

COUNTING THE COST: RESOURCE DEGRADATION IN THE DEVELOPING WORLD

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INTRODUCTION

It has been said that our reluctance to regard education as an investment in human capital on a par with investments in machinery results in people receiving worse treatment than machines. Along the same lines, our reluctance to regard conservation as an investment in productive assets on a par with investments in other economic assets results in the environment receiving worse treatment than economic assets. For example, tropical forests in critical watersheds may provide as many benefits as irrigation systems in terms of water control and many other benefits. Yet, billions are being spent in constructing and maintaining irrigation structures and very little, if any, in protecting or rehabilitating natural watersheds.

Economists, trained to detect and minimize economic waste, tend to ignore the enormous waste caused by the wholesale destruction of natural ecosystems. Conservationists, tirelessly looking for ways to get their message across, overlook the immense force that the economic argument for conservation carries: "conservation does pay." The other side of the coin, and the central theme of this article, is "good economics does conserve." Economics and environmental conservation, far from being antithetical, go hand-in-hand. Good economics is good ecology and vice versa.

Examples from the developing world illustrate that natural resources and the environment are productive assets that generate a return like any other type of economic asset, and yet they are degraded. Moreover, macro, sectoral and development policies, especially in developing countries, generally undervalue natural resources. Policy changes are needed to increase productivity and economic return and at the same time conserve natural resources and protect the environment. Possible modes of financing conservation and sustainable development need to be explored.

NATURAL RESOURCES AS ECONOMIC ASSETS

In many respects natural resources are like machines, buildings, factories or any other form of man-made capital. Natural resources are productive assets which, like other economic assets, generate a flow of goods and services over time. For example, forests produce timber, fuelwood, food and medicine,

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watershed protection, wildlife, biological diversity and recreational amenities. No form of human-made capital can ever match this productivity.

Yet, human-made capital is cared for, protected, maintained and constantly enhanced. Natural capital is not. It is mined, degraded and abandoned. When it comes to budget allocation, a good portion of national income is devoted to investment for replacement, maintenance and augmentation of the economy's human-made capital stock. Very little, if any, goes into the maintenance and enhancement of the economy's natural capital stock. There are several reasons for this unfavorable treatment of natural resources, none of which adheres to economic reason.

First, in total disregard of economic principles, national accounts do not include natural capital as part of the economy's capital stock. The depreciation of human-made capital is fully accounted for in the national accounts; the depletion of natural resources is simply ignored. This omission is an open invitation for governments to liquidate their natural capital and convert it into current income. The result is registered as economic growth that has been attained with little or no detectable or accountable costs to the economy. Few governments can resist this temptation, especially when their political survival depends on economic growth that is hard to come by otherwise. Liquidation of human-made capital would never have passed as growth since the increase in the current account would be offset by a decrease in the capital account.

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Second, again in disregard of economic principles, high return natural capital is converted into low-return human-made capital, marginal consumption or is simply squandered. For example, tropical forests that yield inestimable services to downstream agriculture are frequently logged, slashed and burned, or simply degraded to be replaced by irrigation systems that will not last and by agriculture that is not sustainable. While private and public asset portfolios are finely tuned to take advantage of even small yield differentials, stands of trees, acres of land and stocks of fish that could generate a sustainable economic yield in perpetuity are depleted and converted into low-yield human-made assets.

Why is such a fundamental principle of economics so blatantly violated? The answer is that a basic premise for the functioning of markets is not present: markets allocate resources properly only if the property rights to these

resources are well-defined, secure and exclusive. Unlike human-made capital, natural resources, especially in developing countries are often no-man's-land (everybody's property is nobody's property). The open-access or common property status of tropical forests, fisheries and much of the land in developing countries goes a long way in explaining their predicament. Make human-made capital open access, and very soon it will resemble the condition of tropical forests and fisheries: run down, unmaintained, even vandalized. No rational person will invest in maintaining or building machines and structures which others are free to exploit and misuse at no charge. The reverse is certain to happen: there will be a rush to share the spoils, causing considerable destruction and waste in the process.

