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BRAZIL'S TRANSAMAZON HIGHWAY SETTLEMENT SCHEME: AGROVILAS, AGROPOLI, AND RUROPOLI

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In 1970, the Brazilian government embarked on a project effectively to occupy the "demographic void" of the world's largest tropical rain forest, covering 5 million km.² of the Amazon basin. The pioneer Transamazon road, cutting 3,000 km. across the southern interfluves of Amazonia (Fig. 1), is to serve as the main axis for settlement and integration of the North. Both in scale and expenditure, the *Transamazônica* is the most ambitious government-directed colonization scheme ever attempted in the lowland tropics. By 1976, plans call for settling 100,000 families on 600,000 km.² expropriated along the road.

Only recently has the Brazilian government taken active measures to integrate the Amazon with more developed regions. Until the opening of the Belém-Brasília highway in 1964, the Brazilian Amazon was inaccessible by road. Under PIN (Programa de Integração Nacional), the government proposes that 15,000 km. of pioneer highways will serve as the main integrative links for the region. The Transamazon, completed in 1974, functions as the east-west axis in the PIN highway network.

A major factor in the decision to build the Transamazon and associated PIN highways is the concern of the Brazilian government for security of the region. Reis (1960), for example, has stressed the dangers of international covetousness of the resource-rich but sparsely-settled Brazilian Amazon. However, the 1970 drought which seared the backlands of the Northeast, uprooting an

estimated 2 million people, was the triggering factor in President Medici's decision to initiate construction of the Transamazon. The highway was envisaged as a safety valve for the overpopulated, drought-plagued Nordeste by providing an outlet for the Northeast's 30 million people, increasing by 1 million a year. The two-lane highway would also create an avenue for filling the "empty space" of the Brazilian Amazon, a region of 8 million people occupying 59 percent of the national territory.

TRANSAMAZON SETTLEMENT SCHEME

In order to prevent speculation and to control colonization the government expropriated a 100 km.-wide zone along both sides of the pioneer highway. INCRA (*Instituto Nacional de Colonização e Reforma Agrária*) an organ of the Ministry of Agriculture, has divided a 20km.-wide strip along the Araguaia-Itaituba stretch of the highway into 100 ha. lots for distribution to incoming colonists. Much of the remaining 90 percent of public lands is being subdivided into lots ranging in size from 3,000 to 66,000 ha. for sale to private companies. Along the Marabá-Itaituba stretch, for example, 3.7 million ha. of forest are being cleared for cattle ranches.

To encourage settlement, INCRA offers the 100 ha. lots for U.S. \$700 payable over twenty years. Some settlers are also provided with four-

