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Course: NR595F

Instructor: G. Blank.

# The Dauerwald: Its Role in the Restoration of

Following an almost 80-year discussion, several European countries recently mandated natural forest management based on uneven-aged silvicultural systems. This shift from traditional forestry is envisioned to eventually restore forests to a near natural condition, while promoting large volumes of high-quality wood. We review the evolution of the Dauerwald concept, which greatly influenced this significant shift, and briefly assess its relevance for American conditions.

By Hans G. Schabel and  
Siegfried L. Palmer

*"All wise forest management must endeavor to utilize [woods] as much as possible, but in such a way that later generations will be able to derive at least as much benefit from them as the present generation claims for itself."*

—Georg Ludwig Hartig, organizer of the Prussian Forest Service (1795)

*"Humanity has the ability to make development sustainable—to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs."*

—World Commission on Environment and Development (1987)

These statements originated at critical junctures in the history of resource management, i.e., in the early days of scientific forestry and of ecosystem management, respectively. The striking similarities between the two indicate that, while over the course of the last two centuries farsighted individuals and organizations have recognized the essential soundness of sustainable forestry in the broadest sense, the realization of this vision of forestry has, in many instances, been impeded by pressures to promote shorter-term economic goals.

Today, forestry is clearly in transition. Worldwide, the profession is challenged from within and without. Not surprisingly, the call for a "new" forestry is generating uneasiness, as foresters struggle to agree on changing parameters. In considering directions for the future, American foresters have the opportunity to capitalize on their own mistakes and those of others. To that end, analyzing more than 200 years of forestry evolution in central Europe, the cradle of scientific forestry, may be particularly useful.

"Turning a blind eye to the history of forestry in Germany cost that country dearly in a lesson twice learned," is

how Turner (1992) referred to an almost 80-year debate concerning the "Dauerwald," a concept that has recently gained broad acceptance in much of central Europe. This German word means permanent, perpetual, continuous, or sustainable forest. In simple terms, it refers to natural forest management systems based on uneven-aged silviculture. Implementing the Dauerwald in Europe amounts to a major restoration effort that will recreate forests which closely express their natural potential in structure, composition, and stability while meeting various product and service functions. To understand the emergence of the Dauerwald concept, a review of early forest history in central Europe, followed by the ups and downs of the Dauerwald movement, is instructive.

## Pre-Dauerwald

Scientific forestry in Germany evolved in the 18th century, an age of rapid industrialization and growing human pressures. It was a response to looming timber shortages resulting from unregulated exploitation of natural resources (Leopold 1936a; Plochmann 1992). The challenge was to return understocked forest and degraded land to greater timber production in the shortest time possible. The answer was fast-growing, undemanding Scotch pine (*Pinus sylvestris*) and Norway spruce (*Picea abies*), mostly grown plantation-style often irrespective of the natural distribution of these species. The result was a shift in the composition of German forests from originally about two-thirds mixed hardwoods to two-thirds mostly pure conifers. Considering the original objective, this rehabilitation of forests was a success.

