

## Management of natural tropical forests for the future

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The conservation of tropical forests is one of the main challenges of this century; however, areas established for forest conservation will not be able to ensure the conservation of all species. Future conservation of biodiversity and forest ecosystems will have to take place in sustainably managed tropical forests. Sustainable forest management (SFM) aims both to ensure the flow of goods and services and to maintain forest processes intact, safeguarding the array of functional species that provide those goods and services. This issue brief presents the main challenges to sustainable management of tropical forests and specifies changes necessary in order to meet them<sup>1</sup>.

### Key messages

- ◆ Future tropical silviculture must increasingly deal with agroforests and secondary or degraded forests that will have to be strictly managed and in some cases restored through intensive restorative silviculture.
- ◆ More diversified forest management models are needed to produce multiple goods and services in addition to timber, such as non-timber forest products and biodiversity, soil protection, and climate-change mitigation.
- ◆ More diverse and flexible policy approaches that consider the different perspectives of diverse actors are necessary.
- ◆ To ensure the provision of forests goods and services in multifunctional landscapes, forest policies need to be part of more integrated policy frameworks addressing those landscapes.
- ◆ Multi-scale governance approaches are required to address increasing interaction between decision-making at the sub-national, national, and international scales and the influences of globalizing markets and investments that shape forest resource management.

### Towards new concepts of sustainability

Until recently, tropical forest management focused largely on timber production. The central approach was to log trees above a minimum diameter size and subsequently allow the tree stock to recover during a 30- to 40-year period. Under this view of forest management, sustainability is reached if the same volume of timber is extracted at each logging cycle—that is, every 30 to 40 years (Figure 1). Another view of SFM, however, is a return to conditions prior to logging by the end of the rotation cycle. This means that the forests should exhibit the same structure, timber volume, species diversity, biomass, and ecological processes as before logging operations began.

Modern tropical silviculture is no longer limited to promoting timber production: it must also ensure the long-term continuity of essential ecological functions and the health and productivity of forest ecosystems. This does not necessarily mean a return to pristine conditions but finding a compromise between production of goods and provision of environmental services, as illustrated in Figure 2. Under sustainable management practices, although forests are likely to remain very close to primary forests, they will undoub-

<sup>1</sup>This brief is based on Sist, P., Pacheco, P., Nasi, R. & Blaser, J. 2014. Management of natural tropical forests in the past and present and projections for the future. In Katila, P., Galloway, G., de Jong, W., Pacheco, P., Mery, G. (eds.). *Forests under Pressure - Local Responses to Global Issues*. IUFRO World Series Volume 32. Pp. 497-511. The book is available for download at: [www.iufro.org/science/special/wfse](http://www.iufro.org/science/special/wfse).

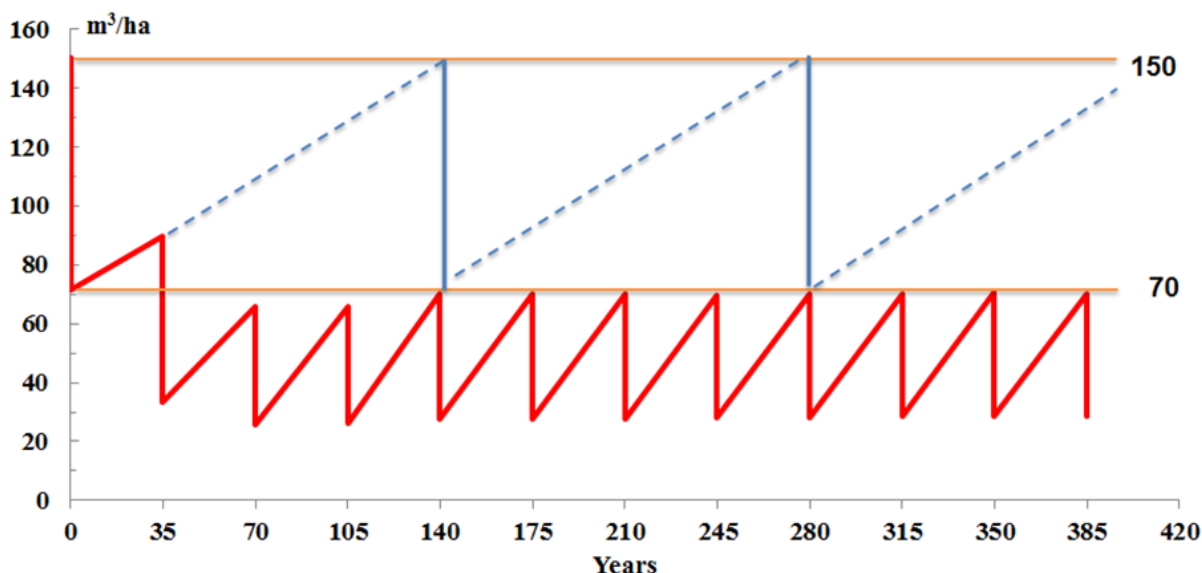


Figure 1. Sustainable extracted timber volume at each rotation cycle of 35 years (red line) and at cycles of 100% timber volume reconstitution (blue lines) in a mixed dipterocarp forest of East Borneo.

