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*A prescription for slowing*

# **Deforestation in Amazonia**





**By Philip M. Fearnside**

**D**eforestation is rapidly converting Brazil's Amazon forest to low-value, unproductive cattle pasture.<sup>1</sup> To stop this annual loss of about 35,000 square kilometers of forest from the 5-million-square-kilometer Amazonian region, effective policies that slow deforestation must redirect development.<sup>2</sup> Otherwise, the option to use the forest in a sustainable way will be irrevocably lost, because rapid soil degradation, competition with weeds, and disruption of seed dispersal and pollination prevent forest regrowth.

Only production systems that allow the forest canopy to remain intact will prove sustainable in Amazonia. Sustainable production implies harvesting only those forest products that can be easily renewed. One possibility is to protect tracts of Amazonia as extractive reserves, from which only nonendangered flora and fauna could be harvested (for another discussion of extractive reserves, see Walter V. C. Reid's "Sustainable Development: Lessons from Success" on page 6). Such a harvest would include only nontimber forest products like latex, resins, nuts, and medicinal compounds.<sup>3</sup> However, slowing deforestation is only a means of buying time for more research on the technologies of sustained production and on the economic mechanisms needed to en-

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sure that sustainable systems are adopted by Brazilian settlers and businesses.<sup>4</sup>

### Motives for Deforestation

Slowing forest destruction requires more than simply outlawing deforestation, which is the current, completely unenforceable approach embodied in Decree Law 7511 of 7 July 1986. Policymakers also must remove the motives for deforestation. Some of the needed measures are expensive: For example, to reduce the flow of migrants to Amazonia, massive funding would be required to increase employment opportunities in migrant source areas, such as the southern state of Paraná, through agrarian reform and urban industrial development.<sup>5</sup> Other measures, such as

changing people's attitudes through education and extension programs, can only produce results slowly. However, many essential measures can have immediate impact at no cost or even at considerable savings to the government.

#### *Land Speculation*

One principal force driving deforestation in Brazilian Amazonia today is land speculation.<sup>6</sup> The forest is free for anyone who can claim it. By clear cutting forest for cattle pasture (the cheapest land use to adopt), settlers can gain title to a tract of land and keep other squatters or ranchers from invading the area either before or after title is obtained. Although a tract's beef production may be negligible or zero, such land speculation is highly profitable because a title

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*Legal title to land allows the owner to sell it at a good profit. Title may be gained by clear cutting the forest, because planting pasture is legally defined as an improvement. In Brazilian Amazonia, such land speculation is a leading motive for deforestation. (Photo: Philip M. Fearnside)*

