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Deforestation and Government Policy

By Malcolm Gillis and Robert Repetto

International Center
for Economic Growth



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PREFACE

This essay, by Malcolm Gillis and Robert Repetto, is number eight in the Center's series of Occasional Papers, which present broad reflections by senior scholars and policymakers on major development issues.

The subject of this paper has enormous importance for understanding a major global environmental issue and the important socio-economic issues related to it. The central conclusion of the paper is that ill-conceived government policies are a major reason for the deforestation of the world's tropical forests. The authors recite six major policy problems responsible for this, but the most fundamental is the tendency to overvalue exploitation of the forests and to undervalue their conservation. Drawing from the empirical evidence available, they recommend both forestry and nonforestry policies that would improve the management of natural resources within developing countries, and they recommend complementary, supporting actions by international agencies and the developed countries. Their conclusions are based on the broad research reported from all over the world in the book they edited, *Public Policy and the Misuse of Forest Resources*, to be published by the Cambridge University Press in 1989. This paper is adapted from the conclusion to that book.

The coauthors of this paper bring long academic and policy experience to bear on this topic. Malcolm Gillis, of Duke University, has been a successful development economist as well as advisor to a number of governments, and Robert Repetto is the chief resource economist of the World Resources Institute in Washington, D.C.

We trust this paper will make a useful contribution to an understanding of and solution to this serious problem.

Nicolás Ardito-Barletta
General Director
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Panama City, Panama
September 1988

ABOUT THE AUTHORS

MALCOLM GILLIS is a distinguished economist who has had considerable policy experience as an advisor to a number of developing countries. He is currently Dean of the Graduate School and Vice Provost for Academic Affairs at Duke University, and was before that an Institute Fellow at the Harvard Institute for International Development. His major fields of expertise are economic development, public finance, and natural resource policy, and he has written widely on them. Among his many books are *Tax and Investment Policies for Hard Minerals: Public and Multinational Enterprises in Indonesia* (1978) and *Economics of Development* (1983, with Dwight Perkins, Michael Roemer, and Donald E. Snodgrass).

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MALCOLM GILLIS AND ROBERT REPETTO

Deforestation and Government Policy

A few low-income nations are confronting an imminent shortage of wood; the world is not. All nations, however, are facing an extremely serious shortage of natural tropical forests, an international asset of inestimable value. Deforestation and forest degradation are rapidly shrinking the size and quality of this fragile endowment, with severe consequences for the entire planet. In developing countries, depletion of natural forest endowments is responsible not only for declining supplies of wood fiber, but for irretrievable loss of habitat for flora and fauna, squandering of irreplaceable genetic material for breeders of plants and animals, and loss of livelihood for millions of humans who for centuries have depended upon nonwood forest products for their livelihood. Continuing destruction of natural rain forests has also left

This article is based on research conducted by the authors and collaborators for the book *Public Policy and the Misuse of Forest Resources* (New York: Cambridge University Press, 1989). Analysis of information from ten case studies formed the basis for the conclusions presented herein. The authors are responsible for any errors of fact or interpretation.

many tropical countries with vast tracts of land rendered unsuitable for all but the most capital-intensive agriculture, and has accelerated erosion and damage to vital watersheds.

In recent years it has become evident that the immiserization following upon this process is not confined to tropical countries, but has instead worldwide implications. While policymakers in both rich and poor countries have begun to understand something of the value of natural forests as a standing resource, deforestation continues apace. This paper will explore the causes of deforestation in Third World countries, with special emphasis on waste-promoting government policies. It will also suggest policy reforms designed to lessen the problem, along with ways in which international development agencies and governments of industrial nations can help.

New Perspectives on the Causes of Deforestation in the Tropics

A number of recent studies have clearly established the extent of forest decline and likely economic, social, and environmental consequences (Brown et al. 1985; Eckholm 1976; Fearnside 1982; Grainiger 1980; Lanly 1982; Myers 1980, 1984, 1985; Spears 1979). Many of these studies and others as well (Allen and Barnes 1985; Bunker 1980; Ehrlich and Ehrlich 1981; Plumwood and Routley 1982; Tucker and Richards 1983) have also sought to establish the principal causes of deforestation. Shifting cultivation, agricultural conversion, and fuelwood gathering—three major outgrowths of population growth and rural poverty—have been identified as threats to natural forests in the Third World. The impact of large development projects has also been shown to be a contributing factor. Finally, almost every previous study has focused upon logging, land clearing for ranches, and other forms of commercial exploitation as sources of the problem.

Our research reinforces prior findings on the role of poverty and commercial forest activities in deforestation. But in addition we focus on the role that government policies have played in significantly exacerbating other pressures leading to wasteful use of natural forest resources, particularly those owned by governments themselves. Our findings are based upon evidence of the effects of government policies on deforestation and forest degradation in ten case studies covering seven countries: Brazil, Gabon, Ghana, Indonesia, Ivory

Coast, Liberia, the Philippines, and three regions of Malaysia—Peninsular Malaysia, Sabah, and Sarawak. We emphasize the policy dimension because changes in policy can substantially reduce resource wastage. Our emphasis on wasteful use in the economic sense does not ignore or minimize the importance of noneconomic objectives in shaping forest policies. Rather, our research implies that policies leading to economic waste have also undermined conservation efforts, regional development strategies, and other socioeconomic goals.

Separating the effects of government policies from those of other causes is an extremely difficult task, because policy-induced exploitation interacts with other pressures on natural forests. Forests opened by loggers encouraged by liberal concession terms are thereby more accessible to shifting cultivators. Government-sponsored settlements also attract spontaneous migrants. Development policies that worsen rural poverty lead to more rapid encroachment on forest lands. The indirect effects of government policies are substantial. Despite this complexity, an important conclusion emerges from the case studies we have considered: *wastage of publicly owned natural forests has been widespread and long-standing. To an extent heretofore unappreciated, these outcomes have been the largely unintended, avoidable consequences of government policies.*

The policies in question are not confined to those formulated by government agencies nominally responsible for oversight of forest utilization (forestry policies). A wide range of other policies designed to serve broader governmental goals (nonforestry policies) have also badly undermined the value of natural forest assets.

Forestry policies include (1) those governing terms of timber harvest concessions, such as their duration, permissible annual harvests and harvest methods, levels and structures of royalties and fees, (2) policies affecting utilization of nonwood forest products, and (3) policies toward reforestation. Case studies from West Africa, Latin America, and Southeast Asia furnish ample evidence that forestry policies have provided strong incentives for wasteful use of natural forest resources. Inadequate use of royalties and other charges to collect the economic rents potentially available to harvesters of mature timber have set off "timber booms" and scrambles for short-term profits. In most of the countries studied, including Indonesia, Malaysia, the Philippines, the Ivory Coast, and Ghana, the result has

been rapid, careless timber exploitation that outran both biological knowledge and administrative capacity for sustainable forest management.

