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Is multiple-use forest management widely implementable in the tropics?

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ABSTRACT

Multiple-use forest management (MFM) for timber, non-timber forest products and environmental services is envisioned by many as a preferable alternative to timber-dominant management models. It is praised as a more equitable strategy of satisfying the demands from multiple stakeholders, an ecologically more benign harvesting approach, and a way of adding more value to forests making them more robust to conversion. MFM thus represents a common and prime management objective under the sustainable forest management (SFM) paradigm. However, its implementation has been lagging behind the expectations, particularly in the tropics. In this paper, we analyze selected MFM implementation examples to try to explain why. We scrutinize the tropical forestry debate to find that the meaning of MFM has undergone significant changes along the way, and that the topic depends heavily on the scale of inspection. Also, we examine the conditions that either favor or constrain MFM adoption. At the local scale, the factors that set the scene for multiple-use approaches to be successfully adopted are favorable governance conditions relate to land-devolution policies, effective collective institutions, and multi-agent forest-management models. MFM feasibility also depends on the stage of forest transition, i.e. in society's economic development. MFM (at the stand level) dominates in poor subsistence-oriented autarchic forest settings, it typically declines when entering capitalist stages of specialized commodity production, but may then rebound (at the landscape level) in more advanced development stages. Key factors MFM generally is up against range from intricate technical trade-offs to the economies of scale in forestry production and marketing. MFM remains a valid management alternative under specifically favorable local context conditions, especially when practiced at the landscape scale, but these conditions are less frequent than commonly assumed.

1. Introduction

> The elements of what constitutes good forest management change over time, but the bedrock features of forest tend to remain fairly constant. It is human beings' perception of forest and how forest resource base is utilized that shifts constantly. (Wang, 2004, p. 209)

It is these shifts in forest perceptions that heavily influence the current search for new management alternatives to avoid forest conversion to privately more competitive land uses. In the early 1970s, concerns about the environmental impacts of the onslaught on tropical forests and forests' importance for rural communities had a decisive role in the search for novel forest management models (Wiersum, 1999; Poore, 2003). Until then, forests had been seen principally as catalytic agents for industrialization and economic development (Westoby, 1987; Wiersum, 1999; Kant, 2004). Forestry discussions now shifted towards the "sustainable forest management" (SFM) paradigm, which embraced the notion of sustainable development: 'development to meet the needs of the present without compromising the ability of future generations to meet their own needs' popularized by the Brundtland report *Our Common Future* (WCED, 1987). The previously prevailing notion of sustainability, as applied in forestry for over two centuries, had focused on sustaining timber yields (Wiersum, 1999; Kant, 2003). SFM then broadened the scope to both present and future generations' needs, to multiple beneficiaries and stakeholders—but also to multiple products and services (incl. marketed versus subsistence-oriented products), thus also building the case for MFM (Pearce et al., 2003; Kant, 2004).

Over the last decade, MFM has been envisioned as a promising and more balanced alternative to timber-dominated strategies

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(Panayotou and Ashton, 1992; Dickinson et al., 1996; Hiremath, 2004). Proponents of MFM emphasize that the inclusion of multiple values and stakeholders might give SFM a much needed social and financial boost (Campos et al., 2001; Hiremath, 2004; Kant, 2004; Wang and Wilson, 2007). Skeptics question whether in the tropics non-timber values are sufficiently high to outweigh the alleged economic inferiority of SFM vis-à-vis conventional logging (CL) and/or forest conversion, whether MFM is feasible under precarious tropical governance scenarios, and whether it is cost-efficient vis-à-vis more direct conservation models (Rice et al., 1997; Bowles et al., 1998; Kaimowitz, 2004; Wunder, 2005).

This paper addresses the feasibility of MFM in the tropics considering selected current implementation examples, and the key obstacles these have faced. Much of the conceptual development of MFM models has occurred in the Northern Hemisphere and became mainstream thinking in forestry operations in the tropics without regarding the large differences in scenarios. Despite the prolific literature proclaiming the advantages of MFM as a tool to achieve SFM (Panayotou and Ashton, 1992; Hiremath, 2004; Zhang, 2005), its implementation and adaptation to real-world scenarios, particularly in the tropics, has been less prominent (Boscolo, 2000).

