

HEALTHY PEOPLE NEED HEALTHY FORESTS— POPULATION AND DEFORESTATION

Deforestation worldwide continues at a net rate of 9.4 million hectares a year, posing a serious threat to human communities and natural ecosystems at the outset of the 21st century.¹ This **Emerging Policy Issues in Population, Health, and the Environment** brief examines how deforestation threatens human and ecological health and highlights the underlying causes of deforestation, while paying special attention to the role of human population dynamics in this process.

Today, forests cover about 27 percent of the world's land area, compared to roughly 50 percent 10,000 years ago.² In Europe and South America, forests extend over roughly half the land, compared to less than one-fourth in Africa, Asia, and Oceania. Of the forested land that remains today, 55 percent is found in less developed countries.³

During the 1990s, human activities resulted in the gross deforestation of an area roughly the size of Colombia and Ecuador combined (146 million hectares, or 563,709 square miles). During that same time period, 52 million hectares were regained due to reforestation efforts and natural regrowth. Rates of net deforestation (gross deforestation less reforestation, natural regrowth, and plantation growth) were highest in South America and Africa, while high rates of gross deforestation in Asia were offset by expanding forest plantations (see Table 1, page 2). In general, the 1990s saw forest cover expand in temperate less developed countries, decline in tropical less developed countries, and remain relatively stable in more developed countries.⁴

Critical Impacts of Deforestation

Deforestation, and related forest degradation, can have harmful and even deadly consequences for both people and the environment:

■ **Less precipitation, higher temperatures, greater flooding**—As trees that normally help induce precipitation in an area are removed, the area's climate becomes increasingly arid, often leading to desertification. Recent research has

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Deforestation continues to threaten human and ecological well-being throughout the world.

shown that, on average, precipitation is 30 percent lower and temperatures are 1 degree Celsius higher in deforested areas of the Amazon than in forested areas.⁵ Ironically, deforestation can also lead to increased flooding, even if rainfall is reduced. Forests regulate runoff from precipitation, buffering against widespread flooding and landslides. The removal of trees, especially in hilly or mountainous areas, impairs the ability of the soil to absorb and retain water and release it slowly over time.

■ **Loss of food, medicine, and fuel**—Forests, which have the highest species diversity of any terrestrial ecosystem, serve as important and dependable sources of food, medicine, and fuel for surrounding communities. Tropical forests, where the majority of deforestation takes place, provide habitat for up to two-thirds of known terrestrial species.⁶ As forests are destroyed, degraded, or fragmented, many of these valuable species of plants and animals—any number of which contain precious genetic resources that could lead to new pharmaceuticals or provide important traditional medicines—are threatened or lost forever.

Table 1

Top Gains and Losses of Forest Cover by Country, 1990–2000

Country	Net Forest Loss (ha)	Country	Net Forest Gain (ha)
Brazil	23,093,000	China	18,063,000
Indonesia	13,124,000	United States	3,880,000
Sudan	9,589,000	Belarus	2,562,000
Zambia	8,509,000	Kazakhstan	2,390,000
Mexico	6,306,000	Russia	1,353,000
Dem. Rep. of Congo	5,324,000	Spain	860,000
Myanmar	5,169,000	France	616,000
Nigeria	3,984,000	Portugal	570,000
Zimbabwe	3,199,000	Vietnam	516,000
Argentina	2,851,000	Uruguay	501,000
Australia	2,820,000	New Zealand	390,000
Peru	2,688,000	India	381,000

ha= hectares

NOTE: The FRA 2000 recalculated the 1990 forest cover figures, using the same definitions and methodologies used for calculating the 2000 figures, in order to make the comparison between 1990 and 2000 possible.

SOURCE: Food and Agriculture Organization of the United Nations (FAO), “Forest Resources Assessment (FRA) 2000, Forest Cover Change” (www.fao.org/forestry/fo/fra/index.jsp, accessed Aug. 13, 2001).

■ **Declining crop yields, loss of vital soil nutrients, and degradation of surrounding ecosystems**—Trees serve as barriers to soil erosion and ensure that vital nutrients are naturally returned to the soil. In many tropical areas, valuable soil erodes and crop yields can quickly decline when trees are cleared to make way for agriculture or livestock. Eroded soil often ends up in streams and rivers, leading to siltation, contamination, and stagnation. These processes, in turn, disrupt aquatic ecosystems, often killing fish and other aquatic organisms.

