

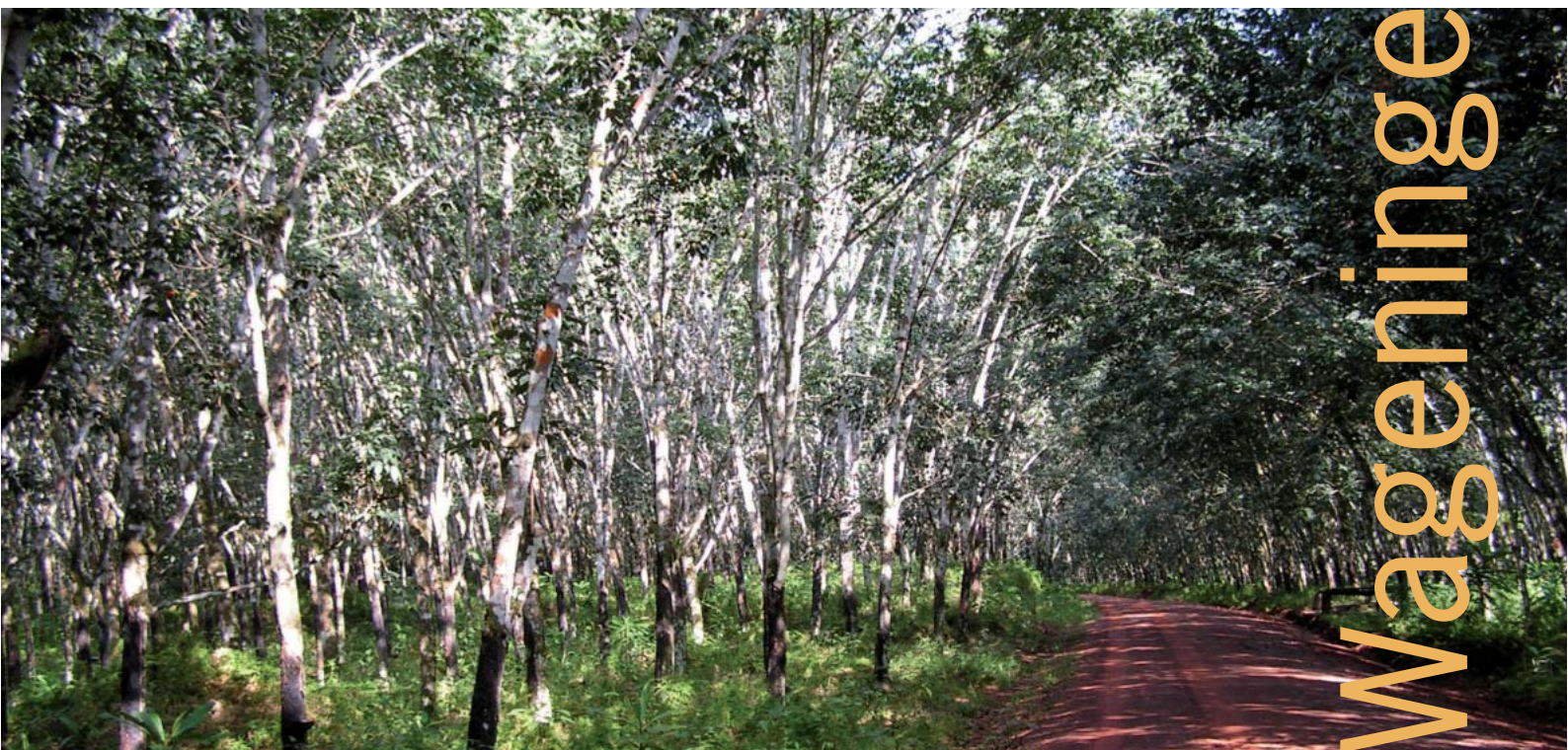
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# Forest plantations for sustainable production in the tropics: key issues for decision-makers

Arend Jan van Bodegom  
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May 2008

Wageningen International





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# Executive Summary

This discussion paper outlines the major issues to be dealt with by decision-makers at international, national and sub-national levels when considering whether to establish and expand forest plantations for sustainable production in a particular country or area. There has been renewed interest in forest plantations in recent years, both among the public and from private groups, and the general consensus is that forest plantations will increase in importance in the coming years. Almost half of all forest plantations, some 67 million hectares, are located in tropical countries: some 80% in Asia and the Pacific region, 13% in Latin America and the Caribbean, and 7% in Africa. In this discussion paper, we analyze the costs and benefits of forest plantations in environmental (PLANET), economic (PROFIT) and social terms (PEOPLE). We also discuss Process aspects (the fourth P) at various levels to ensure stakeholder dialogue, coordination and decision-making when dealing with the first three Ps.

## Planet

Forest plantations offer a quick and efficient way of producing wood. When well managed, they may provide a habitat for a surprisingly large proportion of native biodiversity (see Box 2). They are also a source of environmental concern, however, mainly with respect to soil productivity, water cycles, biodiversity, and pest and diseases.

The claim that plantations take the pressure off natural forests and thus help reduce biodiversity loss is highly tenuous. Plantations may well be part of a strategy to alleviate the pressure on natural forests, but they are only one element in a whole package of measures to reduce the deforestation of natural forests and promote their sustainable use and management.

Forest plantations clearly cannot replace all the supporting and regulating services provided by the original natural forest, but an integrated landscape approach makes it possible to reduce their negative environmental impact. We suggest that new plantation policies should focus on establishing plantations that offer the greatest possible and most sustainable combination of goods and services. Tools are available to analyze all the relevant aspects, including the environmental and social ones (e.g. societal cost-benefit analysis). Trade-offs between the various functions and values have to be weighed up and dealt with by public decision-makers at national, regional and local level. There is an urgent need for plantation-specific tools and models to quantify and value the long-term effects of specific silvicultural management regimes and for legal and institutional arrangements for the provision of plantation goods and services.

## Profit

Forest plantations are often more efficient and profitable than natural forests for production purposes. Other agricultural land uses (mainly monocropping) — for example growing soya beans or oil palm — usually appear to be more attractive and profitable than forest plantations, but in fact their competitiveness varies greatly, depending, for example, on local ecological factors (e.g. soil fertility) and socio-economic, cultural, and financial aspects. Such factors also affect the cost-effectiveness of incentives to establish forest plantations.

There is still considerable concern about the economic and financial viability of plantations as a large-scale or small-scale commercial investment. In the past, subsidies were one of the most important means of solving this problem. More effort must be made to explore other options, such as (a) making investments more attractive, (b) requiring payment for the plantation forest's other functions, (c) bridging the gap between investment and long-term harvesting, (d) improving governance or the enabling environment, (e) improving the image of the sector, (f) removing the 'perverse' incentives for agricultural land use, and (g) reducing risk and uncertainty. The level of risk can be reduced by applying good forestry practices and sharing the plantation's benefits fairly among the different stakeholders involved at various levels of decision-making, including local communities.

The key elements of an enabling environment for establishing a plantation include macro-economic, political and institutional stability; secured access to land; clear resource tenure and ownership arrangements (land and trees);

fair compensation for the loss of land rights; and policies supporting the development of systems requiring payment for environmental services.

### **People**

Planted forests in general and industrial-scale plantations in particular do not automatically have a positive impact on the livelihoods of local people. Many critics of tropical timber plantations are concerned about the risk of an unfair distribution of costs, benefits, rights and responsibilities. Forest plantations often seem to favour the interests of a few above the basic needs of the majority of the rural population.

One promising option is participatory land-use planning for plantations, involving all the relevant stakeholders. Another strategy focuses on mixed species and agroforestry plantations with well-defined rights of access and use for the local population.

### **Process**

In order to properly integrate and equitably balance the various aspects of PPP and deal with their tradeoffs, transparent frameworks or mechanisms for multi-stakeholder dialogue, decision-making, coordination and collaboration are needed. Such frameworks will consider the concerns and interests of groups of stakeholders (international, national or local), making plantations more acceptable and reducing the risk of failure. New initiatives are needed on both a national and local scale for the balanced integration of Profit, Planet and People through a meaningful multi-stakeholder Process (PPP+P).

At the national level, the FAO set of plantation guidelines offers a good start for integrating the most important issues in forest plantation policy and management. At this level, plantation policies and planning should be formulated according to the core principles as internationally defined for national forest programmes (NFPs): (a) national sovereignty and country leadership, (b) consistency within and integration beyond the forest sector, and (c) participation and partnership.

