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Sustainable development of forests

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This article briefly describes the context surrounding the international deliberations on world forestry and proposes a conceptual framework for the sustainable development of forests. While the framework and objectives proposed may be applicable to the sustainable development of all types of forests worldwide, the actual practice of sustainable forest development would require the development of silvicultural techniques appropriate to local ecological and socio-economic conditions.

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FORESTS AS A GLOBAL ISSUE

Forests are nature's most bountiful and versatile renewable resource, providing simultaneously a wide range of economic, social, environmental and cultural benefits and services. The worldwide demand for their numerous functions and outputs is increasing with the expanding population, while the global forest resource is shrinking either as a result of overharvesting, deforestation and permanent conversion to other forms of land use in many tropical regions, or as a consequence of forest decline associated with airborne pollutants in temperate regions.

Forests represent a unique situation in terms of global environmental issues. Physically, they are located within the territories of sovereign states, yet their environmental role extends beyond their borders at both transboundary and regional as well as global levels. For example, the management, or mismanagement, of watershed forests of international rivers has transboundary implications in terms of soil and water conservation in neighbouring countries. Similarly, airborne pollutants generated in one country may be transported across the boundary and cause forest decline in others. The role of forests in global ecological cycles highlights the environmental significance of forests beyond the boundaries of the nations where they are located. In this context, they are being viewed as global commons similar to the atmosphere and oceans.

Conservation and sustainable development of all types of forests worldwide have now emerged as priority items on the international policy agenda, particularly in the context of the United Nations Conference on Environment and Development (UNCED), to be held in Brazil in June 1992. The role of forests is receiving particular attention in the biodiversity and climate change conventions currently under negotiation. While special interest groups are only focusing on a specific role or function of forests (e.g. as a reservoir of biodiversity, for carbon sequestration, economic development, subsistence, fuel, etc.), national and international policy-makers face the challenge of reconciling the role of forests in meeting national socio-economic and environmental objectives as well as the global environmental and socio-economic interests of the community of nations. Ecological considerations are now being viewed not as subordinate but as an integral part of economic policy and planning (Ullsten, 1991).

The United Nations Conference on Environment and Development (UNCED), held in Rio de Janeiro, Brazil in 1992, marked the birth of the sustainable forest management concept and the current international dialogue on forests. This article, by one of the main players in the international arena, introduced a *Unasylva* issue on the theme of sustainability published just before UNCED.

Sustainable forest development is also emerging as a consideration in the international trade of forest products. Many consumers, individually and collectively, are preferring to buy products obtained from sustainably managed forests and manufactured by environmentally acceptable

processes. There have been consumer threats to boycott wood products that are not "green" both in terms of raw materials and manufacturing processes.

In contrast, most members of the forestry community have usually dealt with local issues and with "delivering wood to the mill gate". The national and international forestry community is relatively inexperienced, both technically and politically, in dealing with the globalization of forest-related issues. Consequently, their participation in these deliberations and their influence in shaping the international forestry agenda to date have been marginal. Forestry, involving long-term commitments, usually receives limited political attention in comparison with most other, often shorter-term, socio-economic policies. The current attention being paid to forest-related issues by international political communities should be viewed as a rare window of opportunity to advance the interests for forestry of political support and sustainable forest development, and to promote the multiple benefits provided by forests. These benefits range from meeting the socio-economic needs of forest dwellers, forest-based communities and forest industry to conserving environmental values.

It is important to understand the evolution of the structure and content of international deliberations on forests, the shifts in our values and the consequent impact on forestry practices. The forestry and scientific communities are faced with the challenge of defining sustainable forest development, formulating a conceptual framework and establishing internationally accepted criteria and approaches for the practice of sustainable forest development to meet multiple human needs.

SUSTAINABLE FOREST DEVELOPMENT

What does it mean?

The term "environmentally sustainable economic development", more commonly known as "sustainable development", has been popularized globally by the report of the World Commission on Environment and Development (WCED), *Our common future*. In this report, sustainable development is defined as "economic development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987). The term sustainable development has captured the imagination both of the public and politicians at local, national, regional and international levels, and has instigated much discussion. However, there have been limited attempts to put the concept into practice.