The paper presents first the debate about MFM as a desirable management objective under the SFM paradigm (Section 2). Second, we scrutinize main opportunities and constraints in the adoption of MFM (Section 3). We then identify the scenarios where MFM could be a feasible conservation and development strategy, particularly in the tropics (Section 4). Finally, we summarize the potential of MFM strategies (Section 5).

2. Adoption of multiple-use forest management

A progressive forestry vision nowadays requires forests to satisfy multiple stakeholder demands for multiple products and services (Kant, 2004). To accommodate this, SFM has appeared as a new 'Holy Grail' governing forestry agendas in both developed and developing countries (Poore, 2003; Wang and Wilson, 2007). SFM generally aims at promoting conservation and management practices which are environmentally, socially and economically sustainable (Sayer et al., 1997; Poore, 2003). Hence, the SFM concept integrates plural management objectives from long-term planning and maintenance of the resource base to the multiple use of forest values.

Several trends have gradually unfolded under the auspices of this evolving concept transforming current forestry scenarios. The initial focus was on the negative ecological and social impacts of conventional logging operations carried out by timber industries, which was and still is one of the most visible threats to tropical forests conservation. This led to the search for technological packages to minimize the damages of logging and to sustain timber yields (Dykstra and Heinrich, 1996; Pinard and Putz, 1996; Dykstra, 2002). The design and implementation of reduced impact logging (RIL) techniques in the late 1980s was a first practical step to improve timber-harvesting practices by reducing damages to the remaining vegetation and to soils (Pinard and Putz, 1996; Sist et al., 2003). These guidelines are exclusively timber-focused, and were developed to deal with mechanized operations in large-scale logging. They only deal with non-timber forest products (NTFPs) and environmental services (ES) values as passive side-concerns. Hence, more recently RIL guidelines have come to be seen as insufficient to comply with increasingly diverse demands on forests (Sist et al., 2005; Putz et al., this issue). However, RIL are certainly still valid technical guidelines in scenarios where sustainable timber extraction remains the prime management goal. Additionally, some impediments determining the poor adoption of RIL in the tropics (Putz et al., 2000; Applegate et al., 2004) will also be significant obstacles to MFM adoption (Table 1).

While MFM is prominently placed in the SFM concept, it is in no way a new notion: for centuries, forests have been a source of timber, non-timber products, and forest services. It was only after the Second World War that large-scale industrial timber harvesting, the development of plywood manufacturing and sawmills industries, and the accelerating substitution of NTFPs for synthetic derivates initiated a forestry cycle clearly dominated by timber extraction (Sayer and Byron, 1996; Wiersum, 1999; Poore, 2003). In the 1970s, the recognition of the critical role of forests in the life of rural smallholders and local communities refocused attention on multiple values and stakeholders. Yet, while initial multiple uses had referred to low-intensive, broad-based extractivism spread over large areas, MFM was now being reframed in a SFM context of harder and more explicit trade-offs between different, and often more specialized forest uses.

Although the implementation of MFM models has been more widespread in forestry operations in the Northern Hemisphere (i.e. combined management of timber and mushrooms, berries, aromatic and medicinal plants, and wildlife hunting), there are also some examples in the tropics that serve us to explore the conditions that could favor or constrain the multiple-use approach. The integration of xate (*Chamaedorea* spp.), chicle (*Manilkara zapota*) or allspice (*Pimenta dioica*) harvesting with timber

Table 1
Main factors identified in the poor adoption of RIL techniques in logging operations in the tropics, and their potential relevance (+++: highly relevant; +: fairly relevant) to MFM guidelines

Factors	Reasons	Relevance to MFM guidelines
Implementation too expensive	Contested by several studies (Pearce et al., 2003; Applegate et al., 2004), but still part of the conventional wisdom of most loggers	+++
There is no need for the improvement of current practices	Profits of unsustainable logging tend to be high and regulations enforcement too weak	+
Lack of adequate governmental incentives	Tax incentives and other compensation schemes are still rare and untested. If not well planned they can be insidious (Cubbage et al., 2007)	+
Forest will be converted anyway	High short-term timber profits and/or forest conversion to more competitive land-uses, as agriculture or cattle ranching, makes long-term planning unattractive	+
Lack of trained staff	Few applied training programs and materials to disseminate research findings to forest managers and field workers	+++
Opposition against SFM approaches by some environmental groups and researchers	Lobbying for the establishment of parks and other strictly protected areas (Bowles et al., 1998; Rice et al., 2001)	+