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FORESTS AND SOCIETY – RESPONDING TO GLOBAL DRIVERS OF CHANGE

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Preface: This book is the product of World Forests, Society and Environment (WFSE), a Special Project of the International Union of Forest Research Organisation (IUFRO). WFSE is a global, open, non-profit network of scientists and experts steered by ten international research organisations and coordinated by the Finnish Forest Research Institute (METLA).

The network focuses on the forest, society, and environment interface. On the basis of existing scientific knowledge, it looks for innovative solutions to support and advance the formulation and implementation of forest-related policies that promote sustainable development and wellbeing.

The essential idea for this book originated from an acknowledgement of the changing social and natural circumstances, and the related drivers of change affecting forests, forestry, human society, and the environment, globally and locally.

We are convinced that forests and forest-related matters can no longer be addressed in isolation from the surrounding society and natural environment; instead, these need to be seen as an integral part of interrelated social and natural systems.

We sincerely hope that this publication will contribute to discussions and further research related to the drivers of change, and the threats and challenges that forests, forestry, and forest-dependent people are facing today and in the future. We also hope that it will foster attention to taking advantage of the possible new opportunities the changes may bring about. (...)

22 Managing Forested Landscapes for Socio-Ecological Resilience

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Abstract: Addressing sustainability in the face of profound global changes presents new challenges for forest managers. It has initiated a new cycle of development in approaches to management of forests for natural resources and other ecosystem services. Selected case studies from North America, Latin America, and Europe are used to illustrate advances in forest management in response to local impacts of global changes, and to identify options for addressing current challenges and elements of an emerging management paradigm based on the integration and resilience of ecological and socio-economic systems. Such a conceptual framework for management of natural resources recognises the complexity of systems (ecological, economic, and social), their hierarchical structures, the interactions and energy flows between these hierarchies, and their capacity for self-organisation.

Applying systems thinking to forest management requires new approaches to conventional practices. Learning how to facilitate the ability of natural forest systems to self-organise, adapt and evolve, and to guide them towards a desired appropriate state is one of the challenges.

The increasing importance of engagement, capacity building, and participation of all actors on the landscape as critical components for collaborative visioning, planning, and managing future options is recognised as a first step toward maintaining the provision of ecosystem services at the landscape level. Biosphere reserves, model forests, and other landscape-level initiatives that have already contributed to improved understanding of forest management issues and played key roles in establishing participatory decision-making approaches, are well-positioned to assist in testing and applying these new concepts. Keywords: ecosystem management, integrated landscape management, systems management, ecosystem services, resilience (…)

22.1 Evolution in Approaches to Forest Management

(...)

Linking Nature-Oriented Forestry to EconomicGains in Germany

Although German foresters have claimed ownership of the term “sustainable forestry” (von Carlowitz1713), for many years, the primary concern was maximising the output of wood from mostly even-aged forest stands. As production costs and natural disturbances from storms, drought, insects and diseases, and game browsing increased over time, the aim to continuously increase wood production did not continue to yield positive economic results, especially in public forests.

In 1994, after eight years of research, soil surveys, forest inventory, biotope analysis, and much discussion the concept of "Nature-Oriented Forestry" for the 5000 ha of temperate forest in the city of Lübeck was presented first to the public and later to the international community (Fähser 1995). One of the goals of the Lübeck forest was to demonstrate how the UNCED 1992 goals could be put into practice locally. The Lübeck Concept of Nature-Oriented Forestry, known in German as "Prozessschutz-Konzept"(protection of natural processes), is a holistic concept guided by natural processes (i.e., natural regeneration and competition of trees, minimal interference). Underpinning the concept is the premise that a healthy forest ecosystem is the basic precondition for economic success in forestry (Fähser 1988). The following ideas are central to the Lübeck Concept:

- Achieving sustainable timber production means managing forests so that their composition, structure, and functioning match the local natural forest associations having the complete natural biological diversity of the area.
- The targets for the output from the forest should not exceed the potential productivity of the natural ecosystem. In Germany, for example, the sustainable range for timber harvest, based on the productivity of natural forest ecosystems, is between 4 m^3 to 15 m^3 per hectare per year. Exceeding this volume goes beyond the natural capacity of the forest for renewal.
- The principle for achieving economic benefits is based on minimising the input rather than maximizing the output. The basis of this principle is that when living systems, such as forests, are used for industrial production, there is only limited response to inputs, and excessive inputs to the system may even cause collapse, as a result of stress from overfeeding, shock, or unnatural impacts. The following list outlines some of the technical components of the Lübeck Concept. These concepts were developed based on information from detailed soil surveys, forest inventories, and biotope analyses (Sturm 1995).
- Selective single tree cutting is practised. The opening of the canopy may not exceed 0.25 hectare.
- Natural regeneration is the main source for renewal. Planting should be the exception and, if done at all, only with native species.
- The concept can do without tending in most cases because self-structuring is preferred. Thinning should remove poor quality stems and competing exotic trees, but it should not eliminate competition between trees.
- Final harvest of single trees is defined by minimum target diameters for the different species. These are 65 cm at 1.3 m height for beech trees (*Fagus sylvatica*), and 75 cm for oak trees (*Quercus* spp.).
- To maintain self-organisation, the forest requires at least 10% of the trees to remain permanently as snags, nest trees, biotope trees, or other functional habitats of specific species.
- In order to practice adaptive management and learn from nature, at least 10% of the forest area should remain unmanaged as "reference areas."
- Clear-cuts, monocultures, introduction of exotic tree species, application of pesticides and fertilisers, soil disturbance (by compacting or ploughing, etc.), clearing an area, burning of biomass, drainage of moist areas, activities that might cause disturbances during ecologically sensitive times of the year, and feeding of wild animals, are not permitted.

In 2004, a follow-up assessment of forest structures, dynamics, and the associated socio-economic observations (Fichtner 2009) produced the following results:

- Production, based on timber volume, increased from 290 m^3/hectare to 360 m^3/hectare.
- Annual timber yield increased by 15%.
- The proportion of natural tree species in the upper canopy increased by 11%, even more in the lower canopy and in new regeneration.
- Damage from natural disturbances (e.g.,windthrow, insects) decreased.
- Annual profit increased 20%.

22.5 Summary

Highlights of the substantial advances in forest policy and the associated knowledge that has been used to inform development of management plans and practices are summarised in Section 22.1 of this chapter.

The accumulated knowledge, based on research, observations, and learning arising from adaptive management and case studies, such as those from the Americas and Europe presented in this chapter, point towards a developing consensus that long-term sustainability of forest resources requires a multi-level (spatial and temporal) collaborative approach where management units are viewed as eco-sociological systems.

Such a conceptual framework for management of natural resources recognises the complexity of forest systems (ecological, economic, and social), their hierarchical structures, the interactions and energy flows between these hierarchies, and their capacity for self-organisation. Trying to predict and control outputs in systems where the dynamics are not well known has always been a challenge of forest management. This goal is further complicated by the complexity of interactions at multiple levels. Identification of the vital system attributes and the development of an understanding of the underlying processes, weak links, and critical limits of these processes is a starting point for addressing this challenge by using systems thinking to improve forest resilience.

The case studies from Bosque Seco Chiquitano and the Lübeck forest highlighted the importance of understanding the linkages between ecological structures and processes, and the associated and economic values and benefits for social systems.

In both cases, it was demonstrated that management guided by principles of ecological integrity provided greater economic benefits than a management plan based on objectives for improved efficiency.