

A System of National Parks and Biological Reserves in the Brazilian Amazon

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ABSTRACT. This paper describes the programme by which Brazil created seven new conservation units in the Amazon in the past three years, totalling about 7 million ha. It describes the approach that was taken in deciding which of these areas are of highest priority, and in determining the network of areas that is required to conserve centres of diversity and Pleistocene refugia and other sites of biological importance. This methodology is suggested to be of general importance for the design of protected area systems. The next stage in Brazil will be the creation of 30 new protected areas, including a number of management categories which do not yet exist in Brazil.

1. INTRODUCTION

The publication of "An analysis of Nature Conservation Priorities in the Amazon" (Wetterberg *et al.*, 1976), was a landmark in the planning of a system of national parks and protected areas in the Brazilian Amazon. This document was the main source for the Brazilian System Plan for Conservation Units, which is being carried out in five major stages. The First Stage of the System Plan for Conservation Units (Jorge Padua *et al.*, 1979) proposed the establishment of 13 new units for conservation, most of them in the Amazon. Ten of these have already been brought into existence by Presidential Decree, as National Parks and Federal Biological Reserves.

In 1979, there were 2,400,000 ha of land devoted to national parks and biological reserves in Brazil, 0.28% of its entire territory; in the Amazon region in 1979, there was only Tapajó National Park with 1,000,000 ha. With the new additions, there are now some 10,400,000 ha of national parks and biological reserves (1.2% of the national territory), and most of these are in the Amazon region.

The Second Stage (Jorge Padua *et al.*, 1982) of the System Plan calls for 30 new units with new categories of management for Brazil, such as Natural Monument, Wildlife Sanctuary, Parkway, and Natural Park. These new areas, totalling 6,800,000 ha, are to be officially established by means of a Presidential Decree or a law of Congress in the near future.

The successful creation of approximately 7,000,000 ha of national parks and biological reserves in the Amazon in the last two years is due mainly to the planning strategy employed in the various stages of the System Plan for Conservation Units.

The following will give a brief explanation of all the work accomplished in order to achieve the present state of affairs (as of April 1982) and will also include a brief description of the units so far established in the Amazon. In order to facilitate the understanding of this paper, we must clarify that, when we refer to the Amazon, we have in mind the phytogeographical region of Prance (1976) (Figure 1).

2. THE JUSTIFICATIONS FOR THE SYSTEM PLAN FOR CONSERVATION UNITS IN BRAZIL

Influenced by the creation of Yellowstone Park in the United States, in 1872, the Brazilian engineer André Rebouças advocated, in 1876, the establishment of national parks in Brazil as well, suggesting the Island of Bananal and the area of Sete Quedas as logical priorities.

Rebouças did not live to see his suggestion become reality, for neither the Island of Bananal nor Sete Quedas were the first Brazilian national parks; they were only created 80 years after his proposal. In 1937, the National Park of Itatiaia, in Rio de Janeiro, was the first to be

established, followed, in 1939, by Iguaçu, in Paraná, and Serra dos Órgãos, also in Rio de Janeiro.

Nearly 20 years passed before other national parks were created. Thus, 1959 witnessed the creation of the parks of Aparados da Serra, in Rio Grande do Sul and Santa Catarina; Araguaia (Island of Bananal), in Goiás; and Ubajara, in Ceará. In 1961, several national parks were created: Emas and Chapada dos Veadeiros, in Goiás; Caparaó, in Minas Gerais and Espírito Santo; Sete Cidades, in Piauí; São Joaquim, in Santa Catarina; Tijuca, in Rio de Janeiro; Monte Pascoal, in Bahia; Brasília, in the Federal District; and Sete Quedas, in Paraná. Ten years later, in 1971, the National Park of Serra da Bocaina, in Rio de Janeiro, was established, followed in 1972 by Serra da Canastra, in Minas Gerais, and in 1974 by Amazônia, in Pará.

