As a result of significant increases in demand for wood, the global wood market is undergoing rapid changes, putting considerable and increasing pressure on the world’s remaining natural forests. Without significant investment in promoting sustainable forest management (SFM) efforts and in plantation management, it must be expected that, especially in many World Bank client countries, increasing demand for wood will lead to further degradation and fragmentation of forests and permanent deforestation. To successfully change this situation, international wood demand must be met through sustainable wood production from natural forests and plantation management. To facilitate such a process, markets must increasingly adopt mechanisms that not only ensure sustainable forestry and conservation, but also provide satisfactory livelihood opportunities for forest-dependent communities, and promote sustainable economic development for all nations, including countries with low forest cover. Therefore, the sustainable production of wood to meet increasing demand will continue to play a predominant role in the discussion of how to achieve global targets for forest management.

Economic processes have always relied on wood, and access to and exploitation of it have shaped economic structures. The exploitation of wood for subsistence uses for energy or construction material, or for commercial use in local, regional, and global markets, were among the first objectives of managing forest resources through human intervention. See box 3.1 for definitions of several commercial wood products.

Even though managing forests has become more complex over the past decades because of a wider range of management objectives than just wood production (for example, biodiversity conservation, carbon sequestration, recreation, and tourism), the core problems and challenges often remain similar. The exploitation of wood for subsistence use and commercialization at unsustainable levels leads to forest degradation and destruction, which frequently constitutes the first step toward conversion of forests to other land uses and, thus, permanent deforestation dynamics (see figure 3.1).

This sequence of events has become a major concern to resource managers in recent years because the constantly growing demand for wood, particularly by emerging economies like Brazil, China, India, and South Africa, is strongly affecting forests and forest-dependent people in producer countries. For example, in China total forest-product imports rose from 40 million cubic meters (m³) to almost 150 million m³ between 1997 and 2005. It is expected that demand, both domestic and from outside the country, will continue to rise, and forest-product imports to China are likely to double within the next 10 years.¹ This development has strong impacts on markets in other countries in which forest management standards often are not yet as stringent as generally required by consumer countries.² Many of these countries are World Bank client coun-
tries, and supporting these countries in meeting international standards for responsible forest management and good governance constitutes one of the biggest challenges for World Bank operations in the forestry sector. For example, forests in eastern Siberia in the Russian Federation are the primary suppliers of wood to meet China’s rapidly growing demand. Because many of the traditional supply markets are starting to experience resource shortages, the growing demand for wood currently focuses on the exploitation of the last remaining natural reserves, for example, in the Congo Basin and the Amazon. It is therefore very likely that roundwood production in tropical countries will still increase in regions with natural forests.

If demand for wood cannot be met through sustainable supplies, forest degradation and deforestation will continue or even accelerate; thus, other management objectives, such as biodiversity conservation, carbon sequestration, and poverty alleviation are equally threatened. The increase in demand for wood and the resulting policy uncertainties and other sensitivities, paired with an increase in market prices, triggers another important factor contributing to these negative trends: illegal logging (see note 5.5, Addressing Illegal Logging, for further discussion), which is a serious threat to sustainable management of forest resources and, hence, to sustainable development in general. Between 1997 and 2002, estimates of illegally harvested timber in Southeast Asia alone amounted to more than 80 million m³. Based on the factors presented in box 3.2, the global demand for wood is expected to continue to grow in the years to come. While there has been little or no recent change in Europe and North America, deforestation is of great concern in many other parts of the world, especially in many African countries. According to the Food and Agriculture Organization (FAO) of the United Nations, the annual global deforestation rate is presently estimated to be about 0.2 percent (FAO 2006). In the period 1990–2000, this translated into a net loss of 95 million hectares (ha) of forests—an area larger than the República Bolivariana de Venezuela. The loss of 161 million ha of natural forests to deforestation was somewhat offset by 15 million ha of afforestation (the deliberate creation of forests where none existed), 36 million ha of natural expansion of forests, and 15 million ha of reforestation. These trends are critical because they lead to a decreasing supply of wood from natural forests, especially considering that productivity rates of natural forests are declining, too, because of overexploitation and insufficient management.

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**Box 3.1 Technical Definitions**

Wood includes roundwood, wood fuel, industrial roundwood, sawnwood, veneer sheets, and plywood.

Roundwood is wood obtained from removal, harvesting, and felling from forests and trees outside forest. It includes roundwood generally classified as wood fuel (fuelwood and charcoal) and industrial roundwood (sawlogs and veneer logs; pulpwood, round and split; and other industrial roundwood).

Wood fuel is roundwood used for fuel consumption such as cooking, heating, or power production.

Industrial roundwood is roundwood used for industrial production of other goods and services except as a source of energy. It includes several products: sawlogs and veneer logs (production of sawnwood or railway sleepers and veneer sheets, respectively); pulpwood, round and split (pulp, particleboard, or fiberboard); and other industrial roundwood (for tanning, distillation, poles, and so forth).

Sawnwood is wood that has been produced from domestic and imported roundwood, either by sawing lengthways or by a profile-chipping process.

Veneer sheets are thin sheets of wood of uniform thickness, peeled, sliced, or sawn.

Plywood is a panel consisting of an assembly of veneer sheets bonded together with the direction of the grain in alternate plies, generally at right angles.

interventions. Without further investments in improving the productivity of natural forests and establishing plantation forestry to meet future demands, it can be expected that supplies are only available for a limited number of years. Table 3.1 presents such estimations for selected countries.

The projected impact of the increase in the global demand for wood—especially from emerging economies—as major new processing and consumption markets—is, however, only one factor causing forest degradation and deforestation. At present, the conversion of forest land to other land uses, such as agriculture and urbanization, is by far the biggest factor for the continued degradation, fragmentation, and destruction of natural forest area in World Bank client countries and has a strong impact on the reduction in wood supply (illustrated in figure 3.1). While such dynamics are generally discussed with regard to their impacts on global forest market developments, their impacts on local and regional markets are equally important, with strong negative effects on local livelihoods and provision of local and global environmental services.

The global demand for wood fibers has complemented the increase in the demand for roundwood and timber products, with industry alone expected to need 1.9 billion m³ per year by 2015. Fast-growing plantations will be relied upon as a key element in meeting future demand for fiber. This shift of focus from natural forests to plantations for pulpwood production is partly due to their greater economic competitiveness and to environmental concern over declining natural forest cover.

Another significant contributor to the increase in roundwood consumption emerges from local and regional use of wood fuels, that is, fuelwood and charcoal. This aspect deserves particular attention because of its strong poverty link in many World Bank client countries (see table 3.2).

At the global level, the number of people living on less than $1/day is about the same as the number of those lacking access to commercial energy: 2 billion people (FAO COFO 2005). According to the World Bank (2004), about 575 million people depend on wood fuels as a source of energy in Sub-Saharan Africa. The use of wood fuels is pre-

<table>
<thead>
<tr>
<th>Country of origin</th>
<th>Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Russia (far eastern region)</td>
<td>&gt; 20</td>
</tr>
<tr>
<td>Papua New Guinea</td>
<td>13–16</td>
</tr>
<tr>
<td>Myanmar</td>
<td>10–15</td>
</tr>
<tr>
<td>Indonesia</td>
<td>10</td>
</tr>
<tr>
<td>Cambodia</td>
<td>4–9</td>
</tr>
</tbody>
</table>

dominant in both rural and urban locations, accounting for approximately 70 percent of total and 90 percent of household energy use. On average, women carry 20 kilograms of fuelwood five kilometers every day. Commonly, a large number of traders are involved in buying, transporting, and reselling wood fuels; this is often where most of the value added is obtained in this mainly informal sector.

As a consequence, with one of the primary causes of deforestation being exploitation of forests for wood fuels, the use of wood fuels constitutes one of the most pressing challenges for achieving SFM in almost all Sub-Saharan African and other World Bank client countries (including in South Asia, East Asia, and Central America). The most important factor that will cause this challenge to persist for years to come is the considerable population growth in these countries (see box 3.2 for other factors). For example, Sub-Saharan Africa has one of the world’s fastest growing populations (increasing by about 2.2 percent a year) and is expected to be home to more than a billion people by 2025 (compare with numbers in table 3.2). It is estimated that if current trends continue, many areas, especially the Sudano-Saharan belt, will experience a severe shortage of fuelwood by 2025. Again, it must be emphasized that while the wood fuel challenge is most apparent and urgent in Sub-Saharan Africa, it applies equally to other regions where forest resource management is an important component in the World Bank’s investment portfolio for achieving rural development and poverty alleviation. Even though some of these trends may be compensated for through the adoption of alternative energy sources, such as natural gas and biofuels, it is expected that the overall trend will lead to increases in wood fuel consumption over the next 15 to 20 years. It is also important to acknowledge that the wood fuel challenge generally exists in countries that are commonly not regarded as important forest countries for World Bank operations, but countries with low forest cover or low forest resource stocks and productivity rates (for example, savannah woodlands, Miombo forest ecosystems).

As a result of the increase in demand for wood, market pressure has been increasingly directed toward plantation forestry. Countries such as Argentina, Brazil, Chile, China, Indonesia, and South Africa are expected to become increasingly important world producers of pulpwood and industrial softwood for mass consumption through plantation forestry with exotic, fast-growing tree species.

In addition, wood fuel production in particular, but also larger-scale industrial production of wood, can be achieved through bottom-up approaches such as community woodlots, agroforestry, outgrower schemes, and company-community partnerships instigating economic opportunities at the household level (see notes 2.1, Community-Private Partnerships, and 2.2, Small and Medium Enterprises). Many of these interventions can also help regain degraded lands for economic productivity with positive effects reaching beyond sustainable wood production, for example, provision of environmental services. However, at this moment, certain wood, especially high-value timber species, can only be produced from natural forests; plantation forestry cannot yet be substituted for these sources of supply. Given the long production process wood requires, it is obvious that the stage has to be prepared right now for addressing—and meeting—future supply shortages from natural forests through plantation forestry. Another management intervention for increasing the wood supply in the future is to increase the production level of secondary and primary forests, providing the possibility for secondary forests to redevelop into primary forest-like ecosystems (see figure 3.1).