Timber concessions have generally been too short in duration to allow loggers to conserve forest values even if they were inclined to do so. Harvesting methods, particularly the variants of selective cutting prescribed or allowed by most tropical countries, have undermined forest quality. The structure of timber royalties has promoted excessive mining (high-grading) of forest value and yielded too few revenues for government as resource owners. Where reforestation policies aimed at regeneration and restoration of commercial mixed forest stands have been tried, they have proved largely ineffective.

In many countries nonforestry policies have caused greater forest destruction than misdirected and misapplied forestry policies. Nonforestry policies prejudicial to forest conservation may be arranged on a continuum that ranges from self-evident to subtle. Most obvious are the effects of policies leading directly to physical intrusion in natural forest areas. These include agricultural programs that clear forest land for estate crops, such as rubber, palm oil, and cacao, *fe.* annual crops. Closely related are investments in mining, dams, roads, and other large infrastructure projects that incidentally result in significant, once-and-for-all destruction of forest resources. Many such projects are politically driven and of questionable economic worth, even apart from the forest and other natural resource losses they impose.

Further along the continuum are tax, credit, and pricing policies that stimulate private commercial investment in forest exploitation, whether in logging or timber processing. Such policies have induced timber harvesting in excess of rates that otherwise would have been commercially profitable. One step removed are policies that stimulate private investments in competing land uses, such as ranching, farming, or fish culture. The principal instruments of fiscal and monetary policies contributing to forest destruction are generous tax treatment, heavily subsidized credit, and direct government subsidies.

Next on the continuum are land tenure policies that encourage deforestation. Of these, the most direct are tenurial rules that assign property rights over public forests to private parties on condition that such lands are "developed" or "improved." Such rules have facilitated small-farmer expansion into forested regions, but in some

countries have been used by wealthier parties to amass large holdings. A few countries have demonstrated that this policy works in reverse, by awarding private tenures to deforested public wastelands on condition that they be reforested.

A more indirect tenurial policy has been the centralization of proprietary rights to forest lands in national governments, superseding traditional rights of local authorities and communities. Although intended to strengthen control, such actions have more often undermined local rules governing access and use, removed local incentives for conservation, and saddled central governments with far-flung responsibilities beyond their administrative capabilities.

Finally, the furthest points on the continuum represent those policies that appear at first glance to have few implications for forest use, but which ultimately prove to be significant sources of policy-induced forest destruction. Included here are all domestic policies that further impoverish households living close to the margin of subsistence, especially in rural areas. These include food pricing policies and investment priorities biased against the agricultural sector, development strategies that depress the demand for unskilled labor, exchange rate overvaluation, and agricultural policies that favor large farms over smallholders. These policies retard the demographic transition, depress incomes of rural populations and render them more dependent on natural forests for subsistence needs, and increase the concentration of agricultural landholdings.

This emphasis on the policies of national governments responsible for their public forest lands does not imply that external agencies have been blameless in the long-term misuse of natural forests in developing countries. It has long been apparent that trade barriers protecting wood-processing industries in the United States, Japan, Europe, and Australia have usurped many of the benefits from forest-based industrialization that could have accrued to poor countries, while inducing Third World governments to take strong, sometimes excessive, countermeasures. And although multinational timber enterprises from industrial countries were among the primary beneficiaries of log extraction in tropical nations at least into the 1970s, they have steadily withdrawn from the forests of developing countries. By 1980 they had completed divestment of virtually all logging operations in Southeast Asia and West Africa, their places having been taken by smaller multinationals from developing countries and

by firms owned by domestic entrepreneurs. The image of the now-departed multinational firms, popularly identified as the principal engines of forest destruction for so long, no longer obscures the part played by domestic government policies.

There is little doubt that policies of governments have been inimical to the rational utilization of valuable forest resources. Why have these policies been adopted, and why do they persist? In many countries the policies have been deliberately intended to reward special interest groups allied with or otherwise favored by those in power. The existence of large resource rents from harvesting mature timber has attracted politicians as well as businessmen to the opportunities for immediate gain.

That is not the whole story, however. To a considerable degree, the policy weaknesses identified in this study arose despite well-intentioned development objectives. The shortcomings have been failures of understanding and execution. Distillation of the lessons of recent analyses provides six reasons that help to explain why government policies have erred in the direction of excessive depletion of natural forest resources. The six are first presented in summary form, then discussed at greater length.

1. Policymakers have consistently undervalued the continuing flow of benefits from intact natural forests.
2. They have also overestimated the net benefits of forest exploitation and conversion, exaggerating both the direct and indirect economic benefits, and ignoring many of the costs.
3. Development planners have boldly exploited tropical forests for commodity production without adequate biological knowledge of their potential or limitations or awareness of the economic consequences of development policies.
4. Policymakers have attempted—without success—to draw on tropical forest resources to solve fiscal, economic, social, and political conflicts elsewhere in society.
5. National governments have been reluctant to invest the resources that would have been required for adequate stewardship of the public resource over which they asserted authority.
6. National governments have undervalued the wisdom of traditional forest uses and the value of local traditions of forest management that they have overruled.

1. *Undervaluation of forest assets.* Natural forest endowments remain undervalued in all countries studied, not only by the general public but by governments as owners or as regulatory authorities and by international institutions. An asset that is undervalued is an asset that will inevitably be misused.

Forest exploitation has concentrated on a relatively few valuable commodities, neglecting other tangible and intangible values of intact forests. Natural forests everywhere serve protective as well as productive functions. Assigning money values to the protective services is much more difficult than estimating the market value of timber harvests. This difficulty accounts for much of the worldwide tendency to undervalue natural forest assets, but, in addition, potential production has also been undervalued. Forests in the tropics have generally been exploited as if only two resources were of any significance: the timber and the agricultural land thought to lie beneath it. A third resource has been overlooked virtually everywhere: the capacity of the natural forest to supply a perpetual stream of valuable nonwood products that can be harvested without cutting down trees. In the tropics, these include such commodities as nuts, oils, fibers, and plant and animal products with special uses. And both in tropical nations and in high-income countries in the temperate zone, the recreational value of forests is often underestimated.

2. *Overestimation of benefits and underestimation of costs of forest exploitation.* The timber and agriculture products expected to flow from log harvests and clearing of natural forests have been overvalued. The common expectation that tropical logs could be harvested every thirty-five years in cutover stands was based on over-optimistic expectations of the rate and extent of regeneration. These expectations have been grossly unfulfilled in Indonesia, Malaysia, the Philippines, and other countries studied. Assumptions about the agricultural potential from land underlying tropical forests have been even more optimistic. The results here have been even more disappointing, particularly in the Indonesian resettlement activities known as the transmigration program and in the Brazilian schemes for promoting Amazonian development through large-scale cattle ranching.

Policymakers have also overestimated the employment and regional development benefits associated with timber industries, infrastructure investments, and agricultural settlements in tropical forests.

