The text that follows is a PREPRINT.

Please cite as:

Fearnside, P.M. 1987. Deforestation and International Economic Development Projects in Brazilian Amazonia. Conservation Biology 1(3): 214-221.

ISSN: 0888-8892

DEFORESTATION AND INTERNATIONAL ECONOMIC DEVELOPMENT PROJECTS IN BRAZILIAN AMAZONIA

Philip M. Fearnside
National Institute for Research
in the Amazon (INPA)
C.P. 478
BRAZIL

July 7, 1986
Revised: Feb. 2, 1987
June 6, 1987

ABSTRACT:

International economic development projects speed deforestation in Brazil's Amazon region. Highways financed by these projects form a key link in a positive feedback relationship between deforestation and population migration. Roads facilitate entry of settlers whose land claims (established by deforestation) justify building more roads. Deforestation is explosive in Rondônia, site of the World Bank-financed POLONOROESTE project. Increased deforestation is likely in Acre where Inter-American Development Bank-financed highway improvement is underway, and (if funded) in the Grande Carajás agricultural program area. Deforested areas are usually converted to low-diversity cattle pasture to secure land claims at minimal cost. Pasture also facilitates obtaining land titles. Profits from land sales are enhanced by road improvements and by titling. Government and development project efforts to encourage non-pasture uses are unlikely to be effective in the absence of reforms limiting the profitability of land speculation.

Economic development projects in Brazilian Amazonia share many common patterns that lead to heavy impact on the region's natural ecosystems. High level decisions make the projects irreversible before environmental and land capability studies are made--or even in spite of negative indications that are already known. Previous commitments to preserving natural habitats and tribal areas are frequently reneged. Environmental measures are often mere symbolic actions serving only to tranquilize public concern during the key period when the development is not yet a ”fait acompli•. Projects in Amazonia are often undertaken to alleviate social problems outside of the region, especially by absorbing migrants who leave southern and northeastern Brazil because of population growth, agricultural transformation and land tenure concentration. If they are to be effective, measures addressing these problems must be applied directly in the migrant source areas. Financing Brazil's agrarian reform efforts in these areas represents a major opportunity for international lending agencies to help slow Amazonian deforestation.

INTRODUCTION

Brazil's Legal Amazonia (Fig. 1) is the scene of an explosion of Brazilian government projects to obtained speedy economic and political returns from the region's land, forests, mineral deposits and hydroelectric generation sites. International lending agencies, such as the International Bank for Reconstruction and Development (IBRD, better known as the World Bank) and the Interamerican Development Bank (IDB), lend funds for many of these projects, usually making up one-third of the total budget. While demands from these banks for environmental monitoring and protection have often been critical factors in spurring government activities in such economically "unprofitable" activities, it is nevertheless the case that without the international funding many of these projects would not be possible, or would not be possible on the present speedy timetables that preclude prior assessment of environmental impacts.

While the types of projects and types of environmental impacts are many, the most common impact is deforestation, replacing the high-diversity tropical forests of the region with low-diversity vegetation such as cattle pasture. Deforestation can occur either as a direct result of the economic development projects, or as a consequence of the settlement of migrants and increased activity of large ranchers and speculators who are benefitted by the highways and other infrastructure implanted for the developments. The impacts of international economic development projects go far beyond the "zones of influence" officially considered in assessing environmental impacts. Both inside and outside of these zones the deforestation is often greater than assumed. While the monetary benefits of the developments are invariably fully counted in the balance of pros and cons entering into government and lending agency decisions to implant the projects, environmental costs such as deforestation are largely ignored. Environmental costs count less than monitary ones because they are more difficult to quantify, are more longterm in coming due, are less concentrated on voluble interest groups, and because they occur in places far from the country's centers of political power.

POLONOROESTE

The Northwest Regional Development Pole, or POLONOROESTE is a regional development project with US$ 346.4 million in financing from the World Bank (Skillings, 1985; see also IBRD, 1981; Goodland, 1985). The project has already brought rapid change to Brazil's Amazonian states of Mato Grosso and Rondônia. Most (57%) of the project's US$1.55 billion budget for the 1981-1985 period was designated for the now complete reconstruction and paving of the 1500 km stretch of the Marechal Rondon or BR-364 Highway from Cuiabá (capital of Mato Grosso) to Porto Velho (capital of Rondônia). Expanding a network of feeder roads and the settlement of new areas made up most

of the remainder. A small fraction (3%) was destined for reserve protection, including Amerindian reservations. Research was allotted 0.5% (Goodland, 1985).