Last, a newly emerging factor is anticipated to have an impact on wood supply in the future: climate change. Changing climate regimes are expected to shift the current allocation of forest areas, leading not only to changes to and potential decline of natural forest areas, but also changing regimes for plantation establishment. Under climate change, production from plantations that have been established to date could decrease significantly, for example, through increasing climate variability and a higher probability of extreme climate events, such as droughts, initiating forest fires and increasing the vulnerability of trees to insects and disease. These effects are largely theoretical, but need to be explored and closely monitored in coming years to develop appropriate adaptation strategies.

### Table 3.2 Wood Fuel Data for Selected World Bank Client Countries, 2005

<table>
<thead>
<tr>
<th>Country</th>
<th>Total forest area (thousand ha)</th>
<th>Population (thousand)</th>
<th>Wood fuel consumption (thousand m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chad</td>
<td>11,921</td>
<td>8,823</td>
<td>4,088</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>13,000</td>
<td>69,961</td>
<td>108,879</td>
</tr>
<tr>
<td>Kenya</td>
<td>3,522</td>
<td>32,447</td>
<td>24,256</td>
</tr>
<tr>
<td>Madagascar</td>
<td>13,023</td>
<td>17,332</td>
<td>6,433</td>
</tr>
<tr>
<td>Malawi</td>
<td>3,402</td>
<td>11,182</td>
<td>5,617</td>
</tr>
<tr>
<td>Mozambique</td>
<td>19,512</td>
<td>19,129</td>
<td>20,297</td>
</tr>
<tr>
<td>Sudan</td>
<td>70,491</td>
<td>34,356</td>
<td>19,514</td>
</tr>
<tr>
<td>Tanzania</td>
<td>35,257</td>
<td>36,571</td>
<td>25,200</td>
</tr>
<tr>
<td>Uganda</td>
<td>3,627</td>
<td>25,920</td>
<td>42,041</td>
</tr>
<tr>
<td>Zambia</td>
<td>42,452</td>
<td>10,547</td>
<td>8,798</td>
</tr>
<tr>
<td>Zimbabwe</td>
<td>17,450</td>
<td>13,151</td>
<td>10,381</td>
</tr>
<tr>
<td>Total</td>
<td>301,358</td>
<td>1,359,140</td>
<td>278,976</td>
</tr>
</tbody>
</table>

Sources: FAO 2006; FAO 2007.
In summary, the global market for wood is characterized by considerable and increasing pressure on the world's remaining natural forests. Without significant investment in promoting sustainable management of natural forests and in plantation management, especially in many World Bank client countries, further degradation, fragmentation, and destruction of natural forests can be expected. To successfully change this situation, the wood market must be transformed into one that ensures sustainable forestry and conservation, provides satisfactory livelihood opportunities for forest-dependent communities, and promotes sustainable economic development.

The Global Vision for Forest 2050 Project, which brought together leading experts, nongovernmental organizations (NGOs), industry representatives, and donor institutions, yielded the scenario depicted in figure 3.2 for a global closed-forest area of 3 billion ha in 2050. This would result in an increase in community-owned and -managed forests and a significant increase in protected areas as defined by the World Conservation Union (more formally known as the International Union for the Conservation of Nature and Natural Resources, or IUCN). The area of state and private production forests under intensive management would remain roughly the same as at present, and industrial plantation forests would increase slightly, from 95 million to 100 million hectares.

These developments will have a significant impact on how the World Bank—together with its development partners—can engage in forest management to develop feasible solutions to address these challenges. In a broad sense, this engagement can be put into practice in two ways: (i) through operational work directly supporting governments and industry in their efforts to use the potential of sustainable wood production from natural forests and plantations to foster economic development and achieve poverty alleviation, and (ii) through analytical work, ensuring up-to-date knowledge management and dissemination.

**PAST ACTIVITIES**

The initial rationale for the World Bank to engage in the forestry sector in the 1970s was based on addressing worldwide declining wood supplies and the dependence of the rural poor on wood energy. To meet these objectives, early projects promoted industrial-scale forest plantations with an emphasis on forest engineering components (plant breeding, fast-growing species, plantation establishment, and the like). One common feature during this period was that the forest service was assigned a policing and controlling role, enforcing forest laws with the main objective of keeping people out of state-owned forest reserves and plantations. The involvement of rural people in forestry was limited to being a source of labor.

The early 1980s began with a shift toward greater participation by stakeholders and community involvement. The World Bank started to promote the importance of community mobilization in stabilizing forest resources and improving the incomes of forest-dependent communities. The main objective of this change was to link investment in forestry with poverty alleviation and environmental protection efforts.

Following a period of strong criticism from civil society organizations, especially environmental NGOs, who regarded World Bank investments as strong contributors to global deforestation dynamics, the Bank's engagement in productive forest management decreased significantly. As a consequence, in the 1990s the World Bank's forest policy and Bank operational activities focused mainly on projects aimed at the conservation of biodiversity.

In 2002 the World Bank adopted its current forest policy, which provides the opportunity to reengage in industrial-scale forest management when such investments are certified under an independent forest certification system that is acceptable to the World Bank. This development resulted from the intervention of environmental NGOs that consid-
Between 2002 and 2005, the World Bank ran approximately 29 projects with components that focused on meeting the growing demand for wood. Total lending associated with these projects was approximately US$282 million, which constituted about 40 percent of the lending on forests during this period. Of this amount, a large portion was invested in projects involving community participation in plantation and commercial harvesting, approximately US$55 million was invested in projects involving mainstreaming biodiversity considerations, and approximately US$10 million was allocated to forest certification systems.

KEY ISSUES

Meet the increasing demand for wood. Plantation forestry will become more important in meeting the growing demand for wood (see note 3.3). From 1995 to 2000, global forest plantation area increased from 120 million ha to about 170 million ha (116 million of which are located in Asia). In Brazil alone, forest plantation area increased from 500,000 ha in 1966 to 3.7 million ha in 1979, to 10.5 million ha in 2005 (Del Lungo, Ball, and Carle 2006). Over the past 15 years, the share of industrial fiber from plantations has grown from 5 percent to 30 percent compared to native forests, but in some countries the share is much higher (FAO 1995a).

Today, plantation forestry plays a significant role for wood production, especially in tropical countries, because of several important characteristics including high yield, short rotations, and accessibility. Although some plantations are for protection purposes, most are for production (FAO 2006), and plantations’ share in providing roundwood to industry is growing. Plantation forestry is also increasingly changing from large-scale investments in monocultures to small-scale investments in which local households and communities are the principle owners of the means of production, not just employed as laborers (see chapter 2, Engaging the Private Sector in Forest Development, and its associated notes, and note 3.3, Forest Plantations).

Avoid cross-sector policy impacts on sustainable management of forests. Threats to the long-term sustainable management of natural forests have generally come from decisions regarding alternative land uses, not from a lack of technical knowledge about SFM (for example, in the agricultural sector and in infrastructure, such as building of roads and dams). Such cross-sectoral policy impacts must be further analyzed and increasingly brought to the attention of policy makers and relevant stakeholders so they can design and strengthen policy interventions at the macro level that address these issues (for example, agricultural policies, road building, and the like). In this context, projects primarily designed for improving forest management in World Bank client countries must increasingly have their cross-sectoral effects taken into consideration (see detailed discussion in chapter 6, Mainstreaming Forests into Development Policy and Planning: Assessing Cross-Sectoral Impacts), thus making cooperation with other sectors necessary. The World Bank concurrently should further improve the way in which forest considerations are integrated into projects developed in nonforest sectors (for example, the infrastructure and energy sectors). Last, the World Bank could enhance its engagement in international policy efforts that address these cross-sectoral impacts, perhaps by engaging proactively in international initiatives, such as the Roundtable on Sustainable Palm Oil and others.

Another example in which policies have negatively affected forest management in World Bank client countries is the tropical timber import ban executed by several Western countries in the 1980s and 1990s. The import ban exacerbated the problem it was trying to address by shifting the terms of trade away from products derived from natural forests, thus further reducing the incentive to avoid conversion to other land uses. Since then, innovative tools, such as independent forest certification, have been developed to permit access of wood and timber products to high-price consumer markets in Western Europe and North America if they are proven to be in compliance with internationally accepted management standards. The high prices gained from these markets make management interventions in natural and plantation forests requiring additional investments—such as reduced-impact logging or the rehabilitation of degraded forests—economically feasible and contribute to achieving sustainable wood production in the future. In light of these developments, future activities need to focus on reducing transaction costs for forest certification, especially for smallholder producers, and to supporting their efforts to increase the marketing potential for their products and their access to high-price markets. Independent certification may also lead, in some cases, to a reevaluation of export ban policies in producer countries for high-value certified roundwood if domestic prices cannot
often provided at subsidized, below-market prices to further
tainable wood production of the region. This problem
processing capacity has been created that exceeds the sus-
 Reduce wood processing overcapacity. In some areas,
tion of logs, for instance, need to be further developed and should include improvements in transparency and accountability.

Develop incentives for sustainable management of natural forests and forest plantations. In contrast to policies negatively affecting sustainable management of natural forests, policies can also be designed to provide economic incentives to invest in responsible forest management. For example, land tenure reform can play a significant role in improving the security of returns on investment in SFM, thus augmenting incentives to participate. This is especially important for motivating small-scale farmers and communities to make investments in forestry (see note 1.4, Property and Access Rights). Another example of such positive policy interventions are tax incentives for forestry operators that undergo independent forest certification, which may cause higher transaction costs for forest management. Providing a framework that facilitates secure contractual arrangements between various stakeholders in forest management can equally encourage investments in responsible forest management. Complementary investments in research and development also often provide the platform upon which improvements in the field can be realized (for example, silvicultural techniques, nursery improvements, species variations, knowledge generation on lesser-known species, and the like). Often, these costs are not taken over by private investors, but have to be taken up through public expenditures instigating improved and increased investments in forestry.

Balance wood production with demands for biodiversity conservation. Various benefits can be realized from integrating conservation and production (see note 3.1, Mainstreaming Biodiversity Considerations into Productive Landscapes). Three key benefits are (i) improving the feasibility of achieving conservation goals by using production and protected areas, (ii) increasing the benefits from conservation by conserving parts of forests adjacent to protected areas, and (iii) improving the overall ownership and understanding of conservation.

