

Conservation and Enhancement of Natural Resources

by Stephen Vosti and Sara Scherr

Meeting food and livelihood security needs in developing countries will require the conservation and enhancement of natural resources that contribute to agricultural production. Chief among the resources to be sustainably managed are soils and forests. Failure to protect and improve soils will lead to dramatic decreases in domestic agricultural production and consequent dependence on imported food supplies, an infeasible option in poor countries lacking foreign exchange to purchase foreign foodgrains. Failure to conserve and enhance forests and wooded areas will expose other resources (especially water and soil) to increased degradation, reducing the availability of fuel and game and leading to less biodiversity--potentially robbing the rural poor of needed resources, with consequences on a regional and even global scale. To address these problems, past trends in soil degradation or enhancement and forest conversion and land use need to be charted, the proximate causes of these trends in selected areas of the developing world should be identified, and most importantly, likely and perhaps not-so-likely scenarios (involving different combinations of technologies, policies, and institutional arrangements) and the impact of these different scenarios on soils and forests must be considered.

Agricultural Land Degradation

There is evidence of widespread degradation of agricultural lands in the tropics (Table 1). Key concerns include deterioration of cropland soils, due to erosion, nutrient depletion, compaction, waterlogging, or salinization, and deterioration of pastures and rangeland due to devegetation, erosion, and changes in perennial species composition. These problems are associated, in some areas, with declining agricultural production and broader environmental damage.

Table 1--Human-induced land degradation, worldwide, 1945 to present

Region	Overgrazing	Deforestation	Agricultural Mismanagement	Other ¹	Total	Degraded Area as Share of Total Vegetated Land
			(million hectares)			(percent)
Asia	197	298	204	47	746	20
Africa South	243	67	121	63	494	22
America	68	100	64	12	244	14
Europe	50	84	64	22	220	23
North and Central America	38	18	91	11	158	8
Oceania	83	12	8	0	103	13
World	679	579	552	155	1,965	17

Source: Worldwatch Institute, 1991.

To date, quantification of these problems has been difficult. Remote sensing can be used for some estimates. For others, analysts have had to make heroic assumptions about the association between land characteristics and the risk of degradation. A particular problem is lack of systematic information about patterns of land improvement such as tree-planting, vegetative erosion barriers, composting, fallowing, terracing, irrigation or water harvesting, and their effects on land productivity. Thus, there is considerable controversy about the overall direction, rate, and magnitude of trends in land degradation.

Equally controversial are explanations of how and why land degradation or investment occur, and the economic and environmental importance of degradation to farmers and to society as a whole. For example, some erosion occurs at little economic cost. Cropland erosion may make only a modest contribution to total sedimentation loads from some watersheds. Eroded soils may even be deposited on pieces of land that can then be used productively for intensive vegetable cultivation.

Why are some farmers degrading resources, while others are energetically improving resources? Common explanations relate to lack of appropriate and economically attractive resource-conserving technologies; lack of security of land use rights; policies that make it more

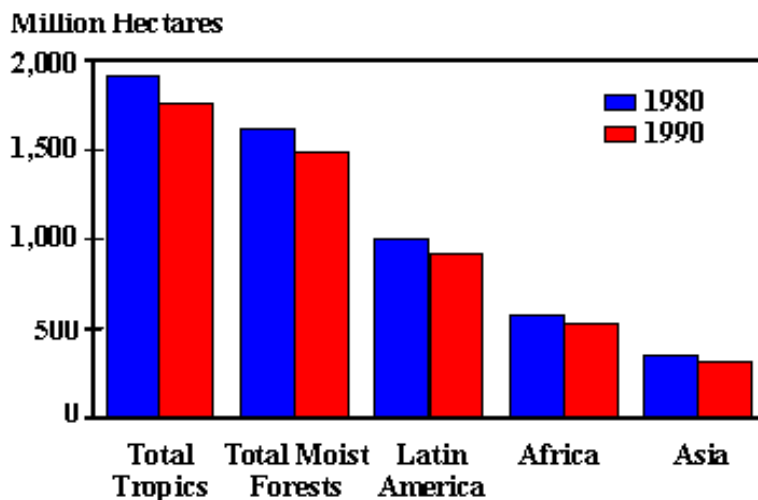
¹Includes exploitation of vegetation for domestic use (133 million hectares) and bio-industrial activities, such as pollution (22 million hectares).

attractive to farmers to invest their resources or labor in other activities or off-farm employment; rural poverty; weak rural institutions for resource management; difficulty in mobilizing the necessary labor and capital inputs for better land management; and regulatory restrictions. Many of these factors are amenable to change through new policies, institutional arrangements, and better technologies.