■ **Spreading tropical diseases, reduced quantities of safe water**—The spread of some potentially fatal tropical diseases (including malaria, hemorrhagic fever, filariasis, leishmaniasis, and cholera) often follows paths of deforestation.⁷ Mosquitoes thrive in recently deforested areas as the number of stagnant bodies of water (pools, culverts, pits, and streams clogged by felled trees) needed for breeding increase. As some forest animal species such as birds and bats disappear from an area, insect populations swell, facilitating the transmission of disease. Deforestation and hunting also remove the natural predators of rodents. As their numbers multiply,

diseases such as typhus and rabies can spread. Migrants to recently deforested areas typically do not have the immunity to these diseases that indigenous forest dwellers have built up over time. In addition, as deforested watersheds lose the ability to provide adequate amounts of water consistently, reduced flows lead to stagnation and falling per capita supplies of water. These conditions are ripe for the spread of cholera and dysentery.

■ **Exacerbating climate change**—As trees grow, they absorb carbon from the atmosphere and store it in their tissues. When forests are cleared or burned, this carbon is released back into the atmosphere as carbon dioxide, which traps the sun’s energy and raises global temperatures. Forests contain 40 percent of all stored carbon, more than any other terrestrial ecosystem, and thus help buffer against global warming.⁸ The Intergovernmental Panel on Climate Change, a UN-sponsored consortium of leading scientists, found that land-use change—of which tropical deforestation is the most significant component—was responsible for roughly 20 percent of human-induced carbon emissions during the 1990s.⁹ If left unchecked, global warming could melt polar ice caps, raising sea levels by several feet and threatening low-lying countries. Such a development would be devastating for many countries. For example, if the sea level were to rise by 150 centimeters, Bangladesh could lose up to 16 percent of its land area, displacing 34 million people.¹⁰

■ **Loss of aesthetic value and natural beauty**—Many people view forests as natural treasures and areas of beauty that lose spiritual and aesthetic value when destroyed through deforestation and forest degradation.

Drivers of Deforestation

Deforestation is directly attributable to humans clearing land for agriculture or pasture, building roads, logging, and extracting forest products. These direct causes of deforestation are themselves symptoms of underlying demographic, social, and economic interactions. While patterns of deforestation vary, its four main essential causes have been summarized in the phrase, “people, poverty, plunder, and policy.”¹¹ The relationships and interactions among these forces are often very complex, challenging our ability to understand this critical phenomenon.

PEOPLE: The Complex Role of Population Growth

An increase in population density, whether due to natural increase or migration, heightens the probability of deforestation in any given area. For each additional person, there are additional resource demands (food, fuelwood, shelter, land, etc.), resulting in increased pressure on forest resources. The impact of each additional person will vary depending on their particular needs and the availability of employment opportunities outside the agriculture and forestry sectors. In one study of deforestation in Costa Rica, doubling the number of potential cultivators in an area adjacent to forested land increased the likelihood of deforestation in the area by 37 percent.¹²

While the connection between population growth and deforestation often seems clear when examined at the local level, the links are less obvious at higher levels. First consider a regional example. Population pressure on forests is arguably much greater in Asia than in any other region of the world (see Figure 1, page 4). Yet rates of net deforestation in Africa and South America (7.8 percent and 4.1 percent, respectively) were much higher during the 1990s than in Asia (0.7 percent).¹³

Nor is the connection clearer at the national level. Some countries that experienced substantial population growth in the 1990s, for example, actually gained forest cover. In Bangladesh and Gambia, population growth rates were high (averaging 2.2 percent and 3.3 percent per year, respectively, as opposed to 1.4 percent worldwide), yet each of them saw a net increase in forest cover.¹⁴ India, the world's second most populous country, added more than 160 million people in the 1990s, but gained forest cover due to the growth of tree plantations that offset high rates of natural forest loss. Such observa-

Although disagreements exist over the connections between population and deforestation, at some level demographics do matter.

tions led Jacques Diouf, director general of the Food and Agriculture Organization of the United Nations (FAO), to state that, "These differences [among countries] cannot be explained by population pressure on forests alone, rather they are apparently the results of economic developments at large, and national forest or land use policies."¹⁵

While many analysts believe that population growth does contribute to deforestation in one way or another, there are disagreements over the precise role that it plays. Some believe that population dynamics—growth, density, and migration—are the primary drivers of deforestation, while others assert that these dynamics merely exacerbate

or alleviate more fundamental causes (poverty, land-use policies, and resource consumption). To differing degrees, both of these views affirm the value of policies that attempt to preserve forests by slowing population growth, such as providing access to voluntary family planning or restricting migration into ecologically sensitive areas. A third school of thought is less convinced that population is an important factor in deforestation, stressing instead the primacy of the other causes mentioned above.¹⁶

Although disagreements exist over the connections between population and deforestation, at some level demographics do matter. However, the population-deforestation link may not be as clear at the national or international levels due to wide variation between countries and regions in the other variables associated with deforestation.

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Deforestation in the U.S. Pacific Northwest leaves an ugly scar on the land, increasing the likelihood of flooding and soil erosion while reducing habitat and threatening surrounding aquatic ecosystems.