Where such initiatives have not been economically sound to begin with, they have not induced further development or even been able to sustain themselves without continuing dependence on government subsidies. However, one result of such inflated expectations has been that governments have encouraged timber speculation by allowing high-value timber to be removed too cheaply. Rather than collect the available tax revenues and the rents due them as landholders, governments have allowed the economic rent on forest lands to accrue to the timber concessionaires in the form of artificially huge profits. This problem is reflected in persistently low timber royalties and license fees and unduly low—sometimes zero—income and export taxes. Only in the East Malaysian state of Sabah (and then only after 1978) have governments been moderately successful in appropriating a sizable share of the rents available in logging. Elsewhere, in Indonesia, Malaysia outside of Sabah, the Philippines, and West Africa, sizable rents available to timber concessionaires have generated destructive timber booms and pressures for widespread, rapid exploitation.

Nor have optimistic expectations about the employment benefits from forest utilization been realized. The wood products industries in tropical countries have provided some employment, to be sure, but with the single exception of Gabon, the timber sectors in tropical wood-exporting nations have typically provided jobs for less than 1 percent of the labor force, a figure only as high as in the diversified United States economy and half as high as in Canada. The drive to expand employment, domestic value-added, and foreign exchange earnings has led to strong protection of domestic processing through bans on log exports and high export taxes on logs but not on timber products. Stress on forest-based industrialization has also led to tax and credit incentives for sawmills, plymills, and even pulp and paper projects that have been inappropriate for short-fibered tropical hardwoods. Jobs in the forest-based sector were indeed created, but at very great cost to nations with large tropical timber endowments. Large amounts of taxes and foreign exchange earnings were dissipated in Indonesia, Malaysia, the Philippines, and West Africa, and some of the industries that were sheltered became inefficient claimants to more of the forests than foreign mills could ever command.

Along with overestimated benefits, there has been a pervasive tendency to underestimate not only the economic but also the social and environmental costs of forest exploitation. Although some of

these costs have by now been well documented, they have nowhere been explicitly offset against the putative benefits of forest use. The destruction of habitat that threatens myriad little-known species endemic to tropical forests and the displacement or disturbance of indigenous communities have been especially neglected costs. In addition, the costs of "boomtown" development that often arise from intensified logging and processing activities were overlooked in the drive to promote development of lagging or backward regions. In Indonesia, Brazil, and elsewhere, neither the infrastructure costs of providing for large inflows of immigrants to timber provinces in the early stages of timber booms nor the costs of maintaining excessive infrastructure in post-boom periods were viewed as offsets to the private economic benefits flowing from the opening of the natural forest. Instead, they were viewed as investments in regional development that could be financed through timber sales.

In some areas, large-scale extractive activity in natural forests has imposed heavy environmental costs. Misused, fragile, tropical soils have been seriously damaged over large areas. In Indonesia and the adjacent East Malaysian state of Sabah, for example, these hitherto unforeseen costs reached calamitous heights in 1983. In that year of severe drought, fire in the moist tropical forests in both countries burned an area about one-and-a-half times that of Taiwan. Previous droughts had brought fire, but on a far smaller scale and with minimal damage. By 1983, however, extensive logging in both areas had predisposed even the wet rain forest to disastrous damage from fire, while unlogged forests suffered far milder damage. In Indonesia alone, losses in the value of the standing stock of trees exceeded \$5 billion, and the costs of ecological damage are yet to be calculated.

3. *Development policies based on inadequate knowledge of ecological limitations and economic consequences.* Governments have proceeded without adequate biological or economic knowledge of tropical forest resource management. Little is known about the potential commercial value of all but a very few of the tropical tree species, so most trees are treated as weeds and destroyed during logging operations. Much remains to be learned about potential regeneration of currently valuable tree species and successful management of heterogeneous tropical forests for sustained yields. Without this knowledge, loggers have blundered through the forests,

extracting the few highly valued logs and severely damaging the rest. Even less is known of the potential value for agricultural, scientific, or medical purposes of the millions of other plant and animal species, despite clear indications from previous discoveries that unknown treasures may exist in the forests. Consequently, forest habitat is recklessly cleared for commodity production of marginal economic value.

Large-scale agricultural settlements and livestock operations have been encouraged without adequate study of land use capabilities. Painful and costly failures have driven home the lesson that the lush tropical forest does not imply the existence of rich soils beneath it. It is now recognized that most underlying soils are too nutrient-poor for sustained crop production without heavy fertilization, and that the better soils—along rivers, for example—are probably already being used by shifting cultivators. Similarly, massive conversions to monocultures and ranches have taken place without prior attention to potential problems of plant and animal diseases or to pest and weed management, with costly and sometimes disastrous consequences. Only now is serious attention being paid to the capabilities of tropical soils and the development of sustainable farming and livestock systems suited to them.

Governments have pushed ahead with forest exploitation not only in advance of ecological knowledge but even before understanding the likely consequences of the policy instruments with which they hoped to stimulate development. Several countries awarded concessions for the majority of their productive forest estates before enough time had elapsed to assess properly the adequacy of their forest management system, or the impact of forest revenue systems on licensees' behavior. Governments have stimulated large domestic processing industries before evaluating the appropriateness of the levels of protection afforded them, their technical and economic efficiency, and the costs and benefits to the national economy of the incentives provided. Similarly, governments have gone ahead with large-scale conversions of tropical forests before adequately evaluating the economic viability and worth of the alternative uses.

4. Forest exploitation as a tool for sociopolitical conflict resolution. The precipitate actions described above are related to a fourth reason: governments have tended to grasp at tropical forests as a

means of resolving problems arising elsewhere in society. Migration to forested regions has been seen in Indonesia, the Philippines, and many countries as a means of relieving overcrowding and landlessness in settled agricultural regions, whether those conditions sprang from rapid population growth, highly concentrated land tenures, or slow growth of employment and opportunities for income generation. Rather than modifying development strategies to deal more effectively with unemployment and rural poverty, or to tackle the politically difficult problem of land reform, many countries have in effect used forests as an escape valve for demographic and economic pressures.

Sale of tropical timber assets has been seen as a ready means of raising government revenues and foreign exchange. Governments have found that drawing down these resources has been easier in the short run than broadening the tax base and improving tax administration, or reversing trade policies that effectively penalize nascent export industries. Ultimately, however, the easy options are exhausted and the underlying problems remain.

5. Insufficient commitment of funds and research efforts to forest ecology and management. Governments (and development assistance agencies) have failed to devote the resources and attention to the forest sector that would have been necessary to ensure proper management and stewardship. Development spending on the forest sector, for example, has been a tiny fraction of that allocated to agriculture. While most sizable countries in the Third World have built up substantial agricultural research programs (including tree crop research in some countries), none have developed appreciable research capabilities or activities focused on natural forest ecology and management.

Despite the enormous value of the resource, including billions or, in Brazil, even trillions of dollars in timber alone, and the large sums of money represented in the annual log harvest, governments have not built up adequate technical and economic expertise or effective management and enforcement capabilities. As countries with large petroleum and other mineral resources have found, the cost of such expertise and managerial capability is small relative to the value of the resource, and is an investment that is quickly returned in increased earnings to the national economy and the government treasury.