POLONOROESTE's impact extends far beyond the two states officially considered the "area of influence" of the project. The highway paving, completed in September 1984, removed a major barrier restraining migration to Amazonia of small farmers displaced from southern Brazil (especially the state of Paraná) by land tenure concentration and mechanized soybean and wheat cultivation. Rondônia serves as a gateway to the Amazon Region for an increasing flood of such migrants, many of whom fail to find land in that already overflowing state whose area is approximately that of West Germany. Migrants leaving Rondônia move on to more distant Amazonian frontiers, such as Roraima and Acre (See Fig. 1).

Despite the paucity of work on the diversity of any taxonomic group in Rondônia, some of the likely impacts are apparent from the explosive pace of deforestation in the area. Even before POLONOROESTE, satellite imagery from 1978 revealed that Rondônia had an exponential deforestation trend that was the fastest in the Brazilian Amazon (Fearnside, 1982). Additional satellite data from 1980 and 1983 have shown that cleared areas continued to increase at a faster-than-linear pace (Fig. 2; Fearnside, 1986a; Fearnside and Salati, 1985). The greatly accelerated rush of land-hungry migrants since the 1984 inauguration of the BR-364 Highway assures that deforestation continues in an explosive fashion. Roadbuilding sets up a powerful positive feedback loop with population growth: roads facilitate the entry of migrants who stake out claims beyond the limits of the existing road network, thereby creating political pressure to build still more roads to extend the network out to their claims (Fig. 3).

Increase in deforested area has been even faster than the approximately 14% per year increase in the human population (Fearnside, 1986b). The average person in Rondônia is clearing more today than in the past because of agriculture facilitated by better road transportation, cattle pasture planted to secure speculative claims from invasion by squatters or other speculators (motivated by land values that are skyrocketing because of new highways or the promise of highways), and the arrival of a wave of newcomers who buy properties from the less-wealthy original owners and proceed to clear more rapidly (Fearnside, 1979, 1983, 1984). The rapid increase in forest clearing is obvious to anyone working in the area.

The impact on diversity is likely to be greater than the proportion of area deforested might lead one to believe. Much of Rondônia is occupied by small farmers on lots of 50 or 100 ha. Each farmer clears land as rapidly as the limitations of family labor supply and capital permit its conversion to agriculture (Fearnside, 1986c). Despite government promotion of perennial crops, the great majority of cleared land is planted to cattle pasture after a year or two of use in annual crops. As clearing proceeds, the forest remnants remaining in each lot will lose species due to the effects of isolation in small patches. This effect has been demonstrated experimentally in the National Research in the Amazon (INPA)/World Wildlife Fund-US "Biological Dynamics of Forest Fragments" (formerly "Minimum Critical Size of Ecosystems") Project near Manaus (Amazonas) (Lovejoy, et al., 1984).

In newer colonization projects, the 50% of each property legally required to be left in forest has been grouped into "block reserves" to reduce the fragmentation effect and to make enforcement more practical. Several invasions by squatters have already occurred in the block reserves. In the case of the Urupá settlement area, squatters were removed in 1985 under pressure from the World Bank, but many of the claims have since been reoccupied. As a general rule, the requirements of Brazil's forestry code are not enforced in Amazonia.

The tendency to rescind commitments to reserves is potentially an even greater threat to the region's plant and animal diversity than is the current rapid rate of deforestation. Government maps of highway construction plans in Rondônia show roads cutting through six Amerindian reserves and two biological reserves (Fearnside and Ferreira, 1984). One of these, the Guaporé Biological Reserve, is to be crisscrossed by three different highways. Official maps as recent as December 1985 indicate that the roadbuilding plans remain unchanged (Brazil, Governo de Rondônia, SEPLAN, 1985), but the highway department at the federal level has reportedly rescinded one of the planned routes (which would have bisected the Jar' Biological Reserve).

When roads are built, invasion and deforestation of reserve areas become virtually inevitable. Road building in reserves also violates Brazilian legislation. If commitments to reserves continue to be rescinded whenever the land is desired for development, then the remaining natural habitats in Northwest Brazil can be expected to succumb to the threat posed by POLONOROESTE's migrants.