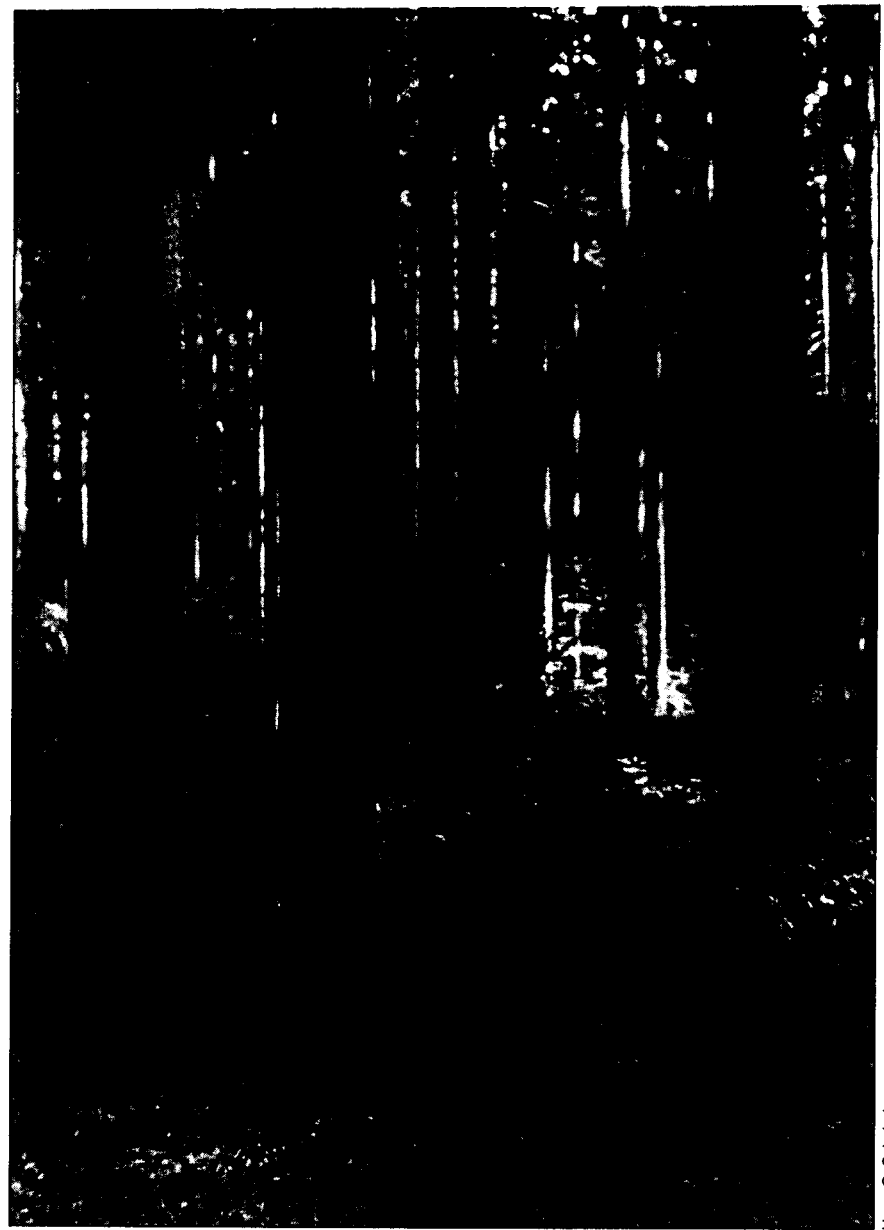
Concurrent with the rise of technology and scientific methods, early forest management systems were almost militarily mechanistic and sys-

# Natural Forests

tematic. Disenchantment with the newly created “wood factories,” however, was expressed as early as 1824 by von der Borch and later by König (1849), who addressed issues of forest aesthetics and forest health. Gayer (1886), among others, later demanded a return to mixed forests and “healthy” forest soils. Nevertheless, high prices for timber, in combination with cheap labor, improved technology, and a degree of professional complacency, perpetuated the entrenched system, which increasingly was emulated in other parts of the world, including North America. Forestry routinely relied on intensive nursery production, planting, weeding, clearcutting, and heavy machinery. Frequent interventions to prevent or correct damage from various pests and other stresses were and still are commonplace in this “old” forestry.

## The Bärenthoren Dauerwald

In the 1880s, Friedrich von Kalitsch, owner of a forest estate at Bärenthoren in the state of Saxony-Anhalt, deviated from established practice. To upgrade his pine forests, which suffered from soil fatigue following centuries of exploitation, he used various soil amelioration measures in combination with emphasis on more timber species. Within a few decades he created a forest with demonstrably healthier soil, a more benign microclimate, and, because of its more complex composition and structure, a forest both less vulnerable to pests and more pleasant to the eye. These mostly subjective judgments were subsequently substantiated by evidence from yield studies indicating “double the increment set as standard for this site quality” (Krutzsch and Weck 1934). This statement does, however, need to be qualified in the sense that part of this astonishing improvement in site index may be attributable to discontinuation of two particularly



