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# The Future of Deforestation in Amazonia: A Socioeconomic and Political Analysis

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### ABSTRACT

*Analysis of the socioeconomic and political forces that determine deforestation provides grounds for guarded optimism regarding its future pace and the adoption of technical alternatives in Brazilian Amazonia. Both capital and labor have been induced to move to Amazonia by a particular model of development and by official incentives that resulted more in speculation and instability than in productive settlement. The precariousness of settlement generates constant new pressures for further frontier expansion. This process could be slowed by cutting official incentives, relieving pressures that generate frontier migration, consolidating existing frontier settlement, and using less predatory forms of new settlement. Since deforestation depends to such a large extent on artificial stimuli, slowing it is more politically feasible than may be apparent.*

The foregoing essays in this book present a wide variety of technical alternatives to deforestation in Amazonia. It may seem that, given the means now at hand, the problem can be readily solved. Questions loom, however, as to what extent the alternatives are economically, socially, and politically feasible.

The prevailing point of view is that deforestation is inevitable, increasingly rapid, a necessary cost of development, and merely a question of time, measured in decades or even years (e.g., Fearnside 1984). Based on a socioeconomic and political analysis of the broader context, this paper offers a more optimistic view. The focus is on Brazil, although many of the arguments probably apply to the

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natives to Deforestation: Steps  
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other Amazonian countries as well. The basic point is that environmental problems in Amazonia reflect essentially social problems and that their solutions must also be social.

If deforestation has profound social causes, there is no easy technological solution or "fix," nor can nature be preserved by decree. Appropriate technology and effective enforcement of protective measures are, of course, important and necessary elements in slowing deforestation, but they are not sufficient. In order for protection to be achieved, it is necessary to understand why firms and individuals stay put or move into the forest, why they use or do not use certain technologies, and why they destroy nature or leave it be.

This essay approaches the question from a structural and historical perspective. Firms and individuals are not seen as destroying Amazonian rain forest because of lack of law enforcement, information, technology, ecological consciousness, or goodwill. Rather, it is argued, both capital and labor have been induced to move to the frontier and to behave as they do by government policies and, on a deeper level, by Brazil's economic and social system. Policies followed by the Brazilian government have worked in such a way as to concentrate land ownership and income, excluding the poor majority from the benefits of economic growth, which are channeled to social classes or groups who are already most favored (Furtado 1972). The specific mode of capitalist development in Brazil is based on political domination that is labor-repressive (Velho 1973). Such unequal development involves profound social conflicts.

If destruction of the Amazon rain forest has such deep social roots, one might conclude that it will only cease when the structure is radically changed. In this paper, I take an alternative view and focus on the prospects for preservation of the Amazon environment with only limited change in the existing socioeconomic and political structure.<sup>1</sup> The basic point is that if certain reforms are undertaken in such a way that society has more control over the State, destruction of the forest can to a large extent be avoided. Thus, characterizing the problem of deforestation as "social"<sup>2</sup> instead of "natural" does not mean that it is inevitable, but rather that it can be slowed, given political will.

The analysis deals with social origins of Amazon settlement, its environmental consequences, suggested new policy guidelines, political feasibility, and strategies to be followed.

### The Social Origins of Amazon Settlement

This section focuses on the determinants of the migration of capital and labor to the Amazon frontier in recent years. The deep structural determinants are difficult to modify, even in a democratic regime, but the proximate determinants are more subject to change, especially when they do not conflict with overall economic growth.

In contrast to historical patterns, in which commercial and agricultural capital dominated the Amazonian economy, the business interests involved in recent frontier expansion in Amazonia are based in industry and finance, mostly within Brazil. Like entrepreneurs anywhere, they are motivated by possibilities for prof-

its. What needs to be done in the late 1960s and early 1970s is to make sure that as they expect

As a first step, the government should encourage the construction of roads and ranches. The government should also encourage the use of wood. The basic problem is the cumulative depletion of the forest. The horizontal expansion of the forest is not sustainable, at least in the late 1960s, when

This growth in Amazonia after the 1960s was indirectly by the government. It was the building of the infrastructure. The depletion of a vast natural resource sparked a reaction. At the end of the 1960s, the government took advantage of the incentives for investment in the government income tax (1982; Gasquet)

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its. What needs clarification is why they began to move so suddenly, starting in the late 1960s, and how they make their profits (or failed to make as much profit as they expected).