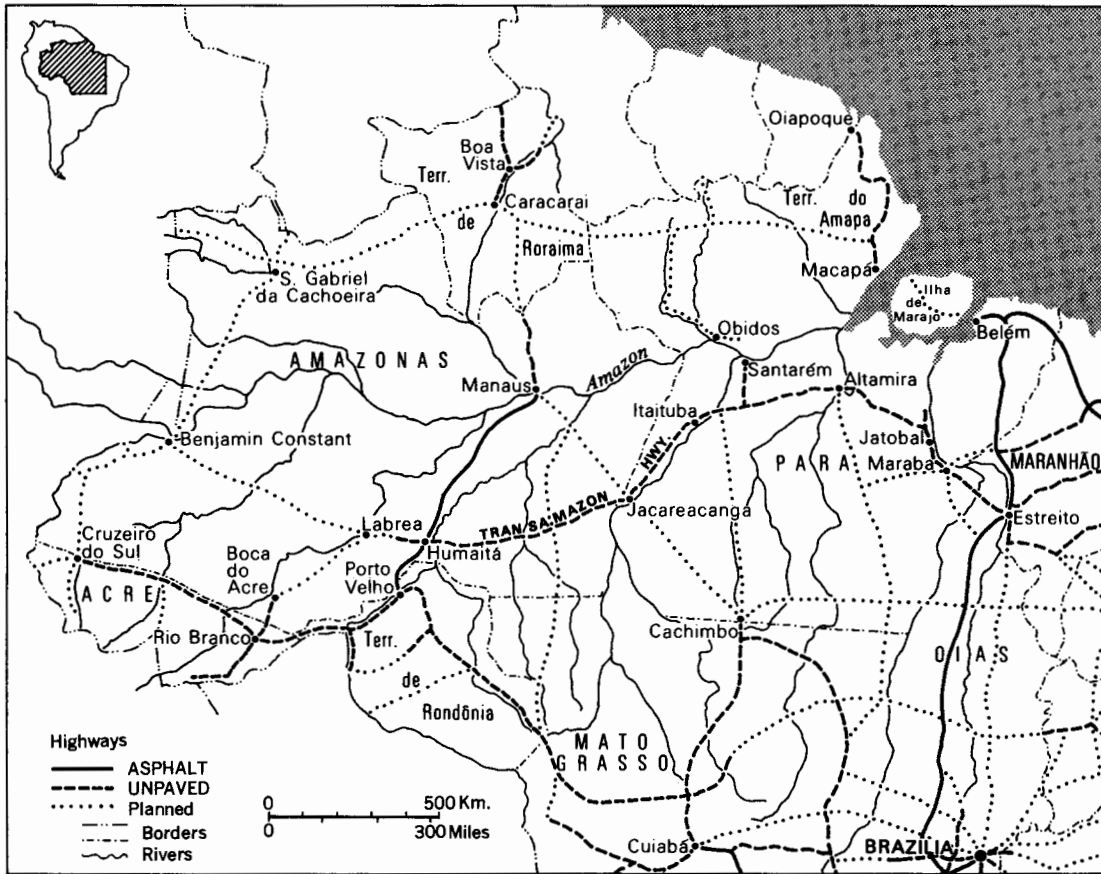


Fig. 1. The Brazilian Amazon high highway system, 1975.

room wooden houses at an additional cost of U.S. \$100, also payable over two decades. All colonists receive a loan distributed in six monthly installments to buy basic necessities until the first crops are sold. Credit through *Banco do Brasil* is available to hire labor and to purchase agricultural equipment.

According to INCRA plans, the settlement pattern is to be dominated by the *agrovila*, a government-built community of forty-eight to sixty-six houses located every 10 km. along the main highway and side-roads. Each *agrovila*, arranged around a common square, is designed to contain a medical post, primary school, government-run general store (COBAL), as well as offices of the agricultural extension service (ACAR) and INCRA. Colonists are encouraged to build their own ecumenical churches and social centers.

The *agropolis*, a community for up to 1,000 families, is next in the *urbanismo-rural* hierarchy. *Agropoli*, to be built every 100 km. are designed as

intermediate administrative centers equipped with a secondary school, hospital, light industry and warehouses. The *ruropolis*, at the apex of the rural-urban hierarchy, is to serve as administrative headquarters for a radius of 200 km. It is projected that *ruropoli* will house up to 20,000 inhabitants each and offer expanded services such as trade schools, banks, hotels, and an airport (INCRA, 1972a, 1973).

PROGRESS OF COLONIZATION, 1970-1975

It seems unlikely that the original goal of settling 100,000 families by 1976 will be reached. As of December, 1974, 5,717 families had been settled by INCRA along the highway. Since the average family size of settlers is six, the population of government-sponsored colonists is 34,300. However, there is a significant additional population of migrant workers, squatters, and government

employees which account for an estimated 33 percent of the total highway population. Thus the population density of the 45,600 in the 20 km.-wide agricultural zone is 1.3 persons per km.²

Although government plans call for a Transamazon population that is at least 75 percent Nordesteño (INCRA, 1972b), the representation of Northeasterners in the highway population is declining. In December, 1972, Nordesteños accounted for 67 percent of the population; however, by June, 1974, the proportion had decreased to 45 percent. Even if all the Transamazon settlers were Northeasterners, the highway would absorb only 0.5 percent of the annual increase of the region's population.

Although the *urbanismo-rural* project calls for an *agrovila* to be built every 10 km. along the highway and side-roads, as of December, 1974, only twenty-seven were completed. Of the twenty-seven *agrovilas*, eight are equipped with privies and four with piped ground-water. The occupancy rate of three *agrovilas* surveyed along the highway averaged 45 percent while that of side-road communities appeared even less. In spite of the amenities of the *agrovila*, settlers prefer to live on their lots.

A total of three of the fifteen *agropoli* planned for the Estreito-Itaituba stretch of the highway have been completed while two more are scheduled for imminent construction. None of the *agropoli* house the projected 1,000 families. One *ruropolis* is under construction at the junction of the Transamazon and Cuiabá-Santarém highways.

REASONS FOR DEMISE OF URBANISMO-RURAL

The overriding desire of colonists to live close to their fields is the principal reason why they generally prefer to live on their lots, even if this means building their own houses. Not only are time inputs increased in agro-ecosystems, thereby increasing productivity; crops can be more easily transported to the house for consumption and storage. Vigilance over crops, especially in the case of rice and maize, is required in order to reduce losses to pests.