Numerous case studies have documented the needless waste of forest resources because of inappropriate policies or widespread evasion of justifiable but poorly enforced regulations. Yet the record of policy analysis in the forest sector is sparse, and infusions of funds and technical assistance to train, staff, equip, and monitor forest administration agencies have been inadequate.

6. *Preemption of local traditions of forest management.* Finally, while national governments have overestimated their own capabilities for forest management, they have underestimated the value of traditional management practices and local governance of forest resources. Local communities dependent on forests for a wide variety of commodities and services, not just timber, have been more sensitive to their protective functions and the wide variety of goods available from them in a sustainable harvest. Moreover, when provincial and national governments have overruled traditional use rights to the forests, local communities and individual households have been unable, and less willing, to prevent destructive encroachment or overexploitation. Conversely, governments such as China have found that restoring or awarding such rights to local groups has induced them to attend carefully to the possibilities of sustainable long-term production from forest resources.

Improving the Policy Environment for Utilization of Natural Forests

Those with important interests in the natural forests form a wide and diverse constituency. Included are not only public and private proprietors and enterprises based on forest resources, but also those who benefit from the protection that forests provide to soils, water, and wildlife. With respect to the tropical forests, this constituency is worldwide.

Conflict over forest policy is frequent between competing interests and is sometimes seen as inevitable. In particular, "conservationists" and "developers" are supposedly unalterably in opposition. When conservation interests are external to the region or nation seeking to develop, conflicts between interests can be acute. Nevertheless, an important implication of this study is that such conflicts are

often more apparent than real. Policies that have led to wasteful exploitation of forest resources, both in developed and developing countries, have been costly not only in biological terms, impoverishing the biota and soils, but also in economic terms. Uneconomic investments have been promoted, assets have been sacrificed for a fraction of their worth, and government treasuries have been deprived of revenues and foreign exchange earnings sorely needed for genuine development purposes.

Reforms of public policies toward publicly owned forests can save both natural and financial resources. Rather than a "win-lose" predicament, opportunities for policy reform present "win-win" situations for nations with natural forest endowments. In Brazil, for instance, tax and credit incentives for conversion of Amazonian forests to livestock pastures have resulted both in ecological and fiscal disasters: the incentives have made social waste privately profitable at great expense to the government budget. Such outcomes are not by any means confined to tropical nations; in the United States, the Forest Service has subsidized timber production on economically unfit lands. Potentially superior recreational uses have thus been sacrificed along with hundreds of millions of dollars in federal funds. Efficient management of scarce resources is the proper concern of economic policy. Policies such as these, which promote the wasteful use of forest resources, are seldom justifiable.

Opportunities for policy improvements notwithstanding, there is a vein of truth in the assertion heard in the Third World that rich countries, having preempted a large share of the world's resources, wish developing countries to bear the costs of conservation. Since the clientele for tropical forest conservation is worldwide, it is in the rich nations' interests to help defray some of the costs of policy reforms affecting faraway forest endowments. For example, worldwide interests are clearly furthered when Brazil, Indonesia, Malaysia, or Gabon sets aside new areas in parks and forest reserves. Survey and exploration of natural forest resources, for wood and nonwood products as well as genetic resources, are costly but essential for better management. International interests are served by forest conservation and research; international financial and scientific support for them is therefore sensible.

We identify in the following sections a series of measures that could be undertaken by tropical country governments, by industrial

country governments, and by international agencies to improve economic utilization and conservation of natural forest assets. This list is not intended to be an exhaustive agenda of needs and opportunities for slowing deforestation. Such a list would include recommendations for accelerating botanical, genetic, and ecological research, for improving agroforestry, plant breeding, and selection, and for strengthening forestry practices in responsible government organizations.

Our focus is complementary to that of tropical biologists and foresters, although our concerns are the same. We have identified needs and opportunities for policy reform to alter incentives affecting decisions about natural forest resource use. For convenience of presentation, the reforms are grouped into two categories: those that are essentially the responsibility of governments as owners of forests and as regulators of activities in them, and those for which responsibility properly falls to agencies representing the worldwide constituency for forest conservation. Neither category is intended to be airtight; for example, the need for joint responsibility for financing reforms is particularly great. Further, the international community should help to provide better and more complete information on which policy reforms by owners can be based. This requires expanded policy research on several forest-related topics.

Policy reforms by national governments of tropical countries. In most cases, two objectives can serve as adequate guidelines for policy reform: (1) more efficient development of the *multiple* uses of natural forests; and (2) improved financial returns to governments as owners of forest resources. At first glance these objectives may seem to be too narrow, as they may appear to ignore noneconomic considerations such as preservation of indigenous communities and ecosystems. Steps to achieve these two objectives, however, will generally contribute strongly to these noneconomic goals as well, because of the complementarities discussed above. Thoroughgoing reform is required both in forestry and nonforestry policies.

Forestry policies. Royalties and related charges on private contractors for harvesting and sale of government-owned timber have been deficient on two principal counts. First, charges have been maintained at levels well below the stumpage value of the timber.

This has resulted not only in lost timber rents for the government, but also in enormous pressures from business and political interests to obtain timber concessions and the substantial short-run profits they offer. This rent-seeking syndrome has joined with other flaws in timber policy to create a climate of over-rapid, wasteful exploitation. As a result, timber has been harvested from marginal stands, often in such ecologically vulnerable sites as slopes and critical water catchment areas. Second, the structure of royalties has combined with inappropriate selection systems to exacerbate loggers' proclivities toward high-grading (or mining) forest stands. As a consequence, forest quality has been needlessly damaged in the ten cases covered by our research. Sensible reform calls both for increases—sharp increases in many countries—in royalty levels and for thoroughgoing modification of defective royalty structures. Inflexible, undifferentiated, specific charges based on the volume of timber harvested should be replaced by *ad valorem* royalty systems, based on export prices properly discounted for costs of harvesting logs and transporting them to ports. Valuation of logs for royalties should be equivalent for log exports and for those delivered to domestic processing mills, for the measure of the opportunity cost of a log is usually its f.o.b. (free on board) value. Countries should use differentiated *ad valorem* rates, with lower rates for so-called "secondary" species than for the most valuable "primary" species, to the extent that their forest services are sufficiently well trained and administered to enforce them. If the forestry service is undermanned and untrained, flat-rate *ad valorem* royalties constitute the best of inferior options, and can be adequate if set at moderate levels and combined with other measures to capture resource rents.

Governments have generally proven reluctant to enact royalty reform. Of the countries studied, only Sabah (1978) and Liberia (1979) have implemented sharp increases in royalty levels in recent years. China has sharply increased log prices by administrative measures and by permitting market transactions, and proposals that were pending in China in 1987 would have raised stumpage fees further. Elsewhere, including the Philippines, Indonesia, Ivory Coast, Ghana, Gabon, Sarawak, and Peninsular Malaysia, royalties continue well below true stumpage values and should be raised. Again, tropical nations are not alone in selling timber resources too cheaply: in the United States, although royalties are bid (usually

competitively) and approximate private stumpage values, the government's absorption of substantial logging costs means that timber with negative stumpage value is routinely harvested. The simplest remedy for this is the imposition of minimum acceptable bid prices high enough to recover the government's full separable costs of growing and marketing timber.