As a first approximation, frontier profits can be divided into two types, productive and speculative. Productive profits come from the output of new farms and ranches and from exploitation of natural resources, especially minerals and wood. The basic cause of expansion of the "resource frontier" into Amazonia was the cumulative and constant process of economic and demographic growth and depletion of natural resources in more settled and developed regions. Because of horizontal expansion, with low productivity of land and labor and limited sustainability, land and forests had been largely depleted in the rest of Brazil by the late 1960s, while they remained abundant on the Amazon frontier.

This gradual process, however, does not explain the rush of capital to Amazonia after the mid-1960s, which was due to strong stimuli provided directly and indirectly by the State after the military coup in 1964. The main indirect stimulus was the building of roads and other transportation and telecommunications infrastructure. In addition to providing profits for construction firms, the opening of a vast network of roads, undertaken for basically national security reasons, sparked a real estate boom that provided spectacular opportunities for land speculation. At the same time, the enterprises that established projects in the region took advantage of direct official stimuli in the form of generous tax and credit incentives for groups that provided political support for the new regime. Few government incentives actually reached their supposed destination (Mahar 1979; Hecht 1982; Gasques and Yokomizo 1986).

The rush of migrants to Amazonia is sometimes exaggerated. The numbers were large for the region but not for Brazil. Net interregional migration in the 1970-1980 decade was less than one million, compared to about 20 million net rural-urban migrants in Brazil (Martine 1987). Still, while they did less damage than ranchers, pioneer farmers were responsible for a significant part of deforestation (Mahar 1988).

As in the case of big business, the frontier settlers also responded to both long-term structural trends and policy incentives of the new regime. The cumulative and constant structural trends were rapid population growth in the postwar period and highly skewed distribution of income and property, which generated centrifugal forces pushing people outward from the center to the periphery. The principal political factors attracting migrants were ambitious land settlement projects along the Transamazon Highway, as part of the National Integration Programs, and in Rondônia, in the western Amazon (Sawyer 1984).

The migrants sought land (or other means (placer mining, small business, etc.) to gain sustenance in the present and security for the future. They wanted to be their own bosses. Their search for autonomy, which ran contrary to the overall tendency of formation of a propertyless working class in Brazil, was contemplated and partially attended by official plans. Frontier migration served as an escape valve, at least symbolically, relieving pressures for land reform and other profound changes in the Northeast, Southeast, and South of Brazil (cf. Velho 1973).

This summary analysis points to the conclusion that the recent transfer of capital and population to the Amazon region was to a great extent induced by a

particular model of development and particular policies. Its genesis was, to be sure, capitalist development in Brazil. Nonetheless, frontier expansion was due to policies and programs that had more to do with military or private interests than with the capitalist system as a whole or with the majority of the population, within the region or elsewhere. The move to the frontier was hardly essential or necessary for capitalist development, which could have followed a more distributive route without providing special favors to specific business groups. Incentives and colonization could even have been contrary to overall development efforts because of their unfruitful allocation of public funds.

### Environmental Consequences of Frontier Expansion

As in the case of origins, the effects of frontier expansion on the rain forest environment can be examined in terms of the two principal participants, firms and migrants.

The business interests involved in frontier expansion in Amazonia established new latifundia (large landed estates), many of which covered tens of thousands of hectares and some of which reached hundreds of thousands of hectares. These properties differ from old latifundia in settled parts of Brazil not only in their larger size, but also in their function. Large estates in the rest of Brazil are basically for two types: 1) traditional latifundia—unproductive properties found most frequently in the Northeast that are maintained by rural oligarchies for purposes of power and prestige and that respond poorly to economic incentives (Barraclough 1973); 2) modern latifundia—landholdings generally located in the Southeast that modernized their production methods through adoption of new technology and large-scale production in response to urbanization, industrialization, and government policies during the 1970s (Muller 1982).