Hans G. Schabel

**A “machine-model,” age-class monoculture of Norway spruce (*Picea abies*) in Germany. Such forests were originally successful in the rehabilitation of degraded land and the aversion of a timber crisis in Central Europe, but they do not meet several modern criteria of forest quality. The European public now instinctively and legally rejects what Aldo Leopold described as “unnecessary outdoor geometry.” The turning of the tide is already evident in this scene, as reflected in the groups of European beech (*Fagus sylvatica*) which have recently been planted in the background to become nuclei in the conversion of this wood factory to Dauerwald.**

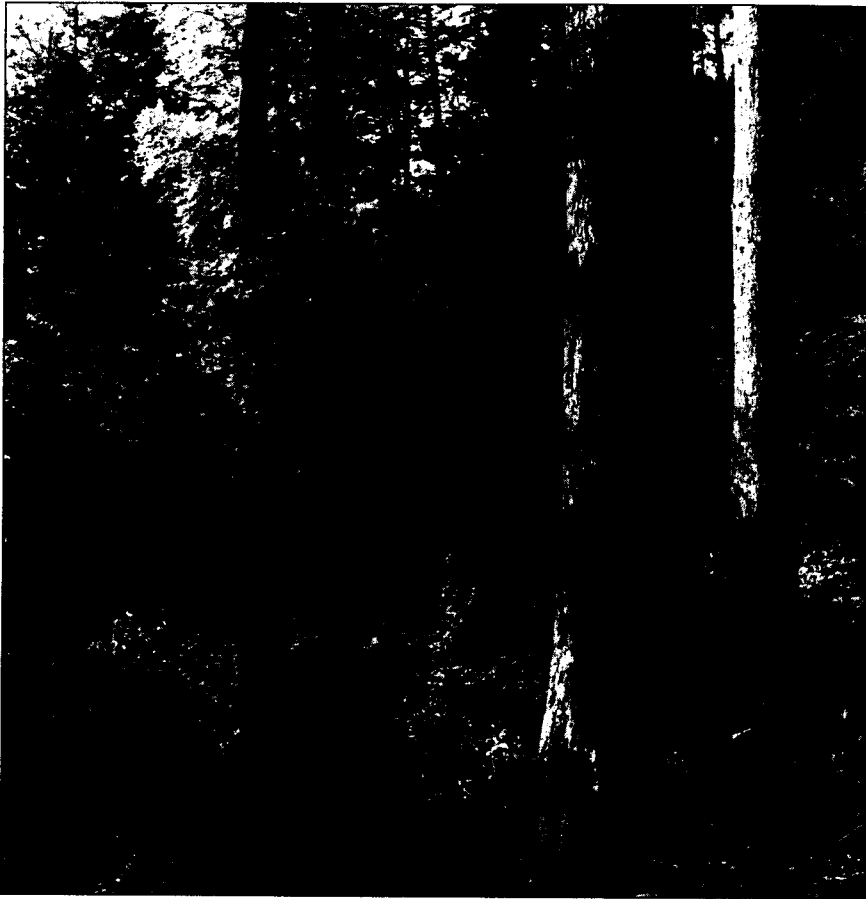
destructive practices, forest pasture and litter removal, which had plagued this site for centuries.

## The Möller Dauerwald

Professor A. Möller apparently was the first to use the term Dauerwald and to conceptualize the basic ideas (Möller 1922). He was influenced by several silvicultural innovators, especially Gayer (1886), by impressions gained at Bärenthoren, and by personal observations of natural forests in North America and the Amazon. A

forest mycologist, Möller credited soil science with having to a great extent guided his “illumination” (*Verständnis*), because of the significant role that “millions of microbes, especially fungi” play in soil fertility.

