

**The text that follows is a TRANSLATION  
O texto que segue é uma TRADUÇÃO**

## **Deforestation in Amazonia**

Please cite the original article:

Favor citar o trabalho original:

**Fearnside, P.M. 1994. "Queimadas e  
desmatamento (1)" *Jornal do Brasil* [Rio  
de Janeiro], 15 Nov. 1994.**

**Fearnside, P.M. 1994. "Queimadas e  
desmatamento (2)" *Jornal do Brasil* [Rio  
de Janeiro], 17 Nov. 1994.**

Disponível em: <http://philip.inpa.gov.br>

## DEFORESTATION IN AMAZONIA

Philip M. Fearnside  
Instituto Nacional de Pesquisas  
da Amazônia - INPA  
C.P. 478  
69011-970 Manaus-Amazonas

Tel: 55 (92) 642-3300 R. 314  
Fax: 55 (92) 236-3822  
After Oct. 1994: 642-3028

Text prepared for Jornal do Brasil

27 September 1994

## BURNING AND DEFORESTATION

In spite of a powerful myth that deforestation in Amazonia is under control, it continues to be one of the greatest environmental problems in Brazil and in the world. Amazonian deforestation destroys opportunities for sustainable use of the forest, especially environmental services such as maintaining biodiversity, avoiding the greenhouse effect and providing rainfall to all of Brazil.

Burning is part of the deforestation process, but burning is not the same as deforestation. In addition to burning of cleared tropical forests (i.e. deforestation), fires are also used in cut secondary forests, in natural savannas such as the cerrado, and in the cattle pastures that dominate the landscape in already-deforested parts of the region. Reliable estimates of deforestation cannot be made from the number of fires or from fire area estimates based on measurements at a single point in time made with satellite-borne sensors that register the heat coming directly from the fires. For estimates of deforestation rate there is no escape from the more expensive and time-consuming method of comparing satellite images from two different years using a sensor (such as LANDSAT's thematic mapper) that registers sunlight reflected from the ground in the cleared areas. Unfortunately, the most recent publically-available information of this kind is for 1991. The National Institute for Space Research (INPE) has interpreted and checked deforestation data for 1992, but, according to a public statement made by the head of INPE's remote sensing department in a speech to a conference held in Manaus in April of this year, the information has not yet been released because the director of INPE is being "pressured."

We know that the rate of deforestation in the Legal Amazon as a whole declined significantly between 1987 and 1991. The annual rate of 11,100 km<sup>2</sup> in 1991 was only half the 20,300 km<sup>2</sup>/year average rate between 1978 and 1988. It should never be forgotten, however, that the lower deforestation rate of 11,100 km<sup>2</sup>/year is still a huge area destroyed each year, virtually all for unsustainable uses such as cattle pasture and with very little benefit for the people of the region. An annual rate of 11,100 km<sup>2</sup>, or 1.11 million hectares (ha), represents an average of over 3000 ha per day, or over 2 ha per minute.

Decline in deforestation rates from 1987 through 1991 does not represent a trend that can be extrapolated into the future until the deforestation problem simply disappears, as some officials have claimed. Lower rates are mainly explained by Brazil's deepening economic recession over this period. Ranchers simply do not have money to invest in expanding their clearings as quickly as they had in the past. A change in policy on granting fiscal incentives, although an important and necessary measure, does not explain the decline: the decree suspending the granting of incentives (Decree No. 151) was issued on 25 June 1991, which was after almost all of the observed decline in deforestation rate had already occurred.

Not only past but also potential future effect of the decree on incentives (Decree No. 153 of 25 June 1991) is much less than many believe. The decree is a modification of a previous decree (Decree No. 101 of 17 April 1991, which "regulates" Law No. 8167 of 16 January 1991), and only covers those incentives that were included in the previous decree (i.e., only new incentives). The

backlog of already-approved projects is much more important than the few new ones that would be added to the list with each passing year.

The overriding importance of the economic recession means that deforestation rates can be expected to increase again once Brazil's economy recovers, unless the government takes steps now to remove the underlying motives for deforestation. This must be done based on a realistic picture of who is clearing the forest.

The notion that deforestation is the result of poor people clearing to feed themselves is promoted by politicians in Amazonia to justify their claims that anyone suggesting that deforestation is harmful or should be reduced is against the people. Central government officials have also begun to blame the poor for clearing, using the (erroneous) argument that clearing by large ranchers has been controlled by suspending incentives, so that the remaining clearing is the work of small farmers. The social costs of greatly reducing the rate would be much less than is implied by those who blame poverty for deforestation.

