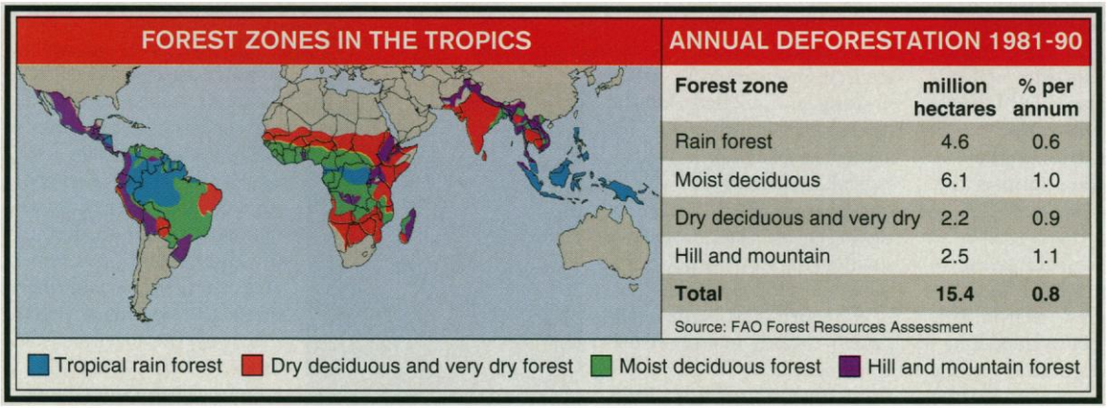
ECOLOGY

Tropical Deforestation: Not Just a Problem in Amazonia

Think of tropical deforestation, and the image that comes most readily to mind is of chainsaws chewing their way through the Amazon basin. But the popular perception that the rain forests of Brazil represent the most threatened of the world's tropical forest ecosystems needs overhauling, according to a new assessment from the United Nations Food and Agriculture Organization (FAO). The Amazon rain forests are being cleared at an alarming rate, the new study shows, but rain forests in some other regions, along with other tropical forest types, are in an even more parlous state.

The FAO report, which will be presented next week at a meeting in Rome of the agency's Committee on Forestry, makes sobering reading. In a study released in 1982, FAO had estimated that 11.3 million hectares of tropical forest were lost each year during the 1970s; the latest survey indicates that the destruction jumped by nearly 40% in the 1980s, reaching an average of 15.4 million hectares per year. South America accounts for the largest absolute losses—6.2 million hectares a year—which translates to an annual deforestation rate of 0.6%. But continental South East Asia is losing a larger proportion of its forests each year—a staggering 1.6%—and Central America is close behind at 1.5% a year. And while 0.6% of the world's rain forests succumb annually to chainsaws, bulldozers, and fire, moist deciduous and upland forests are disappearing even faster (see table).



ANNUAL DEFORESTATION 1981-90

Forest zone	million hectares	% per annum
Rain forest	4.6	0.6
Moist deciduous	6.1	1.0
Dry deciduous and very dry	2.2	0.9
Hill and mountain	2.5	1.1
Total	**15.4**	**0.8**

Source: FAO Forest Resources Assessment

The new FAO study is the most authoritative global tropical deforestation survey to be produced in more than a decade. It was put together from a mix of sources, including existing ground-based assessments and a limited set of satellite images. And FAO project leader K. D. Singh has won universal plaudits for inventing a sophisticated mathematical model, incorporating factors such as human population density and ecosystem type, to derive a comprehensive assessment from this incomplete data set. But some researchers have complained that the effort suffered from lack of money—the FAO team had only $2 million to spend and couldn't afford to buy a complete set of remote sensing images from the U.S. Landsat program, for example—and there's a growing lobby pressing for a continuous satellite program to supplement these 10-yearly FAO assessments.

In spite of the limitations of the data, ecologist Sandra Brown of the University of Illinois says she hopes the new report will focus attention on areas such as South East Asia, where deforestation is an acute problem. "Everyone gets hung up on Brazilian rain forests," says Brown. She points out that Brazil, as one of the most advanced of the developing nations, at least has the remote sensing expertise to monitor its own forests and provide data that could be used to derive a sensible land management plan. But in many other tropical deforestation blackspots —such as Indonesia and Zaire—there's "very poor knowledge" of the problem, says Brown.

The new report could also play a valuable role in assessing the impact of deforestation on biodiversity. In that regard, the high rate of forest loss in South East Asia—which contains some of the world's most notable biodiversity "hot spots"—is particularly worrisome. Just where that problem is most severe should become apparent later this year, when a geographical representation of the FAO data will be superimposed on data from a 3-year effort to map the extent of protected conservation areas across the tropics, carried out by the World Conservation Monitoring Center (WCMC) in Cambridge, England. A high deforestation rate for a particular country doesn't necessarily indicate a serious threat to biodiversity, explains WCMC ecologist Mark Collins: Although forests may be disappearing, sufficient area may nevertheless be set aside for conservation. But by combining the two data sets, he says, it should be possible to focus conservation efforts on those countries where they are needed most urgently.

A second phase of the FAO project, which is already under way, should provide a more precise indication of forest loss. The effort will include a carefully selected sample representing 10% of the world's tropical forest cover, and it will compare Landsat images taken at the beginning and end of the last decade.

Many members of the remote sensing community argue, however, that an even more comprehensive survey is needed to underpin policy efforts to limit global change and the erosion of biodiversity. "We have the tools, but there's been no concerted effort," argues David Skole of the University of New Hampshire, an expert on monitoring forests by remote sensing. Skole is particularly concerned about the need for data to back up the international Climate Change Convention, signed at the "Earth Summit" in Rio de Janeiro last summer. The convention requires inventories of net greenhouse gas emissions to be drawn up for each signatory nation. Forest clearing is a major source of net carbon dioxide emissions, but even the second-phase FAO survey, says Skole, will focus on too small a fraction of the forested area within many countries for a reliable assessment of its impact.

Skole estimates that it would cost only $30 million to $40 million over the next 10 years to build a monitoring program that would fill such gaps. Each year, the program would survey a sample of satellite images to provide an annual estimate of deforestation; every 5 years, it would produce a figure based on a complete set of images covering the entire tropics. He says it could be built from two smaller existing efforts: one in the United States, called the Landsat Pathfinder project; the other project coordinated by the European Community's Joint Research Center in Ispra, Italy, using images from U.S. weather satellites. "It won't cost the world community a lot of money, and there's such a lot to be gained," says Skole.

–Peter Aldhous