Reduce wood processing overcapacity. In some areas, processing capacity has been created that exceeds the sustainable wood production of the region. This problem occurs mainly in southern countries, where raw material is often provided at subsidized, below-market prices to further compete with prices that could be obtained in international markets. In this context, innovative marketing systems, auctioning of logs, for instance, need to be further developed and should include improvements in transparency and accountability.

Use secondary forests for increasing wood production. The management of secondary forests presents both a challenge and an opportunity. Tropical countries have seen an increase in wood production from secondary forests because these areas are increasing dramatically, and in some countries now exceed the area covered by primary forests. Reliance on secondary forests is expected to increase as larger primary forest areas are designated as protected forests. Secondary forests are a good source of wood fibers, NTFPs, social and environmental services, and other goods. The potential of lesser-known species has to be further explored, and forest management should start to focus on these forests, steering wood production to shift gradually from primary to secondary forests. Secondary forests, therefore, have great potential to contribute to global wood demand (see figure 3.2).

Independent certification of forest management. Independent certification provides proof that forest managers are using good management practices, adhering to internationally agreed principles and criteria (see note, 3.2, Forest Certification Systems). The development of forest certification systems and schemes emerged from strident attempts to ban imports of tropical timber, brought forward in the 1980s and 1990s by advocacy groups in North America and Western Europe. Certification was conceived as a market-based instrument, aimed at rewarding good forest management by improving or maintaining access to high-price consumption markets. The final destinations for these products have, in the past, mainly been Western Europe, Japan, and North America, but increasingly, the emerging economies of Brazil, China, India, and Russia serve as destinations. Many of the emerging economies often only harbor the main processing and transformation facilities and export the final consumer products to high-value markets that increasingly demand certification as proof of good management practices. This is made possible by chain-of-custody certification, which, in most systems, complements forest management certification and provides a tool for tracking certified timber throughout the supply chain.

One of the key issues to address is the development of mechanisms to make certification economically attractive for small-scale forest management and timber processing.
operations (such as community-based forest management) that mainly produce for local and regional markets and do not necessarily have the ability to capture the benefits of high-value markets. Larger scale forest operations that do not produce for high-value market segments are another target.

Ensure that production forests provide environmental services while supporting local livelihoods. With the amendment of the Kyoto Protocol in 2005, plantations are expected to increasingly act as carbon sinks in many carbon credit projects, so that in addition to improving markets for forest products, developing countries will benefit from the Clean Development Mechanism (CDM) under the United Nations Framework Convention on Climate Change (see note 2.3, Innovative Marketing Arrangements for Environmental Services, and note 3.1, Mainstreaming Conservation Considerations into Productive Landscapes). Brazilian eucalypts plantations provide a good example of an attempt to maintain biodiversity: High-yielding cloned stands are separated by strips and blocks of protected conservation areas along sensitive regions, such as creeks and rivers. NTFPs, of great importance to local people, also may be integrated into plantation forestry operations. NTFPs including medicinal plants, rattan and bamboo production, rubber tapping, resins, and beekeeping are often a significant component of the forestry operation. Again, facilitating independent forest certification, especially for smallholder forestry, for natural forest and plantation management will contribute to achievement of this goal, ensuring that multidimensional management objectives are simultaneously achieved (see note 3.2, Forest Certification Systems).

Embed Forest Law Enforcement and Governance initiatives into productive forest management and timber and wood product trade. Illegal activities, enabled and fueled by the absence of effective legislation and management or their enforcement, are a leading factor in the loss of forests and the degradation of the resources and thus seriously endanger sustainable development. (See chapter 5, Improving Forest Governance, and note 5.5, Addressing Illegal Logging.)

Design appropriate contractual arrangements to facilitate partnerships between different stakeholders. Reallocation of land ownership to smaller owners is expected to prevent large-scale wood clearing. However, in some countries, such as New Zealand and South Africa, planted forests have been privatized; several other countries in Africa have also taken steps toward private and community engagement. Company-community partnerships are a promising approach and are expanding in the forest sector. Such partnerships can help to reduce risk, achieve better returns to land, diversify income sources, and much more—and therefore have the potential to contribute to the objectives of SFM and to economic development in rural areas (see note 2.1, Community-Private Partnerships).

Channeling economic potential to the local level can contribute significantly to poverty alleviation, especially when these benefits emerge not only as labor opportunities, but also as access to all means of production. Economic incentives should be created for smallholders to engage in forest management and make investments in sustainable forestry. Both traditional and innovative economic mechanisms should be applied to capture the financial benefits and make them available at the local level. The growing worldwide demand for timber also presents an opportunity for the establishment of sustainably managed plantations with the participation of smallholders, taking environmental, ecological, and social requirements into consideration. Lessons learned from plantation forestry indicate that access to such land for poor rural households must be managed in a socially acceptable way to prevent the risk that the rural poor will not benefit. The same holds true for natural forest management. Approaches must be designed that make economic sense to the rural poor, given their constraints and preferences. In this context, future engagement by the World Bank is needed to establish participatory land use and land tenure systems as a precondition for sustainable plantation forestry (see boxes 3.3 and 3.4).

**FUTURE PRIORITIES AND SCALING-UP ACTIVITIES**

Continue support for community-based forest management systems. Pilot projects supported by others are important for the World Bank’s operations, and demonstrate feasible approaches that can be scaled up to make a significant contribution to social, environmental, and economic objectives. The World Bank’s support to community-based forest management systems is promising, with the aim of enabling local communities to manage their own resources, rehabilitate and protect forests, market forest products, and benefit from security of tenure. One of the positive projects in line with this strategy is the Forestry Sector Development Project for Vietnam, which involves small-scale farmers (see box 3.4).
Encourage expansion of wood supply by private and community forest owners. Global fiber supply is shifting toward the southern hemisphere and China. Possibilities need to be explored for World Bank forestry projects and investment policies to support International Finance Corporation (IFC) private sector forest plantation investment in Argentina, Brazil, Chile, China, Ecuador, India, Indonesia, Mozambique, South Africa, Tanzania, Thailand, Uruguay, and Vietnam (see also chapter 2, Engaging the Private Sector in Forest Sector Development). Developing innovative approaches that facilitate certification of smallholder forest management, and improving access to high-price markets for certified small-scale producers, are regarded as important components.

Facilitating sustainable management of natural forests. Improving and extending responsible forest management according to the principles and criteria demanded by the World Bank’s Operational Policy on Forests (OP 4.36) is the principal entry point and vehicle by which the World Bank can improve forestry outcomes. To meet future wood demand, the productivity of natural forests that serve production purposes must be improved. Securing appropriate structure, balance, and composition of the flows of resources into and out of the forestry sector is the most difficult challenge to forestry in most World Bank client countries. Achieving sustainable management of natural forests requires significant reinvestment of revenues received from the extraction of wood. Meaningful stakeholder consultations also need to be maintained to ensure that socially endorsed goals and objectives are achieved (see also chapter 10, Consultation and Communications in Forest Activities, and chapter 12, Applying OP 4.10 on Indigenous Peoples).

Enhance technical capacity for natural forest management and plantation development. The technical capacity in many World Bank client countries is not sufficient to meet internationally acceptable standards for SFM. This is often evident even in the lack of timely collection and management of relevant and accurate data needed for forest management, such as forest area, forest types, resource stock inventories, growth and yield tables, biodiversity mapping, and so forth. Research on lesser-known species to increase management efficiency and productivity...
also needs to be extended in many countries. In addition, silvicultural knowledge as the basis for improving productivity of natural forest management is weak in many World Bank client countries and constitutes a key area for future intervention. Effective dissemination mechanisms need to be established, particularly when wood production is supposed to be increasingly channeled to smallholders.

**Improve cooperation with the conservation community.** Given the trend toward greater reliance on forest plantations, an agreement is needed between the conservation community and industry as to where and how plantation forests can be developed such that potentially negative social and environmental impacts are minimized. One way to achieve this cooperation may be by promoting the mapping of critical forest areas (for example, high conservation value forest [see note 3.1, Mainstreaming Conservation Considerations into Productive Landscapes] and related approaches) and independent forest certification of plantation management (see note 3.2, Forest Certification Systems).

**Design plantations to provide multiple functions.** Plantations will need to be designed so that they are able to provide the multiple functions expected of SFM, in addition to supplying raw material to pulp and paper mills and other industrial processing. To achieve this objective, further research will be needed to improve knowledge on silvicultural techniques, especially on growth performance of indigenous tree species and approaches for creating mixed-species or uneven-aged plantation forestry that resembles near-natural forest ecosystems and, hence, has a higher degree of provision of environmental service functions, such as biodiversity conservation.

**Improve procurement policies of World Bank client country governments.** Governments should be encouraged to increase the proportion of their forest product purchases that come from sources certified by systems and schemes that comply with internationally accepted criteria and indicators for SFM (see note 3.2, Forest Certification Systems).

**Support up-to-date systems for independent forest certification, including chain-of-custody certification.** Producers of tropical timber are under increasing pressure to be able to document the origin of their products, whether to demonstrate legality or achieve sustainability of forest management. Without this ability, producers may be excluded from key segments of the market. Related to this is the need to address “leakages” within the wood trade, such as through customs and other controls (see note 3.2, Forest Certification Systems, note 5.5, Addressing Illegal Logging, and chapter 2, Engaging the Private Sector in Forest Sector Development, and its associated notes).

**NOTES**

1. Different scenarios estimate that China’s forest product imports will reach far higher levels, up to 600 million m³, should imports continue to rise as they did from 1997 through 2005. Eventually the point may be reached when limited supply, coupled with rising prices for raw materials, will stem further increases in wood imports.

2. An increasing number of consumer countries—especially in Europe—are currently developing procurement standards for the import of wood and forest products that often demand independent management and chain-of-custody certification according to internationally recognized principles and criteria (see also note 3.2, Forest Certification Systems).

3. Emerging economies of particular interest in the context of this chapter include Brazil, China, India, Indonesia, Malaysia, South Africa, Thailand, and Vietnam.

4. For further information, please refer to the World Bank Forests Strategy (World Bank 2004a) and World Bank’s Operational Policy on Forests (OP 4.36).

5. This included projects emphasizing biodiversity considerations in forest plantations and productive landscapes, project components that develop forest certification systems, and certification to prevent illegal trade of timber and forest products, arrangements for plantations, and so forth.