In Amazonian latifundia established by big businesses in the 1960s and 1970s, land plays an economic role, but not primarily for production. Not only is there no "hamburger" connection," as in Central America, but Amazon beef production is also inadequate for the region's own consumption needs (Browder 1988). The land itself is a commodity and a reserve of value in a highly inflationary economy (Hecht, Norgaard, and Possio 1988). The purported use of the land is cattle ranching. In retrospect, it can be seen that ranching served more as a pretext than for production. In order to justify their claims to land, which were often of dubious legality, ranchers cut down vast expanses of forest. While such conversion produces pasture initially rich in nutrients, the undertaking soon succumbs to loss of soil fertility, weed invasions, pests, and overgrazing (Hecht 1982; Buschbacher 1986; Serrão and Toledo, this volume; Nepstad, Uhl, and Serrão, this volume). The final result is at best degraded pasture, if not scrubby secondary growth or even sandy and eroded "deserts." Ranching resulted in forms of occupation at the same time precarious and predatory.

Modern extractive activities in Amazonia, targeted at wood and minerals, also received official incentives, in hopes that they would generate foreign exchange needed to pay Brazil's looming foreign debt. These extractive activities are different from ranching in that they are more directly involved in production and

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less in speculation, although there is also a strong dose of speculation in mining rights. Mineral extraction is currently more important to industrialized countries than plant extraction. In the case of iron and aluminum ore, primary processing requires local production of vast quantities of energy, which in Amazonia comes primarily from charcoal and hydroelectric plants. These energy sources have externalities that the consuming countries do not want in their own territories, and Brazil has responded by producing charcoal from the forests near Carajás and electricity from the reservoir of Tucuruí. The environmental onus for Amazonia, by fire or water, is enormous.

On a much smaller scale, the migrants who were able to establish farms on land left aside by the modern latifundia or in official settlement projects have also contributed to deforestation (Schmink 1987). Because of the lack of capital and credit, insecurity about land tenure, unfavorable terms of trade, uncertainty about prices, high transportation costs, exploitation by middlemen, and the effects of tropical disease, among other problems, they are reluctant to incorporate permanent crops or make the land improvements needed for more stable settlement (Sawyer 1979). For small-scale farmers the only real alternative is shifting agriculture, with constant clearing of new forest areas. Like the big companies, the activities of small-scale farmers can also result in environmental degradation. What is important to recognize here is that their settlement is predatory because it is precarious.

The precariousness and instability of frontier settlement due to artificial stimuli, based primarily on speculative rather than productive interests, generate constant new pressures for further frontier expansion, acting in a "cancerogenic" way on the rest of the Amazonian organism. There is a negative feedback process: Precariousness generates degradation, which provokes further expansion, in a vicious cycle.

### New Guidelines

The foregoing summary analysis of the social character of deforestation in Amazonia suggests that there is a degree of reversibility or at least of compatibility between frontier expansion and environmental preservation. It is unnecessary to posit an all-or-nothing choice between development and preservation of the Amazon. It is more realistic and useful to seek ways of redirecting existing policies to promote compatibility. Suggested guidelines for such reorientation provide for positive and negative incentives within the region and in the rest of Brazil.

*Cutting Official Incentives.* The first general guideline would be to cut official incentives that favor precarious and predatory use of land. To some extent, the economic crisis of the 1980s and disappointing results of previous incentives have already led to cuts, by default. Conscious policy decisions, however, would be desirable. As a rule, new penetration roads, such as the Transacrea in Acre, should not be built or paved. New settlement projects, even if they are labelled "agrarian reform," should not be undertaken in remote areas. Tax incentives and subsidized credit should not be provided for ranching and timber activities, es-

pecially the former. Incentives need not be totally eliminated, but they should be provided in such a way as to reinforce activities that are economically feasible and ecologically sustainable, without attracting opportunists who are more interested in the incentives themselves than in production and who cannot survive without them.