What often saves open-access natural resources from overnight depletion and destruction is their remoteness and inaccessibility. (What was easily accessible is long gone.) Increasingly, however, public infrastructure such as roads, railways and ports built by governments in the name of development open up inaccessible areas to exploitation without prior development of the institutions necessary for efficient use and management. The result is not hard to imagine. For example, only fifteen years ago the lower northeast region of Thailand was covered by undisturbed forest. Then the area was made accessible by the construction of a major highway. According to Thailand's National Economic and Social Development Board

landless farmers . . . from around the area and elsewhere have moved in and cleared the land for cultivation, resulting in the destruction of forest land (and watersheds) of 5.28 million rai (one million hectares) between 1973 and 1977. The sporadic immigration to clear new land for cultivation has given birth to 318 villages in the past 9 years.¹

Today, the area is totally devastated by salinization and soil erosion that make both forestry and agriculture unsustainable. Had private and communal property rights been issued before the opening of the area, both agriculture and forestry could have been sustained.

A similar pattern can be seen in Indonesia's outer islands, the Philippines and the Amazon. Open access is more the rule than the exception in tropical forests around the world. In Indonesia alone there are sixteen million hectares of degraded land covered mostly by "alang-alang" (*Imperata cylindrica*), the result of uncontrolled logging and shifting cultivation. And this does not include the 13,000 square miles of rain forest burned down by the 1983 fire in East Kalimantan.

But what happens when the government claims ownership of the resource as is the case in most countries around the world? Do governments act as exclusive and secure owners that fully value their productive assets? Not usually. The claim of the state to ownership is not enforced effectively and

1. *The Fifth National Economic and Social Development Plan: 1982-1986* (Bangkok: NESDB: Office of the Prime Minister), 233.

resources are not accorded sufficient protection, thus reverting into quasi open-access status with all the known consequences. Considering, however, the limited enforcement capability of developing countries in relation to the task of protecting vast areas, as well as the population pressures these countries face, one can hardly fault governments for not enforcing their rights more aggressively. But why not distribute more of these resources to individuals and communities while the state concentrates its efforts on the effective protection of important nature reserves and critical watersheds? For example, over 50 percent of the land in the Philippines is officially state property but is, in effect, common property. With the state acting as an absentee landlord who does not even bother to collect a rent, much of this land has been degraded by illegal logging, shifting cultivation and squatting. Yet, it is the better-managed and politically more sensitive private lands that have been and continue to be the target of land reform efforts in the Philippines.

It is an unfortunate illusion that the state, regardless of the weakness of its enforcement and management capabilities, will always conserve and protect the environment better than will individuals or communities. The evidence points the other way. For instance, large-scale deforestation in Indonesia and Malaysia did not begin until the 1940s and 1950s, when the central government in Indonesia and the states in Malaysia asserted ownership over forest lands previously held by individuals and local communities. This example is raised not to argue against state ownership but to make the point that state ownership is no guarantee for conservation, nor is private ownership a prescription for uncontrolled exploitation. To be sure, many market failures affect natural resources, but it is a leap of faith to conclude that the state will always do better, without examining first the state's ability to assert its ownership and make the most of the society's scarce natural resources.

There is another reason that natural resources should be treated on a par with other economic assets but are not. Natural resources are capable of generating a return to their owners over and above the cost of production. This return or rent is attributable to the scarcity of these resources and it is as real as the return to capital. Under secure ownership this rent goes to the owners of the productive asset (in this case a natural resource). Only if the entire rent is extracted will the resource be used optimally. Under open access, there is no owner to appropriate the rent, and it is wasted in its entirety among a multitude of claimants with disastrous effects for the resource.

Under state ownership, the rent belongs to the society at large. Unless the full amount of the rent is extracted whenever the resource is exploited, exploitation goes too far. The society not only loses part of the rent to which it is entitled, but more importantly, it also relinquishes to exploitation more of the resource than it would otherwise. Unfortunately, governments invariably undervalue natural resources and price them too cheaply. Logging concessions are often given to foreign and domestic logging firms on truly concessionary terms. The combination of royalties and taxes charged are well below the rent or stumpage value of the forest that is opened up to logging. This undervaluation leads, as expected, to excessive logging and the loss of billions of

dollars that could have been used for reforestation and protection of reserved forests.

