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POLICY ISSUES

The Nature of the Challenge

A critical feature of forestry activities that distinguishes them from most other primary activities is that private costs and benefits usually differ markedly from national and global costs and benefits. The existence of these externalities implies that the free interplay of market forces will not bring about socially desired outcomes. Some of these externalities are costs borne by the countries in which the forests are located—for example, soil erosion, desertification, degradation of watersheds, and threats to the cultural survival of indigenous people who traditionally live in or near the forests. Others, however, are costs that affect the international community (for example, loss of biological diversity and induced changes in the global climate). Because the people who cut or plant trees typically have no incentive for considering the environmental and social consequences of their actions, externalities inexorably lead to excessive deforestation and insufficient planting of new trees.

Of the various challenges that arise from this divergence between private and social interests, two stand out as deserving special attention. The first is to prevent excessive rates of deforestation, especially in the tropical moist forests. The second is to ensure adequate planting of new trees and the management of existing tree resources to meet the rapidly growing demand for the products and services that forests and trees can provide for the rural poor in developing countries.

Deforestation and Forest Degradation

Forests in developing countries have declined by nearly half in this century, and the rate of deforestation is still increasing. Recent studies using remote-sensing data and extensive ground surveys have found that between 17 million and 20 million hectares of forest—mainly tropical moist forest—are being lost each year. In addition to the deforestation going on in the tropics, forest degradation, principally as a result of acid precipitation, is affecting large areas of temperate forests, especially in Eastern Europe.

The loss of tropical moist forest is especially worrying because these forests have a much greater influence on the global climate than do the other main types of forest—tropical dry forests and temperate forests—and because they are a major repository of biological diversity. Moreover, they are the most fragile forests in that their soils are easily degraded once deforested, and experience to date indicates that even if reforestation or selective felling is attempted, the original ecosystems cannot be fully renewed or sustained.

Deforestation, including the cutting of woodlands and scattered trees, occurs because somebody finds it profitable. The individuals, communities, and corporations responsible for deforestation, and their primary motives for cutting trees, vary widely across regions and forest types. Although fuelwood gathering accounts for the largest share (80 percent) of wood use in developing countries worldwide, its impact is concentrated in the tropical dry forests and in nonforest wooded areas. The tropical moist forests are being lost primarily to agricultural settlement (about 60 percent of the area cleared each year), with the balance split roughly between logging and other purposes such as roads, urbanization, and fuelwood. Deforestation seldom involves only one type of decisionmaker, and the actions of one can lead to subsequent interventions by others.

Incentives to cut trees have grown in recent years for four reasons:

- The pressure of population on the natural resource base has grown sharply in many countries.
- Income opportunities in settled agricultural regions have deteriorated in some countries, leading to increased migration and encroachment on forested land.
- Access to the forest frontier has increased dramatically in some areas because of infrastructural development, especially road building.
- In a number of countries subsidies for alternative land uses and logging have been deliberately introduced to encourage frontier settlement.

Deforestation can contribute to short-term economic growth and to the alleviation of poverty, but often it does so at the expense of other environmental and social goals. Some of the costs are incurred within the country and some are borne by the international community. If these costs were more fully reflected in the incentives facing those who cut trees, there would be significantly less deforestation today. Adding to the incentive to cut trees are weak property rights in many forest and wooded areas; high private discount rates (the rate at which individuals discount future costs and benefits), especially among poor people who encroach on the forests; inappropriate government policies that make conversion of forestland artificially profitable; and timber concession arrangements that unnecessarily encourage the "mining" of trees.

The Growing Demand for Forests and Trees for Basic Needs

The second major challenge is to meet the rapidly growing demand for firewood, fodder, and building poles and for the environmental services of forests and trees. Most of the world's future need for wood for industrial purposes can continue to be met by trees grown on a sustainable basis in the temperate forests.

Understanding of the contributions that open woodlands, forest fallows, shrubs, and farm trees make to sustainable agriculture and to economic growth in rural areas greatly improved during the 1980s. Much has been learned about the potential, for example, of leguminous tree species that fix nitrogen and so improve soil fertility. Planting trees on farms and establishing shelterbelts can significantly increase crop and livestock yields, in addition to protecting soil and water resources.


Forest-derived edible plants, fruits, insects, and wildlife contribute significantly to the nutritional requirements of rural populations. The sale of poles and other forest products is a significant source of cash income for many rural households. Indirectly, such income contributes to improved food security. In many developing countries small-scale wood-using industries in rural areas are among the second or third most important activities in terms of employment potential and added value.