At local level, landscape approaches could be combined with systems of payment for ecosystem goods and services, allowing interest groups to define the configuration of the plantations in their landscape. Company-community or company-farmer partnerships or alliances can provide a strategy for a more equitable distribution of ecosystem benefits, and knowledge-sharing on both sides may help improve the living conditions of rural people and reduce poverty in rural areas. It may also contribute to better mutual understanding between the private sector and local communities.

Forest certification can serve as a complementary tool for guiding the process of integrating and balancing the three Ps. It is first and foremost an incentive for opening up markets for sustainably produced timber; it is not designed to promote forest governance, because it focuses on the management unit level and gives only limited consideration to the landscape surrounding the management unit and the governance structures and processes present there.

**Keywords:** forest plantation, farm plantation, agroforestry, forest policy, biodiversity, subsidies, enabling environment.

# 1. Introduction

Forest plantations have been the object of renewed interest in both the public and private sectors in recent years. Leading global organizations in the international forest conservation and management sector have drawn attention to forest plantations as an alternative to natural forests for the production of forest goods and services. IUCN-WWF, CIFOR, ITTO, FSC and FAO have all published extensive reviews, opinion papers, and guidelines focusing on the potential and advantages of forest plantations, as well as on the associated risks and possible negative impact (Cossaltar & Pye-Smith, 2003; ITTO, 2006; FAO, 2006; Forest Stewardship Council, 2006; Maginnis & Pollard, 2006). These reviews show that forest plantations have the potential to produce fuelwood, timber and various other products and services very efficiently. However, they also show that many controversial issues must be dealt with both at political and operational levels before forest plantations are broadly accepted as a sustainable alternative to natural forests. Governments, the private sector and NGOs all agree that plantations will increase in importance. Kanowski (2005) observes the following global trends and issues:

- Increasing global demand and technical advances in wood processing give plantations a comparative advantage over natural forests;
- Ownership of plantations is shifting towards private companies;
- Plantations are being financed mainly by private capital investments;
- Opposition to plantation expansion owing to economic and environmental concerns.

This discussion paper outlines the major policy issues to be dealt with by decision-makers at international, national and sub-national levels when considering whether to establish forest plantations in a particular country/area. The key question addressed here is:

*Which issues must be dealt with by policy-makers to ensure that forest plantations are environmentally sound, economically viable and socially acceptable and – at the same time – relieve the pressure on natural forests? What trade-offs do policy-makers have to make when formulating a plantation policy?*

After an introductory section that considers the definition and types of forest plantations, the goods and services they provide and area and production figures, we compare the costs and benefits in environmental (PLANET), economic (PROFIT) and social terms (PEOPLE). We also review processes at various levels designed to bring stakeholders together to deal with the three Ps (the fourth P of PROCESS).

## 1.1 Definitions and typology

The FAO (2006) defines plantations as ‘forests of introduced species and in some cases native species, established through planting or seeding, with few species, even spacing and/or even-aged stands.’ This definition encompasses both industrial plantations for the production of biomass and timber and small-scale home and farm plantations, agroforestry plantations, and plantations established for environmental services (e.g. soil protection, biodiversity conservation). This broad view of plantations is nicely illustrated by CIFOR (2002), which provides a typology of planted forests covering a large variety of different plantation types and characteristics. These different types are distinguished not only by their differing purposes but also by their spatial scale, management intensity, structure and type of ownership (see Box 1).

While the global area under forest continues to decline gradually, the area covered by forest plantations grew by about 2.8 million hectares per annum between 2000 and 2005 (FAO, 2006). In 2005, forest plantations made up an estimated 140 million ha, which is equal to 3.8% of the total forest area of almost 4 billion ha. Most forest plantations (78%) are intended for production and produce mainly wood and fibres and to a lesser extent timber. The remaining share (22%) consists of protective forest plantations, established for erosion control, water regulation, and biodiversity control purposes.

| <b>Box 1. 'Typology of Planted Forests', based on CIFOR (2002)</b>  |  |
|---|--|
| Plantation type and purpose   | Characteristics  |
| Industrial Plantation:<br>timber, biomass, food   | Intensively managed forest stands established to provide material for sale locally or outside the immediate region, by planting and/or seeding in the process of afforestation or reforestation. Individual stands or compartments are usually of even age class and regular spacing and consist of introduced species and/or one or two indigenous species. Usually either large scale or contributing to one of a few large-scale industrial enterprises in the landscape. |
| Home and farm plantations:<br>fuel wood, timber, fodder, orchards,<br>forest gardens, and other                                       | Managed forest, established for subsistence or local sale by planting and/or seeding in the process of afforestation or reforestation, of even age class and regular spacing. Usually small in scale and selling in a dispersed market, if at all.   |
| Agroforestry plantation:<br>fuel wood, timber, fodder   | Managed stands or assemblages of trees established in an agricultural matrix for subsistence or local sale and for their benefits on agricultural production; usually regular and wide spacing or row planting.  |
| Environmental plantations:<br>windbreaks, soil protection and erosion<br>control, wildlife management, site<br>reclamation or amenity | Managed forest stand, established primarily to provide environmental stabilization or amenity value, by planting and/or seeding in the process of afforestation or reforestation, usually of even age class and regular spacing.   |
| Managed secondary forests with<br>planting  | Managed forest, where forest composition and productivity is maintained through additional planting and/or seeding.  |

## 1.2 Goods and services of forest plantations

When well managed, forest plantations offer multiple benefits to society, both direct and indirect. Direct benefits include goods such as timber, food, fuel wood, fodder, ornamental and medicinal resources. Indirect benefits ('services') comprise carbon sequestration, soil and water conservation, pollination, conservation of biodiversity and overall maintenance of the life-supporting system.

Plantation benefits (the Goods & Services approach) can be grouped according to the Millennium Assessment typology (Reid et al., 2005):

- Provisioning services (supply of products/goods);
- Regulating services (benefits like air purification, water regulation etc.);
- Cultural services (spiritual enrichment and recreation);
- Supporting services (ecological processes which underlie the functioning of the ecosystem).

Box 2 shows the Goods and Services of forest plantations in India, as reported by Van der Meer et al. (2007).

| <b>Box 2. Ecosystem goods and services from forest plantations in India according to the typology of the Millennium Ecosystem Assessment</b> |  |
|--|--|
| Typology of Ecosystem Functions  | Goods and Services   |
| Provisioning Services  | Production functions   |
|  | Fresh water (for drinking, irrigation, cooling, etc.)  |
|  | Food (from wildlife)   |
|  | Raw materials (fibre [e.g. wood, wool], skins, etc.)   |
|  | Energy resources (fuel wood, dung, etc.)   |
|  | Fodder & fertilizer (e.g. krill, leaves, guano, organic matter)  |
|  | Genetic resources (genes and genetic information used for animal and plant breeding and biotechnology)   |
|  | Natural medicines and pharmaceuticals (e.g. drugs)   |
|  | Biochemicals (non-medicinal) (e.g. for dyes, biocides, food additives, etc.)   |
|  | Ornamental resources: animal and plant products (e.g. skins, shells, flowers) used in fashion, handicrafts, jewellery, worship, decoration and souvenirs, and whole plants and animals (e.g. fish, plants) used as pets and in landscaping |
|  | Carrier functions  |
|  | Cultivation (of food, raw materials & biochemicals) e.g. plantations, crops etc.   |
|  | Energy-conversion (use of wind, water, geo-thermal heat, etc.)   |
|  | Mining (of minerals, sand, oil, gold, etc.)  |
| Waste disposal (solid waste dumps)   |  |
| Transportation & habitation  |  |
| Tourism & recreational facilities (infrastructure for outdoor sports, beach tourism, etc.)   |  |
| Regulating Services (Regulation functions)   | Air quality regulation (e.g. capturing dust particles, NOx fixation, etc.)   |
|  | Climate regulation (maintenance of a favourable climate, esp. temperature, precipitation) for human health, habitation, cultivation, recreation  |
|  | Waste treatment (maintenance of water and soil quality)  |
|  | Water regulation (buffering of extremes in runoff and river discharge)   |
|  | Natural hazard regulation (reduction of storm and flood damage)  |
|  | Erosion prevention (soil retention and prevention of landslides/siltation)   |
|  | Biological control (reduction of human diseases/crop and livestock diseases)   |
|  | Pollination (of crop species and wild plants)  |
| Cultural & Amenity Services (information functions)  | Aesthetic (non-recreational enjoyment of scenery)  |
|  | Recreation and nature-based tourism  |
|  | Cultural heritage and identity (many people value a 'sense of place' which is often associated with ecosystems)  |
|  | Inspiration (e.g. for art, folklore, national symbols, architecture, design, advertising)  |
|  | Spiritual and religious (many individuals and religions attach spiritual values to ecosystems and/or species)  |
|  | Educational (both formal and informal education in nature)   |
|  | Science (ecosystems influence the type of knowledge systems developed by different cultures)   |
| Supporting Services (Habitat functions)  | Refugium (for resident plants and animals and migratory species) -> maintenance of biodiversity and evolutionary processes   |
|  | Nursery (breeding area for species that spend their adult life elsewhere)  |
|  | Primary production (conversion of solar energy into biomass)   |
|  | Nutrient cycling (maintenance of bio-geochemical 'balance')  |
|  | Soil formation (maintenance of fertile topsoil in natural and cultivated systems)  |
|  | Water cycling (maintenance of the hydrological cycle)  |