As was true of other Latin American countries, the creation of national parks in Brazil, through the 1960s, was justified mainly on the basis of protecting scenic beauty. From a methodological viewpoint, the protection of ecosystems was still precarious. In view of this problem, of the diversity of ecosystems found in the country, and of the limited cultural, scientific, or recreational use of the areas already established, the Brazilian Institute of Forest Development set off in the mid-1970s to elaborate a System Plan for Conservation Units in Brazil, the guidelines of which would be determined by highly relevant scientific criteria.

As a result of the technical-scientific criteria which began to govern the establishment of the new parks called for in the First Stage of the System Plan, many other national parks were created: Pico da Neblina, in the state of Amazonas; Picaás Novos, in Rondônia, and Serra da Capivara, in Piauí, all in 1979; Jaú, in the state of Amazonas, and Cabo Orange, in the Federal Territory of Amapá, both in 1980; and finally Lençóis Maranhenses, in Maranhão and Pantanal Matogrossense, in Mato Grosso, both in 1981.

In regard to biological reserves, a few were created in the 1950s: Sooretama, Córrego do Veado, and Nova Lombardia, all in Espírito Santo, in 1955; and Serra Negra, in Pernambuco, in 1950. Sixteen years elapsed before other biological reserves were set up: Cará-Cará, in Mato Grosso, in 1971; Poço das Antas, in Rio de Janeiro, 1974; Rio Trombetas, in Pará, Atol das Rocas, in the Atlantic Ocean off the coast of Rio Grande do Norte, and Jarú, in Rondônia, all in 1979; and Lago Piratuba, in Amapá, and Una, in Bahia, both in 1980.

There are, therefore, today 24 national parks and 10 biological reserves in Brazil (Fig. 2).

It also became evident that only three categories of conservation units for non-consumptive use of resources (national park, biological reserve, and ecological station) and two for consumptive use (national forest and hunting park) were insufficient to attain the national objectives which needed to be met. A good example is the 32 turtle nesting beaches in Trombetas River, Pará; although these nests should be protected, they do not fit the definition of national park or biological reserve. They

would belong, however, to the management category of wildlife sanctuary (IUCN Category IV) which entails objectives similar to those of the biological reserves, but which receives periodical manipulation and protection, and which requires a much smaller area.

The 360 km Transpantaneira Road, of which 176 km have already been built, and which cuts through the "Pantanal Matogrossense", connecting the cities of Poconé and Corumbá, is a good example of a "Parkway", another category introduced in the Second Stage of the System Plan for Conservation Units. Along the marshy borders of the Transpantaneira, there are large concentrations of caimans, birds, capybaras and other animals. The area, which receives a weekly average of 500 visitors, provides a clear picture of the "Complexo do Pantanal" (the "Marsh Complex").

There are still other units which were not included in the Brazilian System Plan: the Ronca do Reserve, near Brasília, which is managed by the Brazilian Foundation of Geography and Statistics; and four areas near Manaus, which are administered for scientific purposes by the Institute of Research of the Amazon—Campina, Experimental Reserve, Egler and Ducke. These units, however, can be regarded as supporting conservation interests.

3. METHODOLOGY USED FOR THE PROPOSAL OF NEW CONSERVATION UNITS IN THE AMAZON

The proposal of new national parks and biological reserves in the Amazon was grounded mainly on "An Analysis of Nature Conservation Priorities in the Amazon", as well as the analysis of nineteen thematic maps, which helped to eliminate all probable incompatibility. In addition, all government departments responsible for any activity in the area were consulted: the National Department of Mineral Research, DNP/M; the National Institute of Colonization and Agrarian Reform, INCRA; the National Foundation for the Indians, FUNAI; the Superintendence for the Development of the Amazon, SUDAM; the National Sanitation Department, DNOS; and the RADAMBRASIL Project, among others, as well as the state and municipal governments.

The objectives of "An Analysis of Nature Conservation Priorities in the Amazon" were the following:

- to synthesize the published works of various Amazon specialists into a common format from which biologically significant conservation priorities could be tentatively identified;
- to identify and locate both the existing and the planned conservation units in the Amazon;
- to analyze the potential compatibilities or incompatibilities between the Brazilian programmes of the POLAMAZONIA and the preservation of biologically significant areas;
- to propose an overall outline of a programme for

the preservation of nature in the Amazon, which takes into account the diversity of this region, which permits the identification of priority areas to be preserved, and which is flexible enough to be adapted to future scientific discoveries;

- to make it possible for the public organizations responsible for national parks and equivalent reserves to gain a dynamic, aggressive position from which an Amazon conservation policy could be actively pursued before this option is ruled out by other development projects; and
- to contribute to the development of the System Plan for National Parks.