ACRE

A loan from the Interamerican Development Bank is providing US$58 million toward paving the stretch of the BR-364 Highway from Porto Velho (Rondônia) to Rio Branco (Acre). Final approval of the initial IDB loan occurred on March 14, 1985--one day before the entry of Brazil's current president--with the effect that any untoward environmental impacts can be easily blamed on the previous administration.

The project, originally called "PLANACRE," has been supplanted by the IDB-financed road paving project plus two "Protection of the Environment and Indigenous Cultures" (PMACI) projects. The protection activities and studies are included in PMACI-1 (to be financed by IDB) and PMACI-2 (to be financed by the World Bank). The area of influence of PMACI-1 covers half of Acre and part of Rondônia, while the 432,000 km^2 PMACI-2 zone covers these areas plus the rest of Acre and part of the state of Amazonas. Neither PMACI-1 nor PMACI-2 have started to receive funds (W. Groeneveld, personal communication, July 1986). Funds for these projects pass through a more circuitous bureaucratic route than do those for highway improvement, which are dispensed directly to construction firms by the Ministry of Transportation. Work on paving the Porto Velho-Rio Branco highway has already begun, thus assuring explosive migration to the far western part of the Amazon region.

As in the case of POLONOROESTE, the building and improving of roads is precisely the point within the system of forces driving deforestation that is most sensitive to deliberate control, either to speed or to slow the process. Due to their great expense, only the government builds highways. The decision to build or not to build a highway is made by government officials, in contrast to the thousands of largely uncontrolable individual decisions made by far-flung squatters, speculators and others once a highway is built. Subsequent laws and executive decrees, such as enforcement of Brazil's 1965 Forestry Code limiting deforestation to 50% of each property, are often futile. They are largely token gestures.

POLONOROESTE and the highway paving project in Acre both illustrate the virtually universal pattern in Brazilian Amazonia of constructing highways and other development projects before evaluating environmental impacts. Rather than serving as an input to decision-making in the key initial phases, the role of research is limited to trying to alleviate the ill effects of projects whose ultimate existence has already been decreed (Fearnside, 1985). Under the pressure of the advancing construction, areas to settle migrants in Acre are being planned despite the absence of detailed land capability surveys. In the case of POLONOROESTE, settlements were decreed in areas already known to have poor soils that were classified as unsuitable for the agriculture to be employed by prospective settlers (Fearnside, 1986d).

The planned PMACI projects in Acre have declared intentions of providing better environmental protection measures than did POLONOROESTE in neighboring Rondônia, but a quantitative increase in funding for the environment cannot be expected to substitute for qualitative changes in the structure of decision-making. The continued pattern of decreeing economic development projects before studies are made can only lead to history repeating itself to the detriment of the environment.

GRANDE CARAJÁS

The Grande Carajás regional development program administers fiscal incentives and other developments in the portion of eastern Amazonia surrounding the Carajás mineral deposits and railway. The approximately 900,000 km^2 area, larger than Texas and Oklahoma combined, was expanded in 1985 from the previous 840,000 km^2 area by including all municá¡ápios intercepted by the 8th parallel (which previously served as the southern boundary). The US$ 1.18 billion Programa Grande Carajás (PGC) Agrícola project (Brazil, Ministério da Agricultura, 1983; see Fearnside, 1986e) was originally envisioned as a proposal to IDB for a wide range of activities in agriculture, silviculture, roadbulding and related developments. IDB is funding some of the mineral processing facilities and is considering funding road construction for one of the north-south highways (presumably the PA-140), but has not funded the larger project.

Eastern Amazonia is the site of rampant deforestation for cattle ranches, which are made profitable by tax incentives and as a means of securing land against squatters for speculative purposes, despite poor productivity (Fearnside, 1980; Hecht, 1985). As in Rondônia, the network of highways to be constructed in the area can be expected to fuel clearing for speculation, because this is the traditional means of establishing land claims and obtaining title. Fourteen cuts would also be made through Amerindian reserves in the area (Fearnside, 1986f). Deforestation for

cattle pastures will follow the highways and other infrastructure of Grande Carajás even in the absence of new funding programs.

