most cases proved not to be fulfilled. Others used the principles as an excuse for overlogging forests in order to achieve quick revenue (Heyder 1986).

**Dauerwald dictate by the Nazis.** The Dauerwald-movement experienced a new era as the national socialists came to power in 1933. Thus, in 1933-34 the Dauerwald principles were integrated into the forest legislation whereby the principles were dictated to the foresters (Heyder 1986, Unterberger 1983). In the long run this meant a major set back for close to nature forestry for the following reasons: Firstly, the attempt to dictate management practices led to aversion among foresters (Höher 1993 personal reference). Secondly, natural regeneration of the forests was made difficult as there was a political will to maintain a dense population of roe deer and other game species (Heyder 1986, Larsen 1993 personal reference). Thirdly, the legislation did not make it possible to adapt the management principles to local forest conditions, which led to devastation of some forests (Leiber 1966). Finally, in an attempt to increase wood supply the target diameter was reduced to a level that caused overlogging of many forests.

**Arbeitsgemeinschaft Naturgemässe Waldwirtschaft (ANW).** The Dauerwald-movement and the attempt to introduce close to nature forestry by law had led to a large set back for close to nature forestry. Thus, when Willy Wobst founded a working group for close to nature forestry, "Arbeitsgemeinschaft Naturgemässe Waldwirtschaft" in 1950, only 46 foresters joined (Wobst 1979, Schoepffer 1983). Even though this organisation would experience very little interest from other foresters for decades, it has now proved to be the most successful contributor to close to nature forestry.

**Motivation and objectives.** The most important motivation for forming ANW was the stability and vitality problems that were experienced in forests dominated by monocultures and managed with clear cut systems (Olberg 1950, Gayler 1977). On average, the wood production had declined by 10 % in Preussen, 25 % in

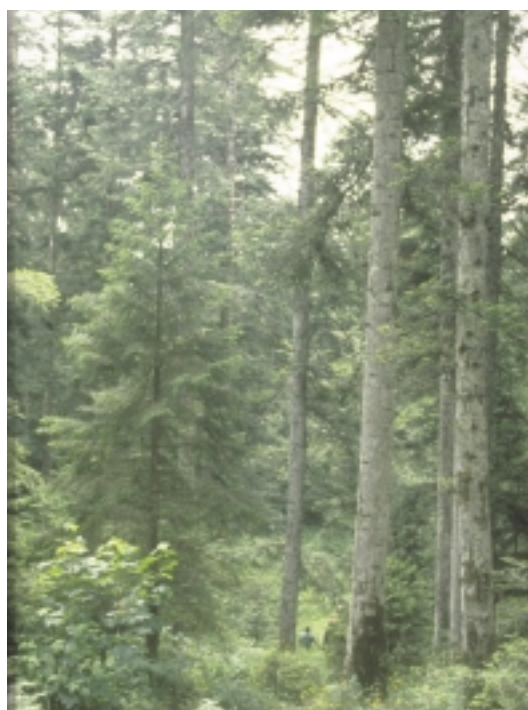
Bayern and 33 % in Sachsen over a period of 25 years (1913-1937). The decline was mainly seen in second and third generations of monocultures that were often damaged by insects and windthrow (Unterberger and Wobst 1985, Gayler 1959). In one forest district 44 % of the total harvesting from 1936 to 1951 was made up by cutting of Norway spruce monocultures that had been damaged by wind, insects or other calamities. ANW argued that the reason for these problems was the management system, and that it was necessary to change management system in order to secure a sustained yield (Gayler 1959).

ANW wanted to develop and promote silvicultural systems on biological and ecological principles rather than technical (Wobst 1979, Schoepffer 1983). The objective was to optimise economic profit, but in contrast to the traditional school, ANW believed that this could only be achieved by utilising the natural processes in all aspects of silviculture (nature automation). The basis for pragmatic decisions on how to manage the forests were growing factors and site conditions as well as the forest composition and dynamics. The decisions were often made by intuition, as there was no scientific evidence or long term experience of this type of silvicultural systems. Forest science did not contribute to the knowledge of methods and consequences of close to nature management as the silvicultural practices did not fit formulas or abstract doctrines (Heyder 1986, Gayler 1975, Wobst 1979). Thus, for a long period ANW did not have any proof or evidence of the advantages and disadvantages of this silvicultural system.