For instance, Côte d'Ivoire leaves to the concessionaires as much as \$40 per cubic meter in uncollected rents. Not surprisingly, Côte d'Ivoire has the world's highest rate of deforestation at 7 percent a year.² Indonesia captures only 50 percent of the rents from log exports and 25 percent of rents from sawn timber. With \$700 million of rents left annually to loggers it is not surprising that the demand for concessions has been so high that by 1983 awarded concessions totaled 65.4 million hectares, an area larger than the country's productive forests!³ Other examples come from Ghana and the Philippines, where less than 40 percent and 10 percent of the rents, respectively, are being collected by governments for the exploitation and degradation of their virgin forests.⁴

Moreover, royalties and taxes based on the total volume of timber harvested rather than on the marketable timber encourage selective cutting, destruction of remaining stands, and accumulation of large amounts of easily combustible litter on the forest floor, predisposing the forest to uncontrollable fires. It is believed that the severity of the 1983 forest fire in East Kalimantan "had its origin in the nature and extent of logging activity during the past 15 years."⁵ The ecological consequences of this fire include extinction of flora and fauna, soil degradation, sedimentation of rivers and possible climatic changes. These are as much economic losses as is the loss of the timber and other products.

The bulk of conservation activities and the move toward sustainable development, far from requiring financing, will themselves generate funds.

This brings us to a difference between natural resources and human-made capital that in principle should have worked for conserving natural resources but in reality works against conservation. Natural resources such as forests not only produce timber and firewood; they also produce intangible services and amenities such as watershed protection, biological diversity, wilderness, recreational services, ecological balance and positive climatic effects. As such,

2. R. Repetto, "Creating Incentives for Sustainable Forest Development," *Ambio* 16 (1987).

3. M. Gillis and R. Repetto, eds. *Public Policy and the Misuse of Forest Resources* (England: Cambridge University Press, forthcoming).

4. R. Repetto, "Creating Incentives for Sustainable Forest Development," *Ambio* 16 (1987).

5. M. Gillis, "Multinational Enterprises, Environmental and Resource Management, Issues in the Tropical Forest of Indonesia" (Cambridge, MA: Development Discussions Paper, No. 171, Center for International Affairs, Harvard University, 1984).

tropical forests should be considered superior economic assets and accorded special protection. For example, governments should charge logging companies a full rent reflecting wood scarcity and add an imputed rent on top of the stumpage value for all these other services that the society is foregoing by conceding its forest to logging. The more important the non-wood services of the forest, the higher this imputed surcharge should be, thereby limiting logging to those areas where the non-wood services are least significant and preserving areas that are important environmentally. To put it another way, activities such as logging that impose environmental costs on society should pay for these costs. Such payments would limit the scale of the environmentally destructive activities, make their methods less destructive and provide funds to counter their effects on the environment through activities such as reforestation, forest protection and landscaping.

This is the theory. In practice, environmental costs are often ignored for at least two reasons. First, they are difficult to measure because they are largely qualitative in nature and outside the domain of markets. For example, how is the preservation of wilderness or biological diversity to be valued and measured? Second, and more discouraging, environmental costs are in the form of externalities, i.e., those who generate them do not suffer the consequences and therefore have no cause to take them into account when planning their activities. For example, loggers have no reason to take into consideration downstream erosion and flooding in deciding the extent of their logging activities. No matter how large the damage of logging on downstream agriculture is, only logging costs are relevant to the loggers' calculations. Similarly, loss of species and ecological disturbance are social costs that have no bearing on a logger's decision to log; if a logger takes these factors into account he or she will lose the ability to compete with other loggers. The result is again excessive logging with environmental consequences that remain unaccounted for.

These situations are classic market failures, prime areas for government intervention to "internalize" the externality; that is, to make each activity accountable for its social costs, and to do so across the board so that those who practice conservation are not put in a disadvantaged position.

Governments should tax activities that generate negative externalities (social costs) and subsidize activities that generate positive externalities (social benefits). For example, logging should be taxed and reforestation subsidized in proportion to their external or side effects. Chemical fertilizers that cause pollution ought to be taxed and organic fertilizers that improve the soil structure should be subsidized. A similar case can be made for taxing the use of chemical pesticides and subsidizing integrated pest management. Soil protective crops such as tree crops should be promoted while soil-erosive crops such as corn and cassava should be discouraged. As we will see, the reverse is the rule around the world. Why? An argument often advanced is that environmental costs are very difficult to estimate, which is true. But this

difficulty is hardly an argument for ignoring such costs, much less for subsidizing them.