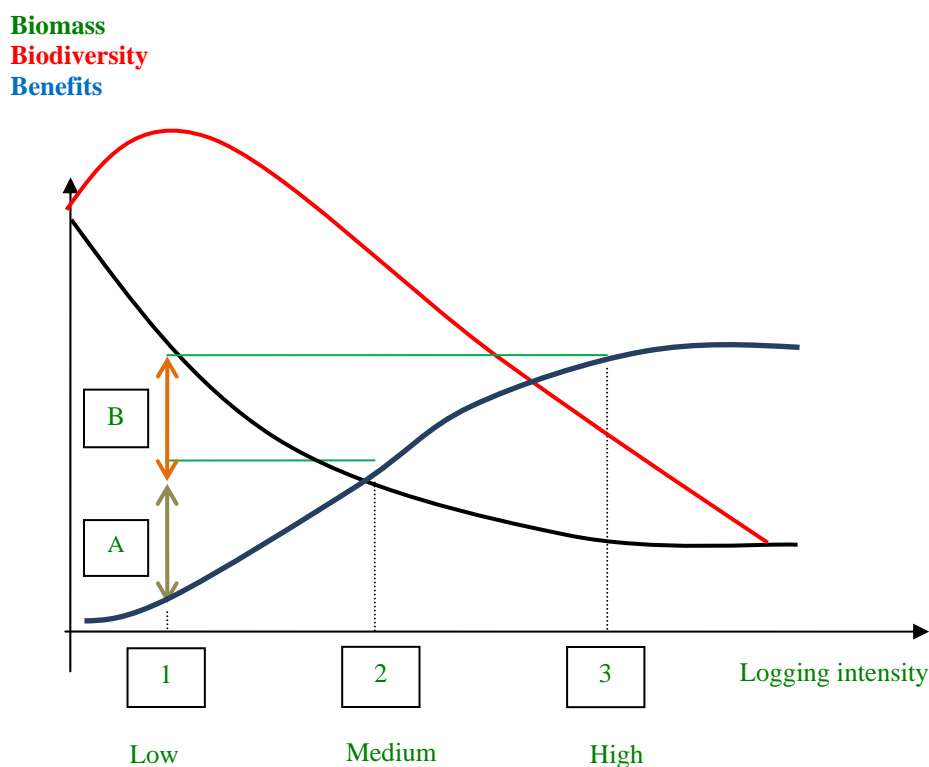


Figure 2. Theoretical trend curves for biodiversity, aboveground biomass (agb) and immediate logging benefits depending on logging intensity at a given moment. These curves can be used to define production compromises. In a context of payments for environmental services, A, B, and A+B represent the lost earnings between the different compromises (respectively between 1 and 2, between 2 and 3, and between 1 and 3) and can form the calculation basis for assessing the cost of payments for environmental services.

Compromise 1: Low intensity and low financial earnings, high agb and biodiversity  
 Compromise 2: Medium intensity, moderate financial earnings, moderate biodiversity and agb  
 Compromise 3: High intensity and financial earnings, very low biodiversity and low agb.

tedly present differences in structure and species composition.

Unlike tropical silviculture of today, which still focuses on primary forests with a large stock of timber, tomorrow's silviculture must deal with disturbed, sometimes degraded forests that will require strict management and, in some extreme cases, restoration through intensive silviculture. It will no longer be possible to intervene only during logging operations; it will also be necessary to turn to post-logging silvicultural treatments, such as liana removal around future crop trees, refinement and timber-stand improvement, and enrichment planting with species of commercial value. It is therefore vital to assess the regeneration capacities of existing logged-over forests on a regional scale, in terms of wood volume, non-timber forest products, biodiversity, and carbon stocks and to make silvicultural recommendations that are adapted to the different types of forests in a given region.

## New forest policy and governance approaches for different stakeholders and different objectives

For the past 20 years, rural populations have actively claimed their rights to benefit from forest resources and to be recognised by legislation as legal and significant actors in the forestry sector. The multiple local-forest stakeholders have their own needs, capacities, perceptions, and forest-related livelihood strategies. Community forest management, when it is formally recognised and land ownership is legally recognised, can effectively contribute to the conservation of natural forests. The involvement of different actors in the management of natural tropical forests is undoubtedly a key issue in promoting large-scale SFM and preserving forests from degradation and conversion in the future. Community-based forest management (CBFM) must therefore be developed to contribute more actively to the forestry sector than in the past, when logging companies were the main suppliers of timber. In the Brazilian Amazon, partnerships between communities/farmers and logging companies have been considered as a possible path to promote SFM in agricultural settlements. Unfortunately, these partnerships are generally informal (no legal agreements) and in most cases favour the companies, which tend to pay very low prices for standing trees.

