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PROPOSAL: PROMOTING SUSTAINABLE DEVELOPMENT AT THE MUNICIPAL LEVEL IN THE EASTERN AMAZON

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I. BACKGROUND

Amazonia conjures up visions of mystery, richness, and grandness, but, nowadays, these visions are intermingled with thoughts of rampant deforestation, armed land disputes, and forests aflame. Nowhere on our planet is the conflict between unspoiled nature and human beings more shockingly and dramatically enacted than in Amazonia. As the Basin's natural cover disappears at 1% a year, conservationists and exploiters, alike, continue to argue in simplistic terms. Conservationists frequently fail to recognize that humans can, simultaneously, appreciate nature and benefit from her bounty. Developers seldom recognize that natural ecosystems have limits and, if severely disturbed, may lose their capacity to heal themselves. Meanwhile, both sides seem to be unaware that landscape change is a complex process. Once a landscape is altered through deforestation, there are many developmental pathways, each with its own benefits and impacts in ecological and social terms.

Holistic studies of the benefits and impacts of different Amazonian land-use options are rare. Hence, there is a meagre pool of information to guide development. If sound land-use approaches--those which reconcile the aims of development and conservation--are to be created for the region, it will be essential to understand the actual process of landscape change in all of its economic, social, and ecological complexity. In short, there is a need for high-quality information to guide the development process. Furthermore, at this moment in Amazonia's history, scientific information has great power to influence the fate of the region. This is so, first, because the information available is scant and of low quality: second, because there is a genuine hunger on the part of citizens, policy makers, and educators for reliable information:

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and, finally, because information resulting from scientific research carries great prestige in Brazil.

II. OBJECTIVE

Since 1988 our group has been studying landscape change in Amazonia-- evaluating the ecological impacts of ranching, agriculture, and logging. These development activities are concentrated in an arc of deforestation extending from the State of Rondonia through Mato Grosso to Para State. This research has been conducted in the municipality of Paragominas (27,000 km^2), Para, one of the areas of most intense deforestation along this arc.

We now propose to codify this research experience with a thorough environmental, social, and economic analysis at the municipal level. Parallel with this, we will develop a battery of techniques, field tested at Paragominas, that Amazonian citizens can use to: 1) census the resources in their environment: 2) evaluate the present-day uses of those resources: and 3) develop strategies to ensure the sensible use of their environmental bounty. These steps will be important catalysts in the development of political and legal measures necessary at the municipal level for the adoption of sustainable patterns of resource use. We base this work on the premise that the power of scientists to influence prevailing patterns of Amazon land use lies in the appropriateness and quality of our scientific information, and in our ability to deliver that information to the public and policy makers in a timely and clear manner.

Paragominas is an ideal location for this synthesis because in many ways it presents a microcosm of Amazonia, containing within its boundaries significant areas devoted to ranching, logging, slash-and-burn agriculture, and mining. Moreover, because of its more mature status, Paragominas serves as a bellweather municipality: developmental trends, innovations, and failures appear in Paragominas before they are seen in other younger development centers. Hence, lessons learned at Paragominas could have broad import in influencing regional development.[1]

[1] The municipal-level focus of this work is timely because there is a general absence of local-level information in Amazonia. Indeed, municipalities have little knowledge of their natural resource base, the spatial distribution of their resources, or of the ways to manage them. This

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III. WORK PLAN

A. Enviro-economic portrait of municipality

The first step in this work is to construct an enviro-economic portrait of the municipality of Paragominas. Paragominas and other Amazonian municipalities need to be able to see themselves--see where their watersheds are, where their level and rugged regions are, and where their deforested, logged, second-growth, and primary forest patches are. Just as important, Amazonian municipalities need to be able to put names and faces (i.e., property lines) on mapped landscape units. We propose to develop municipal-level landscape maps using Landsat imagery with superimposed property lines. Such maps could revolutionize the way that Amazonians perceive their environment. For example, using Landsat data, individual property holdings could be scaled with respect to sustainability of land use, and taxed accordingly. Holdings, with an apparent abusive history of land use, dominated by second-growth forest, logged forest, and/or degraded pastures will occupy low positions on the scale and be subjected to high taxes under such a scheme: whereas, holdings, with a history of careful management, dominated by primary forest, tree plantings/and or productive pastures would occupy high positions and be less heavily taxed.

