AGRICULTURE PROJECT

Introduction

IMAZON now has a program focusing on the sustainable uses of deforested lands in the State of Pará. This program compliments the "Wood Project Program" of IMAZON which focuses on forested lands in the State of Pará.

Given the central objective of IMAZON--to promote sustainable use of Amazon resources--a focus on agriculture is natural. However, we do not begin with the assumption that agriculture is necessarily an appropriate or inevitable land-use in Amazonia. Such a premise would lead us to merely pursue technological solutions to land settlement. In contrast, we proceed by: 1) analyizing the patterns of agricultural development in Pará; and then 2) assessing the economic, social, and environmental impacts of this development. In this way, through research which produces high-quality information, we will assess the desirability of agriculture in Pará on a region-by-region (municipality by municipality) basis. Depending on the conclusion of this analysis, we will work to promote agriculture (along sustainable lines) where appropriate and discourage agriculture where our analysis reveals that this activity is ill-advised. Throughout this process, the unit of study is purposely the municipality and the State. This guarantees that our information is framed in terms that are politically relevant.

As with all Institute programs, there are research, policy and education components to our Agriculture Program; but research comes first and, in fact, results of the research component define the opportunites and approaches taken in the policy and education phases. These policy and educations phases, in their turn, should lead to concrete measures that substantively improve present patterns of agricultural land use.

Review/Synthesis of Agricultural Development in Pará

We recognize that a significant amount of research has been done on the topic of land use in deforested areas in Pará and we do not wish to repeat past efforts but rather to identify areas where we can make a research contribution. In this spirit, a multidisciplinary synthesis of existing information on agricultural

land use in Pará is a good starting point. Such an exercise will, first, provide us with a full understanding of what has been done in the agriculture area; and, second, through the creative act of analyzing and combining existing information, lead to new insights that will guide later phases of the research program.

Agricultural Map of the State of Pará: We will begin by constructing an agricultural map of the State of Pará. We will compile information on the climate and physical geography and geology of the State. The actual maps will present the state-wide distributions of rainfall, drought frequency, soils, vegetation, deforestation, mineral deposits, etc. This type of information is already available in most cases and our task will be to gather and evaluate what has been done. But in some cases we will need to work with existing data, casting it in a way that is more useful to agricultural evaluations.[1] The sources of information for physical geography and geology will be RADAM, SUDAM, SAGRI, IDESP, SEICOM, EMBRAPA; information sources for climatic data will be INEMET, DNAEE, EMBRAPA, IDESP ELETRONORTE, AND DEPV.

Mapping of social and economic elements: Once the physical maps are complete, we will proceed to map the distribution of social and economic elements in the State. Relatively little work has been done in this area. Here, we will map the distribution and density of the human population, agriculture production (by crop), saw mills, charcoal ovens, cattle herds, banks, transportation lines, etc. This could be done on both a macro scale (State) and for each municipality. Information will come from INCRA, SEFA, IBGE, SUDAM, IDESP, etc.

Matrix of "agricultural situations": Following from this, we will construct a matrix of "agricultural situations" which characterize the State of Pará. Tentatively, we envision a matrix with xx possible cells. The cells might be defined by climate (rainfall abundance), soils (classified as having high, medium and low agronomic potential), access to market (classified into easy, moderate, and difficult), access to capital (low, moderate, high), and cultural heritage (Indian, Asian, Portuguese, Italian, etc.). In practice, some of the cells may be empty (e.g., there may be no

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[1] For example, in the climate area, present-day rainfall maps show yearly rainfall totals and not annual variation. Yet, annual variation (i.e., the extent and predictability of the dry season) is very important for agricultural planning.

significant agricultural activity on poor soils far from markets using high-capital inputs). Once the matrix is established, we will estimate the percentage of the cleared land in the State of Pará that falls into each category.

Map of agricultural success and failure: Finally, these maps in hand, we will predict the areas of Pará where agricultural development should be proceedingly rapidly, proceedingly slowly, or not proceeding at all. We will then test these predictions by using indices of agricultural development. Possible indices might include: 1) capital moving to the agricultural sector (e.g., government lending/ha of cleared land); 2) production of perennial plant products/ha of cleared land (high values indicate good technological development and availability of capital); 3) agricultural tax revenues/ha of land (high values indicate good integration into regional and/or national economy). In this exercise, we will use time series data where possible (1970-80-90). This will reveal variation in index values over time and will provide insight into the permanency of agricultural production. Parallel with these indices, we will work in regional marketing centers (e.g., at CEASA in Belem) to get independent estimates of regional production patterns. In the end, we will actually map this information, thereby illustrating the relative success of agriculture throughout the State.

Economic, Social, and Ecological Impacts of Agriculture in Pará

Once we have the matrix of agricultural situations and agriculture success map (described above) defined and weighted by percentages, we will choose sites for intensive field study. Sites will be selected to represent important categories (high percentage areas or "important" because they reveal something about sustainable approaches) in the classification matrix. The intent here will be to determine what works and why and to contrast this with what doesn't work. This understanding will only be grasped through field research (i.e., the mapping study (above) will allow us to determine where agriculture has been successful but will only be suggestive as to the reasons for this success).

We will select sites for intensive study that illustrate a range of performance from success to failure. In each community, we

will study production patterns, household economy, credit sources, agricultural diversification, marketing strategies, etc. We will focus on variability in production and it causes both within and between communities.

As we quantify the elements necessary to success, we will develop hypotheses to explain the range from failure to success that we observe. We will test these hypotheses by visiting still more communities. Only when we have a robust pardigm will we conclude this field phase.

Parallel with this search for success, will be a thorough analysis of agricultural failure. While many ecological and sociological studies have documented agricultural failure in Amazonia, we intend to go beyond these works by considereing failure in a holistic way. For example, we wish to determine the true cost of agricultural failures in terms of forest loss (opportunity cost), social costs (disease), subsidized transport, etc. In short, we will express agricultural failure in as precise economic terms as possible (i.e., in terms meaningful to policy makers).

Application of Research Findings--education/policy phase

The research described above should produce a rather sophisticated picture of the agricultural situation in Pará. More important, it should provide the tools for understanding why agriculture has been successful in some areas and not in others as well as an understanding of the consequences of failure. In the end, we will develop a synthetic zoning map of Pará combining the physical and agronomic data with data developed in this field phase. The resultant map will be the first truly holistic agricultural zoning map for Para State.

In this third phase of the program, we will develop specific educational and policy initiatives aimed at promoting the more rational use of deforested lands in Pará. On lands and in situations defined as appropriate for agriculture, we will develop ways of promoting agriculture development. We will work equally hard in the policy and educational front to discourage agriculture where it appears to have an economically bleak and/or environmentally destructive future.