Möller interpreted forests as complex, dynamic organisms that can express their inherent vigor and productivity only if all parts are healthy. To assure permanence (*Stetigkeit*) of all product and service functions of forests, his Dauerwald concept emphasized measures that strive for “har-



An "organic model," mixed forest consisting of silver fir (*Abies alba*), Norway spruce (*Picea abies*), and European beech (*Fagus sylvatica*) in Germany's Black Forest. Although distinctly more complex, stable, and beautiful than a monoculture, this particular forest is still impoverished in terms of its intrinsic potential for biodiversity, but it is now moving toward a full-fledged Dauerwald. European forests are not blessed by great tree diversity to start with, but previous monoculturing of conifers and of deer, among other factors, sharply curtailed the indigenous complement of sensitive biota.

mony," i.e., that maintain or improve the forest climate, forest soils, and the assortment of associated fauna and flora. Möller's main principles included abstention from clearcutting and preference for natural regeneration of indigenous, site-specific trees, leading to mixed, uneven-aged forests. His demand for cessation of clearcutting did, however, "not necessarily mean that all age classes be represented on the same area," only that the intrinsic potential of forests for complexity be respected. By bringing "forest art" to its perfection, Möller asserted, "the most beautiful forests will also be the most productive."

Questioning many established policies and practices, Möller's 1992 book unleashed a storm in the forestry estab-

lishment and precipitated a flood of publications and years of heated discussions between traditionalists and reformers. During this time, Bärenthoren became a Mecca for the Dauerwald movement (Bode 1992). Despite continuing skepticism in some circles of the forest establishment, the Dauerwald was mandated for all forests in Germany in 1934. However, attempts to implement the Dauerwald were short-lived. Only three years after its inception, under the leadership of a politically appointed nonforester influenced by a powerful hunting lobby, and dictated by pressures of an economy preparing for war, the Dauerwald policy was repealed. Moreover, despite the Dauerwald's appeal to arguments of autarky, the lengthy adjustments necessary

for its implementation were untimely.

Though the Dauerwald promised rich rewards in the long run, Möller acknowledged that the transition to a Dauerwald would be a generational effort requiring patience and possibly temporary economic sacrifice. The transition would depend on a cadre of "trustworthy, and skillful foresters... who spend more time in the woods than in the office." He also expressed the need to defer the harvest of quality timber and, through frequent silvicultural interventions throughout the forest, to create a progressively more complex, eventually nature-like forest with large volumes of high-quality timber. Once established, tree removal in a Dauerwald would be strictly by low grading criteria, i.e., removal of "lesser" trees. Age of a tree would be of no concern in its selection for harvest. According to Möller, the Dauerwald knows no rotation, no particular structure, and no regeneration periods. It offers no patent silvicultural prescriptions, as it acknowledges the individuality of every site. As a result, its ideas apply universally. He asserted that by carefully manipulating a Dauerwald in collaboration with nature, human demands on forests could be secured indefinitely without compromising aesthetics, soil fertility, and biodiversity. In some ways, the Dauerwald "represents the antithesis of quantification and regulation" (Guldin 1996).

### The Contemporary Dauerwald

Following World War II, Slovenia, then Yugoslavia's northernmost republic, terminated age-class forestry by law. In 1950 a "Working Group for Nature-friendly Forest Management" (ANW) revived the Dauerwald idea in other parts of central Europe but hybridized Möller's Dauerwald ideas with selection-cutting principles developed by Ammon (1937) in Switzerland. Ammon's suggestion that the Swiss system of selection might apply elsewhere was reinforced in more pragmatic fashion by Trepp (1974) who considered selection cutting feasible "wherever this system can be accomplished economically with indigenous species." Support for the ANW arose primarily from a number of large private forest owners,

attracted by the Dauerwald's purported long-term cost-efficiency.