*Relieving Centrifugal Pressures.* Pressure on the Amazon environment would be less intense if there were better living conditions in the Northeast, Southeast, and South of Brazil. If there were agrarian reform, urban reform, health and welfare reform, and other changes leading to better distribution of means of production and the benefits of development, urban and rural workers and small farmers would be more secure and would not have to seek sustenance in the rain forest.

*Consolidation of Existing Settlement.* Population and development in Amazonia would be more compatible with each other and with the environment if existing settlements were more solid and stable. The key concept is consolidation. Obviously, this does not mean consolidation as it usually occurs in Brazil, with expulsion of the disadvantaged, but would have to involve retention. This could be done through installation of infrastructure, paving and maintaining already existing roads, strengthening of the urban network, and use of traditional and new perennial crops. Paradoxically, it would involve greater substitution of forest by agriculture in the areas already partially occupied. Such additional deforestation where agriculture is more sustainable because of proximity to infrastructure, services, and markets means less deforestation on the distant frontier, where agriculture is less sustainable.

*Less Predatory Forms of New Settlement.* In addition to conventional forms of farming and ranching, which necessarily involve destruction of the forest, there are alternative forms of land use that permit conservation of the forest, many of which are described in this text. Unfortunately, other than a few perennial crops, these alternatives have not been incorporated into official development plans in Brazil.

### Political Feasibility

Environmental laws in Brazil are advanced in concept but are poorly enforced. The fact that they date from the authoritarian periods of the Vargas dictatorship (1937–1945) and the military regime (1964–1985) raises a question about the compatibility between environmental protection and democracy (Sawyer 1987). Can governments in less developed countries reconcile popular support and protection of natural resources? Put more directly: Can people worry about nature when they are poor and hungry?

In the case of Amazonia, the answer is certainly "yes." Existing settlement patterns based on ranching and colonization produce very little and do not solve the problems of poverty or hunger, for migrants or for other Brazilians. Slowing present devastation would not imply deprivation for anyone.

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The artificial and perverse character of frontier expansion in Amazonia means that, at least in principle, change is possible. Since the process is not an inexorable and necessary feature of capitalist development, preserving the rain forest is not unrealistic, romantic, utopian, or impossible. Of course, it will not be easy, but the attempt to slow down the process that degrades both people and their environment is not a quixotic undertaking.

There are signs that protection of the environment is not rowing entirely against the current. Despite the rate and scale of frontier expansion to date, there is some evidence of deceleration. There are reasons to believe that spatial reconcentration of agriculture in already settled areas and debilitation of the distant frontier can be expected as a logical outcome of economic and ecological processes (Sawyer 1984, 1986; see also Buschbacher 1986). Modern agriculture, which increases the productivity of land, requires a degree of infrastructure and market integration that is only available in relatively accessible areas. On the frontier, transport costs increase with distance and the humid tropical environment multiplies needs for modern inputs and technology. The "Green Revolution" thus favors more developed areas and generally avoids the "Green Hell."

Something similar may be occurring on a global scale. Technical progress and attempts at self-sufficiency make the developed countries less dependent on natural resources in the Third World, especially those of plant and animal origin. At new levels of technological development, in which biotechnology finds wide application, developed countries will have an increased stake in the sustained utilization and preservation of tropical rain forests, thus assuring that the rich gene pool characteristic of these ecosystems will not be destroyed.

In addition to economic debilitation, there may also be demographic involution of the frontier. New generations of Brazilians seem to be less willing than their parents and grandparents to seek out a living in the backwoods. This is especially true once it becomes clear that the dream of having their own land, the moving force behind migration, is more illusion than reality. Many recent frontier areas are losing population, which moves to new frontiers, to cities within Amazonia, or to other regions (Sawyer and Pinheiro 1984; Torres 1987).

