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THE DEMENE RIVER, AN EXAMPLE OF ECONOMIC-ENVIRONMENTAL ZONING

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Barcelos, Amazonas (AE) -- "Unplanned human occupation in the Amazon region has spurred the substitution of the rain forest for production systems, causing great environmental damage in the region," said Eduardo Evaristo Miranda, the head of Brazil's federal Environmental Monitoring Nucleus (EMN-Embrapa), to Agência Estado (AE), during an expedition to the Rio Demene, an affluent of the Rio Negro, in the Amazon.

The expedition was planned by Agência Estado, organized together with the EMN, and financed by Universidade Paulista (Unip-Objetivo), a private university in São Paulo. In mid-August, a group of eight EMN scientific researchers, five AE journalists, and four Unip professors, left Manaus -- the capital of the northern Brazilian state of Amazonas -- to the Rio Demene, an affluent on the left margin of the Rio Negro, 430 kilometers away. Researchers and professors were of varied fields, from biologists and landscape experts to anthropologists.

The main goal of the expedition was to show both the government and the general public what this type of zoning means: how it is done, what it is for, and "its weight on the intelligent occupation process of a region like the Amazon," said Rodrigo Lara Mesquita, AE General Director.

The EMN director, Eduardo Miranda, explained that in order to occupy the Amazon basin region with the least amount of environmental impact, and the most efficient use of natural resources, it would be necessary to utilize two basic instruments in modern planning: eco-environmental zoning and environmental land use planning. In other words: scientifically-based zoning should come before the arrival of unplanned land development efforts.

Ecological diversity

Last December, a group of researchers from the EMN did a preliminary study of the Rio Demene area. The next step was to use Landsat satellite images of the area to process maps, used as a basis in the project.

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The actual expedition, in August, lasted 15 days on board a riverboat travelling through the Negro, Demene, Branco and Cuieiras rivers. Along the route, journalists, researchers and professors interviewed river-side dwellers, crossed much of the flooded areas in the area, on rafts, and trekked through the fields and margin forests, besides an air reconnaissance flight.

All of this resulted in a detailed X-ray of the Demene area. The final report of the zoning will be presented to the public in news stories, photo exhibits, educational material, and a publication, containing maps and results of the zoning. The publication should come out during the second United Nations Conference on Environment and Development (Unced), to be held in Rio de Janeiro, next year in June.

"We also want to develop a graduate course in which the students will do fieldwork in the same boat and area of this expedition," said Unip president, João Carlos Di Gênio.

The expedition covered 1.83 million hectares, and took in the high Demene, the Cuieras and Xeruini rivers, as well as part of the Rio Branco, in the state of Roraima. The area was chosen because of its biological and geographic diversity, and the minimal land occupation rate of the region.

There are 38 different ecological systems in the area, according to expedition researchers.

The Rio Demene crosses the Equator Line, on the Amazonas state border with Roraima. The river runs 500 kilometers North to South, from the mountains, where it begins, on the border with Venezuela, to the Amazon plains.

Because of its peculiar geographic angle, there are both densely humid tropical rain forests and semi-arid sand dunes along the river margins. Between the two extremes lie altitude fields, cerrados (savanna-like vegetation), lavrados (natural fields), campinas (natural pasture lands), varzea fields (flooded grasses), alagados (swamp-like areas), and palmtree growths.

On the limit

The riverside population is not large. A census done by the expedition registered 181 caboclos (racial description for miscegenation of indians and whites), and 60 Ianomami indians. Their subsistence lies mainly in extractivism and manioc cultures, laid-out according to the patterns determined by the water systems.

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According to ENM's Evaristo Eduardo de Miranda, the population in the area is on its limit of environmental sustainability. "The population is placed in the best location, from the environmental perspective: they are located in the only spots where the firm ground forest touches the riverbed," he said.

Besides the hunting and fishing, local inhabitants also take advantage of resources both from the firm ground and the flooded areas. The poor soil in the region leads to diversified extractivism, creating almost no pressure to local resources, and thus maintaining the capacity for natural regenerative processes.

