

ECONOMICS OF LAND DEGRADATION AND IMPROVEMENT

A Global Assessment for Sustainable Development

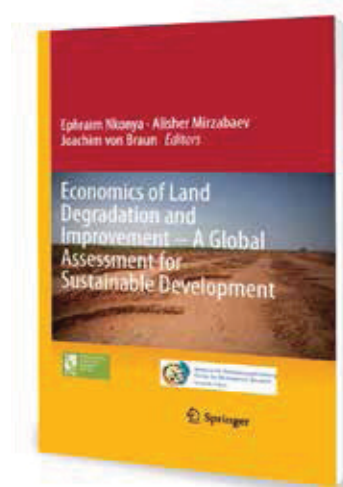
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The costs of doing nothing about land degradation are several times higher than the costs of taking action to reverse it. Despite the crucial role land plays in human welfare and development, investments in sustainable land management are low, especially in developing countries. These findings come from the book, *Economics of Land Degradation and Improvement—A Global Assessment for Sustainable Development*, which examines the costs of land degradation and what needs to be done to reverse it.

The book reveals the cost of land degradation in case studies for 12 countries, analyzes the drivers, and identifies strategies for sustainable land management. It focuses on two kinds of land degradation: long-term loss of value of land ecosystem services due to land use and cover change (LUCC) and the use of land-degrading management practices on cropland and grazing lands that do not undergo LUCC. Six major biomes that accounted for about 86 percent of global land area in 2001 are covered, including forest, shrub lands, grasslands, cropland, barren land, and woodlands. Thirty-three percent of grasslands, 25 percent of croplands, and 23 percent of forests experienced degradation over the last three decades.

Sustainable land use and protection of soils are vital to food, climate, and human security. Yet land degradation has become a global problem in most terrestrial biomes and agroecologies in both low- and high-income countries. Because land degradation has global implications, everyone benefits from efforts to reverse it.



SCOPE OF THE PROBLEM

About 30 percent of global land area, which is home to about 3.2 billion people, has experienced significant degradation. Land degradation is serious in both low- and high-income countries and in both temperate and tropical regions. The poor are especially affected by land degradation, because their livelihoods heavily depend on natural resources. Africa south of the Sahara (SSA) accounts for the largest share (26 percent) of the total global cost of land degradation. Given that the region is home to people experiencing severe poverty, taking action on this problem is vital.

While land degradation-induced processes, such as soil fertility decline and biodiversity loss act on local scales, they have regional and global implications. Only about 46 percent of the cost of land degradation due to LUCC is borne by immediate land users. The remaining share (54 percent) is borne by consumers of ecosystem services off the farm.

When evaluating the costs of land degradation, this book goes beyond the conventional market values of crop and livestock products lost to land degradation and seeks to capture all major terrestrial losses of ecosystem services.

COSTS OF INACTION VS. BENEFITS OF ACTION

The costs of land degradation—or persistent reduction of the terrestrial ecosystem services (goods and services derived from the interconnected system of biological communities and their physical environment) and loss of biodiversity—are substantial. The annual cost of land degradation is about US\$300 billion, or about 0.4 percent of the 2007 global gross domestic product. Unless otherwise specified, all monetary values are expressed in 2007 US dollars.

Yet the returns generated from taking action against land degradation are high. Restoring degraded lands makes good economic sense. Every dollar invested in restoration of degraded lands generates about \$5 in benefits. In spite of the high returns on investments in sustainable land management, they are still low, especially in developing countries. The main reasons that investments to improve land are limited include:

- ▶ Land users who invest in sustainable land management get less than half (46 percent) of the benefits. Most (54 percent) of the benefits go to beneficiaries off the farm.