In some of the most heavily populated countries the availability of fuelwood is a matter for concern; demand is growing rapidly, and supplies are increasingly obtained by mining the available stock of natural trees. Fuelwood gathering contributes to land degradation, especially in agricultural regions with limited wooded areas, and to loss of forest near densely populated areas. These effects are most severe in tropical dry forests and in nonforest areas. Growing awareness of the importance of trees in rural areas was an important factor in the World Bank's 1978 decision to give greater support to people-oriented forestry.

Many of the same social and economic forces that induce excessive deforestation also reduce the incentive to plant trees, either for fuelwood or for timber. As with any crop, a farmer's willingness to plant trees will depend on the crop's profitability. Planting is discouraged when the price of wood is depressed by open access to natural forests and by poorly defined property rights to forests. There also has been relatively little progress in developing higher-yielding, faster-growing trees for farm rather than plantation conditions, and the high discount rates of poor farmers make it particularly unattractive for them to tie up scarce capital for the relatively long payoff period involved in growing trees. The establishment of large-scale industrial plantations is similarly restricted by low profitability.

Strategies for Forest Development

The challenges faced by the world community in addressing forestry issues are enormous, and progress in arresting the current trends requires concerted efforts by governments and many international organizations, of which the Bank is only one. Government policies and programs need to be directed toward changing the incentive and institutional structures that are



leading to excessive deforestation and that discourage rural people from planting trees and practicing good forest management. In addition, global externalities, particularly those related to the preservation of tropical moist forests, need to be internalized into local actions through international cooperation and assistance.

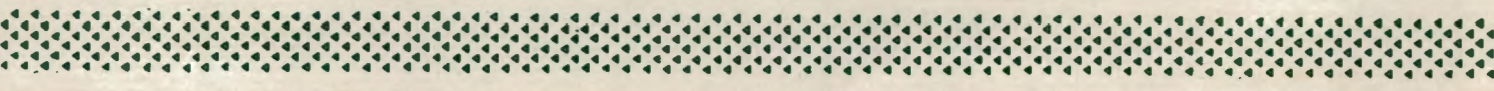
Protecting the forests

A fourfold strategy is required to check deforestation.

POLICIES TO ALLEVIATE POVERTY. Policies to protect the forests or to slow deforestation seem doomed when pitted against a growing tide of poor people who need land to survive. General economic development, including increased diversification of the national economy, reductions in inequality and poverty, and slower population growth, are necessary for a long-term solution to the forestry problem. But in the interim, priority must be given to increasing agricultural productivity in poor, densely populated areas, especially those adjacent to forested areas and those from which most forest encroachers originate, and to expanding nonfarm employment opportunities in these target areas. In the long run, even if economic development takes place, specific policies will still be needed to deal with problems of externalities.

FOREST ZONING AND REGULATION. Part of the forest will have to be protected through specific legislative and regulatory measures, especially in tropical moist forests. Decisions on zoning and regulation should be based on an understanding of what is expected of the land and a realistic assessment of what is technically feasible in light of local capacities and incentive structures. Given the likely limitations on resources and the desirability of increasing the size and number of protected areas, countries must develop workable priority criteria for setting aside specific forest areas that will be protected from any intrusion and for managing areas designated for different uses. This involves undertaking appropriate surveys of natural resources in the forested areas and determining which areas are of special value for their ecological diversity, which are essential for protecting indigenous forest dwellers, and which protect sites that are environmentally fragile, such as hillsides and watersheds. Available resources for protective purposes can then be focused on these priority areas.

Commercial logging can be contained through a strict policy that limits the extent of timber concessions and allows them only in areas that can be put under sustained timber management systems. Given the practical difficulties of achieving sustained management in tropical forests and the related environmental costs, governments should be cautious in allowing such activities and should give priority to the preservation of intact tropical forests. In all types of forests, high priority should also be given to reforesting degraded areas, and new timber concessions could be tied to the successful replanting of degraded lands. Because these areas may have become the source of livelihood for some communities, the interests of these people need to be considered when reforestation is undertaken.



CORRECTING PRIVATE INCENTIVES. Enforcement of zoning and other regulations is likely to be ineffective unless private incentives are also changed. In many instances government policies systematically underprice forest concessions. This, together with governmental reluctance to offer long-term concessions, increases the incentive for quick "mining" of trees. Timber concession systems can be modified in several ways. Stumpage fees or area concession rents can be increased to reflect the real value of the trees. Felling leases or licenses and logging rights can be allocated by competitive bidding (through auction or tender) that is open to the private sector, nongovernmental organizations (NGOs), and local communities and is adjusted as necessary to take account of externalities. And concessions can be made long term and, with appropriate controls, transferable.