GOVERNMENT POLICIES AND RESOURCE CONSERVATION

Developing countries around the world are facing three serious problems that are often given as reasons for not affording environmental conservation. First, developing countries need increased productivity and rapid economic growth to feed and improve the living standards of their growing populations. Environmental conservation is seen as a stumbling block in their efforts for faster growth. Second, they need to reduce poverty and improve income distribution by spreading the benefits of economic growth more widely. Conservation is seen as depriving the lower socioeconomic groups of their free access to natural resources and, therefore, as running counter to equity objectives. Third, developing countries need to conserve their limited fiscal and financial resources to service their considerable foreign debt and to carry out development projects. They can hardly meet the costs of environmental conservation.

There is some truth to these arguments in relation to certain conservation activities, such as the preservation of wilderness and the protection of species from extinction. However, there are many areas of conservation that are not only fully compatible with economic objectives but complementary and mutually supportive. Here, I propose that there are policy changes that could simultaneously promote economic efficiency and growth, improve income distribution, save budgetary resources and conserve natural resources and the environment. To see this, consider that currently many developing countries are keeping their economies inside their environment-development production possibility frontier (Figure 1) through a constellation of policy distortions, such as subsidies, that cost the government considerable budgetary resources. Many of these subsidies have long outlived their usefulness, if they ever had any, but continue to be a drag on the budget, the economy and the environment. On the other hand, to mitigate market failures institutional arrangements and taxes could be introduced such as subsidies, insecurity of tenure, common property and externalities, that would promote economic efficiency and equity, generate government revenues and conserve natural resources. Policy reform will bring such economies close to their production possibility frontier, generating both more development and better environment in the process. At this point there would be more truth to the argument of a trade-off between development and environment. But we are still far away from such a happy state of affairs.

Here are a few examples. Upland rice is considerably less erosive than cassava or maize, and it may even make a positive contribution to the productivity of other crops. Paddy with soil loss of 0.6-30 tons per hectare per year is comparable to forest and tree crops while cassava and maize at 100-6,000 tons/hectare/year are comparable to shifting cultivation.⁶ Yet, successive

6. *Thailand* (Bangkok: Thailand Development Research Institute, 1987).