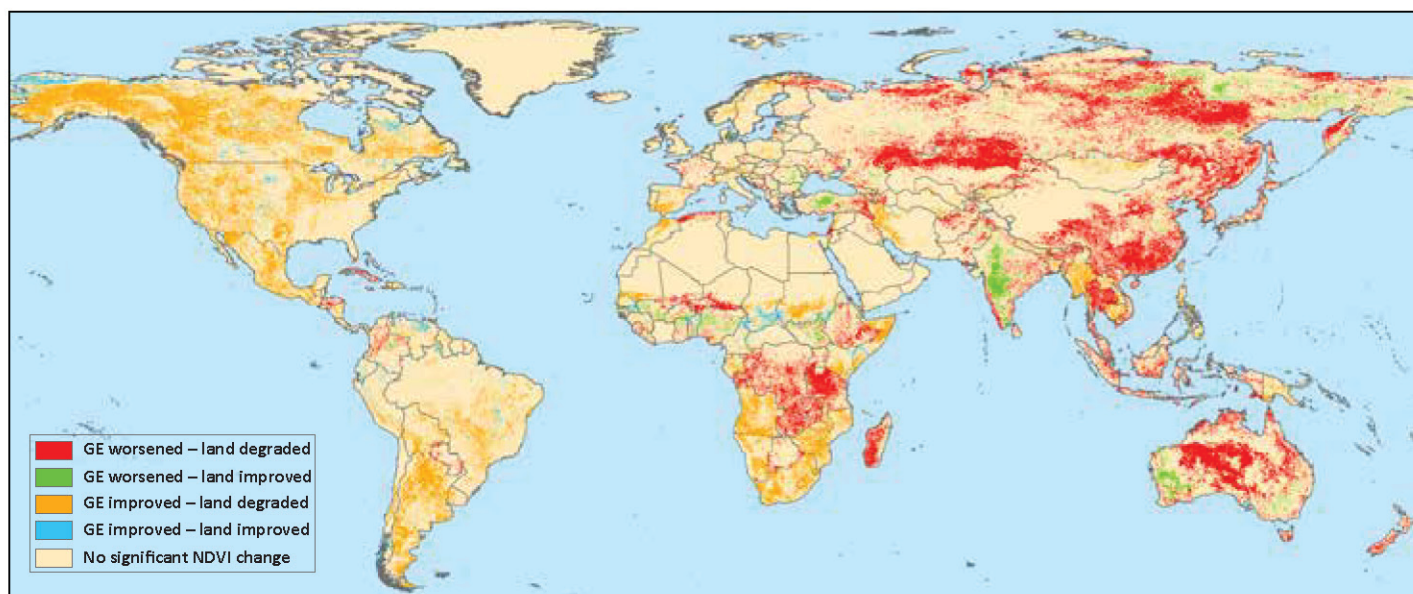
- ▶ Sustainable land management depends on highly effective governments (Figure 1), strong local institutions, market access, and secure land tenure. Incentives for investments also need to be provided through sound natural resource management policies. Where these elements are lacking, sustainable land management is unlikely.
- ▶ In places with higher government effectiveness and market access, higher population density leads to land improvement even in areas with severe poverty.

DEGRADED GRASSLANDS

The severe degradation of grazing lands is cause for concern. Global meat and dairy consumption are expected to increase by 173 percent and 158 percent, respectively, between 2010 and 2050. Developing countries will likely see even higher increases in meat and dairy consumption. Currently the annual cost of livestock meat and milk production due to grazing land degradation is about \$6.8 billion or about 1 percent of the value of global production of livestock.

North America accounts for more than half of the cost of grazing land degradation. The high loss in North America is due to severe degradation. Additionally, because livestock are so productive in North America, the effects of degradation are greater there than in developing countries. However the impact of land degradation in North America is not strongly felt, because farmers use more inputs and technologies to mask its negative impact. The impact is more severe in developing countries, where livestock provide food and income to most of the 1.2 billion people living below the poverty line of \$1 per day. This means efforts to address grassland degradation are especially urgent in SSA because of the key role that livestock play as a source of wealth, food and nutrition, draft power, and sociocultural services such as payment for dowry. While the actual cost is small due to low livestock productivity, the impact of grassland degradation on human welfare is more severe, especially in the drylands where most livestock are located and where a majority of the population lives below the poverty line. Addressing grassland degradation could simultaneously reduce poverty, contribute to carbon sequestration, increase productivity of crops, and provide more draft power. Efforts to improve grassland through controlled grazing, planting legumes, and other practices will increase both livestock productivity and carbon sequestration. The international community has the responsibility to support livestock development programs in low-income countries due to carbon sequestration's potential to benefit the entire global community.

FIGURE 1 Change in government effectiveness and land degradation



Note: GE = government effectiveness, which is the quality of public and civil services and their degree of independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. Government effectiveness index scale ranges from -2.5 (weak) to 2.5 (strong). NDVI = normalized difference vegetation index, which measures the density of plant greenness on a patch of land.

Source: Authors.

LAND DEGRADATION ON CROPLAND

The loss of maize, rice, and wheat grain production due to depletion of soil nutrients is about \$15 billion per year or 1.4 percent of the global crop output value. The land degrading management practices also result in a loss of carbon sequestration equivalent to \$43 billion or 75 percent of the \$57 billion total cost of maize, rice and wheat cropland degradation in 2007.