Direct funding from the Grande Carajás Program will have greatest impact on natural forests through the charcoal production scheme. This is the portion of the PGC-Agrícola plan now being implemented with the greatest haste. As of May 1986 the Grande Carajás Interministerial Council had approved incentives for seven pig-iron factories, two iron alloy factories and two cement factories, all planned to function with charcoal. These 11 enterprises (especially the pig-iron plants, which use more charcoal) will demand 1.1 million metric tons of charcoal annually (Brazil, Presidâ^ância da República, Secretaria de Planejamento, Programa Grande Carajás, Companhia de Desenvolvimento de Barcarena-CODEBAR and Ministá,ário do Interior, Superintendâ^ância do Desenvolvimento da Amazá“ánia-SUDAM, 1986: 2). Francisco Sales Batista Ferreira, the present Executive Secretary of the Grande Carajás Program, states that projects awaiting approval would bring the total number of pig-iron plants to 20, and that it has not yet been decided, even for those already approved, if the charcoal will be supplied by *Eucalyptus* plantations or from the native forest (F.S.B. Ferreira, personal communication, May 1986). Because of the high cost of silvicultural plantations it is likely that charcoal will come from cutting native forests for as long as accessible forests continue to exist (Fearnside, 1987a).

Because no decision has been made on the source of charcoal for plants already approved, it is clear that a prior evaluation of environmental impacts was not a prerequisite for approval. Once the investment has been made in an expensive installation such as a pig-iron plant, the plant will play a role similar to a cuckoo in the nest. When a cuckoo lays an egg in another bird's nest, the unfortunate host soon finds itself diverting all of its efforts to providing food for the enormous cuckoo chick. In the same way, the forests and the entire economy of the areas around the pig-iron plants will be irresistably drawn into feeding the plants with charcoal, regardless of the local population's own interests.

COMMON PATTERNS

POLONOROESTE, the complex of projects in Acre, and the Grande Carajás program share many common features that lead to deforestation and other impacts follow inexorably from the repeated pattern of high-level decisions taken in the absence of prior studies to assess environmental impacts, or even to confirm the viability of agriculture. The repeated abandonment of previous governmental commitments to biological reserves, Amerindian reservations, and other areas of natural ecosystems can only mean, if continued, that the entire region will eventually be cut. All such reserves can be expected to feel the demands of "development" as access improves and the region's population continues to grow and to be squeezed out of privately defended properties that are sparsely inhabited.

Another pattern leading to habitat destruction is countering environmental impacts with "symbolic actions"--public gestures that are confused with concrete measures that could reasonably be expected to achieve their stated objectives. Symbolic actions include announcements of grandiose plans that are never to be executed, and undertaking visible environmental measures that are either inherently ineffective as solutions to the problems created by the development projects in question, or are carried out on a merely token scale. Symbolic action is a phenomenon common to many countries, of which Brazil is only one. The strength of the phenomenon in Brazil is reflected by the hundreds of environmental protection laws that have been enacted but never enforced (see Rosenn, 1971). Symbolic actions play an important role in diminishing public concern over environmental impacts during the key time period when a development project is not yet a *fait accompli*.

Symbolic action also contributes to preventing the lessons of past mistakes from having a real impact on subsequent development efforts. The failures of previous projects are frequently acknowledged as each new development is launched, with the correlary that these known mistakes will be avoided. The new projects then proceed without fundamental changes from past programs. Colonization in POLONOROESTE, for example, was to avoid the agricultural problems of the Transamazon Highway and early Rondônia colonization projects by having detailed land capability surveys so that use could be "tailored to the carrying capacity of the land" (Goodland, 1985: 13), but projects were launched without the survey or in spite of negative survey results (Fearnside, 1986d). PMACI in Acre is to avoid the environmental mistakes of POLONOROESTE, but the road is being paved before carrying out the other project activities, just as it was with POLONOROESTE. Grande Carajás Agrícola recognizes the poor agricultural results of cattle pasture financed in the earlier programs of the Superintendency for the Development of Amazonia (SUDAM), as well as the role of large ranchers in exacerbating land conflicts--but the bulk of the proposed budget is earmarked for activities benefitting large landholders (see Fearnside, 1986e). SUDAM itself is a prime example: while proclaiming

the error of subsidizing cattle pasture, the bulk of the funds channeled through the agency continues to underwrite the large ranching operations.

Another pattern highly relevant to the impact of developments on Amazonian forests is the fact that many of the developments are motivated by desire to solve social problems outside of the Amazon region. POLONOROESTE and Acre are absorbing migrants who are being expelled from southern Brazil (especially the state of Paraná á) by land concentration and agricultural mechanization. These problems will eventually have to be faced in southern Brazil itself, despite the temporary relief afforded by migration to Amazonia. Brazil's approximately 10 million landless families would fill the entire "Legal Amazon" region at 50 ha/family--making the need for immediate solutions outside of Amazonia obvious.