Another major reason why settlers prefer to live on their lots is that domestic animals can also be more effectively protected against predators. Since fencing is not provided in *agrovilas*, the raising of domestic animals is discouraged by officials in the interests of community harmony. Chickens and pigs are notorious for dismantling unattended back-yard gardens. Chickens cannot be left un-

guarded on the lot at night because of predators such as virginia opossums (*Didelphis marsupialis*) and forest cats (*Felis* spp.). Feeding domestic animals, such as maize to chickens and sweet potatoes and manioc to pigs, is also facilitated when colonists live on their lots.

Since small primary schools have been built at frequent intervals along the highway, the *agrovila* offers few incentives for year-round residence. Since the settlers come from different regions, and hold several faiths, *agrovilas* lack the cohesive sense of community.

By comparing the design of *agrovilas* with native villages, some insights were gained into the importance of planning communities which are adapted to the ecological and cultural conditions of the region. For the purpose of cross-cultural reference, both archaeological sites and two recently abandoned Arara *aldeias* were examined. All of the twenty-three potsherd sites abandoned at least 100 years ago, as well as the Arara villages, were located within 500 metres of a perennial stream.

The availability of potable surface water was not a factor considered in the selection of sites for Transamazon communities. The rigid *urbanismo-rural* pattern does not always coincide with a large, nearby water supply. Houses built by INCRA on lots facing the main highway are situated in the center of the 500 m. of frontage, as much as 1 km. from a perennial stream. Although wells have been dug in some of the *agrovilas* and by colonists on their lots, these invariably run dry during the summer months. During the rainy season, the wells provide breeding grounds for mosquitos, especially for species of *Culex* and *Anopheles*, potential vectors for arboviruses, Bancroft's filariasis, and malaria. Only four of the *agrovilas* are equipped with a piped ground-water supply system.

The quality and supply of drinking water is of utmost concern for the health of settlers. While streams and highway-dammed ponds utilized by Transamazon colonists are usually in cleared areas, streams close to Arara villages were left in forest. The former water sources are more subject to contamination by fecal matter due to erosion, thereby increasing the incidence of gastrointestinal disease. Gastro-enteritis is the leading cause of infant mortality along the Transamazon, accounting for 48 percent of deaths in the 0-4 age group. Roundworms (*ascaris lumbricoides*) infest 68 percent of the highway population. Both diseases reduce working capacity and are exacerbated by feces-contaminated water. The

aboriginal custom of defecating in the forest, where there is a rich coprophagous beetle fauna, and of maintaining water courses in forest, reduces the morbidity of gastro-intestinal disease.

While *agrovilas* along the highway were built with privies, the majority of settlers are not accustomed to using them. Children defecate promiscuously in backyards while adults generally prefer the discretion of a banana or maize patch. Since few coprophagous Coleoptera are adapted to disturbed habitats (Howden and Nealis, 1975), the probability of feces contaminating drinking water is increased. Thus the mere provision of toilets is insufficient—the populace must be motivated to use them.

A further advantage of Arara villages is that they are located on relatively flat surfaces, thereby minimizing erosion. The estimated 200 Araras live in two main *maloccas* and four smaller lean-to structures occupying approximately 0.5 ha. However, an *agrovila* housing up to 300 residents sprawls over 25 ha. Since the Transamazon transect is generally undulating, in spite of the deceptive canopy cover, soil erosion is a problem in most *agrovilas*.

Another defect of *agrovila* design is that the distances between houses reduces cohesion within the community. Since most *agrovila praças* were left in forest or have reverted to second growth, the common square impedes rather than fosters communication. The extensive layout of INCRA communities discourages social interaction, especially during the rainy season when streets are a quagmire.

The high roof design of Arara *maloccas* not only repels rain but reduces heat radiation on the inhabitants. In contrast, the low roof design of INCRA houses incubates interior heat during the day. The dark interior of the Arara communal house would also discourage the diurnal biting attacks of the numerous black flies (*Simulium*

spp.) during the rainy season. Besides creating a nuisance, the strongly anthropophilic flies are responsible for a hemorrhaging syndrome (Pinheiro et al., 1974) and are potential vectors for onchocerciasis. Families frequently migrate from the Transamazon during the rainy season since the porous and well-lit interiors of INCRA and peasant houses offer no respite from the flies.

CONCLUSION

A plea is not being made that Transamazon settlers immediately adopt indigenous designs for communal houses. The cultural heterogeneity of colonists would preclude a *malocca* life style. However some of the adaptive features of the native settlement pattern could have been incorporated in the highway settlement scheme. The Transamazon serves as another example of development planners attempting to impose projects alien to the cultural and ecological conditions of the region. The rigid *urbanismo-rural* scheme was based on a theoretical geometric pattern rather than on practical necessities such as flat surfaces for building, proximity to potable water, and fertile soils.

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