

Land Degradation in the Developing World: Issues and Policy Options for 2020

by Sara J. Scherr and Satya Yadav

By the year 2020 land degradation may pose a serious threat to food production and rural livelihoods, particularly in poor and densely populated areas of the developing world. Appropriate policies are required to encourage land-improving investments and better land management if developing countries are to sustainably meet the food needs of their populations.

Land degradation takes a number of forms, including depletion of soil nutrients, salinization, agrochemical pollution, soil erosion, vegetative degradation as a result of overgrazing, and the cutting of forests for farmland. All of these types of degradation cause a decline in the productive capacity of the land, reducing potential yields. Farmers may need to use more inputs such as fertilizer or manure in order to maintain yields, or they may temporarily or permanently abandon some plots. Degradation may also induce farmers to convert land to lower-value uses. For example, farmers may plant cassava, which demands few nutrients, instead of maize, or convert cropland to grazing land.

Farmland degradation can also have important negative effects off the farm, including deposition of eroded soil in streams or behind dams, contamination of drinking water by agrochemicals, and loss of habitat.

Existing estimates of the current global extent and severity of the problem should be considered indicative at best. The Global Land Assessment of Degradation (GLASOD), based only on the impressions of experts, estimates that nearly 2 billion hectares worldwide (22 percent of all cropland, pasture, forest, and woodland) have been degraded since mid-century. Some 3.5 percent of the 2 billion total is estimated to have been degraded so severely that the degradation is reversible only through costly engineering measures, if at all. Just over 10 percent has been moderately degraded, and this degradation is reversible only through major on-farm investments. Of the nearly 1.5 billion hectares in cropland worldwide, about 38 percent is degraded to some degree. Africa and Latin America appear to have the highest proportion of degraded agricultural land, and Asia has the highest proportion of degraded forestland (Figure 1).

Various sources suggest that 5 to 10 million hectares are being lost annually to severe degradation. If this trend continues, 1.4 to 2.8 percent of total cropland, pasture, and forestland will have been lost by 2020. Declining yields (or increasing input requirements to maintain yields)

could be expected over a much larger area. These data are, however, likely to overestimate the problem, as they do not account for the effects of land improvements, which also appear to be widespread.

The Impact on Global Agricultural Production

Globally, there are few studies of the impact of degradation on agricultural production. Pierre Crosson, in a 1994 study, analyzed GLASOD results and other data and concluded that there has been a 17 percent cumulative productivity loss over 45 years (1945-90) as a result of degradation. During that same period, growth in global food production and long-term declines in grain prices were unprecedented; clearly other factors offset the effects of degradation on aggregate performance.

A 1995 study by Rattan Lal of the impact in Africa based on field data estimated that yield reductions due to past erosion may range from 2 percent to 40 percent, with a mean of 8.2 percent for the continent and 6.2 percent for Sub-Saharan Africa. If accelerated erosion continues unabated, yield reductions by the year 2020 may be 16.5 percent for the continent and 14.5 percent for Sub-Saharan Africa.

Evidence from four Southeast Asian and three Middle Eastern countries indicates a degradation-induced decline in productivity greater than 20 percent.

Hot Spots

Declining food supplies from specific regions due to degradation are likely to have only a modest effect on global food supplies, because of the potential for substitution from other producing areas. However, land degradation could have dramatic effects in specific countries and subregions.

Nutrient depletion is predicted by the experts to cause serious problems in the mid-altitude hills of Nepal, in poor soil quality areas of northeastern India and Myanmar now undergoing transition to permanent agriculture, and in areas in northeastern Thailand, where farmers consistently extract more nutrients from the soil than they put in. It is also expected to cause major problems in large areas of Africa under transition to short fallow or permanent cropping, in areas of reduced silt deposits in the Nile delta, in the subhumid Mesoamerican hillsides, and in the semi-arid Andean valleys, northeastern Brazil, and the Caribbean Basin lowlands, where agriculture is undergoing intensification.