The forestry sector, perhaps more than any other, is well positioned to provide worldwide leadership in the practice of sustainable development. The forestry community is accustomed to a long-term perspective; it is reasonably knowledgeable about the response of forest ecosystems to natural and human disturbances; it is comfortable with the sustained yield principle; and, in a few instances, it has attempted to practise a multiple and integrated use of forests. As compared to many other industrial sectors, it is relatively easier for the forest community to expand its scope from sustained yield to sustainable development, which requires a shift from forest management to forest ecosystem management.

Sustained yield is a deeply embedded principle in the forest community. Is sustained yield the same as sustainable development? Yes, but only partially. While sustained yield in forestry is mainly concerned with a perpetual and even annual flow of timber for human use, sustainable development of forests is much broader and is concerned with integrated forest management, maintaining the ecological integrity of the forest environment and keeping future options open. This does not imply that all forests everywhere should be managed for all benefits simultaneously. In practice, forests in specific areas are likely to be dedicated to primary uses or benefits (e.g. to the production of industrial wood or fuelwood, the protection of watersheds, or for use as ecological reserves, wildlife habitats and reservoirs of biodiversity, etc.), while other secondary values are also respected. This approach would allow periodic and selective harvesting of watershed forests, provided it is not detrimental to the primary objectives of soil and water conservation.

As a part of the demands on forestry to meet present needs and our ethical responsibility toward future generations, the following definition of sustainable forest development is proposed (Maini, 1989):

> Sustainable development of forest land and its multiple economic and environmental values involves maintaining indefinitely, without unacceptable impairment, the productive and renewal capacities as well as the species and ecological diversity of forest ecosystems.

The acceptable threshold of "impairment" is determined by the choices and decisions made by individuals, institutions and nations as well as by the international community. It is based on our understanding of both ecological principles and socio-economic imperatives. What is acceptable under a specific socio-economic and ecological condition may be totally rejected under another set of conditions. Consequently, choices and trade-offs are made in terms of risk management and the cost of inaction.

The formulation of approaches to sustainable forest development requires the harmonization of human activities with the biological and physical aspects of forest ecosystems. Human activities and forest ecosystems as well as the interactions between the two are dynamic and change over time and space. Consequently, monitoring the two systems and their interaction is crucial when practising sustainable forest development, and it involves a number of ecological, socio-economic, technological and political considerations.

From an ecological perspective, all

forests are composed of an assemblage of diverse species and a life-support system that has the capability to renew itself. As long-lived and rather resilient ecosystems, most forests are not ecologically fragile. To a considerable degree they are able to withstand a wide range of natural disturbances such as weather extremes (wet and dry periods), storms, fires, insects and diseases. These disturbances are an integral part of the dynamic nature of forest ecosystems and play a critical role in their health, species diversity, renewal and rejuvenation, as well as in their gradual evolution over time. The mosaic structure of natural forests in tropical (Lamb, 1990) and temperate (Suffling, Lihou and Morand, 1988) regions is often a reflection of past disturbances attributed to natural causes.

Of course, primarily, our concern with the potential for sustainable forest development lies not with the natural changes that occur over time in undisturbed forests, but rather with the impact of human activity on the forest resource. While in the remote past forest dwellers across the globe utilized forest resources for subsistence with limited permanent impact on the resource, the expansion of the agricultural frontier has led to the significant and increasingly rapid permanent conversion of forest land to other uses. Permanent conversion of forest land to agricultural use, currently concentrated in the developing regions of the world, is similar to that experienced in the now industrialized temperate regions over the past several centuries. To meet the demands of growing populations, most of the developing countries will need to continue converting some of their forest area to other uses, including agricultural production, shelter and infrastructure. The key is that this conversion should be well-planned and implemented only on lands with the potential for sustainable, non-forestry use. This article, however, concentrates on principles for the sustainable development of land designated permanently for forestry.