The distribution of 1991 clearing among the region's nine states indicates that most of the clearing is in states that are dominated by ranchers: the state of Mato Grosso alone accounts for 26% of the  $11.1 \times 10^3 \text{ km}^2$  total. Mato Grosso has the highest percentage of its privately held land in ranches of 1000 ha or more: 84% at the time of the 1985 agricultural census. By contrast, Rondônia--a state that has become famous for its deforestation by small farmers--had only 10% of the 1991 deforestation total, and Acre had 3%. The number of properties in each class explains 74% of the variance in state-level deforestation rates both for 1990 and for 1991. In both years small farmers (with less than 100 ha of land) accounted for about 30% of deforestation activity, with 70% being done by ranchers.

## THE RISK OF CLIMATE CHANGE

One of the impacts of deforestation is contribution of carbon dioxide and other gases that provoke global warming, which is one of the most serious problems facing the planet today. Brazil's official estimate indicates that deforestation in Brazil contributes 1.4% of the global total of carbon dioxide entering the atmosphere. However, this estimate omits a large portion (approximately 70%) of the emission from deforestation that occurs from decay of unburned biomass or from burning of biomass that is not combusted at the time of the initial clearing. Inclusion of this and other factors omitted in the official estimate approximately triples the contribution of Brazil's Amazonian deforestation to over 4% of the global total. When the impact of deforestation is understated, one also underestimates the advantage of slowing clearing as compared, for example, to planting Eucalyptus to remove carbon dioxide from the air (currently Brazil's major proposal). The global warming impact of each large rancher in Amazonia is equal to over 3500 people living in cities like Rio and São Paulo.

A second climatic consequence of massive conversion to pasture would be a decrease in rainfall in Amazonia and in neighboring regions. Half of the rainfall in Amazonia is derived from

water that recycles through forest as evapotranspiration, rather than from water vapor in clouds originating over the Atlantic Ocean. Importance of recycled water is greatest in the dry season, and increases as one moves farther away from the Atlantic Ocean. This means that in Rondônia and Acre the proportion of rainfall derived from forest could be much higher than the roughly 50% found by Enéas Salati and co-workers between Belém and Manaus. Greater dependence in the dry season means that conversion to pasture would cause this period to become longer and more severe, a change that could wreak havoc on the forest even if annual precipitation total were to remain unchanged.

Many rainforest trees are already at their limits of tolerance for drought stress. In patches of forest isolated by cattle pasture in a study being carried out near Manaus by the National Institute for Research in Amazonia (INPA) and the Smithsonian Institution, over 80,000 trees have been tagged and mapped. Trees on the edges of forest patches die at much greater rates than do those in continuous forest. Since many trees die "on their feet" rather than being toppled by wind, dry conditions in the air or soil near reserve edges provide a likely explanation for the mortality. Precipitation in Amazonia is characterized by tremendous variability from one year to the next, even in the absence of massive deforestation. Were the forest's contribution to dry season rainfall to decrease, the result would probably be a very severe drought once in, say, 20 or 50 years that would kill many trees of susceptible species. Such a change could set in motion a vicious cycle leading to less dense forests that transpire less, increasing the severity of droughts, thereby causing even more tree mortality and forest thinning.

Severe droughts provoked by deforestation could lead to a surprisingly rapid demise for the remainder of the forest once a substantial portion of the region had been converted to pasture. In Amazonia at present, burning is almost entirely restricted to areas where trees have been felled and allowed to dry before being set alight. Fire normally stops burning when it reaches the edge of the clearing rather than continuing into unfelled forest. This lucky situation need not necessarily continue unchanged. In forested areas that have been disturbed by logging along the Belém-Brasília Highway, fires from neighboring pastures have already been observed to continue substantial distances into standing forest. During 1982-83 (an unusually dry year because of the El Niño phenomenon) approximately 45,000 km<sup>2</sup> of tropical forest on the island of Borneo burned when fires escaped from shifting cultivators' fields. Devastation would be catastrophic should fires such as this occur in Amazonia during one of the droughts aggravated by drying from deforestation.

## WHAT MUST BE DONE

The government should discourage further deforestation. Heavy taxes should be levied on land sales so as to remove the profits from land speculation (clearing allows speculators to maintain their claims to land with a view to later sale). Ceasing to use clearing as a measure of "improvement" for granting land titles would be another obvious step that would cost no money. A high-level decision to not open up currently inaccessible areas by further expanding the highway network would also be a key step that is entirely within the government's capability; it would save a lot of money as well. Other needed steps include removing the remaining subsidies, reinforcing

procedures for the Environmental Impact Report (RIMA), carrying out agrarian reform both in Amazonia and in the source areas of migrants, and offering alternative employment in both rural and urban areas.

The environmental services of forest are Amazonia's most valuable product. Ways must be found to base maintenance of both the forest and the human population on the value of these services, rather than attempt to generate revenue by expanding cleared areas and by selling timber.

The burning season provides a reminder that the basic causes of deforestation have still not been addressed.