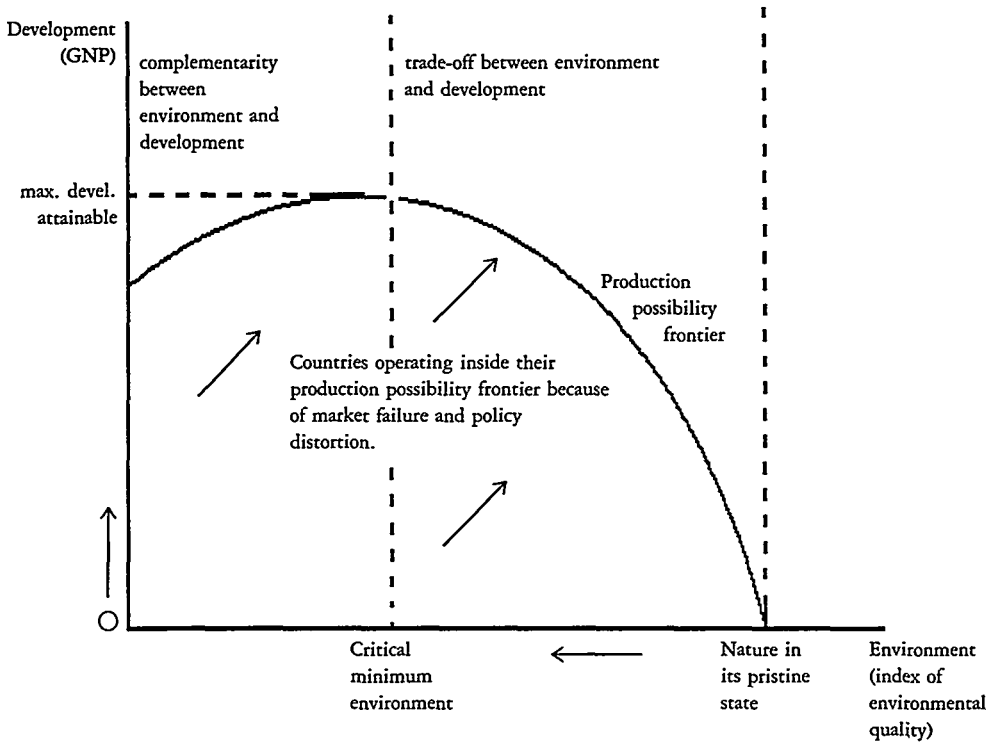


Figure 1. Environment-Development Production Possibility Frontier. Many developing countries are operating inside this frontier as a result of market failures, such as insecurity of land ownership, or policy distortions, such as pesticide subsidies, that result in both economic losses and environmental damage.

Thai governments have consistently taxed rice and indirectly subsidized cassava production on account of Thailand's large share in the world rice market (20-30 percent) and the need for crop diversification.

This policy, combined with free access to forest land and a loophole in the EEC's common agricultural policy, has led to more than a 100 percent increase in the area planted with cassava over a seven-year period. The result is hardly diversification when one considers that Thai cassava exports account for 95 percent of the world market and go to a single and highly uncertain market. While both the conditions of demand (EEC policy) and the conditions of supply (deforestation and soil mining) are clearly unsustainable over the long run, the environmental effects of land degradation and soil erosion may be permanent. Had the government included these environmental costs in the export price of cassava through an appropriate tax and had titles to alienable

forest land been issued, the cassava boom may never have occurred. Instead, a more sustainable, though less spectacular, form of agriculture may have evolved.

A policy of free land frontier may sound egalitarian, but its consequences are economically and environmentally disastrous. In Thailand, it has led to a deforestation of such scale that the country has been turned from a major exporter of wood into a major importer. But more significantly, it led to insecurity of land ownership for over 40 percent of agricultural land. In fact, *full* title deeds have been issued to only 14 percent of agricultural lands. Insecure ownership inhibits productivity and conservation in many ways: 1) it reduces the incentive for longterm investment in soil conservation; 2) it biases the choice of crops against perennials, tree crops and forest plantations which are environmentally more benign than annual field crops such as maize and cassava, and 3) it keeps land under inferior uses by preventing its sale, legal transfer or use as collateral for credit. Under these conditions, it is no surprise that between 1976 and 1983 the area under fruits and trees grew by less than 10 percent compared to a 100 percent growth of the area under cassava. Nor is it surprising that two-thirds of the Thai cropland is severely eroded.⁷

Developing countries demand a level of development higher than current levels . . . Developed countries, on the other hand, have a demand for more environmental amenities . . . a classic opportunity for international trade.

Heavy pesticide use has indisputable negative environmental effects and doubtful economic benefits over the long run. While humans, animals and fish are poisoned, the pest populations which are the targets of pesticides resurge with the elimination of their natural predators and become resistant to pesticides, necessitating the use of larger quantities of more lethal chemicals. Given their considerable externalities and long-term costs, pesticides should be taxed to raise their price to their true social costs and discourage their use. Instead, they are heavily subsidized. Repetto reports that

in a sample of nine countries, subsidies range from 15 to 90 percent of full retail cost, with a median of 44 percent. In large countries,

7. "Background Information on Agricultural Technology Generation and Diffusion in Thailand" (US Presidential Agricultural Mission to Thailand, April, 1982).

these are costing governments hundreds of millions of dollars per year, and the fiscal burden is growing.⁸

Pesticide subsidies distort farmers' incentives in favor of chemical pesticides and against alternatives such as integrated pest management, changes in cropping pattern and planting time, and the choice of pest-resistant varieties, all of which are economically less damaging. Considering also the large and growing costs of such subsidies, their elimination would save governments substantial sums of money and improve both the economy and ecology of farming.

Fertilizer subsidies ranging from 50-60 percent of retail cost are common and result in overuse and bias against organic fertilizers and soil conservation.⁹ Excessive use of fertilizer causes water pollution that poisons fish and promotes growth of aquatic weeds that inhibit free water flow. Whatever the argument in favor of fertilizer subsidies, their environmental costs should be part of the calculus. There is no good justification for discriminating against soil conservation and use of manure, both of which restore soil structure and stability and reduce water pollution. Reduction and restructuring of fertilizer subsidies in accordance with social costs again should improve the economics and ecology of farming as well as conserve fiscal resources.