The document utilized all pertinent scientific literature available at that time, such as the phytogeographic regions, the planned and the existing conservation units, vegetation formations, Pleistocene refugia for birds, lizards, plants and Lepidoptera, development centres of the Brazilian Amazon (the legal Amazon), as well as indications for units of conservation of nature of the RADAMBRASIL project. All this information was transferred to transparent maps, drawn on the same scale, which thus made possible a visual analysis of the approximate relationships among several factors.

Field expeditions were made to up-date evaluation of the areas which displayed high potential to become conservation units.

In regard to vegetation, we tried to identify several general types, according to the Aubreville (1958) and Montoya (1966) structure (FAO, 1976). Wherever possible, the elements corresponding to the aforementioned works were transferred to Figure 3, which, however, is based mainly on Pires (1974). A visit to the centre of one of these formations may reveal that the local situation presents variations, since a vegetation formation consists of several component associations.

Even though approximately 90% of the Amazon consists of tropical rainforest, other types of vegetation contribute to the biological diversity of the area: "Mata de Cipo" (Liana Forest), "Campinas Altas" (an open forest), "Mata Seca de Transição" (a semideciduous forest), "Igapó" (mangrove forest), "Várzea" forest, "Cerrado" (a savanna), grassland of "Terra Firme", and "Várzea" grassland. In addition, G.T. Prance stated that a bamboo forest had been discovered in the State of Acre in 1976 which has not as yet been charted. The diversity represented by every one of these formations should be protected by a general conservation programme for the Amazon.

The probable existence of Pleistocene refuges in the Amazon, in the tropical rainforest of "Terra Firme", were suggested by Hafler (1969, 1974), Vanzolini (1970), Vanzolini and Williams (1970), Prance (1973), Brown (1975, 1976) and Wing (1973). These proposed refuges, especially where they overlap or merge, are areas which present a high probability of endemic species. Plants or animals are likely to have been genetically isolated in

these refuges, which would have served subsequently as centres for the repopulation of the Amazon.

It was possible, by superimposing the maps of the various authorities, to obtain Figure 4, which shows general areas where two or more authors agree upon the existence of Pleistocene refugia. Although this formation is drawn at a gross scale and does not take into account the possibility of recent environmental alterations, it provides an idea of the areas of potential biological importance.

The analysis was carried out in every Phytogeographic Region of the Amazon and priorities were established according to three criteria: first priority was given to those areas which two or more scientists, in independent studies, identified as possible Pleistocene refugia; second priority was given to areas which were likely to represent several vegetation formations and perhaps a refuge; third priority was given to all other parks and reserves of various types, recommended by IBDF, RADAMBRASIL, SEMA, or other sources, as yet not included in the first two categories.

4. MAIN CONCLUSIONS OF THE "ANALYSIS OF NATURE CONSERVATION PRIORITIES IN THE AMAZON"

The phytogeographic regions which appeared to have the best coverage were the Atlantic Coast and Jari-Trombetas, as a consequence mainly of the extensive programme of nature conservation in Suriname. There were no Brazilian conservation units in either of the two regions mentioned; the Solimés-Amazonas phytogeographic region was the only one which did not have conservation unit coverage, at that stage;

the Upper Rio Negro and Roraima regions were poorly represented. In the Roraima Region there was only the Brazilian Forest Reserve of Parimá, which represented a transitory management category. In the Upper Rio Negro Region, there was only the Rio Negro Forest Reserve (transitory) in Brazil, and the El Tuparro Faunal Territory in Colombia. There were, however, in these two regions, vast areas which had been recommended for nature conservation by the RADAMBRASIL. The Upper Rio Negro Region encompassed four proposed Venezuelan National Parks and 20 Biological Reserves;

the analysis of the conservation units according to the vegetation formation showed that at that time the most complete coverage—existing and planned—was in the tropical evergreen rainforest of Terra Firme, which makes up approximately 90% of the area under study. Nevertheless, most of these areas did not meet the priorities established. In fact, neither the National Park of the Amazon (Tapajós) with one million ha, the only Brazilian conservation unit existing in the region

at the time, nor the proposed Rio Negro National Park would be considered as first or even second priority, according to the established criteria;