### **1.3 Tropical forest plantations: area and production**

Almost half of all forest plantations, some 67 million hectares, are located in tropical countries (ITTO, 2006). The Asia & Pacific region has the largest share (80%), while Latin America (including the Caribbean) and Africa have much smaller shares (13% and 7% respectively) (ITTO, 2006). Less than half of forest plantations in the Asia & Pacific region are available for industrial purposes, while 91% of plantations in the Latin America & Caribbean region and 75% in Africa are industrial plantations.

No detailed statistical information is available on production and trade in tropical plantation timber products. Trees planted in forest plantations are usually of the genus *Eucalyptus*, rubber tree and genus *Pinus*. Estimates based on manufactured products (sawn wood, veneer, plywood, reconstructed wood panels and pulp wood) indicate a total industrial roundwood production in the tropics of about 322 million m<sup>3</sup>/year, of which 47.5% is from plantations (ITTO, 2006).

The sustainable timber production capacity of forest plantations in the tropics is estimated to be around 446 million m<sup>3</sup>/year (ITTO, 2006). Harvesting in tropical forest plantations therefore seems well below the calculated sustainable timber production capacity. This is probably related to such factors as poor management, lack of technology to process plantation timber, and low log quality.

The export value of forest products from tropical countries reached USD 13.4 billion in 2004. Industrial roundwood exports from the tropics come mainly from natural forests. Roundwood exports from plantations are unlikely to account for even 10% of the total. Timber availability from natural tropical forests is gradually declining, however, and tropical timber production costs will therefore grow (ITTO, 2006). The forest industry is looking for other sources of timber supply, and the most feasible alternative seems to be plantation timber. Timber production in forest plantations appears to be more efficient than sustainable production in natural forests. On average, forest plantations have a mean annual increment of between 15-40 m<sup>3</sup>/ha/year, whereas annual production in tropical natural forest ranges between 1-7 m<sup>3</sup>/ha/year (Evans & Turbull, 2004). The higher production rate of plantations compared to natural forests is nicely illustrated by the fact that the 5% of global forest area covered by forest plantations produces 35% of the world's annual wood production (Earth Policy Institute, 2006).

## 2. Sustainability issues

### 2.1 Planet

Some groups embrace forest plantations, seeing in them the solution to the growing demand for timber and fibres. They also claim that plantations are the answer to natural forest loss. Others believe, however, that plantations pose a serious threat to soil productivity, water cycles, biodiversity, landscapes, and local livelihoods (e.g. Maginnis & Pollard, 2006). This section discusses some of these claims from an environmental perspective and attempts to restore the balance in this often heated debate. We conclude that when properly planned and managed, plantations offer a sustainable and equitable system for producing a broad range of goods (e.g. timber) and services (e.g. environmental protection).

#### 2.1.1 Environmental benefits and concerns

**Biodiversity levels** in forest plantations are generally assumed to be lower than those found in original native forests. Forest plantations can provide a habitat for a surprisingly large proportion of native biodiversity, however. Keenan et al. (1997), for example, found over 300 plant species growing beneath the trees in timber plantations in Northern Queensland, Australia. Preliminary findings from the Planted Forest Project in Bintulu, Sarawak, have shown that many animal species are using plantation areas for foraging (Stuebing, 2006). It is clear that in some cases forest plantations are able to sustain and enhance local biodiversity levels (Cossalter & Pye-Smith, 2003; Kanowski, 2005). Lindenmayer et al. (2002) indicate that with few additional costs, plantations can be managed so as to increase biodiversity levels. Bauhus & Schmerbeck (2006) suggest that increasing the rotation length will also improve the biodiversity benefits of plantations. A landscape approach, including the right mix of production areas with habitat components (high conservation value forests) and biodiversity corridors, should help reduce the impact of plantation development on biodiversity (e.g. Barlow et al., 2006). This entails having tools designed to quantify how management can improve biodiversity levels, but it also means provisioning other plantation goods and services (e.g. Bauhus & Schmerbeck, 2006). Societal cost-benefit analysis is another useful tool (see Lette and de Boo, 2002). A landscape approach combined with increased genetic diversity will also make plantations more resistant to pests and diseases (e.g. Evans & Turnbull, 2004).

**Soil** compaction, erosion, and physical and nutrient degradation have all been observed in various types of plantations (for a review, see Bowyer, 2006). The root systems tend to be particularly poorly developed when rotation periods are very short, meaning that plantations are often less efficient at trapping nutrients than the original forest. Soil compaction can be a serious problem when harvesting and tending are mechanized. Re-forestation of heavily degraded areas can eventually improve soil quality, however, and prevent soil erosion. Not only do trees roots have a beneficial effect on soil structure, but the developing herb and shrub layers help prevent erosion.

Forest plantations have been shown to cause soil **moisture** depletion and reduced stream flow because the canopy intercepts and evaporates rainfall. Eucalypts in particular are known to use far more water than native forest species, and planting them may therefore reduce local water tables. The reduced stream flow may have both positive effects (less erosion) and negative ones (lower yields for other agricultural crops). Good design, including the right choice of species and the right location relative to streams, may either enhance or mitigate the effects, depending on local circumstances and the plantation's objectives.

#### 2.1.2 Reduced pressure on native forest

Opinions are divided as to whether plantations reduce the pressure on native forests as sources of goods. Cossalter & Pye-Smith (2003) conclude that the claim that plantations take the pressure off natural forests and thus help reduce biodiversity loss is highly tendentious. Only in a small number of countries has this actually been proven to be

the case. Several authors (see Bowyer, 2006) have suggested that large-scale plantation development reduces the price of timber, which generally increases the demand for timber from both natural forests and plantations. In addition, when timber is produced mainly by plantations and native forests are no longer used for timber production, the latter may become more vulnerable to conversion or destruction. It appears that using a forest (for instance for timber production) may be the best strategy for its long-term conservation.

## 2.2 Profit

In this section we consider the competitiveness of plantations versus other types of land use. We then look at what makes plantations financially viable. The literature offers many references to subsidies for establishing plantations, but this is only one solution to a single problem. The question is whether incentives are enough to stimulate plantation establishment, or whether other measures are needed. Another option is to require payment for the environmental goods and services produced by the plantations. What is crucial in all this is to create a better enabling environment.

### 2.2.1 Competitiveness of tropical plantation timber and products

Forest plantations are more attractive than natural forests in the tropics for many different reasons (silvicultural, environmental, social and economic). Evans & Turnbull (2004) indicate that the difficulty involved in natural forest management (e.g. unsustainable management, access problems, etc.) and the high potential of forest plantation (e.g. high productivity, rural development, rehabilitation, water regulation, carbon storage etc.) explain the rapid development of forest plantations in the tropics.

Some of the competitiveness of plantation timber can be explained by the high productivity of planted forests (as explained in section 1.3). It costs less to produce plantation timber, making it cheaper than the timber culled from natural forests. Cashore and McDermott (2004) observe that the rules governing plantation management in countries where plantation timber is intended primarily for export (Brazil, Chile, Indonesia and South Africa) tend to be considerably less stringent than those governing natural forests. This could be another factor making plantations more competitive.

Forest plantations do not, however, produce the same timber quality as natural forests, at least for most species, e.g. teak. On the other hand, the pulp industry is successful in the tropics because pulp production costs there are among the lowest in the world. The solid wood industry has accelerated the move towards plantation timber (especially pine in Brazil, Chile and New Zealand). Rubber wood log prices are relatively low when compared to natural forest species and rubber wood is used instead of wood from natural tropical forests, but also timber from other sources. The plywood industry is also gradually moving towards plantation timber. Plantation pine timber has been widely accepted by the worldwide plywood industry in recent years, the main reason being the low price of the product on the international market. Brazil, followed by Chile, is now the largest plantation plywood producer in the world. Small-scale experiments indicate that plantation eucalypts have the potential to displace some of the tropical and non-tropical timber used for plywood production. Eucalypt veneer is also penetrating the market, although much of it is still low grade owing to knots and other wood defects (ITTO, 2006).