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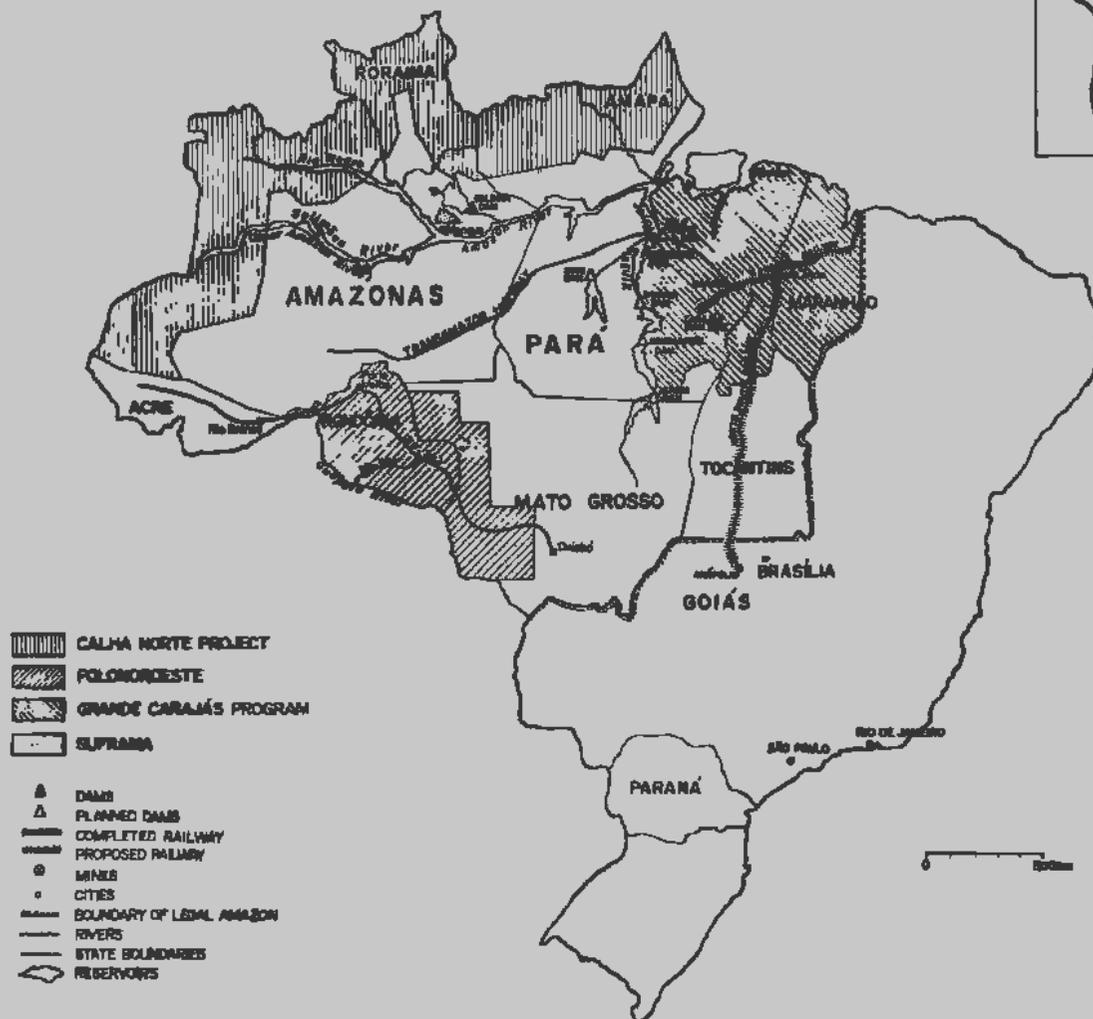
permits the sale of land to be legally recorded, and titled land can be used as collateral for bank loans.<sup>7</sup> Land values also rise when roads are built. Low capital gains taxes on land sales permit speculators to realize large profits with relatively little effort. This profitability must be removed by levying heavy taxes on capital gains from land sales. Heavy taxes are fully justified because the rapid increase in land values does not stem from the efforts of the landholders but from the expanding road network financed by taxpayers throughout Brazil. Whenever a road is built or improved in Amazonia, the value of nearby land immediately multiplies by as much as a factor of 10, if not more.

#### *Pasture as an Improvement*

Land tenure in Amazonia is established by clearing forest and planting pasture, which is recognized by the National Institute of Agrarian Reform as an improvement, or *benfetoria*. In reality, however, creating pasture is not an improvement but a form of ecological destruction, because the soil in clear-cut areas of Amazonia becomes compacted and depleted of available phosphorus in about a decade. Afterwards, pasture is usually abandoned to second growth of little or no economic value. Growth of edible grass for forage declines sharply during the life of the pasture, until the cost of controlling inedible weeds exceeds any economic return from the cattle grazed there.<sup>8</sup>

To control deforestation, classification of pasture as an improvement must be abolished. Otherwise, people claiming title to land will continue to find ways to circumvent forest conservation legislation and will benefit from deforestation and the increases in land value that accompany the granting of legal title.

FIGURE 1. Major development projects in Brazilian Amazonia.