Actions toward sustainable forest development

- **Make fuller use of existing knowledge to practise integrated forest ecosystem management and establish a national and international network of demonstration areas.**
- **Strengthen research to predict the response of forest ecosystems to disturbances associated with natural causes and with human activities; develop the capability to recognize early warning signals and indicators of environmental stress and degradation in forest ecosystems.**
- **Accelerate the development of national and international monitoring systems to provide timely and reliable information on the state of national and global forests.**
- **Promote the establishment of, or further develop, national ecological reserves of representative and unique forest types to protect biodiversity and ecological diversity as well as to provide baselines against which the environmental consequences of human activities can be determined.**
- **Increase forest land productivity in selected areas through improved management of forests and forest plantations as well as reduce losses from fire, insects and diseases so that more forest land is available for other uses without a reduction in the overall timber flow.**
- **Reduce waste in forest harvesting operations and in product manufacturing; improve utilization of wood for a variety of end-products; encourage recycling where appropriate to reduce demand for raw materials and to "do more with less".**
- **Reduce effluents from forest product manufacturing processes to environmentally acceptable levels.**
- **Reduce pollutants from non-forest sector industrial and consumption activities that cause forest decline through reductions in productivity, renewability and species and ecological diversity.**
- **Dedicate more resources to systematic policy research to understand and influence decision-making processes in the forest sector and develop innovative approaches to harmonize different economic, environmental, policy and political time horizons.**
- **Continue work to develop appropriate international policy and institutional frameworks to foster international cooperation in technology transfer and financial assistance in support of the conservation and sustainable development of forests.**
- **Formulate criteria for sustainable forest development to strengthen international trade in forest products derived from sustainably managed forests.**
- **Publicize more widely the commitment, policies and programmes undertaken by various stakeholders in the forest sector to achieve the objectives of sustainable development.**

THE CHALLENGE AHEAD

The world community is now deeply concerned about the sustained use of natural resources and the quality of the environment for both present and future generations. There is an increasing move toward environmental ethics, including: use and not abuse; reduce environmental stress; recycle; and do more with less. Particularly in the industrialized countries, the general public is also very concerned about past and current forestry practices in many parts of the world, especially forest degradation and deforestation in the tropical regions, forest decline in industrialized countries and environmental degradation associated with the manufacturing of certain forest products. The challenge of practising sustainable development as described above may be pursued through a number of specific actions, including research; legislation; forest and environmental policy; forestry practices and management; and international cooperation in developing criteria for sustainable forest development, the transfer of technology and financial assistance.

Practising sustainable forest development, through the management of forest ecosystems for their multiple benefits and values, would be relatively more costly in the short term than the management of forests for wood production only. However, failure to practise environmentally sound forest management is likely to lead to prohibitive future costs. As it is in our collective economic and environmental interest to practise sustainable forest development at the national, regional and global levels, there is a need to develop an appropriate international policy and institutional framework to foster global technical and financial cooperation (Maini, 1991a). A set of guiding principles for the conservation and sustainable development of global forests must also be formulated (Maini, 1991b; UNCED, 1991) and international criteria for sustainable forest development agreed upon.

EPILOGUE

Global issues, such as economic inequity, population growth, hunger, illiteracy, inadequate shelter and environmental degradation, have led to concern for the future of this planet and its inhabitants. Environmentally sustainable economic development is seen as a societal value to ensure that, while attempting to satisfy current demand, we bequeath a healthy environment and adequate natural resources to meet the needs of future generations. Sustainable forest development is aimed to help address many of the above-mentioned global issues by providing food, fibre and wood as well as multiple environmental benefits.

Forest products are environmentally friendly, biodegradable and are obtained from a renewable resource base. The world forestry community now faces two major challenges: first, given the expanding world population and the anticipated increase in demand for wood and non-wood products, how to meet this future demand without degrading the forest resource base and forest environment; second, what technical, financial, institutional and political means to tap in order to promote sustainable development of all forest types worldwide. The international forestry community should be actively engaged in defining national and international forestry agenda.

The stewardship of the world's forests, both on a national and global scale, is a collective socio-economic and environmental responsibility. The forestry community, with its long-term perspective, technical capability and commitment to the sustained yield principle, is very well-positioned to provide national and international leadership in sustainable forest development. This practice will require collective international commitment and cooperation, an appropriate policy and institutional framework and a shift from forest management to forest ecosystem management. ◆

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