How do forest plantations compete with agricultural crops such as oil palm or soya? It is difficult to find data comparing the net present values of plantations to agricultural production. Chomitz (2006) reviews land values in forested areas in relation to deforestation<sup>1</sup> but only cites one relatively old source (from 1989) comparing plantations and other land uses. In this Costa Rican case, plantations proved to be far more profitable than cattle ranching, clear felling or managed forests. In Cameroon, however, oil palm and intensive cocoa cultivation has a net present value of more than USD 1400 per hectare. In Brazil's cerrado (savannah) region, converting native

<sup>1</sup> Chomitz acknowledges that his Table 2.1 might overstate the private gains to forest conversion for two reasons:  
 (1) the costs involved in clearing the logged-over forest are sometimes taken into account and sometimes not,  
 (2) most analyses adopt a 10% discount rate, which is lower than typical private discount rates – especially among the poor.



woodlands to soya increases the value of the land by more than USD 3,000 a hectare. The value of land devoted to coffee cultivation in India's Western Ghats, a biodiversity hotspot, is extraordinarily high. In contrast, mean land values are just USD 400 a hectare in another hotspot, the Atlantic forest in Brazil. Chomitz concludes that the effectiveness of incentives for deforestation varies widely across pan-tropical forest margins. Where conditions are amenable to crops such as soya beans, oil palm, or cocoa, and where old-growth timber is still standing, deforesters are rewarded with thousands of dollars a hectare. On marginal lands, lands far from markets, or where agricultural technologies are unavailable, there may be little incentive for deforestation. We can deduce from this that forest plantations and agricultural land uses vary in their relative competitiveness. In other words, there are situations where it would be useful to consider introducing incentives to establish forest plantations, and other situations where such incentives are pointless because other land uses are much more profitable.

## 2.2.2 Financial problems

Van Dijk & Savenije (2008 in prep.) identify the following basic problems when it comes to financing forestry initiatives, including plantations:

- The multiple values of forest ecosystems and the cost of sustainable forest management are often not considered or internalized. Timber and wood are frequently the only products taken into account. The idea is that they should generate all the income and their price should cover all the costs, without looking for ways to receive payment for other forest goods and services. This means low or moderate financial results that are not very competitive.
- The high initial investment together with the long period before harvest can also be detrimental to financial flows. 'Bridging' resources are necessary. The long-term nature of the activities is also a poor fit with the time horizon of many private and public decision-makers.
- Self-financing capacities in the forest sector are generally limited and external funds are necessary.
- Forestry practices are often inefficient and the legal, political and institutional conditions unstable. In general the business environment is not good.
- The competition is unfair because of illegal logging and 'perverse' subsidies favouring agriculture and cattle rearing.

There are two strategies to solve these problems: (1) eliminate 'perverse' subsidies and policies favouring other economic sectors, (2) increase the competitiveness and attractiveness of the forest sector. With respect to (2), several options are available: (a) make investments more attractive; (b) require payment for other plantation forest functions; (c) reduce risks and uncertainty (e.g. good forestry practices); (d) bridge the gap between investment and long-term harvest; (e) improve governance or the enabling environment; (f) improve the image of the sector.

One example of an innovative and more balanced approach can be found in the guide for small-scale forest enterprises published by the FAO (2005). Experience has shown that microfinance services can be delivered sustainably via village groups to small forest enterprises, even in hard-to-access rural areas in hilly regions. Forest tenure rights and the legal establishment of forest concessions can successfully draw in commercial banks to assist small-scale timber enterprises. Technical assistance and business development have helped micro-entrepreneurs prepare sound annual operating plans and consolidate their financial needs, thus facilitating bank access. Apart from subsidies, loans and credits, there are other financial services that can promote small-scale forest enterprises, for example money remitted by family members abroad, leasing and micro-insurance.

In the following sections we deal with three options in detail: subsidies, payment for environmental services, and the enabling environment. We have chosen these options because they have been well documented, whereas much less has been written about other options, which are still in the very early stages of development.

### 2.2.2.1 Subsidies for forest plantations

The discussion about incentives and their desirability and role is an old one (see, e.g., Keipi, 1997). Most of the world's forest plantations were established with the help of a subsidy of one sort or another at some time, either

directly or indirectly. These subsidies have undoubtedly been key drivers in the rapid growth of plantations (Bull et al., 2006). Estimates for the period 1994-1998 indicate that annual global subsidies accounted for 4% of GDP, and that forest subsidies accounted for only 3.3% of the world subsidy total. Of the total subsidy amount earmarked for forests, 86% or some USD 30 billion was accounted for by non-OECD countries, suggesting that the funds were allocated mainly to industrial plantation forestry in the southern hemisphere and China. Forest plantation subsidies include direct and indirect types; for an overview, see Box 3.

### **Box 3. Types of subsidies**

Direct subsidies:

- Direct transfer of funds (e.g. interest-free loans, government grants covering part of the reforestation costs);
- Promised direct transfer of funds (e.g. government backing for companies acquiring plantation establishment funds on the capital market).

Indirect subsidies:

- Government revenue that is due but that the government foregoes (e.g. tax deductibility arrangements for forest plantation establishment);
- Government provision of good or services other than general infrastructure (e.g. the provision of free seedlings, research on increased yields).

*Source: Bull et al., 2006*

Subsidies may, however, lead to an inefficient allocation of public resources, distortion of markets and prices, and inequity and local dependence on outside resources. Fiscal incentives are also often an ineffective way of promoting properly implemented tree plantations, as those making use of them are often more interested in short-term tax relief than in future benefits. There is a history of public funds being used to establish plantations on the wrong sites, that use poor genetic material, that have been poorly maintained or that are located too far from the market (Cossalter and Pye-Smith, 2003). The best approach would be to reform subsidies so that they are used to address the most critical environmental problems and social market deficiencies. Such reforms could focus on payments for environmental services provided by private forest owners and on forest businesses that directly address poverty alleviation and other long-standing social ills. Bull et al. (2006) developed a set of subsidy guidelines that involve creating links between capital market instruments and sustainable forestry.

Closely related to the topic of investing in plantations is the issue of investing in the processing industry and the related subsidies. When appraising investment in the pulp industry, it is important to look very critically at pulp wood production forecasts. In the case of Indonesia, the four major pulp producers all predicted that they would be able to meet their own plantation fibre needs eight years after 1990, the year that construction of the new processing facilities began. In 2006, however, the industry was still culling approximately 70% of its fibre from natural forest. The shortfall in plantation yields was apparent early on and should have been a warning to anybody financing capacity-building at pulp mills (Spek, 2006).

### **2.2.2.2 Paying for forest goods and services**

Most industrial-scale plantations produce only one or a handful of products. As Box 2 shows, however, forest plantations can provide many different ecosystem goods and services. These non-wood ecosystem services are generally not quantified, and there are no mechanisms for rewarding or compensating plantation owners who manage plantations in a way that supports these services. Such mechanisms would require reasonably accurate models for assessing the trade-off between production services benefits (often timber and wood) and other ecosystem services benefits (Bauhus and Schmerbeck, 2006).

What is also necessary is to design and implement concrete mechanisms whereby plantation owners receive payment for environmental services from consumers. The consumers should be ready and willing to pay, and the payment mechanisms should preferably not lead to greater social inequity. As yet, there are very few payment mechanisms of this kind for forest plantations or for forest management in general. Pilots projects are needed allowing the relevant stakeholders to acquire the necessary experience.

### **2.2.2.3 Enabling policy and socio-economic environment**

Another crucial factor is to create an environment in which such payment schemes can be designed and implemented (Van Dijk and Savenije, in prep.). Christy et al. (2007) mention several factors that make private forestry (and therefore plantations) on any scale impossible: uncertainty about legal status, lack of recognition of customary tenure, uncertainty about land boundaries, fragmentation of forest property, and legal instability.

It will only be possible to invest in plantations and develop a new industry to process plantation timber into quality products in countries with an appropriate business climate.