### Financial Incentives

Deforestation is encouraged by special government subsidies for such programs as the agricultural and pig-iron (crude iron cast in blocks) projects approved by the Grande Carajás Program and the ranching projects and sawmills approved by the Superintendency for Development of Amazonia (SUDAM) as well as the Superintendency for the Manaus Free Trade Zone (SUFRAMA).<sup>9</sup> (The map in Figure 1 on this page shows the projects and places mentioned here.) Incentives for deforestation include income tax exemptions, arrangements that forgive half the taxes owed on profits from undertakings elsewhere in Brazil provided the money is invested in

Amazonian development, and loans granted at interest rates lower than the Brazilian inflation rate. For example, in 1975 when the inflation rate was about 35 percent, loans were granted at an interest rate of just 7 percent. Recently, the rate of inflation has jumped to 1,000 percent, while the loan rate is only a fraction of this.

In 1979, SUDAM policy was changed to bar new incentives in Legal Amazonia, which covers 5 million square kilometers of mostly lowland rain forest. However, SUDAM still grants new incentives in transition forest areas, and incentives approved before 1979 continue to be paid throughout the region.<sup>10</sup> If these incentives were abolished immediately, the government would bene-

fit economically as much as the country would benefit environmentally.

Brazil's economic difficulties greatly reduced the flow of government subsidies in 1988, but no policy has been established to prevent the resumption of large financial incentives when the economy recovers. Indeed, Brazil's president, José Sarney, has declared his intention of maintaining the incentive programs indefinitely.<sup>11</sup> These policies may or may not change, however, after the presidential elections scheduled for 15 November 1989, because Sarney is not running for re-election.

Projects receiving incentives have already devastated wide areas of the Amazon forest for little economic return to the public. The profits made by the ben-

eficiaries do not represent productive contributions to the national economy but, rather, speculative gains and, often, the illicit use of the incentive monies themselves.<sup>12</sup> The incentives should be halted summarily, but if beneficiaries are judged to have acquired rights (*direitos adquiridos*) to incentives that already have been granted, any future installments should be given exclusively for restoring tree cover to already deforested areas.

### Road Building

Highway construction is a key component of deforestation and one of the most sensitive pressure points where government action can slow forest loss.<sup>13</sup> The government could also save substantial sums of money by not building highways. Road construction encourages forest clear cutting by fueling land speculation, pasture planting, colonist turnover, and new immigration. Deforestation has increased wherever roads are built in Amazonia, as it has along the BR-364 and Transamazon highways.

Road building and improvement projects must be restricted to areas where the land is suitable for agriculture. Otherwise, infertile lands inevitably are settled with virtually no government control. A zoning system to identify good agricultural land is necessary, and it must be based on technical criteria like soil quality rather than on politics or geopolitics. The best example of an ill-advised road improvement is the BR-429 Highway in the state of Rondônia, which will open to settlement the highly infertile valley of the Guaporé River. The road already exists as a seasonally passable track, but local politicians are pressing strongly to have it paved. Although maps made by the Brazilian Enterprise for Agricultural and Cattle Ranching Research of the land adjacent to the road clearly show an utter absence of good, fertile soil, preliminary government zoning maps of Rondônia classified the strip along the road as recommended for agricultural use.<sup>14</sup> Subsequent revisions have classified the area for controlled logging. Another example of a development project that opens an infertile region to settlement and deforestation is the Calha



Norte Project (intended to defend Brazil's northern border with military bases and airstrips), which calls for new roads and settlements along Brazil's northern borders. Soil quality maps produced from side-looking airborne radar images indicate that the soil is dystrophic.<sup>15</sup>

Where soil is judged adequate for agriculture, road construction must not begin before the demarcation of Amerindian reserves and extractive reserves is complete. When demarcation is delayed, the option to delineate reserves is quickly lost, because the areas are soon invaded by gold miners, loggers, and squatters. In 1988, while the BR-364 Highway was being paved to link the city of Rio Branco in the western state of Acre with Porto Velho in Rondônia, the National Security Council blocked the reserve demarcation, because the land lies within 150 kilometers of the Bolivian border. The demarcation problems along BR-364 in Acre are very similar to problems that arose along the BR-364 Highway in Rondônia under the World Bank's Polonoroeste program, where road improvement was completed with many reserves still not demarcated.<sup>16</sup> The project in Rondônia proved that simultaneous road building and reserve demarcation does not work; miners, loggers, and squatters have occupied both roadside land and Amerindian re-

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*Land beside feeder roads to the BR-364 Highway in Rondônia is quickly deforested for cattle pasture, which degrades and ceases to produce in about a decade. (Photo: Philip M. Fearnside)*

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serves. If any reserves are to be established, the demarcation must be completed before road work begins.