## ANW PRINCIPLES

### OF CLOSE TO NATURE FORESTRY

Over time and based on the ideas described earlier in this article, ANW developed the following principles for close to nature forestry (Wobst 1954, Gadow



*In most of Europe, close to nature forestry will result in a varied forest structure, where several different tree species of varying ages grow in a mixture. (Photo: Nepenthes).*

1982, Unterbereger & Wobst 1985):

- protection and optimal utilisation of the production potential of a given site by promoting site adapted species
- optimal utilisation of the forest space by natural regeneration and structural diversity
- maintaining a sound and stable forest climate by establishing and managing mixed stands
- production of high quality timber based on “shadow schooling” and management at a single tree level, including target diameter management
- minimal production of small dimensional wood in favour of large dimensions
- increased resistance to calamities by establishing and managing mixed stands of site adapted species
- \* maintaining a sound and sustainable deer population

Instead of bringing up old theoretical discussions about management principles ANW wanted to make an empirical basis for the discussion based on practical examples from a few forest districts spread all over Germany. These were all managed by close to nature principles. As the state forest administration would not adapt these principles it was mainly private forest districts that introduced close to nature forestry (Wobst 1979, Schoepffer 1955).

#### RECENT DEVELOPMENTS

As the forest decline syndrome escalated in the mid 1980s and calamities such as insect attacks and windthrow repeatedly damaged large forest areas. Stability and vitality problems became a serious issue not only for foresters but also for the public, whose awareness of environmental issues grew stronger and stronger at that time as did the demand for protection of endangered species and their natural habitats.

The forest districts that had practised close to nature forestry for decades served as a reference for close to nature forestry compared to traditional management in relation to stability, vitality and environmental protection. They documented that close to nature forests did often have better vitality, stability and nature conservation when compared to traditionally managed forests (Schoepffer 1975, Otto 1993b, Fähser 1985, Larsen 1995). Further studies of the economic results from close to nature forest districts confirmed that this management form is as feasible as traditional management forms, and even better under some conditions. However, the transformation phase from traditional to close to nature forestry will, in most cases lead to a period with falling revenue (Köpsell 1983 and 1990, Leibundgut 1973, Schütz 1986).

During the 1980s, ANW and other groups working with close to nature forestry have experienced an enormous interest. Thus, from 1982 to 1990 the ANW membership rose from 350 to 1300, a rise that continued during the 1990s.

In Germany principles of close to nature forestry, similar to those defined by ANW, have now been adopted by several state forest administrations

where they have been integrated into forest programs setting the guidelines for forest management in state forests.

At a European level, close to nature forestry has been promoted by the organisation Pro Silva since 1989. Pro Silva has overall adopted the ANW principles and is supporting the working groups in many European countries that promote close to nature forestry nationally. Pro Silva recognises that operational guidelines for close to nature forestry must be based on local knowledge and conditions (ecological and economic) and are thereby promoting a process rather than a uniform management system.

#### LESSONS LEARNED

Some of the things we can learn from history is that close to nature forestry was not seen as an objective by itself, but as a means to achieve an optimal economical benefit (Wobst 1954, Günther 1983, Schütz 1990). In addition, history tells us that the main incentives for changing forest management practices have often been serious vitality problems, such as forest decline and reduced yield, or catastrophes like major wind throws, as such events leave the forester in a state of creative uncertainty. Even the concept of sustainability, with emphasis on wood production, was developed from a situation where there was lack of wood and destroyed forests (Kremser 1977, Otto 1993a, Janssen 1990).

History also tells us that attempts to introduce close to nature forestry over night, either by dictates from politicians or popular movements within the forestry sector, are likely to create aversion and cause damage to the forests. The reason for this is that close to nature forestry is not a schematic management system but requires deep understanding of local conditions and forest ecology (Leibundgut 1986, Mayer 1984, Thomasius 1992, Mlinsek 1990). Furthermore, the transformation of a forest made up of stands of monocultures to close to nature forest conditions requires long term decisions and dedication.

From the historical background outlined in this article, it could be questioned whether the rise of interest in close to nature forestry during the last 20 years is just another temporary peak, as have occurred during previous centuries.



*In close to nature forestry natural regeneration is preferred to planting. This is seen as less disruptive than clearcutting, at least in the nemoral parts of Europe. (Photo: Nepenthes).*

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