- The history of plantation development in Latin America shows that the key factors for obtaining significant levels of investment in plantations were macro-economic, political and institutional stability, access to land and clear resource tenure arrangements (Haltia and Keipi, 1997 in Enters et al., 2003).
- The history of plantation development in the Asia-Pacific region also shows that these factors, as well as additional ones that help create an enabling environment, are more important than direct incentives (Enters et al., 2003).
- In many African countries, land and tree tenure systems often prevent and/or discourage private investment in plantations, making it difficult to attract local and foreign investors. There is often a built-in lack of sustainability in the financing and management of plantation schemes, the result of a heavy initial dependence on donor funding and the failure of governments to replace it when the funding is terminated. The current trend of privatizing less successful public plantations has been met with some hesitation by the private sector, partly because it has only limited experience of managing plantations, and partly because it is unwilling to enter into long-term investments in politically uncertain circumstances (Chamshama & Nwonwu, 2004 a and b).

## **2.3 People**

In this section, we focus on two widely discussed social issues associated with tropical timber plantations: the plantation's contribution to rural development and employment generation, and its impact on local control over and access to land and forest resources.

### **2.3.1 Plantations and rural development**

Local community members and other existing land users in developing countries have often been overlooked in land-use planning and development schemes (Evans and Turnbull, 2004). Industrial timber plantations are primarily designed to meet the goals and priorities of national governments and to supply global markets with industrial roundwood, while the needs and concerns of local communities are generally of secondary importance (Charney, 2006). The failure to take local needs and concerns into account when establishing plantations has limited their potential benefits for local communities. Mayers (2006) argues that commercial forestry's contribution to national economic development, as a source of tax revenue and by reinvesting profits, may trickle down to help the poor, but that there is no strong evidence that it does so. Indirect benefits may include government reinvestment of plantation revenues in education, the health service and infrastructure in local communities (Morrison and Bass, 1992).

While it is clear that plantations create jobs, plantations often do not generate enough jobs or infrastructure to provide economic opportunities for a large number of local community members (Charney, 2006). Much of the plantation work is not labour intensive, and the number of jobs created is therefore limited, somewhere in the order

of 1 to 3 jobs per 100 ha of plantation (Cossalter and Pye-Smith, 2003). Moreover, the jobs often go to non-local residents, or to well-educated and trained candidates (Charney, 2006).

It is difficult to determine the full impact of plantations on employment. The jobs generated by plantations may be outweighed by job losses in agriculture at local level and the cost of restructuring the local economy. There may be major employment benefits where plantations replace degraded or abandoned land, or where there is little alternative agricultural employment. Employment rates can also be expected to increase when rotation cycles require continuous replanting, maintenance and harvesting (Mayers, 2006; Colchester, 2000; Cossalter and Pye-Smith, 2003). Local residents are most likely to gain job benefits from plantations when wood processing and manufacturing facilities are located nearby (Charney, 2006).

Plantation industries have often been accused of perpetuating low-wage labour, poor employment conditions, and high rates of injury (Mayers, 2006; Tauli-Corpuz and Tamang, 2007; WRM, 2007). The International Labor Organization (ILO) recognizes that forestry work, including work on forest plantations, is strenuous and dangerous, in particular because of the heavy physical labour involved. The use of dangerous equipment, the remote worksites and poor communications make the rescue and evacuation of workers difficult in emergency situations (WRM, 2007). Some organizations, such as *Movimiento Mundial por los Bosques Tropicales* (2005), have raised concerns regarding the position of women who work in plantations. Women are generally paid less than men and they often do work associated with significant health risks.

The plantation industry is no exception to the global business trend of outsourcing all but a company's core business (Mayers, 2006). The negative effects of this trend include falling wages, insecure and inadequate income, no health insurance or pensions, and the risk of permanent injury. In addition, larger firms contract out work and use their market power to drive down the prices charged by smaller contractors.

### 2.3.2 Control over and access to land and forest resources

It is widely acknowledged that rural smallholders have a difficult time establishing industrial plantations. The reasons include high start-up costs, long-term economic returns and the need for a large land area. For a forest plantation to be commercially viable, it requires a large area of land. The actual amount of land required depends on the plantation's objective. If the timber is for sawmilling and furniture manufacturing, then an area of around 15,000 to 20,000 ha would suffice (Varmola, 2002). In Indonesia, the optimum size for an industrial tree plantation is estimated at between 30,000 and 50,000 hectares (Charney, 2006, citing Hall, 2003). Most plantations are hence owned and operated by large corporations or governments (Charney, 2006).

Many tropical plantations, in particular in Southeast Asia, are located on land officially owned by the state, but where access to land and other natural resources was once subject to customary rights (Charney, 2006). Several countries have laws that recognize the rights of indigenous peoples to their traditional lands. One example is the system of Native Customary Rights (NCR) set out in the Sarawak Land Code of 1958. Native customary rights have become more fragile over the years, however, because of subsequent amendments to the land code.

Governments are often unwilling to recognize that local communities retain customary property rights over state lands. In Indonesia, for instance, the *adat* (customary law) is not formally recognized or supported by legislation. As the legal owner of the land, the government grants exploitation rights to plantation companies or sells the land to them in exchange for revenue. Plantations may therefore end up curtailing local customary rights, restricting local resource use or even displacing local communities.

The negative impact of losing customary land rights on the livelihood of the local community is widely acknowledged; it includes diminished availability of forest resources and services and landlessness, something that often leads to migration to urban areas in search of work (Colchester, 2006).

The decreased availability of resources that can be found in natural forests but not in plantations, including wild food products, fuel wood, and medicines, has a particular impact on women. Their workload often becomes heavier because traditionally it is often their task to collect such resources (Movimiento Mundial, 2005).

Social conflicts may ensue if a plantation deprives local communities of access to land and other natural resources that they believe to be theirs without their agreement and without offering them compensation (Tauli-Corpuz and Tamang, 2007). This is the case in Indonesia, where forest plantations have displaced many smallholders, leading to disputes and in several locations to the destruction and theft of timber (Colchester et al., 2006; Kartodihardjo and Supriono, 2000). Joango (2006) reports on repeated protests by indigenous peoples in Peninsula Malaysia and Sarawak and by national and international NGOs against logging companies that operate on state lands considered by the people to be their own.

## 2.4 Process

In this section we describe various efforts to bring the different aspects of PPP into a single framework. Such integration requires there to actually be a framework and a process within that framework conducive to discussion and consultation between stakeholders and decision-makers. The framework provides a means for dealing with concerns and interests from stakeholder groups in society (international, national or local) and thus increases acceptance of the plantations and reduces the risk of failure.

The frameworks used for these processes are provided by two sets of guidelines: one that takes a market-based approach (plantation certification in general and FSC certification for plantations in particular) and one based on an intergovernmental perspective (FAO guidelines for planted forests). Other frameworks include national and regional land-use planning and national forest programmes.

### 2.4.1 Plantation certification and FSC plantation review process

In 1993, ITTO published guidelines for planted tropical forests (ITTO, 1993). The guidelines consist of 66 principles and 75 recommended actions relating to policy and legislation, environmental, socio-economic and institutional considerations, and management and post-management aspects. The guidelines are voluntary and are not related to any certification system. Currently about 3.2 million of a total of 67 million hectares of planted forest in the tropics were certified in 2004. This represents only a fraction (1.2%) of worldwide certified forests (270 m ha). Most of the certified tropical forest plantations are located in Brazil (over 80%). FSC-certified plantations in the tropics account for 2.2 million hectares, PEFC-certified plantations for 88,000 hectares and MTTC-certified plantations (Malaysia) for 77,000 hectares (ITTO, 2007 based on World Resources Institute data). Tomasselli (2007) presents slightly different figures and states that in general the area of certified forest plantations devoted to products other than pulp is still negligible in the tropics.

Forest certification costs may vary significantly depending on a large number of factors. Nevertheless, such costs are generally lower for plantations than for natural forests. When compared to a non-certified product, wood labelled 'green' is at a slight advantage in terms of market access, mainly in countries that are conscientious regarding green-labelled products. Some certification schemes have reported price premiums associated with certification, but only in spot markets. Moreover, there is no well-established certified product market, only some specific niches in Western Europe (ITTO, 2006). Voluntary certification schemes are failing to reform the forest sector in the tropics because they do not result in changes to forest law and governance, which is often where the main problems lie (Humphreys, 2006). Nevertheless certification schemes could increase confidence among potential investors, for instance because their systematic approach will reduce management and supply risks.

The Forest Stewardship Council (FSC) is one of the most demanding forest certification systems and certifies not only natural forests but also plantations. One of its ten principles is dedicated to forest plantations. This principle is broken down into nine criteria (see Box 4).