Once the physical/property maps are available, we will map the major economic units (sawmills, ranches, farming towns, etc.). In the case of the sawmills, the areas from which each mill extracts timber will be determined. Ranches will be classified by herd size and productivity. Farming communities, likewise, we be classified by population size, extent and types of clearings, and productivity. Using GIS (Geographic Information Systems) software, we will use our data base to illustrate spatial patterns of production and development.

municipal-level focus is also important in a political context. The smallest effective political unit in Amazonia is the municipality. Historically, municipal governments in Amazonia have been ineffective because of a tradition of heavy state and federal control together with a seemingly incomplete understanding of the democratic process, and an absence of innovative thinking. But Brazil's new constitution (1988) has transferred considerable power from the federal level to the state and municipal levels. Municipalities now have the power to regulate land use, assess fines, and levy taxes. Hence, there are significant opportunities for promoting innovative and environmentally sensitive land uses at the municipal level.

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B. Projections of economic development and environmental well being

The enviro-economic portrait of Paragominas, combined with studies of the ecological impacts and sustainability of different land uses (ongoing work), will permit municipal-level projections of economic development and environmental well being. Ultimately we aim to develop criterion for determining: 1) how much land (what % of Paragominas) should be devoted to human production uses (ranching, agriculture, and logging); and 2) what is the right mix of these economic activities for this landscape? To this end we will FIRST work with a scenario wherein Paragominas aims to be self sufficient in production. Given this requirement, we will determine the minimum area necessary for pastures (for local beef consumption) for agriculture(for local grain and vegetable consumption) and for logging (for local building needs). We imagine that the amount of land necessary to support population will be much less than that already cleared.

Next, we will consider the income generating potential of the land area that has already been cleared . Using Landsat data on percentages of land in each use, we will determine the productivity and actual income generating potential of the present landscape matrix.

Finally, we will consider the potential income generating potential of this municipality. We will do this by considering what the agro-zoning data base shows to be the areas appropriate for agriculture, ranching, and logging. We will also determine the areas that should be preserved because they are unique/important or simply because citizens want them preserved. [illegible] and that is available, we will consider the ideal mix of economic activities to meet local food demands while producing high quality marketable products (wood, beef, extractive goods). We will run this scenario both at level of municipality and at level of individual property holdings, considering holdings of 50 ha, 500 ha and 5000 ha.

For all three of these scenarios, we will consider: 1) municipal-level subsidies necessary to maintain production; 2) gross profits; and 3) tax revenues generated. We will also consider the costs and potential returns of modifying these land uses along more sustainable lines. Then, we will consider steps that could be taken to make development more rational, analyzing: what the Federal and

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State government could do: the measures that municipalities could take: the things the private sector might do; and the ways that private citizens might act.

So far we have outlined the basic elements of the development analysis that Paragominas and other municipalities must do if they are to develop along more sustainable lines. Ultimately, we want to take the findings of this research out of the Paragominas laboratory and into the eastern Amazon. We will do this by developing a battery of techniques, field tested at Paragominas, that Amazonian citizens can use to: 1) census the resources in their environment: 2) evaluate the present-day uses of those resources; and 3) develop strategies to ensure the sensible use of their environmental bounty.

IV. CONCLUSION

In sum, the citizens and civic leaders (politicians, educators, activists, lobbyists, etc.) of Amazonia have a need for high-quality information. With such information, the quality of the resource-use debate could change substantially, thereby increasing the chances for wise resource use. We propose to develop a simple and powerful blueprint for the evaluation and wise use of natural resources in one municipality, Paragominas. It is our hope that other municipalities will follow this example. Indeed, good ideas spread like seed on the wind in Amazonia, and Paragominas, with its rich matrix of actors and relatively long development history, is a potent source of such seed.

V. BUDGET

	Year one	Year two
Researcher	$24,000.00	$24,000.00
Research assistant	$12,000.00	$12,000.00
Part-time help	$4,000.00	$4,000.00
Remote sensing Imagery	$2,500.00	
Computer software	$2,000.00	
Travel	$1,500.00	$1,500.00
SUBTOTAL	$46,000.00	$41,500.00
Overhead	$4,600.00	$4,150.00
TOTAL	$50,600.00	$45,650.00