These reforms would do much to counteract the rent-seeking syndrome and its destructive effects. Harvesting of uneconomic forest lands would be curtailed. Timber exploitation in Third World countries would be slowed to a rate more in line with the growth of forest management capabilities. The new policies would permit more complete utilization of available timber in smaller, more compact concession areas. The result would be a reduction in wastage, infrastructure costs, and the forest disturbance that opens the way for secondary clearance and agricultural conversion.

Policy reforms in the administration of concession agreements would also further both conservation and development goals. Realignment of concessions policies requires changes in both the duration of concessions and the level of license fees charged on concession areas. Prior to World War II, many tropical timber concessions were granted for periods of up to a century. Newly independent governments in the postwar period tended to view such arrangements as vestiges of colonialism. Consequently, the duration of concessions was steadily compressed. By 1987, concession periods were typically five to ten years in length even for large tracts; few governments allowed concessions longer than twenty years.

Given the long growing cycles of commercial tropical hardwoods, short-term concessions are generally inconsistent with sensible resource management. Logging firms have no financial interest in maintaining forest productivity under such circumstances. Instead, they have incentives for repeated reentry into logged-over stands before expiration of their concession, compounding damages arising from the initial harvest.

Tropical foresters have long called for extension of concession periods to at least seventy years, so as to provide loggers with at least two rotations of thirty-five years each. Governments have not heeded such proposals, partly because prewar experience with longer concessions showed little evidence of conservation practice by loggers. Therefore, any movement to extend concession periods must neces-

sarily be accompanied by appropriate safeguards to defend the public interest in nations with tropical forest endowments. Among the safeguards proposed is a periodic review of concessionaire performance, with renewal of logging rights conditional on adherence to prescribed practices. In practice, as the experience of the Philippines shows, such arrangements are difficult to police without a substantial improvement in administrative capacity. Furthermore, firms, especially multinational companies, have grown wary of all long-term contracts, including timber concessions, because so many have been abrogated by governments. A complementary approach is to structure policies from the outset to provide strong incentives to firms for rational forest use.

For example, governments could use area license fees much more effectively to promote conservation, rational harvesting, and more complete rent capture. Fees based on the area awarded in concessions have been found to be extremely low in most countries. Ideally, logging concessions should be auctioned competitively, as offshore oil leases are in the United States, ensuring that governments capture virtually all the available resource rent. But auction, or competitive bidding, systems work well only where the owner has enough information about the resources in particular forest tracts to enable him to ascertain their approximate value, and where the number of bidders ensures competition. Acquiring the necessary information about resources is difficult in tropical timber stands, which are typically inaccessible and far more heterogeneous in species composition than temperate forests. Nevertheless, successful examples of auction systems have been reported for both Sarawak and Venezuela. The investment by governments in more detailed exploration and inventory of forest resources is likely to have an immediate payoff in improved revenue capture.

Auction systems can be combined with high reservation or minimum bid prices to guard against bid rigging, or to discourage firms from entering regions that are ecologically sensitive or are better kept back for harvesting at some future time. Where auction systems are not feasible, concession contracts should employ much higher license fees per hectare than is now common in the tropics. Higher license fees serve two conservation goals, as well as revenue objectives: they discourage exploitation of stands of marginal commercial value, and when combined with royalty systems differenti-

ated with respect to stumpage values, they encourage economic utilization of timber stands by providing logging firms with incentives to recover more volume and more species per hectare.

Serious problems have been identified in selection systems governing harvest methods in nearly all of the ten tropical forest cases examined in our research and that of our collaborators. Selective cutting systems are used almost everywhere in mixed tropical forests. Notwithstanding some evidence from Southeast Asia that careful selective logging can be done with minimal damage to residual stands, the selective cutting methods actually practiced in tropical forests yield unsatisfactory ecological results (principally because of heavy incidental damage and poor regeneration of harvested species) and inferior long-term economic results (because of deterioration of the quality of the stand).

It is unfortunately true that much remains to be learned about ecologically sound selection systems in tropical forests. Virtually no one supports clear-cutting ("whole-tree utilization") as a silviculture method in tropical forests except where natural forests are to be cleared for other land uses. There is therefore little basis for recommendations on harvest systems, other than careful research in specific forest regions. But better enforcement of concession terms to avoid excess damage to soils and remaining trees is possible, and the policy reforms discussed above would provide stronger incentives to concessionaires to reduce logging damage and waste.

The most plausible alternative to current methods is one or another of the so-called uniform cutting systems, which also involve selective harvests but generally take more stems per hectare. Uniform cutting systems yield greater immediate volume but also entail greater costs and ecological impacts. In the long run, the most sensible approach to improving harvest methods is more research on the ecological, silvicultural, and economic implications of alternative selection methods, to find attractive variants of uniform cutting systems or more appropriate forms of selective logging.

Reforestation requirements in the temperate forests of North America and China are well understood, even if costs or other constraints have sometimes limited reforestation programs on public lands. The situation is different in tropical countries. If by reforestation is meant the restoration of logged-over stands to something closely resembling their natural states, with similar species fre-

quency, age distribution, and density, then existing knowledge of the ecology of the tropical forest severely constrains the success of such efforts. If by reforestation is meant enrichment planting of primary species in cutover stands, current policies have brought little success, despite encouraging results in Indonesia and a few other areas.

Despite the general lack of success in regenerating cutover tropical forests, some reforestation policies have served other beneficial purposes. Indonesia's reforestation deposit (\$4 per cubic meter harvested) did capture additional timber rents and helped discourage logging on marginal stands, although it was not nearly high enough to induce firms to undertake significant reforestation activity. The same can be said of similar charges in Malaysia and West Africa. Nor have regeneration programs mounted by governments' as owners had much success, whether financed by earmarked forest taxes or directly from national treasuries. Most of these have been either underbudgeted (the Philippines, Ghana, and Gabon), ill designed (Indonesia and the Philippines), or rendered ineffective by institutional constraints (Sabah).

A viable set of regeneration policies in logged-over areas would have the following features: (1) prime focus on cutting methods favorable to natural regeneration, coupled with enrichment planting of native species; (2) carrot and stick incentives for firms to undertake regeneration (the carrot could be a one-year extension of the concession period for every prescribed number of hectares of the concession area in which regeneration is under way, and the stick could be a sizable deposit of at least \$5 per cubic meter of primary species harvested, refundable to firms as regeneration proceeds, on proof of their expenditures for this purpose); (3) more budgetary and scientific resources for regeneration research program; and (4) increased support for government regeneration efforts by international lending institutions and aid donors.

Where reforestation is defined as replacement of forest cover on cutover tracts by non-indigenous trees (such as pines) other than those grown for tree crops, some success has been recorded in tropical countries, including Indonesia, Malaysia, the Philippines, and Brazil. Experience with free plantations (especially conifers) from temperate zone countries may prove helpful in these efforts. Such programs are well established in China, the United States, and other temperate countries such as Chile.