**Box 4. FSC criteria for forest plantations (in brief)**

1. The need for a management and implementation plan.
2. Design and layout of plantations should promote the protection, restoration and conservation of natural forests.
3. Diversity of composition of the plantations.
4. Selection of species based on suitability and preferably use of native species.
5. A part of the area must be managed so as to restore the site to a natural forest cover.
6. Measures must be taken to maintain or improve soil structure, fertility, and biological activity.
7. Measures must be taken to prevent and minimize outbreaks of pests, diseases, fire and invasive plant introductions.
8. Monitoring includes potential on-site and off-site ecological and social impacts.
9. Plantations established in areas converted from natural forests after November 1994 do not normally qualify for certification.

*Source: <http://www.fsc.org/plantations/>*

There have been numerous plantation-related controversies. FSC stakeholders were not satisfied with the way plantations were being dealt with and a review process was initiated that was completed in March 2007. The issues raised by the forest plantation review (Box 5) showed that, like other bodies, the FSC — an institution well known for its advanced ecological, social and economic standards in certification — struggles with the question of what is good and sustainable plantation management. Issues in particular need of consideration included the social aspects, ecosystem integrity, stakeholder consultation, the use of chemicals and forest conversion for plantations. In March 2007, the FSC Board of Directors approved the final recommendations of the Policy Working Group concerning the next steps to be taken in the technical review phase. Teams of technical experts will help elaborate the policy recommendations so as to produce practical handbooks, guidelines, and online tools and resources for forest and plantation managers.

### Box 5. Main issues in FSC forest plantation review process

**Social issues:** There is a need to integrate, more systematically than before, social issues into FSC structures and processes. Social management must be on an equal footing with the economic and environmental aspects of forest and plantation certification. A systematic approach to addressing social issues is required, implemented through a Social Management System, including mapping of socially important features in the landscape; identifying the social objectives of the management unit together with affected stakeholders; systematic management of personnel; detailed, participatory social assessment of positive and negative impacts of the plantation management on the local community; clear strategies for prevention, mitigation and compensation in the event of negative impacts; participation in improvement of livelihood, local development and poverty reduction.

**Ecosystem integrity:** the new approach is based on two rules, viz. (1) the management of an FSC-certified plantation must adopt an active approach to preventing, mitigating and if necessary, remedying/restoring any environmental effects of its management on ecosystem integrity, and (2) the management of the FSC-certified plantation must adopt a proactive conservation strategy (e.g. with respect to high conservation value areas).

**Stakeholder consultation:** in the past, stakeholder consultation was a root cause of conflict. The responsibility for engaging affected parties rests with the manager of the plantation. The manager must implement a clear and robust consultation process which covers the periods before and during the certification process. There must also be a similarly recognized conflict resolution process in place. Any significant conflict must be identified and documented, the manager should be able to demonstrate actions taken to resolve the conflict, and he should contact communities at the operation's cost rather than expecting communities to do so at their own cost.

**Use of chemicals:** certified operators must adopt a consistent best-practice integrated chemicals approach, which includes elimination of significant downstream and adjacent effects; full declaration of chemical usage; adoption of procedures and mechanisms to avoid, mitigate and provide fair compensation for negative impacts on workers, local communities and the environment; monitoring of and reporting on such safety, health and quality controls; demonstrating the results of efforts to avoid or reduce pesticides use.

**Conversion:** forest conversion is one of the most sensitive issues within the FSC, because 'conversion' and deforestation have strong links. The cut-off date of 1994 is a particularly sensitive issue: plantations established in areas converted from natural forests after November 1994 will not normally qualify for certification. However, what is 'normally'? This and other issues are still under debate.

*Source: Forest Stewardship Council, 2006*

## 2.4.2 FAO voluntary guidelines for planted forests

In 2006, the FAO presented a working paper bearing the title: 'Responsible management of planted forests: Voluntary guidelines'. The voluntary nature of the guidelines is stressed in the title and, as it is a working paper, it does not reflect the FAO's official position. The guidelines were formulated in a participatory process, and earlier versions were available on the Internet, with a wide range of stakeholders providing feedback on them.

The guidelines were discussed at length at several meetings, giving the many stakeholders who worked with FAO on this issue a sense of ownership (see Box 6 for a short summary of the principles).

The FAO guidelines are less prescriptive than the FSC rules, which, after all, serve as guidelines for official certification. The FSC focuses mainly on the role and responsibilities of the plantation manager, whereas the FAO focuses explicitly on the roles of the government and other stakeholders. However, there is no easy guide for governments, the private sector or small-scale entrepreneurs. It would have been a good idea to provide an overview of the tasks each actor needs to fulfil in order to establish successful initiatives and create a suitable enabling environment for plantations.

### Box 6. Principles and cross-cutting issues from FAO guidelines

The FAO guidelines refer to the following principles:

- **Institutional principles:** (a) good governance, (b) integrated decision-making and multi-stakeholder approaches, (c) effective organizational capacity.
- **Economic principles:** (a) recognition of the value of goods and services, (b) enabling environment for investment, (c) recognition of the role of the market.
- **Social and cultural principles:** (a) recognition of social and cultural values, (b) maintenance of social and cultural services.
- **Environmental principles:** (a) maintenance and conservation of environmental services, (b) conservation of biological diversity, (c) maintenance of forest health and productivity.
- **Landscape approach principles:** management of landscapes for social, economic and environmental benefits.

In addition to guidelines related to every principle, selected cross-cutting issues are considered:

- **Institutional roles:** governments, the private sector (corporate and smallholder companies and associations), non-government and community-based organizations and other stakeholders have important and diverse roles to play in institutional principles. The roles of the stakeholders are determined by the unique combination of prevailing conditions.
- **Strategic and economic planning:** recognition of the value of goods and services; an enabling environment for planted forest investment, including taxes and fees; recognition of the role of the markets at all levels. Also relates to integrated decision-making and multi-stakeholder approaches; recognition of social and cultural values; maintenance of social and cultural services; and integrated planning and management approaches within the landscape. Planning should be applied to large and medium-scale investments in planted forests. Holders of only small areas of forest should also undertake a similar process, however, in order to ensure that their investment will yield the intended goods and/or services.
- **Stakeholder relations:** considerations of stakeholder relations are particularly relevant in good governance, integrated decision making, recognition of social and cultural values and maintenance of social and cultural services. Open dialogue, participation and the sharing of benefits by relevant stakeholders are important for success. This includes respect and facilitation of both 'bottom up' and 'top down' open, cooperative communication to better understand needs, aspirations and proposed development programmes.
- **Learning and research:** these issues are important for all principles. Adopting a learning culture is essential – through a combination of scientific research, traditional knowledge, education, training and building upon past experience.
- **Operational planning and management:** this includes biotechnology and genetic modification, use of herbicides and other chemicals, fertilizers, forest management, invasive species, conservation and sustainable use of biodiversity, water management, rights of indigenous peoples and community customary rights, land tenure and usufruct, employment and the application of incentives.

*Source: FAO, 2006*

### 2.4.3 National forest programmes

National forest programmes (NFPs) offer global frameworks for forest policy, planning and implementation at country level. They cover a wide range of implementation approaches to sustainable forest management, aiming to achieve the conservation and sustainable use of forest biodiversity and an equitable sharing of forest resources, in accordance with a country's specific priorities, needs and context (DFID & DGIS, 2002; Savenije, 2000; see also <http://www.fao.org/forestry/site/nfp/en/>). NFPs are intended to provide a multi-stakeholder framework for developing forest-related policies. The key principles are (a) national sovereignty and country leadership, (b) consistency within and integration beyond the forest sector, and (c) participation and partnership (NFP Facility, 2006). The NFP approach covers plantations, but an overview of the NFP process in Guatemala (Oliva Hurtado et al.,



2006) that involved regional roundtables with stakeholders makes hardly any specific reference to plantations. One example of an NFP framework that does consider plantations is a study of financing strategies for planted forests in Brazil (Mendes, 2005). This is a study, however, and not necessarily based on a participatory process. We can find scarcely any documentary evidence of participatory processes in which stakeholders actively discuss the national forest policy on plantations. However, NFPs are probably a good vehicle for starting a forest plantation planning and development process on a national scale.

#### 2.4.4 Land-use planning

ITTO recognized back in 1993 that 'land allocation for the establishment of planted forests must consider the interests, legal rights and long-term plans of all sectors concerned with or affected by their development. Particular attention must be given to the interest of local residents and communities who will experience most closely any changes brought about by particular planted forest proposals. There will therefore be a need for specific planning activities at the national, regional and local scale.'

Examples of land-use planning associated with forest plantations are scarce. One promising example is the Land Use Planning and Land Allocation (LUPLA) initiative in Vietnam (see Box 7). Another strategy is to create mixed plantations, although that is hard to reconcile with the current dominant model of industrial-scale monocrops (Colchester, 2006).