However, in most forest-rich tropical countries, a majority of forest policies have failed to promote SFM. Broadly speaking, current forestry legislation has two weaknesses.

First, by favouring mechanised selective logging practised by forest companies, legislation does not adequately consider the communities and smallholders undertaking multiple-use forest management. When legislation does consider communities and smallholders, it imposes large-scale industrial management models for diverse situations in which local actors follow different rationales for making use of their forests. The second weakness is the tendency of forestry legislation, almost universally, to favour command-and-control schemes linked to verification of the legal supply of timber. The command-and-control approach, which is not only costly but relatively ineffective, results in substantial illegal harvesting of tropical timber and often is tied to bad forest management practices. In addition, this approach frequently penalises local actors, who cannot comply with forest management regulations that favour large-scale industrial logging, thereby perpetuating an extended informal sector.

In most cases, forestry policy frameworks are devised in isolation from other sectoral policies, mainly agriculture and land policies. This lack of policy harmonisation is a principal factor working against the maintenance of production forests and protected areas. Indeed, in many countries, unsecure land tenure constitutes an important bottleneck that inhibits investments and impedes long-term perspectives for natural resource management. Incentive systems to promote SFM require the adoption of a wider perspective of sustainable land management, not merely a focus on forest management. The achievement of SFM in the tropics may only be possible under new governance architectures that embrace multiple local-to-global interconnected levels and that engage multiple actors, including both state and non-state actors.



Madagascar

## The way forward

Tropical forest management must adapt to the new tendencies of recent decades. The first important change is the type of forest that will be managed in the future. For many tropical countries of Southeast Asia, for example, forests being logged have already entered the second cycle of timber production, but operators still act as if the forests were in their original state. Indeed, new regulations for timber extraction decrease the minimum diameter cutting limit in order to harvest smaller trees present during the first harvest, while sustainability would require harvesting only trees that grew to a harvestable size during the rotation. As a result, the timber volumes being extracted today at second rotation are still very high, result in high damage, and reduce the forests' regenerative and elastic capacity. Future tropical silviculture will have to change past paradigms and consider many different types of forests that were formerly rejected, such as secondary forests, degraded forests, agroforests, and novel forests.

Although it is undeniable that demands on tropical forests to provide multiple goods and services have increased during the past two decades, tropical forest management systems have made little or no progress in moving from timber-dominated models into more diversified ones aimed at producing these multiple goods and services. Multiple-use forest management could represent an alternative for generating complementary revenue between two timber rotation cycles, which often

exceed 30 years. In addition to non-timber forest products, services provided by tropical forests, such as biodiversity, soil protection, and climate-change mitigation, are now considered as potential sources of income under the mechanisms of payment for ecosystem services, for instance REDD+.

The adoption of SFM practices will not happen without important changes in forest resource governance and in the ways to manage the pressures from competing land uses. The transition required in forests governance involves three important aspects. First, more diverse and flexible policy approaches are required that consider the different perspectives of different actors. Second, forest policies need to be part of more integrated policy frameworks addressing multifunctional landscapes in order to ensure provision of forests goods and services in those landscapes. Finally, multi-scale governance approaches are necessary both because of the increasing interaction likely between decisions made at the sub-national level and those taken by national governments in the future and the influence that import market or investment regulations in consumer countries and certification processes may have in shaping decision-making around forest resource management.

### WFSE network

IUFRO WFSE is an open, independent network of scientists and practitioners steered by 10 international research and development organisations and universities, involving over 100 researchers from throughout the world. It supports sustainable natural resources management, sustainable development and inclusive growth as well as related policy processes, focusing principally on two main efforts: 1) collating, critically analysing, and synthesising existing scientific knowledge on topics of international relevance in the forest, society and environment interface in order to draw out important lessons learned and recommendations and 2) undertaking new research to fill in crucial gaps in existing knowledge. WFSE addresses these topics in a cross-sectoral, holistic and interdisciplinary fashion, encouraging innovative approaches and anticipating conditions that will influence future forest-related development at different scales, from local to global.

IUFRO WFSE partner organisations are CATIE (Tropical Agricultural Research and Higher Education Center), CIAS (Centre for Integrated Area Studies, Kyoto University), CIFOR (Center for International Forestry Research), CIRAD (Centre de coopération internationale en recherche agronomique pour le développement), EFI (European Forest Institute), FAO (Food and Agriculture Organization of the United Nations), Luke (Natural Resources Institute Finland), von Thünen Institute of International Forestry and Forest Economics, University of Florida, and VITRI (Viikki Tropical Resources Institute, University of Helsinki).

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