Salinization will be a major threat in the irrigation systems of the Indus, Tigris, and Euphrates River basins, in northeastern Thailand and China, in the Nile delta, in northern Mexico, and in the Andean highlands.

Agrochemical pollution is expected to be critical in cotton-producing areas in Turkey, in high-density and coastal areas in East and Southeast Asia, on banana plantations in Central America, in areas of intensive agriculture in Bolivia, and in peri-urban agriculture in Southeast Asia and Mexico City.

Soil erosion will create serious production problems in southeast Nigeria, in Haiti, and on the sloping lands of the Himalayan foothills, southern China, Southeast Asia, and Central America. Major wind erosion problems will develop in West Asia as rangelands are converted to grain production, in the Sahel, in West Africa owing to poor mechanization techniques, in the dry Andean Valley, and in the Brazilian *cerrados*.

Vegetative degradation of rangelands will accelerate by 2020, as a result of overgrazing and overexploitation of vegetation for fuel, in the trans-Himalayas and in Southern and North Africa. The spread of Imperata grassland areas in Southeast Asia will also contribute to degradation.

Agriculture-induced deforestation by 2020 will threaten critical habitats in parts of Southeast Asia, Madagascar, the humid Amazon, the hillsides and Atlantic lowlands of Central America, the Pacific rain forest of Colombia and Ecuador, and the Chaco region of Latin America.

Strategies to Reduce Land Degradation

Historical and socioeconomic evidence suggests that farmers often respond actively to degradation by modifying their farming systems or practices and through land-improving investments. Unfortunately, no global or even national data are yet available estimating the scale and effects of land improvements (for example, area under terracing or other soil conservation practices), although data collection efforts are beginning.

Although some types of degradation are irreversible, most can be prevented or reversed by, for example, adding nutrients to nutrient-depleted soil, rebuilding topsoil through soil amendments, reestablishing vegetation, or buffering soil acidity. The practicality of rehabilitating degraded landscapes depends on the costs relative to the value of the output or environmental benefits expected.

Despite the lack of quantitative data, it is clear that land-improving investments are creating a number of bright spots in the developing world. Agroforestry, community forestry, and afforestation are beginning to have large-scale positive impacts in numerous countries. Conservation farming is spreading widely in countries including Morocco, the Philippines, and Thailand and regionally in East Africa, parts of West Africa, Mesoamerica, and parts of South America. Water management is improving through water-saving irrigation, water harvesting, aquaculture, small-scale irrigation, and salinization control.

Diversification into higher-value perennial crops is protecting soils in Africa, Asia, and Latin America. Dryland range rehabilitation schemes are showing positive results in Syria and Jordan, Southern Africa, Mexico, and northern Argentina. Farmer incentives for land investment are improving through range cooperatives in Jordan; more favorable property rights in Cambodia, Ethiopia, Laos, and Vietnam; and community-based natural resource management in many areas.

Policy Recommendations

An effective response to land degradation calls for improving the incentives for farmers to care for their land and improving their access to the knowledge and inputs required for proper care. Based on lessons learned from past successes and failures in managing land degradation, the following policy actions should be considered:

- Increase research and technology development for land management, and improve the spread of information, through widely linked, user-friendly information systems for farmers.
- Promote land-improving investments (for example, building up soil organic matter, planting trees, and installing small-scale irrigation) through technical assistance and new financing arrangements suitable for low-income farmers.
- Encourage long-term land improvements by securing property rights and rights of access to natural resources, particularly for the poor.
- Develop planning systems for sustainable land use that involve key resource user groups.
- Improve the economic environment for farmers by developing market infrastructure, correcting distorted price incentives, and encouraging rural income growth and diversification.
- For marginal regions, encourage more public investment in infrastructure, social services, and agricultural support services.

Sara J. Scherr is a research fellow in the Environment and Production Technology Division of the International Food Policy Research Institute. Satya Yadav is a research associate in the Department of Agricultural Economics and Rural Sociology at the University of Arkansas.

“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 a 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.