In the 1970s in some forest districts of Europe, notably in mountainous parts of southwest Germany, Switzerland, and Austria, a compositional and structural shift had started on an informal basis, based on the enhancement or reintroduction of European beech (*Fagus sylvatica*) in its former habitats (Bode 1997; Spathelf 1997). Nevertheless, the Dauerwald remained marginalized. A number of events in the 1980s, however, created new momentum. Foremost among these was an economic crisis in forestry brought on by Germany's high labor and social costs, and exacerbated by international market forces. Another stimulus came from the well-publicized effects of *Waldsterben* (forest dying), a forest decline triggered by air pollution and worsened by a complex of other calamities and stresses. Symptoms of *Waldsterben* ranged from soil compaction and acidification, to effects of pest insects, diseases, deer, weeds and exotics, windthrow, and snow breakage, to impacts resulting from excessive recreational use and the loss or endangerment of biodiversity. The magnitude of many of these problems was to some extent attributable to traditional forestry practices. By the 1980s an affluent, well-educated, urban public in a nation of virtually no wild land, and where forests are generally no farther than an hour's drive from a major city, increasingly rallied around "save the forests" and "back to nature" themes (Schabel 1980; Schabel and Dwyer 1985). Proponents of conservation biology and restoration ecology also became increasingly vocal and their arguments gained respect with growing support from progressive foresters.

As a response, the German state of Saarland terminated clearcutting in 1987, and thereafter several other states and countries in Europe mandated Dauerwald for public forests. In 1989, "Pro-silva," an initiative that promotes Dauerwald ideals, was founded in Slovenia by the Association of European Foresters Practicing Management which Follows Natural Processes (Anonymous 1996). In Great Britain as well, conversion of at least 10 percent



Helmut Weiss

**Natural forest management as it is presently taking shape in Europe attempts to put the conservation of nature and timber production on equal footing. As a result, uneven-aged mixed forests, such as this one in the Calmbach forest of Germany's Black Forest, increasingly are replacing even-aged, monocultured conifers.**

of the forest area, and "probably much larger," to Dauerwald was recently recommended (Helliwell 1997). With these positions, Europe affirms a strong commitment to international agreements reached at the Rio Earth summit to sustainable development in general, and to restoration of its increasingly beleaguered biodiversity in particular.

Unfortunately the term Dauerwald occasionally evokes emotional responses, reflecting the heated controversy of the 1920s, the ideological stigma associated with its brief adoption by the Third Reich, and occasional misinterpretations as a romantic ideology. As a result, other terms such as close-to-nature, naturelike, nature-oriented, nature-friendly, near-natural, seminatural, nature analog, natural process, conservation, sustainable, and adaptive forestry often mimic or camouflage underlying Dauerwald principles. All of them oppose to at least some extent even-aged production forestry and especially clearcutting, unless justified by nature. Disturbance-dependent communities are, however, uncommon in central Europe. All of the new models proposed endorse silvicultural systems that maintain or create natural communities as complex as the physical, social, and biotic environment will allow. This shift is akin to re-

placing French formal gardens constructed with a ruler with the somewhat unruly, informally composed English landscape gardens. That this novel form of forestry may actually be accomplished with positive economic returns is indicated by a recent probe into the economic dimensions of the Dauerwald (Tzschupke 1997).

The contemporary Dauerwald transition in Europe to a great extent honors Möller's original principles (Palmer 1995; Stahl-Streit 1997), but makes amendments on account of modern conditions. Thus, chemical applications in forestry are generally shunned and low-impact solutions to logging are explored and promoted (Heinmann 1996; Bode 1997).

Consistent with the role of biodiversity in healthy ecosystems and to recreate a semblance of original fauna and flora, noncommercial "serving" species of trees and other biota may be reintroduced. Möller (1922) considered biodiversity necessary "to cure sick forests," to restore healthy soils, and to help forests resist pests and the other stresses that assaulted plantations of his day. In this context, snags and large woody debris, habitat for important insect predators but oddities in many European landscapes, will increase with transition to Dauerwald (Anony-

mous 1993). Attempts are also being made to preserve genetic diversity and to enhance rare biota in emerging Dauerwald communities. Möller's demand to "carefully search" for rare species of trees and shrubs, and to "care for each like a natural monument," matches current international levels of concern for biodiversity. As well as rare flora, reintroductions of fauna such as raptors, wolf, wildcat, lynx, and otter continue in a Europe sensitized to the pressures these creatures have been under for so long. This is not an easy task on a highly populated continent with a shortage of natural habitats.