### Environmental Impact Reports

The National Council for the Environment's Resolution No. 001 of 23 January 1986 requires that every major government project proposed in Brazil have a Report on Impact on the Environment (RIMA). However, consulting firms paid by the projects' proponents write the reports, and often construction begins before a report is finished, even though the resolution states that a RIMA must be finished and approved before work commences.

Both the legislation and its implementation are deficient and must be improved to eliminate this inherent conflict of interest. More effective means are needed to ensure that the interested parties do not influence the conclusions of the reports. For example, a RIMA should be completed, publicly debated, and duly approved before steps are

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taken that render the project in question an irreversible *fait accompli*. This legally mandated procedure has failed to occur in several major projects initiated since January 1986, when RIMAs became a requirement. The best known example is the North-South Railway, running from Açailândia, Maranhão to Anápolis, Goiás: Bids were solicited from contractors within a few days of the announcement of the project and before any environmental evaluation had begun.<sup>17</sup> Another example is the approval of fiscal incentives for pig-iron production in the Grande Carajás region and the construction of the necessary smelters with no environmental study.<sup>18</sup>

RIMAs must also be interpreted by both the courts and government agencies to include guarantees concerning a wide range of collateral projects that become viable because of the existence of a given major project. For example, the railway and mines installed for the Carajás Iron Project (a World Bank project that is separate from the Grande Carajás Program's pig-iron scheme) allowed a highly valuable resource to be tapped with relatively little direct environmental perturbation. However, the indirect impacts of the iron project, such as deforestation for ranching and charcoal production, are enormous.<sup>19</sup> The Grande Carajás Program, which includes a 900,000-square-kilometer agricultural development zone and the highly destructive charcoal scheme for pig-iron production, was granted approval because of the existence of the railroad. When a project is evaluated, the environmental impacts of all possible related developments—not just the initial public works (like the railway)—must be considered.

The series of six dams planned for the Xingú River basin is a case in which the environmental impacts of possible future developments would be much worse than the effects of the initial project. The first dam to be built, Belo Monte (formerly Kararaô), would flood some



land used by Amerindian communities, but would do much less damage than would the other five—Babaquara, Iriri, Ipixuna, Kokraimoro, and Jarina—which would be disastrous for a long list of tribes. Jarina Dam would even flood part of the Xingú Indigenous Park.<sup>20</sup> Thus, the RIMA for Belo Monte Dam should include the environmental impacts of all six dams.

Although Belo Monte Dam would produce a large amount of electricity from a relatively small reservoir, constructing this dam and its associated electrical transmission lines would help justify the other, more harmful ones; once the first dam is built, water-flow regulation from upstream dams and absorption of sediment load would strengthen the arguments for building more dams. Therefore, the approval of any RIMA to allow construction of the first dam should be conditional on an irrevocable commitment not to build the other dams.

At present, Eletronorte, the government power monopoly in Amazonia, asserts that only the first dam is under discussion and that decisions on the other dams will be reached later. This position is very different from agreeing not to build the other dams. The critical difference was made plain in the agency's filling of the Balbina reservoir near the city of Manaus in Amazonas.<sup>21</sup> In 1987,

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*Ariquemes, an agricultural boom town in Rondônia, Brazil, exemplifies the unchecked development that cuts swaths through the Amazon and closes the door to recoverable uses of the forest. (Photo: Panos Pictures—Marcos Santilli)*

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Eletronorte agreed to fill Balbina only to the 46-meter level, after which the water quality would be allowed to stabilize before any decision would be made to fill the reservoir to the full 50 meters, which would flood an additional 780 square kilometers. The amount of water in the Uatumã River was insufficient to fill the reservoir even to 46 meters before the 1988 dry season began. However, when the water level reached 46 meters during the dry season in July 1988, the filling process did not pause at all. Thus, the "postponed" decision had no effect whatsoever, and in January the reservoir was filled to the 50-meter level.