Incentives for agricultural settlers have sometimes been distorted by policies that actually encourage deforestation (for example, subsidies for livestock ranching in the Amazon and the tying of land titling to land clearance). All such distortions should be removed. Customary land rights of forest dwellers need to be formalized and respected, to protect both forest dwellers and resources against excessive agricultural encroachment or exploitation by outside interests.

PUBLIC INVESTMENTS. Access to forests needs to be carefully controlled. Many infrastructural projects, such as roads and reservoirs, inadvertently open up forestlands to settlers. Public investments need to be preceded by much more careful environmental assessments and, where possible, should be directed toward preservation. Substantial expenditures are required to strengthen forestry institutions so that they can better protect designated forest areas; to develop improved systems of silviculture, forest management, and policymaking; to conduct forest research and development; and to carry out afforestation and replanting, especially on degraded land.

Policies to meet basic needs for forest products and services

The achievement of a more sustainable balance between supply and demand requires actions to reduce the demand for fuelwood and other local wood uses and to increase supply by encouraging the planting and husbandry of trees.

REDUCING DEMAND. As wood becomes scarcer, more widespread and more efficient markets are likely to develop, and price increases will become more important in reducing the growth in demand. Because of environmental externalities and inadequate property rights, however, market prices will generally not reflect the full social value of wood. Hence, direct interventions to encourage conservation and the use of more efficient technologies are necessary. These should include research and training to improve the fuel efficiency of household stoves, brick and charcoal kilns, and other wood-burning equipment. In addition, more efficient markets for alternative fuels such as kerosene need to be developed. Investment subsidies may also be appropriate in the initial stages to encourage individuals to purchase the necessary equipment for converting from wood-burning technologies, particularly when new and innovative technologies (such as solar stoves) are involved.

INCREASING SUPPLY. Most wood users in developing countries live in rural areas, and the best way of satisfying their demand for wood and for the services that trees provide is to

mobilize their own resources for tree planting and for better management of existing trees. Supply of rural wood through large-scale commercial operations is not likely to be viable on the scale required, nor is continuation of widespread wood gathering in forests sustainable or environmentally acceptable. It is increasingly recognized that wood production issues should be dealt with at the farm level. Forestry departments need to be reoriented in light of this recognition, and the special capabilities of nongovernmental organizations concerned with the alleviation of poverty and with environmental conservation should be mobilized to help users organize themselves for tree planting. Achieving the level of planting and management required will be possible only if economic incentives and the abilities of farmers are enhanced. Promoting awareness of the role of trees in retaining soil fertility and averting degradation will also help reduce tree cutting and foster better management. This will require extension and training services, a ready supply of tree seedlings and other inputs, and, in some cases, improvements in rights to land and trees.

Past attempts to increase tree planting for fuelwood and other rural uses were based on community woodlots established on lands managed under common-property tenure regimes. They often failed because local communities were inadequately organized for collective action and were unable to reward adequately those who provided labor. Future efforts need to be focused on smaller and more tightly defined groups of local actors, including the poor, who have a common interest in planting and raising trees. Recent programs based on family farm forestry and group farm forestry have shown promise.

Strengthening forestry institutions

Governments are increasingly recognizing that the scale of demands for conflict resolution and mediation now placed on forestry agencies was never adequately anticipated. Governments must recognize and act on the critical need to reorganize forestry institutions and introduce greater accountability and higher performance standards into the public sector. Creative use of private sector contractors and consultants as auditors and monitors and more rigorous intersectoral oversight by agriculture, environment, planning, finance, and other relevant ministries are effective devices for improving the performance of government forestry agencies. Commitment at the highest levels of government is necessary for introducing these reforms.

The role of the international community

The international community must support developing countries in achieving their own national goals for the management of forest resources and must help find ways of better incorporating the value of global externalities from forests into incentive structures for local action. International legal instruments, being discussed currently in various forums, demonstrate the wide interest in these objectives for international action. The adoption of such instruments could facilitate the transfer of resources to promote the conservation of tropical forests. There are three main areas in which the international community can play an important role.

Foresters push for monitoring advances

Latest techniques could curb deforestation

PRESSURE is being stepped up to implement more effective means to monitor deforestation in Southeast Asia. Using satellite technology and the latest remote sensing techniques, scientists feel that the only way that forest cover can be regulated on a global scale is to determine specific plots of land and photograph the change over set periods of time.

With South American deforestation reportedly on the decline, that leaves West and Central Africa along with Thailand, Burma and Indo-China as the main problem areas in the world. More cooperation between researchers is seen as the best means to control massive degradation.