To the extent that the various economic and demographic centripetal forces gain strength in relation to centrifugal forces, environmental protection in Amazonia becomes more feasible. There is also an ecological reaction. Although trees are defenseless against axes, chainsaws, and bulldozers, the rain forest ecosystem fights back. The high temperature and humidity that favor growth of crops also favor proliferation of weeds, pests, and diseases (Serrão and Toledo, this volume). Farms that use temperate-zone technology with large areas of monocultures are most vulnerable. Settlers in the midst of the forest are themselves subject to nature's counterattacks in the form of malaria and other diseases (Sawyer and Sawyer 1987). Investors and migrants are becoming increasingly aware of these diverse environmental risks and their costs.

### What Should Be Done?

If defense of the Amazon rain forest is not a lost cause, as it may seem at first sight, the question is what can be done in practical terms. What political strategy should be followed? What role can scientists, regional inhabitants and public opinion play, in the region and elsewhere?

First of all, it is important to learn from history and attempt to skip some of its stages. Ecological consciousness appeared first in the developed countries, when it was too late to preserve what had already been lost. In Brazil, ecological consciousness needs to be stimulated before similar levels of development—and environmental destruction—are reached, both in Amazonia and the rest of the country. Because the mass media are relatively well developed in Brazil, the task is less difficult than it might otherwise be.

Scientists can seek theoretical and technical foundations for policy initiatives. At the theoretical level, existing approaches to the environment certainly need to be rethought in the Brazilian and Amazonian context (Hecht 1985). As this book shows, there has been considerable progress in discovery of technical alternatives, but many details remain to be worked out in the fields of natural forest management, agroforestry, and recovery of degraded lands. One of the great gaps has to do with the economic feasibility of these alternatives in different settings. Another area that needs clarification is the quantity and type of labor that these alternatives absorb, that is, their demographic impact. In addition, technical knowledge must be translated into terms that can be understood by the people who can adopt it directly or adapt it to their needs. As many of the preceding papers in this volume have demonstrated (Cómez-Pompa and Klaus; Anderson; Alcorn; Subler; Dubois), the rural inhabitants of Amazonia already possess considerable practical knowledge from which land-use research could benefit greatly.

This call for scientific research and for reconciliation between development and conservation does not rule out radicalism. Popular mobilization depends not only on science, but also on emotion. Power structures usually only respond to concrete pressures, even if they are not very "rational." The technical approach should complement, but not substitute for, a political approach.

It is necessary to identify and mobilize all the social and political forces capable of contributing to these goals. The allies and enemies are not clearly defined. As a peripheral region, with even less political leverage in a democratic regime based on popular elections, Amazonia has little power. On the other hand, the distance from the center of power may leave more room for maneuvering. The federal government, state-owned companies like the Companhia Vale do Rio Doce, and the international development banks, located in places like Brasília and Washington, have enormous power. The ecological movement is also strongest farthest away from Amazonia, in Southeastern Brazil and especially in the United States and Europe. This spatial correlation between power and environmentalism should be exploited but not perpetuated.

One of the problems of placing external pressure on external agencies is that environmentalists farthest from Amazonia—with notable exceptions, especially among scientists—know least about the region. It is important to educate the

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activists. They should understand, for example, that if international lending agencies simply pull out, massive invasions of Indian and forest reserves could occur. Investing less in areas already partially occupied will tend to favor further deforestation within these areas as well as on new frontiers.

Although advantage should be taken of environmental consciousness outside Amazonia, efforts should also be made to stimulate awareness and movements within the region. There are signs that a new mentality is emerging, especially among those who have lived there longest, like the rubber tappers (Allegretti, this volume). One can hope it will also develop among migrants and their children, who may no longer see the rain forest as a strange and threatening obstacle to be removed, but as "home."

Ecological movements will probably be successful only to the extent that they coincide with social movements. In Amazonia, social process in partially occupied areas, as in the rest of the country, alleviates pressures on the rain forest. If until now social conflicts in Brazil have provoked destruction of the forest, it may be that in the future the new directions of these conflicts will favor its preservation.

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#### ENDNOTES

1. While it has parallels with the "political ecology" approach used by Schminck and Wood (1986), the present analysis does not presume that economic and environmental goals are necessarily at odds.
2. For simplicity, "social" is used here to mean social, economic, and political, as opposed to "natural" or "technical."

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