Plantations are in any case an essential part of any program to conserve natural tropical forests, because they create an alternative source of supply to meet growing demands for wood products. Tropical areas under tree plantations (other than those established for industrial tree crops such as palm oil) have grown substantially in the postwar period. They covered an estimated 11 million hectares in tropical countries (excluding China) by 1980, and their area is expected to double by the end of the century (Spears 1983).

Policies that promote investment in tree plantations can help in reducing demands on natural forests, especially for domestic needs. A number of countries have adopted incentive programs, including tax benefits, concessionary credits, and guaranteed markets to stimulate private investment plantations. These policies have already been evaluated by several previous studies (Berger 1980; Gregersen and McGauhey 1985; Laarman 1983; Matomoros 1982). Unfortunately, impediments to plantation investments still exist in tropical countries. For example, potential foreign investors in Indonesia cannot own forest land in fee simple nor can they obtain leases for a sufficiently long period of time. Such limitations discourage investment commitments. Even with increasing investments in plantations, deforestation exceeds reforestation by large margins in most tropical countries, and depletion of timber supplies greatly exceeds additions from all sources. Consequently, positive incentives for plantation investments, while important, are insufficient.

Adverse policies that exacerbate losses of natural forest resources must also be changed. Neglect of nontimber forest products is one such policy, based largely on ignorance. Most tropical country governments do not even collect information on the annual value of production or export of dozens of valuable nonwood products that can be harvested without damaging the complex forest ecosystem. In Indonesia, where relatively complete and up-to-date data are maintained on production and export of these items, their value now exceeds 10 percent of gross log export value. Complicated new policies to promote nontimber products are not needed; however, better information should be provided, export taxes on them should be removed, and export controls should be relaxed—except, of course, for trade in sensitive or endangered species. If governments realize how valuable such products can be, they will view their loss with more concern.

Traditionally, local communities have been more sensitive to these benefits, while central governments have tended to regard tropical forests as immense timber warehouses. Consequently, central governments have not been effective resource managers, and provincial or state governments (as in Malaysia) have not done much better. For constitutional as well as other reasons, privatization of permanent rights to natural forests is not a realistic option in most countries. Nor would it necessarily solve the problem by itself. In Brazil, where large-scale forest privatization has occurred, policy-induced distortions in investment incentives have enticed large investors to grasp at opportunities for short-term gains—with predictable results. The record of experience thus far, however, suggests that local communal or collective ownership of forest property rights has been more consistent with conservation of *all* forest values than has central government ownership.

Accordingly, a larger share of rights and responsibilities over natural forests should be returned to local jurisdictions, where long-standing traditions of forest use exist, or to county governments (such as Indonesia's *kabupatens*), or to village cooperatives, as in China. Central governments would retain sovereign taxing power, and therefore would not give up forest revenues, although revenue-sharing with local communities is not only equitable but also effective in ensuring their interest in resource management. Reversion would mean principally that more forest management decisions, about the location, size, and length of logging concessions, and about land-clearing for agriculture, would be in the hands of local groups with a continuing stake in the multiple benefits that natural forests provide.

Nonforestry policies. Experience in all ten tropical cases studied demonstrates that government forestry policies have resulted in more resource depletion than would have occurred had governments tried to minimize their effects on private decisions over forest utilization. Not that *laissez-faire* would have been the desirable policy stance: our point is that, with market outcomes as a standard of comparison, government policies, on balance, have leaned toward more rapid exploitation rather than more conservation. Economic policies affecting the forest sector have had non-neutral effects that have exacerbated deforestation in almost every country investigated. In several, these effects have been extremely large.

Three forms of government subsidies have strongly affected forest use in many countries: (1) revenues lost by failure to collect resource rents from timber harvesting through appropriate royalties and taxes; (2) revenues foregone through income tax incentives for investment in logging, timber processing, and land-clearing activities for estate crops and cattle ranching; and (3) indirect subsidies in the form of artificially cheap credit for investments in those activities.

Along with enormous uncollected rents, generous income tax exemptions for logging and processing firms helped fuel the great timber booms in the Philippines (1950–70), West Malaysia (1960–75), East Malaysia, and Indonesia (1965–81). Some tax holidays were stretched illegally to a dozen years. Fortunately, tax incentives for logging firms are now relics of the past in Southeast Asia, although they are still found in a few African nations, including Gabon and the Ivory Coast. Tax holidays largely explain the poor performance in capturing timber rents in most log-exporting countries, particularly before the late 1970s. They are unnecessary, and should be rescinded where they still survive.

Moreover, in Brazil and other countries, tax credits, provisions for loss write-offs, and generous depreciation provisions joined with tax holidays to convert socially wasteful land-clearing projects into privately profitable ones. Where severe environmental costs are involved, as is often the case in tropical logging, tax subsidies for extractive activities are particularly misguided. Taxes should reflect the social costs not borne by the private investor. Therefore, tax subsidies create perverse incentives. The case for removal of all tax incentives for logging and agro-conversion in tropical countries is extremely strong.

Credit subsidies have added to perverse incentives for forest investments in Ghana, the Philippines, and especially Brazil. The artificially low interest rates and long grace periods available on loans for alternative land uses involving forest clearing have by themselves produced very powerful incentives for forest destruction. When coupled with generous tax subsidies, the incentives for very large-scale forest-clearing have proven irresistible, even where the alternative land uses were intrinsically uneconomic. All kinds of subsidized credit programs have been proven wasteful. Credit subsidies for irreversible destruction of forest assets cannot be justified on any economic or environmental grounds, and they should be abolished.

As much as half of the mass of a log becomes sawdust, wood-

chips, or other residue when the log is processed. Residue can be used for fuel or to make such products as particle board, but is much less valuable than lumber and plywood. Domestic processing of logs therefore offers substantial potential savings in shipping and manufacturing costs. Countries with forest endowments and low labor costs enjoy comparative advantages in forest-based industry; over time most timber processing should gravitate to the raw material source. This transition has been hampered by trade battles in which industrial countries that have built processing industries requiring imported logs erect trade barriers discriminating against imported wood products, while governments in log-exporting nations then retaliate with policies to force exports of processed timber products rather than logs, and policies to encourage investments in sawmills, plymills, and other wood products industries.

While the net effect of these conflicting international trade policies has been to increase fiscal levies on processed and unprocessed tropical timber, and so restrict world consumption somewhat, severe distortions in investment patterns and losses in economic efficiency have also resulted. In industrial countries, capital and labor have been retained in declining industries. In exporting countries, log export bans have led to evasion, corruption, and the construction of high-cost processing facilities as a means of ensuring access to logs. In addition, the tax and tariff protection provided to wood-processing industries has been so high as to weaken competitive pressure and to undermine incentives to minimize costs. Consequently, very sizable amounts of timber rents have been destroyed; in countries such as Indonesia, the Philippines, and Ivory Coast, these losses have run into billions of dollars. Moreover, the low recovery rates in timber processing that have resulted from heavy protection have intensified demands on natural forest endowments. In time, forest-based industries established under the umbrella of heavy protection may achieve higher recovery rates, especially if the degree of protection is gradually reduced. Even then, the processing capacity induced by government incentives will retain a strong claim to raw materials supplies. This is because governments will not be inclined to allow closure of forest-based firms during the periodic slumps characteristic of world markets for wood products. Rather they will provide the logs to keep domestic mills going even if economic or ecological considerations argue against it.