POVERTY: Subsistence Farming and Deforestation

Poverty and a general lack of access to capital, resources, and technology contribute to deforestation in two ways.

First, poor communities often fail to provide adequate forest resource management, leading to general environmental degradation. Poor rural families are more likely to support themselves with subsistence slash and burn agriculture; use forest products as fuel, fodder, and building materials; and live in ecologically fragile zones.¹⁷ In Burkina Faso, Côte d'Ivoire, and Senegal, extremely high rates of deforestation are associated with the expansion of cash crops (groundnuts, cotton, coffee, and cocoa) by large companies for export, which directly displaces forests and reduces the availability of arable land for subsistence farmers, driving them to encroach on forested land.¹⁸

Second, in poor rural communities, the continuing need for family labor supports high fertility and rapid population growth, which some analysts believe places additional strain on forests (see previous section).

PLUNDER: Economic Development and Consumption of Forest Products

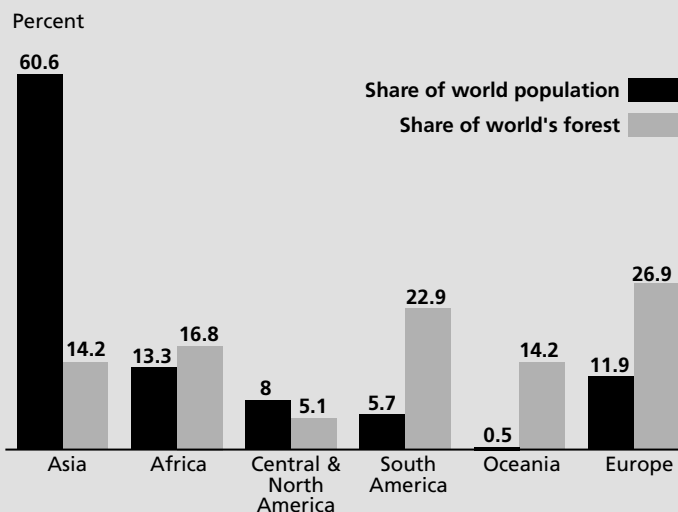
More developed countries such as Japan and the United States can drive deforestation in less developed countries through the import of tropical hardwoods. Many less developed countries exploit their own forest resources, seeking funds to pay down foreign debts or to pay for expensive imported goods needed to support economic development.¹⁹ Less developed countries such as Malaysia or Indonesia (which produces almost 20 percent of the world's plywood) log their forests, often in an unsustainable manner, to meet demand in more developed countries.²⁰ Less developed countries can also drive deforestation beyond their own borders. China's declared moratorium on national deforestation has resulted in rapid deforestation in northern Myanmar and on the Russian border by Chinese loggers eager to meet a growing appetite for wood back home.²¹

POLICY: Incentives That Drive Deforestation

Government policies and programs can often encourage deforestation through fiscal incentives

Figure 1

Per Capita Forest Pressures Highest in Asia and Central and North America*



*Africa and South America experienced greatest loss of forest cover between 1990 and 2000.

SOURCES: Population Reference Bureau, *2001 World Population Data Sheet*; and Food and Agriculture Organization of the United Nations (FAO), "Forest Resources Assessment (FRA) 2000, Forest Cover 2000" (www.fao.org/forestry/fo/fra/index.jsp, accessed Aug. 16, 2001).

to clear land and subsidies of agricultural products and inputs.

In Brazil, where 14 percent of all natural forest loss in the tropics occurs, 60 percent of the arable land is owned by just 2 percent of the population. This inequitable land distribution has driven a growing number of landless peasants into forested regions. As in many less developed countries, the land tenure system in Brazil is structured so that forest clearing and cultivation gives farmers claim to the land and access to fiscal subsidies and incentives. Deforestation is viewed as an investment on the part of the farmer to be rewarded with land title and access to credit. Large-scale ranchers have also moved into the Amazon and cleared even larger tracts of land for cattle and other livestock to take advantage of other favorable credit policies. As a result, large swaths of the Amazon have been destroyed.²²

Implications for Policymakers

Continued deforestation at current rates will have grave consequences for the health of both humans and ecosystems around the world. Since the inter-

actions that influence deforestation are complex, policies designed to address the problem should take care to examine the local context and target factors that most affect rates of deforestation in a given area. The role of population dynamics (growth, density, and migration) should always be considered in combination with other causes of deforestation.

In the long run, controlling deforestation requires addressing the numerous social and demographic interactions that contribute to this process. This calls for multisectoral approaches that encompass all four drivers described here: people, poverty, plunder, and policy. While meeting this challenge will not be easy, the world's forests are precious resources that must be managed sustainably if people and the natural environment they depend upon are to remain healthy.