"There is no room for more people here," said Miranda, "nor is there room for agricultural and ranching activities, or even intensive extractivism." A landscape specialist, Miranda warned that unless the region remains as it is for the next few years, it runs the risk of suffering a collapse in its natural resources.

The survival hunting habits of the riverside dwellers is one of the examples of the limits of sustainability. Without entering the legal merits of these hunting procedures _ wildlife hunting here is prohibited by law, as in the rest of Brazil _ researchers believe that this activity poses no environmental damage.

The worse threat comes from the professional hunters, who sell their kill in fairs in downriver cities like São Gabriel da Cachoeira, Barcelos, Novo Airão and Manaus. There, a kilo of tapir may be bought for US\$5.00.

Subsistence

The extractivism of resources such as Brazil nuts, and gum (used in the manufacture of chewing gum), is also inoffensive to the general environmental picture, depending on the way in which it is exploited. In the socio-economic report of the expedition, it was noted that extractivism is a complement to the family economy, and a subsistence alternative. The main economic product is manioc flour, produced in the villages along the river.

Each family plants at least one hectare of manioc _ two tons of flour per harvest. In the family agricultural plots, another 48 kinds of fruits and vegetables are found. Animal breeding is limited to egg and chickens, with an average 10 birds per family. Thus the necessity for the animal protein resultant from hunting and fishing.

There are at least 29 species of wild animals in the area. Some of them are: the tapir, fresh-water manatee, paca, curassow, monkey, and rodents, not to mention fish, probably the main sources of protein for the riverside families.

Survival hunting is still permissible because the population is small, but this balance may eventually be disturbed. One way to preserve the area would be to close off boat-access upriver. "But it is no use placing the law to block condoned social norms: it is necessary to offer an economic alternative to the population," said Evaristo Miranda.

"The alternative is to organize the space in the long-range, introduce adequate technologies for the substitution of hunting practices by domestic animal breeding, but the first step is the zoning," said the landscape specialist.

Mangroves and semi-arid

The fieldresults of the zoning showed, among other things, that the population commonly travels upriver to hunt, fish and gather, although the population nuclei themselves are concentrated in the lower Demene.

There are several types of green formations utilized by these populations, including open areas, fields, flooded plains, and palm tree growths. The diversification

scientist from the Cirad-Prifas, a French research institution, who accompanied the expedition.

Apparently, with the heat and rainfall in the region _ above 2,000 mm _ there should be a rain forest right under the Equator Line. "But what we found were great fields of low vegetation, in some cases similar to mangroves, in others with plants typical of the semi-arid regions, where rainfall rates is at the most 500 mm a year," Duranton puzzled.

The botanist explained that the mangrove-like vegetation exists in order to resist the strong soil acidity and inundation periods, in which the roots are covered, just like in a seaside mangrove. This sturdy ecosystem resists the highs and lows of the ocean tides, as well as the salinity of the coastal waters.

The semi-arid vegetation on the margins of the Cuieiras is similar to that of the Sahel, in Africa. According to Duranton, they exist in mid-Amazon region, over tall and ancient sandbanks, where the water does not stay (there is no argile to retain it) or reach. The banks stand four to five meters above the maximum level of the river.

Planned occupation

Understanding these and other systems, their interdependencies and fragilities, will help researchers estimate the environmental impact of human activities, and the pressure they exert.

Future-scenario studies may also be done, along with plans for lesser-impact occupations. "By understanding how the ecosystems work, we can identify and minimize "human-provoked disfunctions," said Miranda.

The future-scenario projects will be possible even if future pressure vectors change, as it will be possible to cross information through computerized maps and a rich data bank, resultant of the trek.

The extraction of sorva (gum), is a good example of zoning. The sorva was traditionally tapped from the trees in the high Demene. It was recently substituted by a petroleum-based substance. Because of this, sorva prices are much lower, and few people still tap the resource. But if the sorva prices were to once again rise, many would return to its extraction, as an economic alternative.

The zoning may provide answers to the environmental protection institutions and municipal planning departments, according to their specific necessities, but always with the intent of conciliating production and development with environmental preservation.