At the same time that certain rare biota are being encouraged, exotic trees and excessive numbers of ungulate game are being curtailed. Möller did not endorse exotic tree species for the Dauerwald. However, although controversial in the conservation community, pragmatic proponents of the Dauerwald movement accept a limited role for certain exotic species, such as the American Douglas-fir (*Pseudotsuga menziesii*), which had been present in Europe before the Ice Ages (Anonymous 1996). A main goal of Dauerwald is the sustainable production of large-dimension, high-quality timber. As the productive capacity of Douglas-fir is legendary, this exotic tree can compensate for some lost wood production caused by the deliberate reduction of indigenous conifers. Unlike *P. abies* and *P. sylvestris*, which previously had been grown to the point of excess, Douglas-fir does not appear to compromise indigenous communities or environmental quality, especially in mix with other species.

To allow reestablishment of desirable flora, the Dauerwald transition also includes drastic reductions (Schabel, in prep.), at least temporarily, of roe (and red) deer densities from previous levels as high as 20 to 60 (5 to 15) per square kilometer to 5 to 15 (1 to 2). Hunting interests have long favored ecologically unacceptable levels of these animals, as described by Leopold (1936a), who concluded that resource management as historically practiced in central Europe presented a "plain case of mutual interference between game and forestry," "that better silvi-

culture is possible only with a radical reform in game management," and that "better game management is possible only with a radical change in silviculture." For Leopold, the Dauerwald, which had first been mandated in Germany just before his visit there, suggested an elegant compromise of better timber production in the long run in conjunction with "other indices of ecological health."

### The Dauerwald in America?

Neither the term Dauerwald nor the practice thereof is new to America. Leopold (1936a, b) apparently was the first to introduce the Dauerwald to an American audience. He concluded that with their commitment to the Dauerwald, "the Germans realized that increment bought at the expense of soil

Leopold concluded that "the Germans realized that increment bought at the expense of soil health, landscape beauty, and wildlife is poor economics as well as poor public policy."

health, landscape beauty, and wildlife is poor economics as well as poor public policy." Ironically, he seemed unaware of an exceptional model of a Dauerwald in his own backyard, Wisconsin's Menominee Indian Reservation, which even predates Bärenthoren. This forest has been managed in line with Dauerwald principles for almost 150 years (Schabel and Pecore 1997).

Now, almost 60 years after Leopold's visit to Europe, his recommendations (1936b) are increasingly being heeded on both public and private lands in the United States. Recognizing the enormous economic value of

the world's ecosystem services and natural capital (Costanza et al. 1997), national policies are gradually being aligned with the country's new legal commitments to sustainable development and biodiversity. Ecosystem management, which endorses or incorporates essential Dauerwald ingredients on a landscape scale, is now a mandate on national forestlands, where the potential and risks of uneven-aged management are being carefully scrutinized for their applicability to North American conditions (Guldin 1996). It is apparent that the United States has taken fewer years to initiate the replacement of "machine model" forestry with the "organic model" (Kennedy et al. 1998). Even the timber industry has endorsed a Sustainable Forestry Initiative, and timber certification is becoming the order of the day. Neighboring Canada's largest forest products company announced a phase-out for clearcutting on British Columbia holdings. Nonindustrial woodland owners, who control 59 percent of the United States' forests, do however, still represent a disparate land management category, including everything from "do-nothing" forestry, through various forms of mismanagement, to exemplary land stewardship. It is with many of these land holdings that the Dauerwald deserves to find its greatest consonance (Helliwell 1997).

As America and Europe simultaneously strive to get their forests in order for the next millennium, they do so based on important and sometimes painful lessons learned over time. The truth for both and for the rest of the world is simply that working with rather than militating against nature may be the best long-term strategy for assuring forests that can meet all criteria of forest quality (Anonymous 1999): authenticity, as well as economic, environmental, and social benefits indefinitely, irrespective of what the road toward that lofty goal may be called.

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