6. Successful (net) plantation area must be distinguished from total planted area. The failure rate is often in the range of 20–30 percent, or even higher; plantations in the Philippines have had a success rate of only 26 percent (FAO 2003).

7. Especially in Latin America and Southeast Asia, the knowledge about lesser-known species has improved significantly. In Africa, research and knowledge dissemination regarding these species needs to be further supported.

8. Many consumer countries have developed, or are currently developing, procurement guidelines that require certification of wood products.

9. In this context, “traditional” refers to technical support, provision of material, and the like, while “innovative” refers to payments for environmental services. See note 2.3, Innovative Marketing Arrangements for Environmental Services.
SELECTED RESOURCES

International Tropical Timber Organization (ITTO). http://www.itto.or.jp
Forest Stewardship Council (FSC). http://www.fsc.org/en/

SELECTED READINGS


REFERENCES CITED


CROSS-REFERENCED CHAPTERS AND NOTES

Note 1.4: Property and Access Rights
Chapter 2: Engaging the Private Sector in Forest Sector Development, and associated notes
All notes in Chapter 3: Meeting the Growing Demand for Forest Products
Note 5.5: Addressing Illegal Logging and Other Forest Crime
Chapter 6: Mainstreaming Forests into Development Policy and Planning
Chapter 10: Consultation and Communications in Forest Activities
Chapter 12: Applying OP 4.10 on Indigenous Peoples
Conservation has often been treated as a separate activity from production—protected areas were identified and set aside for conservation while production areas were largely ignored by those with a conservation agenda. It is now widely recognized that a number of benefits can be achieved by integrating conservation and production.

First, conservation goals cannot always be fully achieved by using only protected areas. Critical biodiversity values and ecosystem services are also supported by many production forests. Many forests also have social and cultural values that may not be appropriately dealt with through exclusionary protection but can often be taken into account in production forest management. Forest-dependent communities are likely to have links to nearby forest areas so that the creation of a conservation area in another location brings few or no benefits.

Second, promoting conservation friendly practices in production forests surrounding protected areas can greatly enhance the benefits to conservation through a combination of reducing the threats to the protected areas and increasing the effective area covered. For example, threatened species within protected areas may be able to use adjacent land to supply some of their needs (such as food or shelter), thus increasing the overall population the area can sustain.

Third, addressing conservation within production areas makes conservation much more widely owned and understood. People involved in productive land uses begin to understand conservation and develop their own approaches to implementing it. In mainstreaming conservation, the separation between conservation and production is removed. Land users are mandated to consider how their actions can benefit conservation, both in their own land and in the broader context—a crucial extension.

Although there are major differences among countries in percentage of forests declared protected, existing coverage of protected areas globally is widely regarded as inadequate to safeguard biodiversity for two reasons. First, the area assigned to protection is small. The total area set aside for conservation purposes is less than 12 percent of the earth's land surface (Brooks and others 2004). Second, protected areas are often created in areas where no other productive land uses are possible, meaning that protected areas tend to over-represent infertile, inaccessible, and often low-biodiversity areas, and under-represent highly diverse, productive ecosystems. They also often fail to take account of areas that provide irreplaceable livelihoods to forest-dependent peoples and are critical to the identity of unique human cultures.

Although these problems are recognized, pressures on land are already high, and in many places there are few opportunities to expand protected areas or increase the representation of protected habitats.

Recently, the focus has shifted to improving the conservation of biological, social, and cultural values within a combination of protected and productive landscapes. The addition of production areas dramatically increases the area of land and the range of habitats in which some form of conservation can be practiced, providing more opportunities to address conservation priorities that are poorly represented in protected areas.

THE HCV CONCEPT—WHY IT IS USEFUL FOR INTEGRATING CONSERVATION AND PRODUCTION

The High Conservation Value (HCV) concept provides a framework for identifying forest areas with special attributes that make them particularly valuable for biodiversity or to local people (that is, High Conservation Value Forests, HCVF). The main objective of applying this framework is to design and implement appropriate management options for the area of concern. Strengths of the concept include the following:
The concept is designed to integrate production and protection. Therefore, it does not preclude productive use of some or even all of the HCVF identified. Management prescriptions are developed based on the best way to protect the values identified.

The methodology is not prescriptive, but provides a framework for systematic identification of values and planning for their protection. The HCV approach uses and builds on the findings of whatever conservation or land-use planning activities are already in place rather than replacing them. This makes it both more cost efficient and less threatening.

The HCV framework places equal emphasis on environmental and social values and requires a consultative approach to identify critical values and areas and to reach management decisions.

The concept is widely accepted and already integrated into the land-use planning frameworks of several nations or regions and within sustainable natural resource management standards and certification schemes.

The HCVF concept was initially developed for use in forest certification by the FSC in 1999. Six generic HCVs that a forest may contain or maintain were identified (see box 3.5) and the identification and protection of HCVFs became a requirement for FSC certification. It quickly became apparent that the concept could be useful not only within forest certification, but also in a wider land-use context and it is now used for a range of situations.

The HCV approach is applicable to a wide range of natural resource management scenarios. It is used both within the certification context and more widely, to guide both SFM within production forests, and land-use planning for responsible production of natural resources. HCV is routinely applied for developing management prescriptions to support conservation goals in production forests under the FSC and Malaysian Timber Certification Council certification schemes. Outside of certification, it is mainly being used for land-use planning purposes, including identification of set-aside areas for total protection and plantation design.

For SFM in natural forests, the HCV approach has proved to be a robust tool for undertaking forest land-use planning that integrates conservation and production requirements. The output generally indicates areas needing total protection, areas needing specific management, and

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Box 3.5 The Six Types of High Conservation Value Areas

High Conservation Value areas are critical areas in a landscape that need to be appropriately managed to maintain or enhance HCVs. There are six main types of HCV areas:

HCV1: “Areas containing globally, regionally, or nationally significant concentrations of biodiversity values (e.g., endemism, endangered species, refugia).” For example, the presence of several globally threatened bird species within a Kenyan montane forest.

HCV2: “Globally, regionally, or nationally significant large landscape-level areas where viable populations of most if not all naturally occurring species exist in natural patterns of distribution and abundance.” For example, a large tract of Mesoamerican flooded grasslands and gallery forests with healthy populations of Hyacinth Macaw, Jaguar, Maned Wolf, and Giant Otter, as well as most smaller species.

HCV3: “Areas that are in or contain rare, threatened, or endangered ecosystems.” For example, patches of a regionally rare type of freshwater swamp in an Australian coastal district.

HCV4: “Areas that provide basic ecosystem services in critical situations (for example, watershed protection, erosion control).” For example, forest on steep slopes with avalanche risk above a town in the European Alps.

HCV5: “Areas fundamental to meeting basic needs of local communities (for example, subsistence, health).” For example, key hunting or foraging areas for communities living at subsistence level in a Cambodian lowland forest mosaic.

HCV6: “Areas critical to local communities’ traditional cultural identity (areas of cultural, ecological, economic, or religious significance identified in cooperation with such local communities).” For example, sacred burial grounds within a forest management area in Canada.

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HCV Resource Network Charter (2006, pp. 2–3), adapted from the FSC.
areas that can be used more intensively without threatening maintenance of conservation values. For example, in the Russian Komi Republic, the HCV approach has been used to guide forest land planning exercises at the regional level, including rezoning concession areas based on public consultation and identification of social and biological HCVs. At the management unit level, the HCV approach can be used to guide ongoing management of natural forests. The presence or absence of each HCV is determined based on an analysis of existing information and the collection of additional information where necessary to fill gaps. The existing protection of, and threats to, the values, and the potential future threats (including those arising from the proposed activities) need to be identified to determine management prescriptions.

In areas zoned for conversion to agricultural or industrial forest plantations (for example, palm oil and pulp), HCV is also being widely used to identify areas that are low risk for conversion and those that must be maintained and managed as natural vegetation to preserve critical conservation values. It can also provide guidance on plantation planning and management to optimize conservation goals (see note 3.3, Forest Plantations). For example, the main industry standard for palm oil (the RSPO [Roundtable on Sustainable Palm Oil] Principles and Criteria) includes a prohibition on conversion of HCV areas to oil palm plantations and a requirement to maintain HCVs within areas affected by oil palm plantations and mills. Also, outside of forest certification, at least one pulp company in Indonesia has made public commitments not to convert HCV forests to pulp plantations. In a conversion scenario, the HCV approach needs to be incorporated into an adequate safeguards framework, notably to ensure legal compliance, protect land use and tenure rights, address consent procedures, and ensure that the concept is not inappropriately used to justify conversion based on incomplete information.

Where the HCV approach is used for forest land-use planning involving conversion, identifying which areas of forest cannot be converted to plantations is a core part of this process, but management recommendations for other areas of forest are also extremely important.

Finally, the HCV concept has been invoked in the formulation of procurement and investment policies. A growing number of companies and governments are introducing purchasing policies that preclude the purchase of wood or wood products from forest areas where HCVF are not managed for their values. For example, members of the WWF’s GFTN are committed to excluding material from HCVF, unless certified by the FSC. A number of investment organizations, particularly banks and screened pension funds, are making commitments to avoid investing in poorly managed HCVF.

**OPERATIONAL ASPECTS**

The HCV approach provides a systematic process for identifying critical conservation values—both environmental and social—within a forest tract or production unit, and for planning forest or land-use management to ensure that these values are maintained or enhanced (see examples in boxes 3.6, 3.7, and 3.8). HCV forest is the area of forest that needs to be managed to protect its conservation values. The HCV approach is based on a three-step process:

1. Identify the *critical conservation values* that are present (the HCVs), and the areas where they occur.
2. Manage the HCVs by addressing the *threats* to the values, both now and in the future (including the threats posed by any planned activities).
3. Monitor the HCVs to ensure that management prescriptions are effective in maintaining or enhancing the values, and adapt the management regime to take account of any changes.

An ideal HCV process would follow the sequence illustrated in figure 3.3. The strength of the HCV approach is that it recognizes variations in countries and situations where it is applied (see box 3.9). Where existing protection is good and threats limited, the requirements will differ from those in a similar area where existing protection is poor and threats extensive. Although the HCV approach was originally developed for use at the scale of forest management units, it has increasingly been applied at various scales up to the landscape level.