Earlier in this article it was suggested that irrigation systems should be seen as substitutes rather than complements of natural watersheds. Not only are upstream watersheds not protected, but irrigation systems tend to displace communities which often relocate further up in the watersheds and engage in shifting cultivation that results in sedimentation of the irrigation system and reduction of its efficiency and economic life. Examples include the Upper Solo Watershed and the Karanglates and Cacaban reservoirs in Indonesia and the Nam Pong reservoir in Thailand. This, however, need not be the case. For instance, a World Bank assisted irrigated rice project in Sulawesi, Indonesia, funds the protection and management of the 3,200 square kilometer Dumoga National Park, which covers the watershed catchment area for the Dumoga irrigation system. The irrigation project derives benefits from reduced maintenance costs and increased dry season water availability. The park preserves its forests and endangered species.¹⁰ It is a classic case of good economics, good ecology and sustainable development that could become a model for other irrigation systems.

Unfortunately, the rule in most irrigation systems is a combination of bad economics and bad ecology. The watershed catchments of the reservoirs remain unprotected and unmanaged while the irrigation water is made available to farmers free of charge. This leads predictably to inefficient use of water. Farmers close to the system are wasting water while more remote farmers receive inadequate and irregular supply. Land improvements for water conservation are discouraged since water is free, and the main system deteriorates

8. Repetto.

9. Ibid.

10. *Wildlife Management in World Bank Projects* (Washington DC: The World Bank, 1984).

because of insufficient funds for maintenance and protection of the catchment area. The ensuing sedimentation of the reservoir leads to flooding, waterlogging and salinization. For example, in Thailand only 25 percent of the irrigable area is irrigated during the dry season, and the overall efficiency of the irrigation systems is estimated at 15 percent of the potential.¹¹

Water pricing or allocation of water rights would clearly improve efficiency and equity of water use as well as generate funds for maintenance of the irrigation system and protection and management of the watershed. Additional environmental benefits would include preservation of tropical forests and endangered species.

The list of policy distortions that are detrimental to both the economy and ecology is far from exhausted. Capital subsidies, tax and tariff exceptions for equipment as well as minimum wage laws that displace labor and force with undue mechanization of agriculture or promote capital intensive industry in the face of surplus labor lead to increased pressure on marginal lands and common property resources as a last resort activity. There is no need to enumerate here all the policy distortions in these examples. It should be clear by now that there are enormous economic, budgetary and environmental benefits to be derived from policy reform.

To recapitulate, developing countries can do more than their share of conservation while pursuing their development objectives if they implement even a part of the following agenda, which is not conventionally thought of as conservation:

- a) eliminate or at least reduce policy distortions that favor environmentally unsound practices and discriminate against the poor, reduce economic efficiency and waste budgetary resources,
- b) mitigate, through a system of income transfers and institutional arrangements, market failures such as externalities and open access that result in overexploitation of resources, through a system of income transfers and institutional arrangements,
- c) invest in human resources and provide alternative employment to disadvantaged groups to lessen the pressure on marginal lands and tropical forests;
- d) apply a broad cost-social benefit analysis to all public projects by considering all benefits and costs (economic, social and environmental), whether quantifiable or not, and refrain from projects that lead to irreversible changes of the environment or foreclosure of options.

11. *Thailand Agricultural Assessment Study* (Asian Development Bank, January, 1984).

While this agenda requires considerable political will, any movement in this direction would be a march toward the country's possibility frontier with more of both development and conservation along the way.

FINANCING CONSERVATION AND SUSTAINABLE DEVELOPMENT

The bulk of conservation activities and the move toward sustainable development, far from requiring financing, will themselves generate funds. Eliminating subsidies and other distortions will not only induce more conservation, but will save government revenues and generate additional tax revenues from expanded economic activity that can be used to finance additional conservation, such as creating nature reserves. Similarly, charging forest and mine concessionaires royalties and taxes to the full amount of the resource rent through competitive bidding will not only reduce logging and mining activity but will also generate more tax revenues for use in reforestation, forest protection and landscaping. Thus, the first source of financing for sustainable development ought to come from developing countries through policy reforms that would generate a higher level of development, more conservation and more budgetary revenues.