Large forest-based industries have been established in many

countries, including Indonesia, West Malaysia, the Philippines, Brazil, and parts of West Africa. Replacing log export quotas and log export bans in these countries with increased taxes on log exports would result in higher government revenues and send signals to processing industries of the need to modernize and raise efficiency. This trade liberalization should be negotiated in an international forum in exchange for reduced rates of protection for the timber-processing industries of log-importing countries. The result should be a gradual transfer of most tropical wood-processing industries to countries with large forest endowments, and substantial modernization and improved efficiencies of existing processing industries.

The costly lesson derived from the experiences of these countries can still be put to good use in those countries where forest-based industries have yet to emerge on a large scale, as in Sarawak in East Malaysia, Gabon, and others (Zaire, Cameroon, Papua New Guinea, and Burma, for example). For such nations, gradualism rather than haste is indicated in policies for promoting forest-based industrialization. Higher export taxes on logs than on lumber and plywood are superior in all respects to bans or quotas on log exports. Export taxes furnish whatever degree of protection is desired, raise government revenues, and also make redundant any income tax or credit incentives for sawmills and plymills. Similarly, log export bans and quotas are inappropriate means of preventing logging in sensitive or protected areas. Such areas should be given protected status, and no logging concessions (for domestic use or exports) should be awarded.

Many ambitious forest-based industrialization programs have been founded on wishful thinking. The same can be said about large-scale resettlement programs that have moved people into forested regions. In general, it has been wishful thinking to believe that sponsored out-migration could relieve pressures of rural poverty, land scarcity, or even environmental degradation in the areas of origin. The costs of resettlement have been too large, and, particularly in Indonesia and Brazil, the numbers resettled too small to make such a strategy viable, without dealing with the root problems of rapid population growth, rural inequality, and underemployment in the place of origin. Similarly, those in need of resettlement after being displaced by large infrastructure projects, such as dams in Sarawak and Ghana, have often been victims of wishful thinking that produced inflated estimates of projected returns on such invest-

ments. Most such investments have experienced serious cost and schedule overruns and have produced benefits only a fraction as large as anticipated.

The best way to ensure against such overoptimistic undertakings and the human, environmental, and economic losses they entail is to make the expected beneficiaries financially responsible for most of the costs of the project. In all developing countries, spontaneous migrants outnumber government-sponsored migrants severalfold and typically bear all the costs of their movements as an investment toward an anticipated better future for themselves and their offspring. If resettlement programs were based on the principle of cost recovery, the need for sound planning would be reinforced, and there would be checks on the scale and pace of implementation. Similarly, if agencies responsible for large-scale development projects, such as dams, were financially responsible for recovering operating and most capital costs from project-generated revenues, the tendency toward inflated projections of investment returns would be brought down to earth.

Where resettlement programs are carried out, needless damage to natural forests can be reduced in several ways. The most obvious, of course, is *not* to locate new communities in natural forests at all. In many countries, ineffective or inappropriate land and agricultural tax policies allow large landholders to retain huge estates that are used to only a small fraction of their agricultural potential. In such countries, because smallholders typically achieve much higher per hectare yields and incomes through intensive cultivation, land redistribution with compensation can be brought about, provided that the government is able to reform rural taxes to induce large landowners to sell part of their holdings and is willing to finance land purchases by small farmers on long-term mortgage credit. In addition, there are degraded public forest lands and wastelands in mainly Third World countries that could be transferred to landless peasants, to be used for mixed farming systems involving agroforestry. The main problem here is that governments agencies are typically as reluctant to disgorge any of their estates as any other large landholder.

If any agricultural resettlement projects are sited in forest areas, secondary and logged-over tracts should be selected in preference to intact forests. Individual holdings must be large enough to allow sustained support so that settlers are not forced to encroach on adjacent forest areas as has happened in Indonesia. Colonies should

be based largely on such tree crops as rubber, which are more suitable to available soils, and on agroforestry systems. Further, collection, storage, and marketing facilities for nonwood forest products near resettlement sites would encourage relocated families to use forests sustainably. Finally, award of sites must irrevocably convey all property rights to the awardee, including clear rights of transfer. This not only enables resettled people to offer land as collateral in borrowing for improvement, but reinforces the incentive to protect and enhance value of the property.

We conclude this discussion of domestic policy measures to reduce wastage of forest resources by drawing attention to the connection between deforestation and failed development policies. Pressures on natural forests are greatly reduced when towns and villages achieve adequate growth in rural output and employment, begin to convert from wood as an energy source to electricity and petroleum products, and experience declining population growth rates as birth and death rates decline and young workers are drawn off into expanding urban industries. Conversely, economic stagnation and impoverishment of rural and urban populations inevitably accelerate deforestation, as the experience of Ghana during the 1960s and 1970s illustrates so clearly.

Not much is known about government policies that can accelerate economic development, except those that promote a stable, broadly based political and economic system that rewards enterprise and productive investment by households and enterprises alike. Much painful experience has accumulated, however, about economic policies that retard development. Salient among these are market distortions, such as deeply overvalued exchange rates like those that have prevailed in Ghana for two decades and in Indonesia before 1983, negative real interest rates on forest-sector loans (Brazil and Ghana), and flagrantly distorted commodity prices as in much of West Africa in the 1970s. These not only result in serious market disequilibria, scarcities, and rationing throughout the economy, but also create perverse investment incentives and generate speculation and corruption. Such policies also often imply heavy penalties on the rural sector, as the relative prices of agricultural outputs are lowered relative to industrial prices, and investments are redirected toward the urban sector. If, at the same time, governments expand their direct role in the economy beyond their managerial capabilities, creating

expensive state-operated industrial and agricultural white elephants, economic stagnation is nearly assured.

Reversal of policies clearly inimical to economic growth will not immediately stem forest destruction arising from the spread of shifting cultivation and from the search for fuelwood. But the recent experiences of relatively prosperous countries such as Gabon, Venezuela, and Peninsular Malaysia reveal little deforestation arising from either shifting cultivation or fuelwood demands.

Policy changes by industrial countries and international agencies. Of course, economic development in tropical countries is influenced by policies of the industrial countries. The 1980s have seen stagnation and decline throughout much of the Third World as a consequence of worldwide recession in the early 1980s, extremely high real interest rates, and reductions in net capital flows to developing countries on international capital markets, as well as growing protectionist pressures in the industrial countries. While beyond the scope of this study, the connection must be pointed out between economic stagnation leading to deforestation in the Third World and policies in industrial countries that restrict outflows of capital to developing countries and inflows of commodities exported from developing countries.