**HCV process: Implementing HCV assessment and defining management prescriptions**

**Identification of the presence and location of HCVs.** For each of the six HCVs, a systematic process is required to establish whether it is present in the area of interest and, if present, the approximate extent.

A national interpretation of the HCVF toolkit, if it exists, is the first point of reference as the HCVs are defined for the national context and relevant data resources are listed. In the absence of a national interpretation, relevant information can be obtained from other regional interpretations. The HCVF toolkit provides generic guidance. The HCV
process draws on sources of data that are already available (box 3.10), which may take many forms.

Obtaining reliable maps is an important component of the process. The maps may include data on recent forest cover, hydrology, elevation, and slope, but many national mapping processes give further useful details on habitats, soil type, and current or planned land use. Existing data and maps can be combined with specifically commissioned surveys to build a picture of the location of the values.

**Box 3.6 Identifying HCVFs in State Forests and Taking It to Scale: The Case of China**

The WWF and IKEA Co-operation on Forest Projects selected two local forestry bureaus in northeast China as pilot sites for implementing SFM techniques. HCVFs were identified and assessed in the 420,000 hectares of forests managed by these two bureaus. The detailed work mapped out HCVFs as areas that should be set aside as nature reserves, areas where logging should be banned, and areas with important stands of Korean pine. It also led to these two forestry bureaus achieving the first FSC certification of state-owned forests in China. After their participation in this work, the two involved provincial governments firmly embraced the HCVF concept. The Jilin Forestry Department introduced HCVF identification into its five-year provincial forestry development plan, and in Heilongjiang province, the HCVF concept will be integrated into the provincial standard for identifying forests that provide key ecological benefits. Alongside this HCVF work, the projects also led to the identification of potential HCVFs at the landscape and regional levels within northeast China and Inner Mongolia. In 2006, China’s State Forestry Administration incorporated the HCVF concept into the national guidelines on SFM planning. Thus, areas identified as HCVFs will be designated priority areas for sustainable management or protection. These guidelines are to be distributed to all provinces in China for implementation by local government or forest management units.

Managing the HCVs. The aim of HCV management is to ensure that the HCVFs identified are maintained or enhanced. The activities to achieve this aim can start with delineating areas that need total protection, areas requiring special management (for example, production activities that are consistent with conservation aims, managed to an agreed standard and monitored for any negative effects), and areas that do not require specific precautions.

This begins with knowing the area of forest that is required to maintain each relevant value. For example, to maintain or enhance an HCV1 area (containing a specified set of rare, threatened, or endemic species; see box 3.5), the area of forest required to support viable populations of those species needs to be defined. Thus, some knowledge of the biology of the species in question is required to define areas that are critical habitats or resources for breeding and foraging, areas that permit movement of individuals between these resources, or areas that protect these resources. A similar process needs to be applied to each HCV in turn, with equal consideration given to social, cultural, and ecological values.

In support of meeting the Global Forest Target of improving the management of 300 million hectares of production forests through forest certification by 2010 [http://www.worldwildlife.org/alliance/targets.cfm], WWF has developed a first draft of an HCVF toolkit for Papua New Guinea (PNG). By facilitating the identification of HCVFs, companies will be able to manage these according to FSC principles while maintaining their high conservation attributes, and pursue certification under this system.

The process of developing the HCVF national toolkit brought together government, NGOs, private industry, and land owners to develop consensus on the meaning of HCVF in PNG. After a first draft was circulated to stakeholders, comments were incorporated and a final version was made available online in February 2006 (see http://www.wwfpacific.org.fj/publications/png/HCVF_Toolkit_First_Ed.pdf).

PNG’s ecological diversity posed a challenge to creating a national-level HCVF interpretation. At the time of preparing the technical progress report, large-scale industrial field testing had yet to be conducted, but testing had been conducted in smaller operations, and additional field trials were to be used to test whether monsoon forests, considered “fragile forests,” should be excluded from logging and conversion activities altogether.

Other outputs of the project included the creation of coarse-scale HCVF maps and an effort to lobby the government to recognize HCVFs in provincial and national forest plans. At the time of drafting the technical progress report, it was indicated that the completed PNG HCVF national toolkit was to be adopted by the PNG FSC National Standards for compliance with the FSC’s Principle 9.

Box 3.7 Applying HCVF in Papua New Guinea

In support of meeting the Global Forest Target of improving the management of 300 million hectares of production forests through forest certification by 2010 [http://www.worldwildlife.org/alliance/targets.cfm], WWF has developed a first draft of an HCVF toolkit for Papua New Guinea (PNG). By facilitating the identification of HCVFs, companies will be able to manage these according to FSC principles while maintaining their high conservation attributes, and pursue certification under this system.

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Source: PNG FSC 2006.

Box 3.8 Mainstreaming HCVF Work in Bulgaria

The government of Bulgaria formally endorsed the national HCVF toolkit and adopted it as a methodology for biodiversity inventories. The toolkit will be included in the national standards for forest management planning in Bulgaria. This will ensure that more valuable forests will benefit from its stipulations and will be managed recognizing the HCVs. The toolkit is also being used by the United Nations Development Fund and a number of NGOs in Bulgaria for their biodiversity-related work and by the 10 nature parks in the country.

An important element of the HCV process is the national-level interpretation. Although it is possible to use the generic guidelines of the Global HCV Toolkit, it is much more convenient for forest managers if the global HCV definitions are adapted for use in their particular country, region, or forest type. This step can be done by a specific HCV working group, drawing on existing groups working on related issues or groups working on defining or mapping forest values. This working group can interpret the HCV definitions to develop a national standard. Two types of processes can be used for creating national or regional standards:

- A multi-stakeholder process that is consensus based. Though more time intensive, this provides a definitive interpretation with wide-ranging support as the national or regional standard for HCV.
- A technical adaptation process involving a technical working group or team. This is often a practical way forward for projects in countries with no national standard. However, it must be made explicit that the objective is not national standard setting and that the outcome is not a definitive one.

The objective of national interpretation is to define HCVs and establish guidelines on management for specific cases. This includes deciding the relevant forest values, such as forest types, species assemblages, and the like, and specifying parameters to measure them. It also involves, for each forest value and parameter, defining thresholds for deciding when to designate a HCV (that is, a value that is significant at the global, regional, or national level). Thresholds can include actual locations, levels, numbers, or types.

A national interpretation serves two purposes:

- It facilitates on-the-ground application of the HCV concept by producing HCVs that are clearly defined, detailed, and straightforward in a manner that can be understood by nonspecialists and unambiguously assessed at forest levels. This ensures greater consistency in the way it is used.
- The process itself is useful because it brings together a range of interests and stakeholders and contributes to the development of a shared understanding of the best way to protect environmental and social values.

### Box 3.9 National Interpretation of HCV Guidelines


Specific guidance (all HCVs)
- Existing national or regional HCV interpretations (see www.hcvnetwork.org for a full list)
- Case studies
- Landscape-level HCV maps

Habitat and biodiversity information (HCVs 1, 2, and 3)
- Maps of known habitats
- Lists of threatened or endangered species and distribution maps
- Protected areas—location, status, threats, reasons for gazettement
- Conservation NGO information sources
- Forest inventories

Ecosystem service information (HCV4)
- Soil maps, topographic maps
- Watershed and catchment boundaries
- Fire incidence

Social and cultural information (HCVs 5 and 6)
- Maps of human settlement and community data
- Social studies conducted by industry, NGOs, or research institutions
- NGO projects and current campaigns on the communities or in the region

Finally, any existing protections, such as functioning protected areas or nature reserves can be considered.

The outcome of this process should be a documented plan, integrated into the operational management plan, that sets out management prescriptions, taking into account each HCV and the relevant threat assessments. Plans developed in this way for the protection of the same value in two different locations may be very different depending on the levels of threat and existing protections.

Monitoring the HCVs. After management plans have been defined, a monitoring program needs to be in place to provide managers with up-to-date information on the HCVs for which they bear responsibility, as a basis for management intervention or ongoing adjustment of operational plans. Monitoring plans should be derived from management objectives and written into the management plan. Data gathered during the HCV assessment should be used to determine the generic and specific objectives of the monitoring program. The aim should be to develop a set of simple, measurable indicators for each key value. Monitoring activities can include social and biological surveys and direct and indirect observation of indicators, and are likely to involve detailed data collection over the long term.

There are a number of tools available to support the use of the HCV approach, all of which are available at the HCV Resource Network Web site (http://www.hcvnetwork.org):

- **The HCV Resource Network.** The network was formed by key organizations with an interest in the HCV concept to support and promote the consistent use of this concept across its range of uses. The network’s Web site provides a range of services, including general information on the HCV concept, information on HCVF projects and case studies, country-specific briefings, guidance and support material, contact details for HCV practitioners, details of conferences and training events, and links to relevant resources.

- **The Global HCVF Toolkit.** The toolkit (ProForest 2003) provides globally applicable information, but also contains sections that describe the process of defining HCVs at the national level and guidance for forest managers on how to identify and manage HCVs. The toolkit has been interpreted for several national contexts; it is available from the Web site.

- **Good practice guidelines for HCV identification management and monitoring.** Two documents (ProForest 2008a and ProForest 2008b) set out the process steps that are important to a credible HCV assessment process. The Assessment, Management & Monitoring of High Conservation Values: A practical guide for forest managers (ProForest 2008a) is available from www.ProForest.net and www.hcvnetwork.org. Good Practice Guidelines for High Conservation Value Assessments: A Methodological Approach for Practitioners and Auditors (ProForest 2008b) is available from Proforest and www.hcvnetwork.org.

**Good practice in HCV assessment and management**

To ensure that an HCVF assessment is useful, some important elements should be considered.

**Data requirements.** Appropriate use of data is at the heart of the HCV assessment process. Identifying HCVs and planning appropriate management requires data to allow the assessor to know the values that are likely to be present and the potential impacts of different management scenarios. Preparation is therefore critical to ensure that the full range of applicable information is available. The impact and scale of planned operations, and the likely conservation importance of the assessed area, can only be properly understood with a solid knowledge base. These also help determine the team and stakeholder consultation requirements.

**Team requirements.** HCV assessments are typically carried out by small teams with practical conservation experience. Technical expertise (ideally, local expertise) in a relevant topic such as ecology, social issues, or environmental management is very important, but an HCVF assessment is also much more likely to be carried out successfully if it is undertaken by a team with a thorough understanding of the whole HCV process and experience in implementing it.