##### **Box 7. Land-use planning and plantations in Vietnam**

By giving local communities or individual households registered land tenure, investment in reforestation becomes economically viable and the local poor become empowered to improve their own living conditions. The initiative started by recognizing that previous attempts at land allocation had been unsuccessful primarily because of the failure to involve local communities and the lack of follow-up and training for land recipients.

The initiative consists of seven steps:

1. preparation, including local institutional set-up, training in the methodology;
2. land surveying and mapping;
3. land use and allocation planning, including village meetings where farmers declare their needs and land allocation plans are drawn up;
4. demarcation in the field;
5. completion of administrative procedures (including settlement of possible disputes);
6. issuance of official land certificates;
7. facilitation of land development, including contacting credit providers, extension services and tree growers.

This initiative proved to be successful: more than 16,000 hectares of land have been allocated to more than 3,000 households and six villages. Provincial authorities also officially approved the methodology.

*Source: Le Viet Tam and Doets, 2005*



### 3. Key policy issues

In order to ensure the expansion of sustainably managed forest plantations, policy-makers should consider the following key issues:

#### Planet

1. Forest plantations can produce wood quickly and efficiently, generally faster than natural forests. They may provide a surprisingly large proportion of native biodiversity with a habitat, but less so than undisturbed native forest. They are also a source of environmental concern, for example with respect to soil productivity, water cycles, biodiversity and pests and diseases. There are tools available that can analyze all the relevant aspects, including the environmental and social ones (e.g. an environmental cost-benefit analysis). Public decisionmakers at national, regional and local level must weigh up and deal with the various trade-offs involved. Plantation-specific tools and models are required to quantify the effect of silvicultural management and the legal and institutional arrangements concerning the provision of plantation goods and services.
2. The claim that plantations take the pressure off natural forests and therefore help reduce biodiversity loss is highly tendentious. Plantations may well be part of a strategy to alleviate the pressure on natural forests, but they are only one element in a whole package of measures to reduce their deforestation and promote their sustainable use and management.
3. Forest plantations provide supporting and regulating services (see Box 2), but these cannot replace all the services that would have been provided by the original natural forest. However, an integrated landscape approach makes it possible to reduce the negative environmental effects of plantations. We suggest that new plantation policies should focus on establishing plantations that offer the greatest possible and most sustainable combination of goods and services.

#### Profit

4. For production purposes, forest plantations are often more efficient and profitable than natural forests. Other land uses – mainly monocropping agricultural uses such as growing soya beans and oil palms – usually seem more attractive and profitable than forest plantations, but their relative competitiveness varies greatly and depends on local ecological factors (e.g. soil fertility) and on socio-economic, cultural and financial aspects. The cost-effectiveness of creating incentives for forest plantations also depends on such factors.
5. There is still considerable concern about the economic and financial viability of plantations as a large-scale or small-scale commercial investment. In the past, subsidies were one of the most important means of solving this problem. More effort must be made to explore other options, such as (a) making investment more attractive, (b) requiring payment for the plantation forest's other functions, (c) bridging the gap between investment and long-term harvesting, (d) improving governance, or the enabling environment, (e) improving the image of the sector, (f) removing 'perverse' incentives for agricultural land uses, and (g) reducing risks and uncertainty. The level of risk can be reduced by applying good forestry practices that involve sharing the plantation's benefits among the different stakeholders involved at various levels of decision-making, including local communities.
6. The key elements of an enabling environment for establishing a plantation include macro-economic, political and institutional stability; access to land; clear resource tenure arrangements (land and trees); fair compensation for the loss of land rights; and policies supporting the development of systems requiring payment for environmental services.

## People

7. Planted forests in general and industrial-scale plantations in particular do not automatically have a positive impact on the livelihoods of local people. Many critics of tropical timber plantations cite the risk of an unfair distribution of plantation costs and benefits. Plantations seem to favour the interests of a few above the basic needs of the majority of the rural population. There is often a positive link between local level social and economic sustainability and biodiversity conservation: local people use a variety of products and services from different species and ecosystems to improve their living standards and diminish risks.
8. One promising option is participatory land-use planning for plantations involving all the relevant stakeholders. Another strategy focuses on mixed species and agroforestry plantations with well-defined rights of access and use for the local population. It will take a great deal of effort, however, to reconcile this strategy with the current dominant model of industrial-scale monocrops.

## Process

9. In order to properly integrate and equitably balance the various aspects of PPP and deal with their tradeoffs, transparent frameworks or mechanisms for multi-stakeholder dialogue, decision-making, coordination and collaboration are needed at the various levels. Such frameworks will consider the concerns and interests of groups of stakeholders (international, national or local), making plantations more acceptable and reducing the risk of failure. At international level, a multi-stakeholder process has been used as a framework for formulating the FAO guidelines and FSC plantation review, with apparent success: the final products were accepted by the major stakeholders. At national and local level, only a few examples can be found of comparable processes involving forest plantations. New initiatives are needed at both national and local scale for the balanced integration of Profit, Planet and People into a meaningful multi-stakeholder Process (PPP+P).<sup>2</sup>
10. At the national level, the FAO set of guidelines (see Box 5) offers a good start for integrating the most important issues in forest plantation policy and management. At this level, plantation policies and planning should be formulated according to the participatory principles of the NFP (national forest programme).
11. At local level, landscape approaches could be combined with systems of payment for ecosystem goods and services, allowing the various stakeholder groups to define the configuration of the plantations in their landscape. Outgrowing and company-community partnerships can provide a strategy for a more equitable distribution of ecosystem benefits and may help improve the living conditions of rural people and reduce poverty in rural areas. They may also contribute to a better mutual understanding between the private sector and local communities.

Forest certification can serve as a complementary tool for guiding the process of integrating and balancing the three Ps. This is first and foremost an incentive for opening up markets for sustainably produced timber; it is not designed to promote forest governance, because it focuses on the management unit level and gives only limited consideration to the landscape surrounding the management unit and the governance structures and processes present there.

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<sup>2</sup> For descriptions of various approaches and tools for facilitating such a process, see for example <http://portals.wi.wur.nl/mssp/>

## References

- Barlow, J. et al., 2006.  
The role of plantation forestry in biodiversity conservation in the humid tropics. Bilbao conference IUFRO Oct. 2006.
- Bauhus, J. & J. Schmerbeck, 2006.  
Managing forest plantations for ecosystem goods and services. *Arborvitae* 31, pp. 10-11.
- Bull, G., M. Bazett, O. Schwab, S. Nilsson, A. White & S. Maginnis, 2006.  
Industrial forest plantation subsidies: Impacts and implications. *Forest Policy and Economics* 9 (2006), pp. 13-31.
- Cashore, B. & C. McDermott, 2004.  
Global environmental forest policies: Canada as a constant comparison of select forest practice regulations. Chapter six: Forest policies in Mexico, Brazil, Chile, India, Indonesia, China, South Africa, and the Democratic Republic of Congo. *International Forest Resources*. 96 pp. <http://www.ifor.ca/docs/Ch6.DW714.pdf>.
- Chamshama, S. & F. Nwonwu, 2004a.  
Forest Plantations in Sub-Saharan Africa. Lessons learnt on Sustainable Forest management in Africa. Report. KSLA, AFORNET, FAO. 54 pp.
- Chamshama, S. & Frank Nwonwu, 2004b.  
Plantation Forestry in Sub-Saharan Africa. Lessons learnt on Sustainable Forest management in Africa Policy brief No 4. KSLA, AFORNET, FAO.
- Charnley, S., 2006.  
Industrial plantation forestry: Do local communities benefit? *Journal of Sustainable Forestry* 21 (4), pp. 35-57.
- Chomitz, K. M., 2006.  
At loggerheads? Agricultural expansion, poverty reduction, and environment in the tropical forests. World Bank Policy Research Report. 284 pp.
- Christy, L., Ch. Di Leva, J. Lindsay & P. Talla Takoukam, 2007.  
Forest law and sustainable development: addressing contemporary challenges through legal reform. World Bank Law, Justice and Development Series, 206 pp.
- CIFOR (Centre for International Forest Research), 2002.  
Typology of planted Forests. Infobrief UNFF 2, UN Headquarters, 4-15 March 2002: 4 pp.
- Colchester, M., N. Jiwan, Andiko, M. Sirait, A.Y Firdaus, A. Surambo, & H. Pane. 2006.  
Promised Land: Palm Oil and Land Acquisition in Indonesia – Implications for Local Communities and Indigenous People. First published by Forest People Programme, Perkumpulan Sawit Watch, HuMA and the World Agroforestry Centre.
- Colchester, M., 2000.  
Indigenous people and the new 'global vision' on forests: Implications and prospects. Discussion paper for Global Vision 2050 for Forestry World bank/WWF Project.
- Cossalter, C. & C. Pye-Smith, 2003.  
Fast-Wood Forestry. Myths and Realities. *Forest Perspectives*, CIFOR: 60.