The example of the Balbina reservoir's "postponed" filling makes clear the need to obtain from the government firm commitments (rather than deferred decisions) not to take damaging future actions. The entire RIMA procedure must be greatly strengthened to ensure that such disastrous projects are avoided throughout the region. The precedents being set are extremely dangerous because they will make thorough evalua-

tions of future projects more difficult to obtain.

On 6 April 1989, President Sarney announced the establishment of *Nossa Natureza* (Our Nature), which includes a \$100-million, 5-year program to zone the Amazon basin for both economic use and ecological protection. The program emphasizes increased inspection and enforcement of deforestation restrictions, but it does not remove the underlying motives for clear cutting the forest. For instance, *Nossa Natureza* includes only a temporary suspension of new incentives for ranching and does not eliminate the pig-iron scheme in the Grande Carajás Program.<sup>22</sup>

Deforestation must be slowed drastically and quickly if sustainable uses of the rain forest are to be retained. Cheap and effective measures include taxing land speculation; disallowing pasture as an "improvement" for establishing land tenure; halting fiscal incentives and other subsidies for developments involving deforestation; reducing and strictly controlling road building; and strengthening RIMA procedures for major development projects. Unless the Brazilian government soon enacts and enforces these measures, the forests of Amazonia will not be saved.

*An unpaved road runs from Manaus, in northern Brazil, through roughly 200 kilometers of Amazonian rain forest. This is one of the many newly cut roads that contributes to erosion in the Amazon. (Photo: FAO—Peyton Johnson)*



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## NOTES

1. P. M. Fearnside, "Land Use Trends in the Brazilian Amazon Region as Factors in Accelerating Deforestation," *Environmental Conservation* 10, no. 2 (1983):141–48; and P. M. Fearnside, "Spatial Concentration of Deforestation in the Brazilian Amazon," *Ambio* 15, no. 2 (1986):72–79.
2. P. M. Fearnside, "Deforestation in Brazilian Amazonia," in G. W. Woodwell, ed., *The Earth in Transition: Patterns and Processes of the Biotic Impoverishment* (New York: Cambridge University Press, forthcoming).
3. M. H. Allegretti, "Reservas extrativistas: Uma alternativa para o uso da terra na Amazônia," in A. B. Anderson, ed., *Alternatives to Deforestation* (New York: Columbia University Press, forthcoming); P. M. Fearnside, "Extractive Reserves in Brazilian Amazonia," *BioScience* 39, no. 6 (1989):(forthcoming); N. Myers, "Tropical Moist Forests: Over-Exploited and Under-Utilized?" *Forest Ecology and Management* 6, no. 1 (1983):59–79; N. Myers, "Forestland Farming in Western Amazonia—Stable and Sustainable," *Forest Ecology and Management* 15, no. 2 (1986):81–93; and S. Schwartzman and M. H. Allegretti, "Extractive Production in the Amazon and the Rubber Tappers' Movement" (Environmental Defense Fund, Washington, D.C., 1987, Mimeographed).
4. P. M. Fearnside, "Forest Management in Amazonia: The Need for New Criteria in Evaluating Development Options," *Forest Ecology and Management* 26 (1989):(forthcoming).
5. P. M. Fearnside, "Causes of Deforestation in the Brazilian Amazon," in R. F. Dickinson, ed., *The Geophysics of Amazonia: Vegetation and Climate Interactions* (New York: John Wiley & Sons, 1987); and P. M. Fearnside, "Deforestation and International Economic Development Projects in Brazilian Amazonia," *Conservation Biology* 1, no. 3 (1987): 214–21.
6. S. G. Bunker, "Forces of Destruction in Amazonia," *Environment*, September 1980, 14; P. M. Fearnside, "The Development of the Amazon Rain Forest: Priority Problems for the Formulation of Guidelines," *Interciencia* 4, no. 6 (1979):338–43; and P. M. Fearnside, "Causes of Deforestation in the Bra-

zilian Amazon," note 5 above.