**Consultation requirements.** Consultation is an essential part of the HCV process. Appropriate stakeholders, including industry representatives, conservation NGOs, local government, and local community representatives, have an important role to play in ensuring a successful outcome, both in identifying values and determining management options. Consultation serves a number of important purposes:

- To gather information on the social and environmental situation in the assessment area, to contribute to the HCV identification and decision making process
- To provide information on potential negative impacts of operations on HCVs
To identify possible approaches for avoiding, mitigating, or compensating for negative impacts of operations
To eliminate gaps in data, where information is held by stakeholders
To avoid or significantly reduce conflicts arising from operations
To ensure the transparency of the assessment process and the credibility of the decisions made

Use of the precautionary principle. Where data are lacking, it can be difficult to make management decisions. In the case of low- or medium-impact operations, if there is insufficient information for specific management of a given HCV, managers should aim to implement best operational practice and develop a monitoring plan that will detect changes in the status of an HCV and allow prompt action. The higher the potential concentration of values and the impact of the operation, the further the management plan should go toward protection and restoration. In the context of conversion, the land manager must try to reduce uncertainty, if necessary by commissioning surveys and field work to determine the limits and thresholds of HCVs, and secure these areas before any conversion. Stakeholder engagement is critical to a credible outcome; for example, the full range of stakeholders should be involved in defining what a sufficient area represents.

Reporting and transparency. The end product of an HCVF assessment should be management recommendations about forest that must be protected and forest that must be managed in a specific way. HCVF assessment reports should contain sufficient information for an expert third party to be able to judge whether the identification process and consultation were adequate to justify management decisions. This assessment should be done in a clear and consistent way, and include a final peer review and consultation process to guarantee quality control.

LESSONS LEARNED AND RECOMMENDATIONS FOR PRACTITIONERS

Although the HCVF concept was only developed in 1999, it has already been widely used and some key issues have emerged:

Good understanding of the concept and technical competence are important for proper application. The framework is relatively sophisticated and has multiple elements, as discussed earlier in this note. It requires a good understanding of the concept itself, as well as technical competence from practitioners, to be useful and to ensure that all the different interests and values are balanced.

Prediction of costs. The cost of an HCVF assessment is closely related to the number of people involved and the time required, which, in turn, depend on the size and complexity of the forest area, the number of HCVs potentially present, the types of land use proposed for the area, the availability of data, and the complexity of the local situation. There are excellent examples of HCVF assessments carried out in a few days with a small team, or even internally by a company, and costing relatively little. At the other end of the scale, large assessments in complex situations, particularly involving forest conversion, can cost tens of thousands of dollars. Similarly, national interpretation processes can be relatively straightforward and cost only a few thousand dollars or be complex and involve significant costs.

Follow-up of HCVF implementation. Active stewardship of HCVFs is necessary for implementation. In Indonesia, in response to external pressure to protect the HCVFs in its concessions, the pulp and paper company APP committed to protecting the HCVF found in one of its concessions. In 2005, APP commissioned Smartwood to map HCVFs in three of its other forest management units in the area. On the basis of this mapping, APP announced that it would protect the HCVFs identified and signed an agreement with Smartwood to track how well it is managing its HCVFs over the next five years. However, recent monitoring reports showed that APP failed to protect these areas from fires and illegal logging, despite its earlier pledges. This case highlights the need for active stewardship of HCVFs if company commitments are to make a real difference in practice (WWF 2007).

A systematic framework for analysis. HCVF is not a panacea and cannot resolve every intractable land-use debate involving forests. However, it provides a systematic framework for analysis, gives consideration to a wide range of conservation values in an integrated process, and incorporates consultation and involvement of stakeholders in finding an appropriate solution, all of which combine to make it a very useful tool.

NOTES

1. It should be noted that in most countries regulations and silvicultural guidelines include conservation aspects.
However, these general rules are seldom sufficient to guide actions in particular sites.


3. The need to increase area under protection should be defined by each country and its particular conditions because in some World Bank client countries large shares of forests are already protected while in most others more is needed.

4. FSC Principles and Criteria: Principle 9: Maintenance of High Conservation Value Forests. According to Principle 9 of FSC, “management activities in HCVF should maintain or enhance the attributes which define such forests. Decisions regarding high conservation value forests shall always be considered in the context of a precautionary approach” (http://www.fsc.org/en/about/policy_standards/princ_criteria/11).

5. The Round Table on Sustainable Palm Oil (RSPO) Principles and Criteria are available at http://www.rspo.org.

6. This section draws heavily from the HCVF toolkit. All users of this note are encouraged to consult the detailed HCVF toolkit because it contains helpful checklists and concrete examples. The toolkit is available at http://www.hcvf.org.


8. This section draws on ProForest 2003.

SELECTED READINGS


REFERENCES CITED


CROSS-REFERENCED CHAPTERS AND NOTES

Note 3.3: Forest Plantations
Forest certification has become of increasing consequence to forest management and policy in recent years, as consumers have become increasingly scrupulous about the source of their forest products. This note discusses the potential for certification not only to act as an investment safeguard and supplement traditional World Bank project monitoring, but also to provide a range of other benefits, such as market access and improved governance and stakeholder relations. The overarching goal of supporting the development and adoption of forest certification is to harness its potential while avoiding associated risks. This note describes how, in addition to providing an investment safeguard, certification can achieve less tangible benefits, such as resolving stakeholder conflict, providing forest surveillance where government capacity is inadequate, and enabling market access. This subject is interconnected with many of the notes within this sourcebook, including those on forest governance (chapter 5), illegal logging (note 5.5), and small and medium enterprises (note 2.2).

OVERVIEW AND CONSIDERATIONS OF INTEREST FOR WORLD BANK ACTIVITIES

Reliable information on social and environmental impacts of production processes becomes increasingly important for developing and maintaining business relations as markets become increasingly integrated at the global scale. Demand for such information originates from consumers, including governments, who are concerned about the negative consequences of their purchasing decisions as well as from a growing number of businesses that are interested in avoiding damage to their images, potentially triggered when engaging in socially and environmentally harmful activities.

Against this background, forest certification emerged as an instrument to provide information on forest management performance and thus assist consumers and businesses, predominantly in the timber products sector, with their purchasing decisions. Certification was conceived in the early 1990s as a market-based mechanism aimed at rewarding good management of forests with better market access and possibly price premiums—particularly to high-priced and environmentally sensitive markets in developed countries—for products from certified forests. Since then, the area under certified forest management increased considerably, from 30 million hectares in 2002 to approximately 250 million hectares worldwide today. The number of products bearing certification labels and the number of different certification systems in the marketplace have also proliferated.

OPERATIONAL ASPECTS

Generally, the first step of the certification process consists of a conformity assessment in which the quality of a production process (for example, its environmental impacts, social performance, technical aspects, efficiency) or special features of products or services are assessed against requirements specified in a standard. In the case of forest management certification, independent assessment provides an analysis of the applied management practices in relation to the standard requirements. If successful, a certificate is issued that can be used as assurance that the operation is in compliance with the provisions set forth in the applied standard. Continual conformance monitoring of the certified operation is carried out through repeated surveillance visits during the validity period of the certificate. In general, certificate holders are allowed to use a label and to make claims about their adherence to the standard requirements.

In addition, most certification systems developed rules for the handling of certified timber in downstream processing facilities, such as saw mills, paper mills, or furniture production, that allow certified timber to be traced throughout the supply chain to the end consumer. Application of these rules and the subsequent certification of the implemented processes in the timber industry are the basis for claims on
the origin of products from a certified forest. This chain-of-custody certification is therefore an indispensable tool to link supplies from certified forests to consumer demand for certified products. It should be noted, however, that the scope of chain-of-custody certification is limited to the processes for control of certified and uncertified material flows and does not include the social or environmental quality of timber processing.¹

The World Bank introduced certification as an important element of its safeguard policy on forests (World Bank 2004), making use of the control and surveillance mechanisms provided by certification systems to supplement the World Bank’s own monitoring efforts. Certification under a system acceptable to the World Bank is required for enabling investments into commercial forest harvesting operations at an industrial scale. Alternatively, operations can adhere to a time-bound action plan accepted by the World Bank that is adequate to achieve certification under such a system within a defined time frame. The World Bank’s policy more clearly defines the forest management standards a certification system should require (paragraph 10, OP 4.36) and the necessary minimum thresholds for the rules governing the operations of certification systems (paragraph 11, OP 4.36) for them to be acceptable to the World Bank.

Beyond this more narrowly focused perspective of certification as a safeguard tool are a number of reasons to use this instrument and related processes and institutions more proactively, including the following:

**Conflict mitigation and stakeholder dialogue.** Given the great potential of forests to deliver multiple products and services, interests diverge widely and conflicts over the use of forest resources are extensive in many forest regions. If properly designed, certification systems provide mechanisms for the involvement of stakeholders at the national level in the process of setting standards for forest management. In addition, local communities and other stakeholders are normally consulted during the certification audit and their concerns and opinions are considered in the certification decision. In the course of such processes, the available information is improved not only about forest management practices but also about the varying and conflicting interests of stakeholders. This increases transparency considerably and may contribute to better understanding between the different actors in the sector, and thus bears the potential to mitigate conflicts.

**Supplementing government forest surveillance.** The certification process consists of an assessment of operations according to a standard that at a minimum meets, and frequently exceeds, a country’s legal requirements for forest management. Certification could therefore be used to supplement or in some instances even replace governmental surveillance mechanisms in the sector and thus contribute to more efficient use of scarce public resources.

**Providing a role model.** To achieve certification under internationally acceptable standards, companies must have adequate management systems in place. In comparison with competing businesses, these companies often demonstrate better economic performance and can serve as a benchmark for SFM.

**Market access.** Maintaining or expanding access to export markets is critical to the economic viability of the forest sector in many countries. Particularly for timber from developing countries, market access can be hampered by consumer concerns about the negative impacts of forest harvesting. It is increasingly important for companies to be able to demonstrate the sustainability of their products and to be able to trace the source materials through the supply chain (chain of custody). Many certification systems can help provide this assurance.