"Cutting forests threatens biological diversity and global ecosystems fundamental to life, and it is prompting soil erosion and habitat destruction," said Geneva-based United Nations expert Sipi Jaakkola. Working with the UN Environmental Programme's (UNEP) Global Resource Information Database (GRID), he was in Thailand last week to stress the urgency of further research work and how much more cooperation word between scientists in watching over tropical forests is needed.

He added that deforestation is the second largest contributor to global warming and that because of its importance, every country increasingly requires timely and reliable information on the status of forest resources and the changes constantly taking place.

Jaakkola says that monitoring techniques for temperate forests are rather well established, although the assessment practices lack harmonisation "However, concerning tropical forests, the methods and practices tend to be poorly established," he said.

According to the now decade-old, but latest comprehensive survey of the world's forest reserves by the Food and Agriculture Organization ZFAOX and UNEP, forests covered 3.6 billion hectares, equalling 27.7 percent of the global land area. Tropical forests covered 1.94 billion hectares or 53 percent of the totals.

Presently FAO is making a new assessment, however preliminary results of the tropical part of the project show that in the period 1981 to 1990 the annual deforestation rate was 16.9 million hectares and it was accelerating. But making estimates is not enough, so the latest technology is needed to pin point exacting information.

"Remote sensing from space, typically aided by surface-base measurements, provides global and long term measurements for resource monitoring," continued Jaakkola. "Polar orbiting satellites are particularly useful for data acquisition concerning the status and changes in the forests and computer-aided processing of satellite imagery is rapidly advancing."

According to Jaakkola, monitoring deforestation is done by two methods. One is to classify the imagery at a single point of time and the other is to use what is called the multitemporal analysis for change detection. The latter requires image data from at least two points of time.

Remote sensing techniques were first adopted to vegetation mapping by Nasa scientists in the early 1980's. Further research was then carried out in various North American and European universities and research centres. Now mapping methods cover both visual interpretation or digital analysis of satellite data.

"These rapid advances of information technology can, hopefully, soon be welcomed as a means for contributing to, an ultimately achieving the goal of the sustainable development of the earth's resources," commented Jakkola.

Speaking at the IUFRO-Wacharakitti International workshop, Deputy Director General of the Forestry Department Yanyong Thanampichai added to Jaakkola's comments and said how Thailand could greatly benefit from remote sensing techniques. "Our country faces a very serious problem of deforestation as already half of its land has been transported to other types of land use during the past three decades, so we need this technology for resource management and planning." he said.

But while remote sensing techniques are considerably aiding a global database on forest use and destruction, several technical and practical problems still need to be addressed. The aim, scientists say, is to get an objective record of forest cover at a single moment in time based on the same design criteria.

At least this is new possible with satellites. However, the variable definition of what constitutes a forest and non-forest is of crucial importance, yet this has still not been uniformly agreed to. Other problem areas are data availability, cloud disturbance on data acquisition, land use patterns, and political concerns associated with funding shortages.

But one method proposed which should greatly enhance the accuracy of the information gathered is the establishment of what is termed permanent plots. United States Department of Agriculture expert H Gyde Lund says that this permanent plot is a known location on the Earth's service having defined boundaries or point of origin which can be documented in such a manner so one can remeasure the exact area and same objects at a later time.

"A network of permanent plots offers a good aid in finding out how resources behave under alternative land use regimes and monitoring provides the data for building plans we need for sustained development." he said.

"For world forest monitoring, if we can develop a set of guidelines that cooperating nations can follow, the final result will be a network of databases that will provide consistent information to the international community," Lund told participants.

In choosing a plot location Lund said that there are essentially two kinds of sampling designs used for monitoring, purposive and random. Purposive requires some form of prestratification and this involves deciding in advance what kinds of conditions need monitoring and then selecting a plot that suits specifically this.

Random sampling leaves the location up to chance and while it is not considered as efficient in terms of cost as purposive. the method avoids bias and the data tends to have more general utility and acceptance.

Dr Suvit Vibulsresth from the National Research Council stressed the need for more detailed forest cover information in Thailand. He said that already data had been useful in monitoring land resources and changes in forests, however now the high technology approach was needed to study newer problems, such as mangrove depletion.

He revealed that a cooperative study with the Royal Forestry Department had revealed that during the 16 year period from 1975, the mangrove area in Thailand had decreased by 1,390 square km. From the most recent Landsat data, Suvit said that there was now only 1,736 square km. or 1,085,050 rai of mangroves which is about 1.2 percent of the forested area of the whole country.