Contrary to expectations, we observed an inverse relationship between adoption rate of soil fertility management practices and their profitability in SSA and Bhutan. The major drivers of the unexpected result are the advisory service providers' limited knowledge about integrated soil fertility management—which uses organic inputs, judicious amounts of inorganic fertilizer, and improved seeds—and poor access to markets. The results suggest the need to invest in improving extension services and access to markets.

LESSONS LEARNED FROM COUNTRY CASE STUDIES

Even poor countries can achieve sustainable development through policy and institutional changes that incentivize land users to invest in restoring degraded lands and preventing land degradation. Niger, a success story for addressing land degradation, was one of many case study countries that consistently showed that improved government effectiveness and rule of law make it easier for people to adopt sustainable land management practices. For example, the key driver of the Nigerien tree planting and protection success story was improved government effectiveness that simultaneously made it possible for communities to independently manage their natural resources and directly benefit from their investments.

Bhutan is a country with rich, environmentally friendly Mahayana Buddhist values that promote the coexistence of humans and natural ecosystems. Accordingly, the country designed the Gross National Happiness (GNH) index that includes human development indicators not used in the traditional gross national product. GNH includes good governance, sustainable socioeconomic development, cultural preservation, and environmental conservation. Environmentally friendly policies and cultural values have given Bhutan the most stable forests and the largest share

of land area under forest of any country in the world. About 70 percent of Bhutan's land area is under forests and about 25 percent of its population live in protected areas. There is virtually no deforestation in Bhutan. This achievement reflects the key role country policies and customary institutions play in protecting ecosystem services.

Argentina is a middle-income country with the highest adoption rate (64 percent) for conservation agriculture—or soil management practices that minimize tillage, enhance natural biodiversity, and reduce soil erosion and energy use per hectare. Conservation agriculture also enhances carbon sequestration and other benefits. Argentina successfully promoted conservation agriculture with a strong public-private partnership and vibrant market policies that led to strong growth of the agricultural sector. However, the rapid expansion of cropland and grazing land has led to deforestation—an aspect that underscores the weaknesses of Argentina's efforts to protect its forests. The loss of ecosystem services due to LUCC cost \$70 billion or the equivalent of 26 percent of the country's 2007 GDP. This finding underscores the need for rapidly growing middle-income countries to better protect forests and other high value biomes that are threatened by the growing demand for agricultural products.

LOOKING AHEAD

Goal 15 of the 2030 Agenda for Sustainable Development adopted by the United Nations calls for land degradation to be halted and reversed. Investments to address land degradation could produce significant economic payoffs. Because the global community bears more than half of the cost of land degradation, it is vital that solutions involve both local land users, national governments, civil society, and the global community. Strategies should be developed

that offer incentives for land users to better manage lands and to reward those who practice sustainable land management. Based on the spirit of the Sustainable Development Goals, the payment for ecosystem services mechanisms that saw large investments in carbon markets in the early 2000s should be reactivated to address the loss of ecosystem services through LUCC.

The high levels of land degradation on cropland and grazing lands point to the great need to invest in research and extension in developing countries. Specifically, crop productivity remains low, prompting farmers to clear high-value biomes to plant crops or use land for grazing, or both. Additionally, even when such technologies are available, their adoption rates are low due to poor market infrastructure, advisory services, and other rural services. For example, integrated soil fertility management had the lowest adoption rate of several soil fertility management practices, although it is the most profitable and more sustainable than other such practices.

From a global perspective, livestock is a neglected sector in developing countries despite the increasing demand for meat and milk. Low productivity is due to limited public and private investment in livestock development. This raises great concerns given that grazing lands occupy a much larger area than crops, and most poor people's livelihoods depend on this sector. In light of the increasing demand for meat and milk, coupled with low investment in livestock, livestock is a missed opportunity that developing country governments need to seize to ensure successful poverty reduction and food security programs. As with crops, better market access, more secure land tenure, and improved advisory services are needed to enhance livestock productivity.

Now is the time to take action against land degradation.

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This publication is based on the peer-reviewed book, *Economics of Land Degradation and Improvement—A Global Assessment for Sustainable Development*, edited by Ephraim Nkonya, Alisher Mirzabaev, and Joachim von Braun and published by Springer. This is an open access title. For freely downloadable PDF or HTML: <http://link.springer.com/book/10.1007%2F978-3-319-19168-3>. For more information about the book: <http://www.springer.com/gp/book/9783319191676>. The boundaries and names shown and the designations used on the maps herein do not imply official endorsement or acceptance by the International Food Policy Research Institute.

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