**LESSONS LEARNED AND RECOMMENDATIONS FOR PRACTITIONERS**

**Barriers to certification**

In the past, a number of barriers particularly prevalent in developing countries became apparent, considerably hampering the development of certification schemes and their widespread application. The gap between then-current forest management practices and the performance level required by many standards resulted in high compliance costs and deterred many companies from pursuing certification. Furthermore, the kinds of institutions required for developing and conducting the processes for reliable certification are often not available or lack the capacity to perform the complex tasks involved. Experience has also shown that it is considerably more difficult for small-scale operations to achieve certification and access markets for certified products because of economies of scale that substantially decrease per-unit costs of certification for bigger enterprises. So far, only a limited number of timber processing companies in many developing countries have chain-of-custody certification, a situation that adds to the difficulties for primary producers to access certified supply chains.
The development of acceptable certification systems should form a key element of the World Bank’s forest sector projects to overcome these barriers. This activity should receive increased support, for several reasons:

- In the absence of acceptable certification systems, the World Bank is not in a position to support a wide range of commercial activities involving key players and decision makers in the forest sector. This situation may contribute to unduly limiting the World Bank’s influence to marginal fields and negatively impact the World Bank’s potential role in improving performance in the sector. Integrating forests into sustainable economic development is an overarching goal for World Bank interventions and is greatly facilitated by the existence of appropriate forest certification systems.

- Small-scale operations potentially risk becoming further marginalized through certification activities because achieving certified status has proved to be particularly difficult for landholders with small areas and for community forest enterprises. Certification could therefore negatively affect the World Bank’s overall goal of poverty reduction and the declared strategy to make use of forest benefits for the poor. More proactive World Bank support to the development of appropriate systems could help avoid these potentially adverse impacts of certification on the World Bank’s overall goals (see also note 1.3, Indigenous Peoples and Forests, for particular issues concerning Indigenous Peoples).

Harnessing the potential of certification for improving forest sector performance and avoiding the risks to World Bank activities from a lack of adequate systems requires targeted activities to overcome the bottlenecks that are still widespread in many World Bank client countries.

**Support to certification system development**

The activities outlined below should be considered when providing support to the development of certification systems through World Bank-financed projects.

**Assist standards development processes.** Currently, the lack of appropriate standards presents one of the most important formal obstacles for the widespread application of forest certification. While international and national organizations may be available to implement other elements of certification (such as certification assessments), standards development has to be carried out by local initiatives that, in many countries, lack the funding, capacity, and staff to conduct the tasks involved in managing participatory processes. The World Bank’s provisions for standard setting, which clearly require locally adapted forest management standards developed with the participation of a wide range of stakeholders, provides further justification for supporting these processes.

Consensus-based decision making regarding contentious issues is often a lengthy process with a number of uncertainties. Progress may therefore not follow strict World Bank project deadlines or adhere to narrowly defined project targets. Furthermore, care should be taken to not unduly influence the process so that results not accepted by a number of the involved and affected stakeholders can be avoided. Eligibility of standard-setting initiatives for potential World Bank funding may best be based on the criteria defined in OP 4.36 and on the interpretation of these provisions outlined in chapter 9, Applying Forest Policy OP 4.36, and chapter 11, Forest Certification Assessment Guide: Summary on Use, in section II of this sourcebook.

Today, two certification systems are operating at the international level—FSC (http://www.fsc.org) and the PEFC (http://www.pefc.org). These umbrella organizations provide international framework standards for further elaboration through standard-setting initiatives at the national level. To maintain flexibility and to provide a basis for certification that can later be used by companies interested in either of the international systems, standard-setting processes should strive to adhere to the rules and regulations of both the FSC and PEFC. This approach could reduce conflicts that may arise from an early and potentially contentious selection of the system to which a national certification system may want to adhere to.

**Build local certification capacity.** The skills to implement and manage certification systems, particularly in the field of forest management, are underdeveloped in many World Bank client countries. Although international certification systems and certifying bodies provide services in these countries, the employment of expatriate personnel adds to the high costs for certification in developing countries. Establishment of local expertise for the tasks of certification assessment and possibly accreditation of certifying bodies would often reduce costs and, most of all, add to the maintenance of national ownership over certification and thus contribute to more widespread acceptance of the tool.

**Assist small, individual operations in pursuing certification.** Within its projects, the World Bank may finance investments directed at the improvement of forest

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**NOTE 3.2: FOREST CERTIFICATION SYSTEMS**

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management practices in selected enterprises. Given the decreased competitiveness that results from their structural disadvantages, small operations and community forestry are in special need of adequate funding. In this context, the time-bound action plan for certification foreseen in OP 4.36 and further outlined as a safeguard instrument in chapter 11, Forest Certification Assessment Guide: Summary on Use, can provide the conceptual basis for planning and monitoring assistance to individual companies.

Capacity-building efforts should be extended to downstream processing facilities to improve technical knowledge related to development and implementation of appropriate chain-of-custody systems. Again, these activities should focus on small and medium enterprises, which are important partners for smaller forest operations but in many cases lack the capacity to achieve certification of their processes for the control of material flows.

NOTE

1. The widely applied quality and environmental management systems set forth in ISO 9002 or ISO 14001 standards can provide the basis for chain-of-custody systems but, in general, require adaptation to the specific requirements of certification systems before products can be labeled as compliant with those systems.

SELECTED READINGS


REFERENCES CITED


CROSS-REFERENCED CHAPTERS AND NOTES

Note 1.3: Indigenous Peoples and Forests
Note 2.2: Small- and Medium-Scale Enterprises
Chapter 5: Improving Forest Governance
Note 5.5: Addressing Illegal Logging and Other Forest Crime
Chapter 9: Applying Forests Policy OP 4.36
Chapter 11: Forest Certification Assessment Guide: Summary on Use
Forest plantations can be highly effective for the production of fiber for wood and paper products, and may help in meeting the growing demand for wood identified in chapter 3. Managed properly, they may also be effective in the protection and conservation of soil and water resources, revegetation of degraded landscapes, rehabilitation of habitats, and for carbon sequestration. However, they have also been associated with conversion of natural forests, the destruction of habitat, and the marginalization of local and Indigenous Peoples. This note examines the potential for plantations to deliver a variety of goods and services and identifies the precautions necessary to avoid causing negative environmental and social impacts.

OVERVIEW AND CONSIDERATIONS OF INTEREST FOR WORLD BANK ACTIVITIES

Because of their efficiency in wood production, along with increasing restrictions on the use of native forests, wood supply from plantations has grown from 5 percent to 30 percent of the total share of industrial fiber over the past 15 years, and projections are that this will increase to 50 percent by 2040 (World Bank 2005). Today, most of the world’s 140 million ha of plantations are established for productive purposes, with another 31 million ha established for protection (FAO 2006).

Trees have an excellent capacity to capture and hold, or “fix,” atmospheric carbon and are now being employed for carbon sequestration to mitigate greenhouse gas effects and climate change. Carbon content in trees is a function of their density and volume. The faster the trees are able to grow, the more rapidly they fix carbon. The paradox is that many of the same exotic trees that grow rapidly and are most useful for sequestering carbon also pose increased risks for local environmental impacts because of their aggressive characteristics.

OPERATIONAL ASPECTS

In general, most productive plantations are characterized by uniform species composition and age-class distribution within stands, regular spacing between tree stems, and simple geometric configurations (blocks)—characteristics that enhance their utility and cost effectiveness. However, these same qualities, along with the use of mechanical and chemical treatments and occasional replacement of native vegetation, have led to concerns about plantations’ impacts on the environment and biodiversity. Social issues can also emerge when large operations fail to address impacts on local populations or fail to include landowners’ and other stakeholders’ concerns in their operations. For these reasons, World Bank–financed operations need to ensure that both environmental and social concerns are considered early in the project design. In the end, productive plantations do not have to compromise the environment or biodiversity, or lead to social exclusion—in fact, they can favorably affect each of them, or at a minimum their impacts can be mitigated, and it is the World Bank’s job to ensure that this happens within its investments.

Scale of activity. World Bank operations involving plantations may be carried out at both national and local levels. Striking the balance between these very different approaches, or choosing one over the other, during project design requires a solid understanding of the country’s needs and goals for the sector, as well as of local conditions in areas targeted for interventions. Conversely, most countries lack a strategic vision for forestry, and World Bank projects must frequently incorporate elements of strategic planning with more tangible activities that promote sustainable development, such as research, extension, and the promotion of best management practices. Stakeholder processes such as National Forestry Programs (see note 6.3, Identifying the Need for Analysis on Forests in Development Policy.
CHAPTER 3: MEETING THE GROWING DEMAND FOR FOREST PRODUCTS

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Plantation productivity is not normally much greater than that of natural forests. Well-managed plantations in some developing countries have annual growth rates in excess of 40 m³/ha. The most productive native forests (those of the southeastern United States) show internal rates of return (IRRs) of around 4–8 percent, whereas, P. taeda plantations in Brazil have achieved IRRs of 17 percent, and plantations of Eucalyptus grandis in Brazil have recorded IRRs of 24 percent (Cubbage et al., 2007). The large differences in returns between plantations and natural forests are attributable to the application of management practices, the selection of the best species for production, optimal stocking, and lower land and labor values in developing countries. Industrial plantations also benefit from site preparation techniques, the use of improved seeds, pest management, and higher levels of stocking over natural forests. Natural forests may not need these initial investments. If natural forests are managed as going concerns, they can be and often are economically viable.

Species selection. Productive plantations are usually established for one of two purposes, sawtimber or pulp, and to a lesser extent for NTFPs, such as rubber, or in multiple-use agroforestry and silvopastoral systems. Plantations established for pulp usually emphasize high volumes of fast-growing trees with good pulping characteristics, particularly high specific gravity and long fibers (hardwoods) or tracheid (softwoods). Such plantations in developing countries are frequently established using exotic pines from the Americas, eucalypts from Australia, or acacias. Trees selected for sawtimber plantations must produce wood appropriate for the intended end use, which can be highly variable and includes wood for structural framing and construction, furniture, veneers, or crates and pallets, among others.

In all cases, species needs to be carefully selected to ensure that the desired end products (or services) are eventually obtained. At the same time, market demands and trends should be taken into account to ensure that the trees will be marketable at maturity. Planting programs that fail to take market factors into account can, and have, resulted in large areas of plantations with limited or negligible financial viability and consequent loss of investors in the sector. For many countries, this poses a paradox because they are unable to attract or develop wood industries until an adequate resource base is developed or assured. In such cases, planting programs with productive aims should carefully analyze projections of needs at local, national, and international levels during formulation to ensure their program gets off to the right start.