More specifically, industrial country trade barriers in the forest products sector have been partially responsible for inappropriate investments and patterns of exploitation in Third World forest industries. Within the context of either the General Agreement on Tariffs and Trade (GATT), the International Tropical Timber Agreement (ITTA), or some other international forum, negotiations between exporting and importing countries should result in (1) reduced tariff escalation and nontariff barriers to processed wood imports from the tropical countries, and (2) rationalization of incentives to forest industries in the Third World.

While international assistance agencies have become increasingly concerned with forest-sector problems over the past fifteen years, their involvement has until quite recently primarily taken the form of support for discrete development projects. These have ranged widely, from reforestation and watershed rehabilitation projects to support for fuelwood and industrial timber plantations and funding for wood-processing industries. Associated with these projects, of

course, has been a significant amount of technical assistance in a wide variety of forestry-related subjects.

It must also be said that development assistance agencies have, in the aggregate, provided huge amounts of funding for projects that lead directly and indirectly to deforestation, including roads, dams, tree crop plantations such as those that produce palm oil, and agricultural settlements. Greater sensitivity is required in ensuring that such projects are, wherever possible, sited away from intact forests and especially away from critical ecosystems; in ensuring that such investments are, in fact, economically and ecologically sound once the nonmarket costs of forest losses are weighed in the balance; and in ensuring that such projects are executed in accordance with appropriate safeguards to minimize unnecessary damage.

Only to a much lesser extent have development assistance agencies been involved with the kinds of sectoral policy issues we have discussed. The Food and Agriculture Organization of the United Nations (FAO) has indeed studied forest revenue systems and published manuals and related material for policymakers. Multilateral and bilateral assistance agencies such as the Inter-American Development Bank and the U.S. Agency for International Development (USAID) have examined policies that would encourage private investment in forestry. In recent years, the World Bank has carried out forest-sector reviews in several countries that address some of the broader policy issues identified here, and new directions in World Bank policies indicate growing attention to tropical forest values. Still, it is clear that even more emphasis on policy reform in the forest sector is required. International development agencies must identify and analyze the effects upon forest resource usage of tax, tariff, credit, and pricing policies, as well as the effects of the terms and administration of timber concession agreements. This becomes especially imperative as international capital flows are more and more divorced from specific projects and linked to broad macroeconomic and sectoral policy agreements. Working in cooperation with host country agencies, international agencies can to a greater extent help identify needs for policy changes and options for policy reform.

More generally, governments of industrialized countries and international agencies should act upon the recognized community of interests among all nations in conservation of tropical forests. During 1987, FAO, the World Bank, the United Nations Development

Programme, and the World Resources Institute collaborated with nongovernment organizations, professional associations, and governments around the world on a "tropical forestry action plan" (FAO 1987). Intended not as a blueprint but as a framework for coordinated action, this plan identifies priority action needed on five fronts: forest-related land uses; forest-based industrial development; fuelwood and energy; conservation of tropical forest ecosystems; and institution building. Its recommendations are complementary to and compatible with the policy implications of this study.

The call for action sounded by participants in that process serves equally well as a conclusion to this volume:

Above all, action is needed now. Hundreds of millions of people in developing countries already face starvation because of fuel and food shortages. The forest resource potential of these countries can and must be harnessed to meet their development needs. Properly used and managed, the tropical forests constitute a massive potential source of energy, a powerful tool in the fight to end hunger, a strong basis for generating economic wealth and social development, and a storehouse of genetic resources to meet future needs. This is the promise and the challenge. (FAO 1987, 3)

The promise can be realized and the challenge met through a global cooperative effort between developing and industrialized nations to set aside the protectionist trade rivalries and ill-considered domestic policies that lead to deforestation. International development agencies and industrial countries can play a further role, sponsoring research and analysis efforts to provide policymakers with the ecological and economic information they need to make sensible decisions. All nations stand to lose from the continuing devastation of the world's tropical forests, and it is in the interest of all nations to work toward the conservation of this vital resource.

References

- Allen, Julia C., and Douglas F. Barnes. 1985. The Causes of Deforestation in Developing Countries. *Annals of the Association of American Geographers* 75, no. 2: 163-84.
- Berger, Richard. 1980. The Brazilian Fiscal Incentive Act's Influence on Reforestation Activity in Sao Paulo State. Ph.D. dissertation, Michigan State University, East Lansing.
- Brown, Lester, et al. 1985. *State of the World*. Worldwatch Institute, New York: W.W. Norton.
- Bunker, Stephen G. 1980. Forces of Destruction in Amazonia. *Environment* 20, no. 7 (September): 14-43.
- Eckholm, Eric. 1976. *Losing Ground*. Worldwatch Institute, New York: W. W. Norton.
- Ehrlich, Paul R., and Anne H. Ehrlich. 1981. *Extinction: The Causes and Consequences of the Disappearance of Species*. New York: Random House.
- Fearnside, Philip M. 1982. Deforestation in the Amazon Basin: How Fast Is It Occurring? *Interiencia* 72, no. 2: 82-88.
- Food and Agriculture Organization (FAO), World Resources Institute, World Bank, and UN Development Programme. 1987. *The Tropical Forestry Action Plan*. Rome (June).
- Grainger, Alan. 1980. The State of the World's Tropical Forests. *The Ecologist* 10, no. 1: 6-54.
- Gregersen, Hans M., and Stephen E. McGahey. 1985. *Improving Policies and Financing Mechanisms for Forestry Development*. Washington, D.C.: Inter-American Development Bank.
- Laarman, Jan G. 1983. *Government Incentives to Encourage Reforestation in the Private Sector of Panama*. Panama: USAID (September).
- Lanly, Jean-Paul. 1982. *Tropical Forest Resources*. FAO Forestry Paper 30. Rome: Food and Agriculture Organization (FAO).
- Matamoros, Alonso. 1982. *Papel de Incentivos Fiscales para Reforestacion en Costa Rica*. Costa Rica: Centro Agronomico Tropical de Investigacion y Ensenanza, May.
- Myers, Norman. 1980. *Conversion of Tropical Moist Forests*. Washington, D.C.: National Academy of Sciences.
- . 1984. *The Primary Source: Tropical Forests and Our Future*. New York: W. W. Norton.
- . 1985. Tropical Deforestation and Species Extinction: The Latest News. *Futures* 17, no. 5 (October): 451-63.
- Plumwood, Val, and Richard Routley. 1982. World Rainforest Destruction—The Social Factors. *The Ecologist* 12, no. 1: 4-22.
- Spears, John. 1979. Can the Wet Tropical Forest Survive? *Commonwealth Forestry Review* 57, no. 3: 1-16.
- . 1983. Sustainable Land Use and Strategy Options for Management and Conservations of the Moist Tropical Forest Eco-Systems. International Symposium on Tropical Afforestation, September 19, University of Wageningen, Netherlands.
- Tucker, Richard, and J. F. Richards, eds. 1983. *Global Deforestation and the 19th Century World Economy*. Durham, N.C.: Duke University Press.

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