References

- ¹ Food and Agriculture Organization of the United Nations (FAO), "Forest Resources Assessment (FRA) 2000 Summary Findings," accessed online at www.fao.org/forestry/fo/fra/index.jsp, on Aug. 14, 2001. Deforestation refers to depletion of tree crown cover to less than 10 percent of its original state in any given area.
- ² World Resources Institute, *World Resources 2000-2001* (Washington, DC: World Resources Institute, 2000): 90.
- ³ FAO, "FRA 2000 Forest Cover 2000," accessed online at www.fao.org/forestry/fo/fra/index.jsp, on Aug. 13, 2001.
- ⁴ FAO, "FRA 2000 Forest Cover Change," accessed online at www.fao.org/forestry/fo/fra/index.jsp, on Aug. 13, 2001. More developed countries, following the UN classification, include all of Europe and North America, plus Australia, Japan, and New Zealand. All other countries are classified as less developed.
- ⁵ J. Couzin, "Landscape Changes Make Regional Climate Run Hot and Cold," *Science* 283 (1999): 317-319.
- ⁶ Norman Myers, *The Primary Source: Tropical Forests and Our Future* (New York: Norton, 1992): 50.
- ⁷ N.G. Gratz, "Tropical Environments, Man, and Vector-borne Diseases," in *International Perspectives on Environment, Development, and Health Toward a Sustainable World*, eds. Gurinder S. Shahi et al. (New York: Springer Publishing Co., 1997): 212-213.
- ⁸ World Resources Institute, *World Resources 2000-2001*: 101.
- ⁹ Intergovernmental Panel on Climate Change (IPCC), *Land-Use, Land-Use Change, and Forestry* (Cambridge, UK: Cambridge University Press, 2000): 5.
- ¹⁰ Sven Åke Björke and Megumi Seki, UN Environment Programme, "Vital Climate Change Graphics: Potential Impacts of Climate Change," accessed online at www.grida.no/climate/vital/33.htm, on Aug. 7, 2001.
- ¹¹ Katrina Brown and David Pearce, eds., *The Causes of Tropical Deforestation: the Economics and Statistical Analysis of Factors Giving Rise to the Loss of Tropical Forests* (Vancouver: University of British Columbia Press, 1994).
- ¹² Luis Rosero-Bixby and Alberto Palloni, "Population and Deforestation in Costa Rica," *Working Paper* No. 96-19 (University of Wisconsin-Madison: Center for Demography and Ecology, 1996): 24.
- ¹³ FAO, "FRA 2000 Forest Cover Change."
- ¹⁴ For the deforestation rates, see "FRA 2000 Forest Cover Change." For the population growth data, see UN, *World Population Prospects: the 2000 Revision* (New York: United Nations, 2001). This observation may be due to changes in forest cover estimation techniques—changes in FAO's definitions and information base combined with gaps and inconsistencies in the quality of the data mean that the results from the 1990 and 2000 FRA are not directly comparable.
- ¹⁵ "Africa, South America Blamed for Deforestation," *Agence France-Presse*, Jan. 23, 2001.
- ¹⁶ For more discussion of competing perspectives on and various models of population-environment interactions with respect to deforestation, see Alain Marcoux, "Population and Environmental Change: From Linkages to Policy Issues," *SD Dimensions*, a publication of the FAO's Sustainable Development Department (January 1999), accessed online at www.fao.org/sd/Wpdirect/Wpre0089.htm, on Aug. 7, 2001.
- ¹⁷ J.E.M. Arnold and P. Bird, *Forests and the Poverty-Environment Nexus* (New York: United Nations Development Programme and European Commission, 1999): 4-5.
- ¹⁸ Solon Barraclough et al., "The Social Dynamics of Deforestation in Developing Countries: Principal Issues and Research Priorities," *Discussion Paper* No. 16 (New York: United Nations Research Institute for Social Development, November 1990): 15.
- ¹⁹ Dedanna Donovan, "Strapped for Cash, Asians Plunder Their Forests and Endanger Their Future," *Effects of the Asian Financial Crisis Series* No. 39 (Honolulu, Hawaii: East-West Center, 1999): 3-4.
- ²⁰ Tom Gardner-Outlaw and Robert Engelman, *Forest Futures: Population, Consumption and Wood Resources* (Washington, DC: Population Action International, 1999): 34.
- ²¹ Jake Brunner, Kirk Talbot, and Chantal Elkin, *Logging Burma's Frontier Forests* (Washington, DC: World Resources Institute, 1998): 15.
- ²² Antonio Carlos Diegues, "The Social Dynamics of Deforestation in the Brazilian Amazon: An Overview," *Discussion Paper* No. 36 (New York: United Nations Research Institute for Social Development, July 1992), accessed online at www.unrisd.org/engindex/publ/list/dp/dp36/toc.htm, on Aug. 7, 2001.

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