Tropical Deforestation

Concern over global deforestation has prompted unprecedented examination, via remote sensing, aerial photography, and other surveillance methods, of the rate at which primary forests are disappearing. We have a much better idea now (vis-à-vis even 10 years ago) of how quickly forests are being felled in the tropics, and, regionally, where forests are coming down most quickly (Figure 1).

Figure 1--Inventory of tropical forests, 1980-90

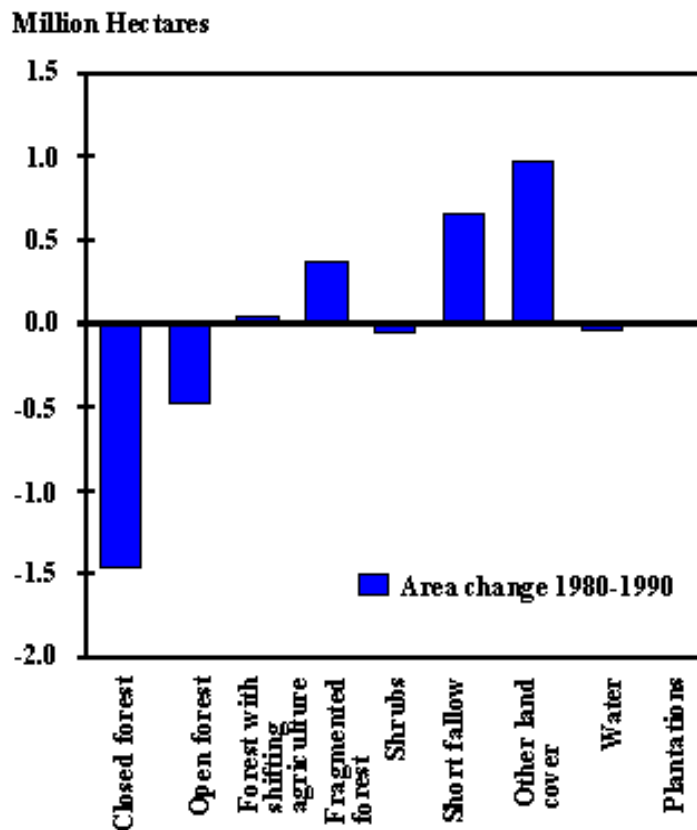


Source: *Unasylva* 174 (44), 1993.

Still, we need to understand the processes behind these numbers to influence the trends; namely, what happens before deforestation, to cause it? and what happens after deforestation? How is deforested land used, and what are the effects on rural inhabitants' welfare and the environment?

Such work has begun. We know, for example, that the lion's share (nearly two-thirds) of tropical deforestation currently comes at the hands of small-scale agriculturists. These are the same rural, developing-world inhabitants who focus on meeting immediate food security needs. A picture, although based on partial data, is also beginning to emerge of how deforested land is subsequently used. As it turns out, reestablishment of ground cover plays a major role in that picture. In parts of Africa over the decade from 1980-90, for example, much of the land lost to open forest was not left barren, but rather converted to agriculture, including planting of trees (Figure 2). For example, a 1985 aerial inventory survey of selected districts in Kenya, conducted for the Beijer Institute, revealed close to 20 percent of originally forested agricultural land to be under woody biomass. Evidence of such "reforestation" exists for Latin America as well.

Figure 2-- Changes in land use in Africa, 1980-90



Source: K. D. Singh, *Unasylva* 174 (44), 1993.

Note: Based on 31 samples.

But so far, the pieces of the forest conversion and subsequent land use puzzles have not been put together in ways particularly useful to policymakers. What is the "final word" on forest conversion rates? Who--which groups in society--are chiefly responsible? Once forests fall, what land-use patterns emerge, and what are the consequences of the new land-use patterns for food security and the environment? Finally, what can be done by policymakers to simultaneously reduce poverty and deforestation rates?

Stephen Vosti and Sara Scherr are research fellows in the Environment and Production Technology Division at the International Food Policy Research Institute.

"A 2020 Vision for Food, Agriculture, and the Environment" is an initiative of the International Food Policy Research Institute (IFPRI) to develop a shared vision and consensus for action on how to meet future world food needs while reducing poverty and protecting the environment. Through the 2020 Vision initiative, IFPRI is bringing together divergent schools of thought on these issues, generating research, and identifying recommendations. The *2020 Briefs* present information on various aspects of the issues.