7. P. M. Fearnside, "The Effects of Cattle Pastures on Soil Fertility in the Brazilian Amazon: Consequences for Beef Production Sustainability," *Tropical Ecology* 21, no. 1 (1980):125–37; and S. B. Hecht, "Environment, Development and Politics: Capital Accumulation and the Livestock Sector in Eastern Amazonia," *World Development* 13, no. 6 (1985): 663–84.
8. P. M. Fearnside, "Cattle Yield Prediction for the Transamazon Highway of Brazil," *Interciencia* 4, no. 4 (1979):220–25.
9. J. O. Browder, "The Social Costs of Rain Forest Destruction: A Critique and Economic Analysis of the 'Hamburger Debate,'" *Interciencia* 13, no. 3 (1988): 115–20; P. M. Fearnside, *Human Carrying Capacity of the Brazilian Rainforest* (New York: Columbia University Press, 1986); and G. Kohlhepp, "Analysis of State and Private Regional Development Projects in the Brazilian Amazon Basin," *Applied Geography and Development* 16 (1980):53–79.
10. P. M. Fearnside, "Deforestation and Decision-Making in the Development of Brazilian Amazonia," *Interciencia* 10, no. 5 (1985):243–47.
11. "Fraude Fiscal: Orgia Amazônica. Incentivos desperdiçam bilhões de cruzados," *Isto É*, 15 July 1987, 62.
12. D. J. Mshar, *Frontier Development Policy in Brazil: A Study of Amazonia* (New York: Praeger Publishers, 1979).
13. P. M. Fearnside, "The Development of the Amazon Rain Forest: Priority Problems for the Formulation of Guidelines," note 6 above.
14. Brazil, Governo de Rondônia, Secretaria de Estado do Planejamento e Coordenação Geral (SEPLAN), *Plano Agropecuário e Florestal de Rondônia* (Porto Velho, Brazil: SEPLAN, 1987); Brazil, EMBRAPA/SNLCS (Empresa Brasileira de Pesquisa Agropecuária/Serviço Nacional de Levantamento e Conservação de Solos), *Mapa de Avaliação da Aptidão Agrícola das Terras do Estado de Rondônia*, map scale 1:500,000 (Porto Velho, Brazil: EMBRAPA, 1982); and P. M. Fearnside, "Settlement in Rondônia and the Token Role of Science and Technology in Brazil's Amazonian Development Planning," *Interciencia* 11, no. 5 (1986):229–36.
15. Brazil, Projeto RADAMBRASIL *Levantamento de Recursos Naturais*, vols. 1–23 (Rio de Janeiro: Departamento Nacional de Produção Mineral, 1973–1982).
16. P. M. Fearnside and G. de L. Ferreira, "Roads in Rondônia: Highway Construction and the Fate of Unprotected Reserves in Brazil's Amazonian Forest," *Environmental Conservation* 11, no. 4 (1984):358–60.
17. "Os canteiros de obras mais caros do país," *Veja*, 20 May 1987, 30.
18. P. M. Fearnside, "The Charcoal of Carajás: A Threat to the Forests of Brazil's Eastern Amazon Region," *Ambio* 18, no. 2 (1989):141–43.
19. P. M. Fearnside, "Agricultural Plans for Brazil's Grande Carajás Program: Lost Opportunity for Sustainable Development?" *World Development* 14, no. 3 (1986):385–409.
20. Conselho Indígenista Missionária (CIMI), Centro Ecumênico de Documentação e Informação (CEDI), Instituto Brasileiro de Análise Social e Econômico (IBASE), and Gesamthochschule Kassel (GhK), "Brasil: Áreas Indígenas e Grandes Projetos," map scale 1:5,000,000 (Brasília: CIMI, CEDI, IBASE, and GhK, 1986).
21. P. M. Fearnside, "Brazil's Balbina Dam: Environment versus the Legacy of the Pharaohs in Amazonia," *Environmental Management* (forthcoming).
22. James Brooke, "Brazil Announces Plan to Protect the Amazon," *New York Times*, 7 April 1989, A5.
23. P. M. Fearnside, "Como frear o desmatamento na Amazônia," *Amazônia Brasileira em Foco* (forthcoming).