A second source of financing is needed to address the twin problems of fluctuating commodity prices and mounting foreign debts that have severe consequences for resource conservation. There is a tendency among developing countries to follow boom-and-bust policies. When their commodity export prices are high, they tend to borrow heavily and spend freely often on marginal projects, many with negative environmental effects. When prices are down they are forced to exploit their resources more intensively to meet their foreign and domestic commitments. With commodity prices half as high, developing countries must export twice as much to service their debts, assuming no changes in interest and exchange rates. Changes in these rates may further increase the burden. In addition, governments have continued commitments to development projects that began in good times. Perhaps more significantly, to maintain political stability, governments try to hold steady or increase the consumption levels and meet the unrealistic expectations they created during boom times, thus putting further pressure on their natural resources (by opening forest land for ranching, increasing logging and promoting export crops on marginal lands, for example). This reduces prices. Furthermore, those who become unemployed or impoverished as a result of the depressed commodity prices are forced into marginal lands and common property resources or migrate into cities, causing further environmental problems.

To solve this problem, and to reduce the pressure to exploit resources more heavily in depressed times, international financial institutions could provide some form of loan to developing countries when the prices of their main export commodities are depressed. The loan would be secured by a mortgage on the country's exports (a certain percentage of its long-run average value) to be retired in installments, each payment being the amount secured by the commodity exported during the previous period, plus accumulated interest.

Such a loan scheme would accomplish three objectives: (a) it would reduce the price fluctuation of primary commodities; (b) it would reduce the surplus resources during good times and the tendency to borrow heavily and spend wastefully on marginal projects which are often environmentally unsound, and which create obligations and expectations that cannot be met on a sustainable basis; and, (c) it would reduce the pressure to exploit resources more heavily when prices are down or at any rate below their social prices. Accordingly, lending by international institutions should be countercyclical rather than procyclical. In the past, lending increased when prices were up and was reduced when prices came down. If this change cannot be made by existing institutions, then a new facility needs to be created.

There is a need for a third source of financing from the developed countries, who would be the main beneficiaries of any conservation over and above that which results from policy reform in developing countries. The creation and growth of the environmental movement in developed countries is a testimony to the fact that developed countries have a preference for more environmental services than those available at home. It does not matter if the purpose is for global ecological balance, science and education or simply preservation of wilderness. Here we have a real preference for more and better environment not just at home but also abroad. This appetite will be satisfied partially by policy reform in developing countries which could be done with little additional funding. But developed countries almost certainly would want to preserve more rainforests and more species and wilderness than developing countries can either afford or are willing to pay for. Given their lower level of development, these nations would prefer a different development-environment combination than will satisfy high-income countries. (Pristine environment beyond a point is a luxury good.)

True, many tropical countries have a comparative advantage in producing environmental services. Tropical forests are far richer in biological diversity and play a more important role in ecological balance and the climate than temperate forests. But developing countries do not have the purchasing power or the willingness to buy all the environmental services they can produce in the same way they cannot buy all the copper and coffee they can produce. Developing countries demand a level of development higher than current levels, and they are willing to sacrifice part of their environments to obtain it, just as the developed world has done during earlier parts of its history. Developed countries, on the other hand, have a demand for more environmental amenities than are available at home and they are presumably willing to pay for them, a classic opportunity for international trade. The citizens of developed countries can pay developing countries to provide more environmental services by conserving their tropical forests and other unique ecosystems. Both groups will be better off in the process.

Thus, if our demand for saving the tropical forests is genuine and widely shared, we should be able to mobilize the votes and the money to create a facility to pay for the conservation of tropical forests. Unlike other commodities traded in world markets, environmental services are public goods that

cannot be funded individually. Since tropical forests are international public goods, the facility should be international, with country shares analogous to those of the IMF, or World Bank. Developing countries could also make small contributions but developed countries should be the big contributors.

The degradation of the environment affects all countries of the world, developed and developing. Incentives must be instituted at the international level which will halt the destruction of the environment. Although each country has its own perspective on the problems of the environment, both developing countries and the more affluent countries of the world must join together to count the costs of degradation of the environment, and begin to formulate solutions to the environmental crisis.