Management practice. Plantation productivity is normally much greater than that of natural forests. Well-managed plantations in some developing countries have annual growth rates in excess of 40 m³/ha. The most productive native forests (those of the southeastern United States) show internal rates of return (IRRs) of around 4–8 percent, whereas, P. taeda plantations in Brazil have achieved IRRs of 17 percent, and plantations of Eucalyptus grandis in Brazil have recorded IRRs of 24 percent (Cubbage et al., 2007). The large differences in returns between plantations and natural forests are attributable to the application of management practices, the selection of the best species for production, optimal stocking, and lower land and labor values in developing countries. Industrial plantations also benefit from site preparation techniques, the use of improved seeds, pest management, and higher levels of stocking over natural forests. Natural forests may not need these initial investments. If natural forests are managed as going concerns, they can be and often are economically viable.

Use of native species. Because many species of trees grow much faster outside their native ranges, they provide improved opportunities for increased financial returns. This has given rise to an extensive use of eucalypts (from Australia) and southern yellow pines and Monterey pine (from the United States) in industrial plantations and development programs. In the developing world, about 44 million ha of plantations are found in Asia, the bulk of which are located in China; 11 million in South America, mostly in Argentina, Brazil, and Chile; and another 10 million in Africa, in Côte d’Ivoire, Nigeria, Rwanda, and others. Smaller areas of exotic plantations are common throughout the rest of the developing world. While the use of exotics is popular from an economic perspective, concerns about their environmental impacts have been growing. A recent CIFOR study concluded that there are situations where plantations have affected critical habitats, but it also concluded that such claims may be exaggerated (World Bank 2003; Cossalter and Pye-Smith 2003).

Still, the widespread use of exotics has led to an increasingly polarized debate concerning their use and potential impact on the environment. For World Bank projects, this means potential reputational risks, and the need for good public outreach and consensus building during project preparation and implementation, as well as safeguards monitoring.

While World Bank–financed projects should endeavor to use native species whenever possible, in reality, client countries and producers are more likely to favor the use of exotics over native species because financial returns on investments are frequently much higher. In such cases, finding a middle ground and ensuring that any impacts from the use of exotics is mitigated or avoided is essential. To achieve this, specific measures must usually be employed to integrate biodiversity conservation into exotic plantations. Examples of such techniques include maintaining biological corridors and integrating native species into plantations; establishing set asides for wildlife and biodiversity conservation; favoring smaller patches of plantations rather than large contiguous blocks of monocultures; avoiding invasive exotics; and generally following standard best management practices, which emphasize the control of nonpoint pollu-
tion from silvicultural activities, including site preparation, road building, and harvesting (Davis 2005). Research programs to promote knowledge building for the use and management of native species can also be helpful. With these tools at the disposal of the project team, World Bank operations stand to do a much better job of guaranteeing environmental sustainability than could be done under current industry standards, thereby ensuring that new programs get off to the right start.

**Community involvement in plantations.** Planting trees to establish woodlots and agroforestry or other multiple-use systems can be important elements of community and local development. So can plantations for wood production, particularly those using short rotation systems. Such efforts generally focus on overcoming local population needs for building materials and fuelwood, increasing incomes (for example, through the sale of timber), and encouraging environmental sustainability of land holdings. The principles of working at the local level are similar to those outlined for larger-scale operations in technical terms—species and site selection; market, cost, and needs analyses; capacity building; and management practices. At the same time, because the rural poor are often challenged with day-to-day survival, it is critical that risks to their livelihoods are mitigated. Programs should be designed from the bottom up, and implemented in full cooperation and consensus with participants, in consideration of their particular situations. Frequently this means employing social foresters or other development specialists who work closely with the communities involved in a project (see also note 1.3, Indigenous Peoples and Forests, and chapter 12, Applying OP 4.10 on Indigenous Peoples, for particular risks and issues concerning Indigenous Peoples).

Pests and fires pose common threats to plantations; provisions for fire breaks and training and equipping fire crews in fire suppression can be important elements of World Bank–financed projects. Monoculture plantations, whether native or exotic, pose increased risks to investments because they may be more susceptible to pests and disease. Massive loss and near eradication of some tree species has occurred in the last 100 years. For example, one of the most important production trees in North America, the American Chestnut (*Castanea dentata*), was virtually eliminated in a matter of a few years by an introduced fungus, *Cryphonectria parasitica*. Thousands of hectares of exotic *P. radiata* plantations were infected and succumbed to infections of *Dothystroma pini* in the 1980s and *Cedrela odorata*, even in its native range, suffers from infections from *Hypsipyla grandella* when planted in monocultures. Despite the lessons learned from such experiences, monocultures are easier and more cost effective than mixed plantations—that is, until problems occur, causing devastating loss.

**Establishment costs and technical capacity.** Two essential factors must be taken into consideration in the development of a plantation project—establishment costs, and the technical capacity required for planting and stand management. Initial investment capital for plantation establishment generally comes from three sources—land owners, loans, and government subsidies. With average establishment costs ranging from US$500 to US$2,000 per hectare, most small- and medium-scale producers are not able to finance their own plantations, nor do they have sufficient access to credit to guarantee loans.

Large areas of plantations may be required to guarantee sufficient raw material for major forest industries. For example, a large pulp mill with a capacity of 1 million tons per year will typically require a resource base of 100,000–200,000 ha of plantations to sustain its production over time (depending on growth rates and pulping characteristics of trees). In contrast, the resource base for saw timber plantations rarely exceeds 20,000 ha, and could be substantially less for smaller operations.

Subsidies can play an important role in stimulating planting to encourage the development of an adequate resource base for industry (see note 5.4, Strengthening Fiscal Systems in the Forest Sector). To foster social inclusion within the sector, some World Bank projects either directly subsidize plantations through grants (usually for small farmers) or work with the government in the design and execution of subsidy programs for a wider range of producers. In theory, once the cycle of planting and harvesting has been completed, subsidies should be reduced or removed because producers will have the means to reforest with income derived from timber sales—and the economic incentive to do so.

While subsidies can sometimes be useful to mainstream small producers into the sector, and help to expand the resource base necessary to promote economic growth for other producers, they have to be approached with caution. Poorly designed or implemented subsidy programs can result in unintended environmental impacts when producers plant trees in environmentally sensitive areas, or cause habitat destruction and deforestation, as can happen when farmers convert native forests to plantations. They may also encourage planting without sufficient attention to end uses and markets. The management of subsidies also poses chal-
challenges to weak institutions, which may provide opportunities for corruption—for example, when planting subsidies are paid without sufficient field verification. Each case and country situation has to be reviewed carefully when entering into discussions on subsidies and considering their inclusion in the project design.

Outgrower schemes can also encourage plantation development. This approach involves mill owners providing subsidies and technical assistance to local land owners to ensure the availability of growing stock for the mill owners’ production lines. In general, the World Bank would have a limited role in such cases because of the private-sector nature of these schemes, except in cases of IFC involvement. Still, Bank staff should be aware of the option and possibilities to interact with such schemes within the context of their project planning and implementation.

Carbon financing can provide about US$4 per ton of carbon sequestered. This is generally paid out in increments over an extended period, such as 20 years. However, funding available from carbon, may in some cases only be sufficient to pay a portion of the plantation establishment costs and, over the lifetime of the project, usually comprises only about 15–25 percent of the total costs of management. Consequently, carbon finance projects are building productive activities, including timber sales, into their projects. Thus, carbon financing can provide important subsidies for stimulating plantation development and carbon sequestration, but they are not viable economic endeavors in themselves. Despite these drawbacks, World Bank carbon projects are producing valuable lessons for future efforts, which may become vital as the climate continues to change and global warming continues.

**LESSONS LEARNED AND RECOMMENDATIONS FOR PRACTITIONERS**

Planted forests allow intensive production of industrial wood at a reasonable cost, which is important in countries with high population densities. Planted forests also offer economic opportunities for countries with natural competitive advantages and lands available for planting, such as Argentina, Brazil, Chile, China, Indonesia, Mexico, South Africa, Uruguay, and Vietnam.

In countries and zones where public land ownership is dominant, it is important to place plantation development within the framework of a transparent, accountable, and consultative land-use plan that specifies the extent of the permanent forest estate and locates land available for planted forests. Good governance and an enabling policy environment are necessary to ensure private investment in plantation development, which can be initially motivated by the World Bank’s initial support.

To make plantation forestry economically viable, technical management standards frequently need to be raised. As happened in Chile and Brazil, the adoption of new innovative technologies relying on high-performance species, high-quality seedlings, and efficient planting practices can substantially improve productivity and economic profitability. Also, production technologies that depend on natural regeneration can offer cost-effective ways to conduct production forestry or to rehabilitate degraded lands. Furthermore, it has been observed (for example, in India and Vietnam) that plantations linked to industry tend to have higher levels of productivity.

Site and species matching must receive due attention to avoid adverse environmental and social impacts. In addition, because policy and market failures can create more formidable obstacles to viability than technical considera-
tions, projects must be solidly based on sound policy and market organizational analyses. In particular, security of land tenure is key in fostering investments in plantation forestry.

In smallholder forestry, extension programs need to introduce improved technologies compatible with the maintenance of environmental and social values in plantation areas. These programs should be considered long-term undertakings and should not be limited to the plantation establishment phase. Effective linkages between silvicultural research and extension institutions are critical to successful technology transfer.

RECOMMENDED READING

Forest Stewardship Council. http://www.fsc.org. See the links concerning plantations to learn about the FSC standards and revision process under way for plantation certification. Subscribe to the plantations forum by e-mail at Plantationsforum_fsc.org to get a glimpse of the debate on plantation certification.


REFERENCES CITED


CROSS-REFERENCED CHAPTERS AND NOTES
Note 1.3: Indigenous Peoples and Forests
Chapter 2: Engaging the Private Sector in Forest Sector Development, and associated notes
Note 5.4: Strengthening Fiscal Systems in the Forest Sector
Chapter 12: Applying OP 4.10 on Indigenous Peoples

NOTE 3.3: FOREST PLANTATIONS IN WORLD BANK OPERATIONS