The Brazilian government's incipient agrarian reform program could either attack one of the root causes of Amazonian deforestation or it could be the opening of a new surge of forest destruction for little lasting benefit. Agrarian reform could slow deforestation by redistributing large unproductive landholdings in the regions from which migrants to Amazonia are being expelled, but pressure from large landholders is mounting to divert the program into a distribution of public lands. Since almost all of Brazil's land still in the public domain is located in Amazonia, such a change would make "agrarian reform" a mere euphemism for internal colonization--and a repetition of the agricultural and environmental misadventures of the past. It would also not solve the problems that agrarian reform is intended to address, but rather would create new problems. Loans to help implement the agrarian reform program in the source areas of Amazonian migrants constitute one of the most important ways that international lending agencies could contribute to slowing forest destruction and loss of diversity in Amazonia.(1)

(1) An earlier version of this paper was presented at the "Simpósio sobre Homem e Natureza na Amazônia," 26-28 May 1986, Blaubeuren, Federal Republic of Germany (Fearnside, 1987b).

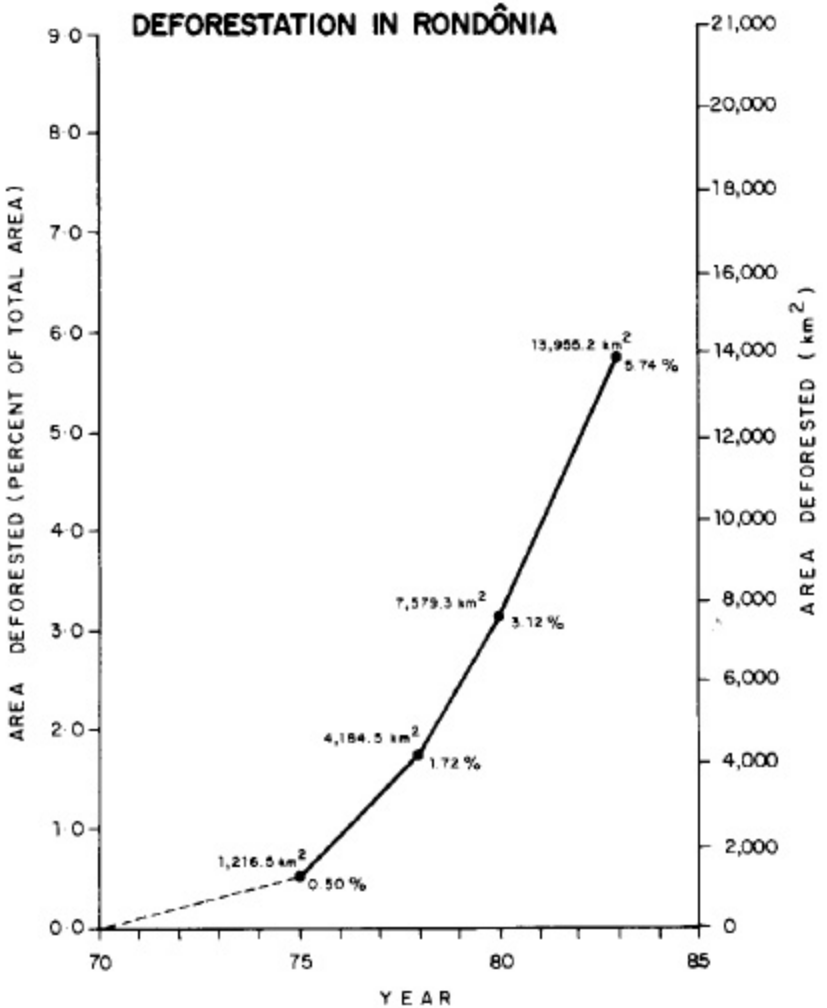
- - - - - - - - - Roads

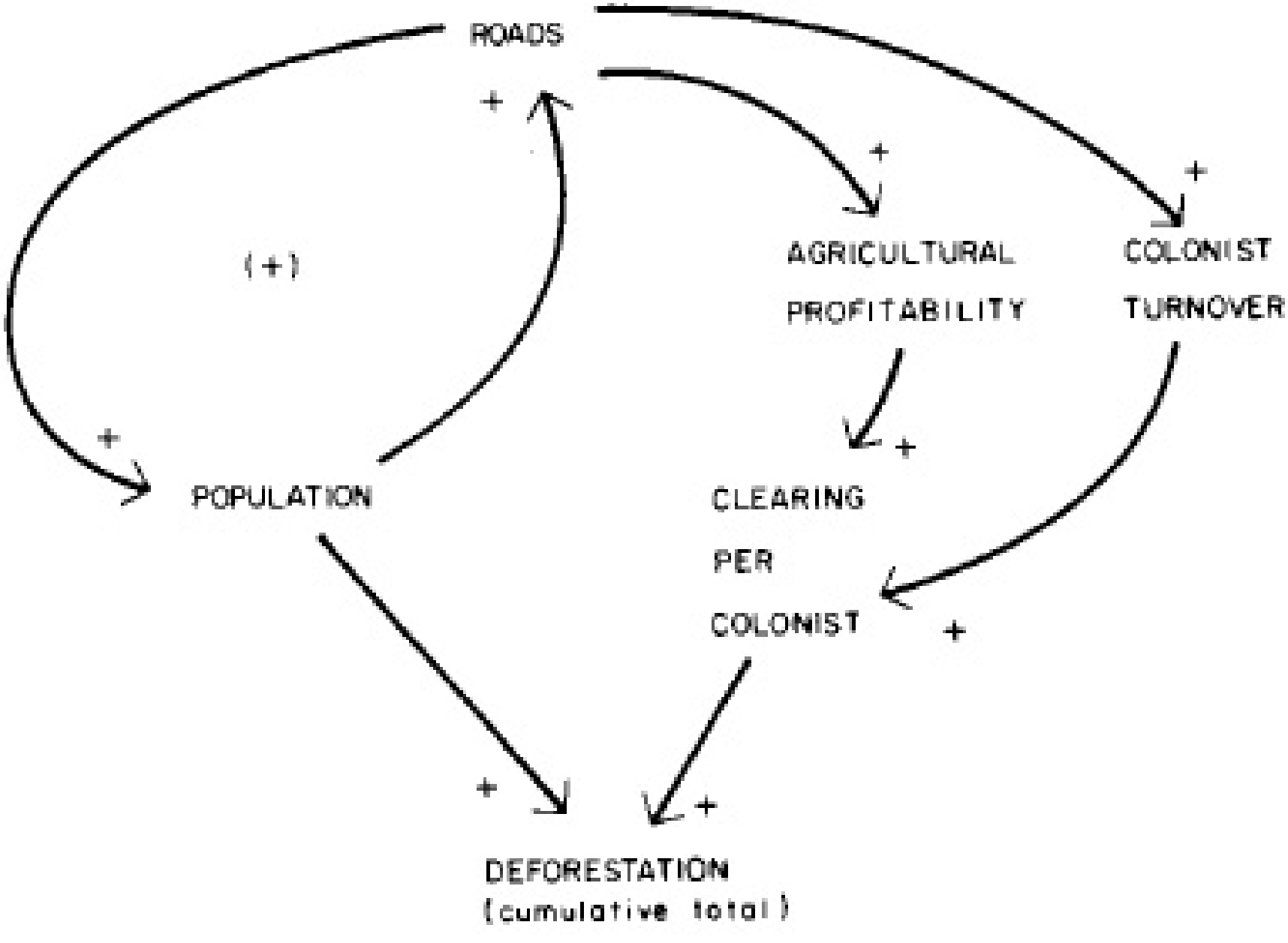
———— State boundaries

▨ - POLONOROESTE

▨ - Programa GRANDE CARAJÁS

▨ - ACRE


DEFORESTATION IN RONDÔNIA
AREA DEFORESTED (PERCENT OF TOTAL AREA)
AREA DEFORESTED (km²)
YEAR
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
0
2,000
4,000
6,000
8,000
10,000
12,000
14,000
16,000
18,000
20,000
21,000
70
75
80
85
1,216.5 km²
0.50 %
4,184.5 km²
1.72 %
7,579.3 km²
3.12 %
13,955.2 km²
5.74 %


ROADS
+
(+)
+
AGRICULTURAL
PROFITABILITY
+
COLONIST
TURNOVER
+
POPULATION
+
CLEARING
PER
COLONIST
+
+
+
DEFORESTATION
(cumulative total)