DFID & DGIS, 2002.

National forest programmes. Keysheet No 17, 2 pp. [www.keysheets.org](http://www.keysheets.org).

Dijk, Kees van & Herman Savenije (in preparation), 2008.

Hacia estrategias nacionales de financiamiento para el manejo forestal sostenible en América Latina: Síntesis del estado actual y experiencias de algunos países. Proyecto GCP/INT/953/NET: 'Estrategias y mecanismos financieros para la conservación y el uso sostenible de los bosques - Fase1: América Latina' y Proyecto OTCA – BMZ/GTZ - DGIS 'Uso Sostenible y Conservación de los Bosques y de la Biodiversidad en la Región Amazónica'.

Enters, Th., P.B. Durst & C. Brown, 2003.

What does it take? The role of incentives in forest plantation development in the Asia-Pacific region. UNFF Intersessional Experts meeting on the role of planted forests in sustainable forest management, 24-30 March 2003, New Zealand. 13 pp (available at: <ftp://ftp.fao.org/docrep/fao/005/y4744e/y4744e03.pdf>).

Evans, J. & J.W. Turnbull, 2004.

Plantation forestry in the tropics: Role of silviculture and use of planted forests for industrial, social, environmental and agroforestry purposes (3rd edn.). Oxford University Press, Oxford, UK.

FAO, 2005.

Microfinance and forest-based small-scale enterprises. FAO Forestry paper 146. FAO, Rome, Italy. 90 pp.

FAO, 2006.

Responsible management of planted forests: voluntary guidelines. Planted Forests and Trees Working paper 37/E. Rome, Italy ([www.fao.org/forestry/site/10368/en](http://www.fao.org/forestry/site/10368/en)).

Forest Stewardship Council, 2006.

The FSC plantations review policy working group final report. 19 pp. [www.fsc.org](http://www.fsc.org).

Hall, D., 2003.

The international political ecology of industrial shrimp aquaculture and industrial plantation forestry in Southeast Asia. In: *Journal of Southeast Asian Studies*, 34(2): 252-264.

Humphreys, D., 2006.

Logjam. Deforestation and the crisis of global governance. Earthscan Forestry Library. Earthscan, London. 302 pp.

ITTO, 1993.

ITTO guidelines for the establishment and sustainable management of planted tropical forests. ITTO Policy Development 4. 38 pp.

ITTO, 2006.

Report on the market study on tropical plantation timber products. Prepared for ITTO by STCP Engenharia de Projetos Ltda. ITTO Thirty-ninth session 6-11 November 2006, Yokohama, Japan. 192 pp.

Joango, H. 2006.

Forest governance in Malaysia: An NGO perspective. A report prepared for FERN.

Lette, H., & H. de Boo, 2002.

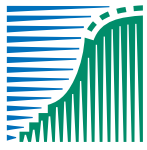
Economic valuation of forests and nature. A support tool for effective decision making. Theme Studies Series 6. Forests, Forestry and Biodiversity Support Group. International Agricultural centre (IAC), National Reference centre for Agriculture, Nature management and Fisheries (EC-LNV), Ede, Netherlands. 69 pp.

- Keipi, K., 1997.  
Financing forest plantations in Latin America: Government incentives. *Unasyuva* 188. FAO. Also at:  
<http://www.fao.org/docrep/w3247e/w3247e0b.htm>.
- Kanowski, P., 2005.  
Intensively managed planted forests. A report prepared for The Forest Dialogue, Yale University, Connecticut, United States, June 2005.
- Kartodihardjo, H. & A. Supriono, 2000.  
The impact of sectoral development on natural forest conversion and degradation: The case of timber and tree crop plantations in Indonesia. CIFOR, occasional paper no. 26(E), Bogor, Indonesia.
- Le Viet Tam & C. Doets, 2005.  
Land use planning and land allocation (LUPLA). Linking reforestation with democratization and poverty reduction in Vietnam. SNV Netherlands & Vietnam. 6 pp.
- Lindenmayer, D.B., R.J. Hobbs, & D. Salt, 2002.  
Plantation forests and biodiversity conservation, *Proceedings Australian Forest Plantations 2002*, BRS/ANU.
- Maginnis, S. & W. Jackson, 2003.  
The role of planted forests in Forest Landscape Restoration. UNFF Intersessional Experts meeting on the role of planted forests in sustainable forest management. New Zealand, 25-27 March 2003, pp. 87-99.
- Maginnis, S. & D. Pollard, 2006.  
'Forest Plantations: the good, the bad and the ugly.' *Arborvitea - IUCN-WWF Forest Conservation Newsletter* 31: 1.
- Mayers, J., 2006.  
Poverty reduction through commercial forestry: What evidence? What prospects? Research paper, no. 2-2006, the Forestry Dialogue, [www.theforestdialogue.org](http://www.theforestdialogue.org).
- Mendes, J. B., 2005.  
Estratégias e mecanismos financeiros para florestas plantadas. FAO, 68 pp.
- Morrison, E. & S.M.J. Bass, 1992.  
What about people. In: Sargent, C. and Bass, S. (eds). *Plantation politics: Forest plantation in development*. Earthscan Publications Ltd., London, UK, pp. 92-120.
- Movimiento Mundial por los Bosques Tropicales, 2005.  
Mujer, bosques y plantaciones: una dimensión de género. WRM, Montevideo, Uruguay, pp. 44-59.
- National Forest Programme Facility, 2006.  
Understanding national forest programmes. Guidance for practitioners. FAO, Rome, 64 pp.
- Oliva Hurtado, E., E. Sales Hernández & I. Bustos García, 2006.  
Guatemala's national forest programme – integrating agendas from the country's diverse forest regions. *Unasyuva* 222, Vol. 57 pp. 34-39.
- Reid, W. et al., 2005.  
Millennium Ecosystem Assessment 2005. Washington: UNEP.

- Salleh, M. N. & J. van den Berg, 2007.  
Plantation Forestry: A Review of Policies and Strategies in Sarawak, Sabah and Peninsular Malaysia.  
Unpublished research paper, LEI, Den Haag, The Netherlands.
- Savenije, H., 2000.  
National forest programmes: From political concept to practical instrument in developing countries'.  
Theme Studies Series 3. Forests, Forestry and Biological Diversity Support Group. Wageningen: National  
Reference Centre for Nature Management (EC LNV). 55 pp.
- Stuebing, R., 2006.  
Biodiversity conservation in a mixed-use plantation in Sarawak. *Arborvitae* 31: p. 12.
- Spek, M., 2006.  
Financing pulp mills: an appraisal of risk assessment and safeguard procedures. CIFOR, Bogor, Indonesia.  
86 pp.
- Tauli-Corpuz, V. & P. Tamang, 2007.  
Oil palm and other commercial tree plantations, monocropping: Impacts on Indigenous peoples' land tenure  
and resource management systems and livelihoods. Paper prepared for the Permanent Forum on Indigenous  
Issues, the 6<sup>th</sup> Session of the United Nations Permanent Forum, New York, 14-25 May 2007.
- Tomaselli, I., 2007.  
The allure of plantations. *ITTO Tropical Forest Update* 17/1, pp. 10-13.
- Van Der Meer P. J., J. Schmerbeck, A. Hooda, C. Bairaktari, N.S. Bisht, M.S. Gusain, C.J.Singh, A. Naithani,  
A. Saxena, A.F.M. Olsthoorn & R.S. de Groot, 2007.  
Assessment of ecosystem goods and services of forests in India, The Netherlands, and Germany. NETFOP  
report no 2, EU-ECCP program India (Internal Report).
- Varmola, M. (ed.), 2002.  
Case study of the tropical forest plantations in Malaysia. FAO, Forestry Department, Forest Plantation Working  
Papers, FP/23, FAO, Rome, Italy.
- White, A. & A. Martin, 2002.  
Who owns the world's forests? Forest tenure and public forests in transition. *Forest Trends*. Center for  
International Law, Washington D.C., United States.
- WRM, 2007.  
Working conditions and health impacts on tree plantations. In: *WRM Bulletin* 122.







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