- the analysis based on vegetation formations also revealed some gaps in Brazil: the "Caatinga" of the Upper Rio Negro; the "Várzea" Grassland of the Upper Rio Xingu and the Atlantic Coast; and the Grassland of "Terra Firme";
- only a few of the existing conservation units, none of which were found in Brazil at that time, coincided with areas designated priority according to the criteria presented in the document. These conservation units included the following: the Natural Reserves of Kaysergebergte and Taffelberg in Suriname; the National Park of Canaima in Venezuela; the Isiboro Sécure National Park in Bolivia, the National Park of Sangay in Ecuador; and the national parks of Manu and Tingo Maria in Peru. In addition to these, a new national park, Amacayacu, in Colombia, includes part of one priority area. The study did not include a qualitative evaluation of the protection provided the above-mentioned areas:
- the terminology used to identify conservation units in several nations presented a confusing picture, when viewed regionally. "National park" is a term used by many countries, whereas others use terms such as "Biological Reserve", "Ecological Station", "National Reserve", "Natural Reserve", and "Natural Park". In some cases the objectives of these different categories of management overlap, even within the same country. Where the overlapping categories are created and implemented by separate government organizations within the same country, unnecessary duplication of human and financial resources are often incurred; and
- only in three of the fifteen Brazilian Development Centres of the Amazon (Altamira, Aripuanã, and Juruá-Solomés) were there first priority areas, with high endemic probability according to the analysis of refuges.

From the biological viewpoint, an appropriate goal of conservation in the Amazon would be that of preserving an average of three large samples of each phytogeographic region and three or more smaller ones. The larger samples should have an average of 5,000 km each, including a nucleus of 2,500 sq km and a buffer strip 10 km wide, depending on the local conditions. At least 24 smaller reserves, with about 1,000 sq km each, should also be created for special micro-habitats, such as bird or turtle nesting sites, areas for the concentration of species or for other important natural phenomena such as dunes, waterfalls, and so forth.

5. RESULTS OF THE PUBLIC REVISION

The "Analysis of Nature Conservation Priorities in the Amazon" was widely circulated by IBDF and FAO in

both Portuguese and English and public comments were solicited prior to June 1978.

About twenty written responses, both from Brazilians and from foreigners, representing government agencies, research institutes, museums, universities and conservation organizations were received. These were summarized in the document "The 1978 status of Nature Preservation in the Brazilian Amazon" (Wetterberg and Jorge Padua, 1978).

The comments ranged from very brief statements to several-page letters. In some cases, letters were further exchanged in order to clarify points or suggestions. All this mail has been kept in a special file at IBDF for future reference. In general, the comments indicated that, in view of the present state of scientific knowledge about the Amazon, this approach is the most suitable one. *The most important factor is that no all-encompassing strategy was suggested as an alternative.*

After being broadly identified, the potential units for the conservation of nature in the Amazon had to be analyzed in more depth. For this purpose, several new expeditions were made. The trips to the Amazon included an interdisciplinary staff, among whom were scientists who had identified the Pleistocene refuges.

Of the 34 areas visited in the first stage of the System Plan, 13 met the criteria of evaluation and were recommended as national parks and biological reserves. Ten of these areas have already been established as parks or reserves by Presidential Decrees.

Of the 64 areas visited all over Brazil in the second stage of the System Plan, 9 were selected as national parks and biological reserves, in the Amazon, making a total of approximately 6,800,000 ha.

In addition to this system, there is additional basic legislation which limits the use of the renewable natural resources under certain conditions such as, for example, the Forest Code and the Law for the Protection of Fauna. This legislation is particularly effective in areas which are not under any sort of management category or which, due to their meagre dimensions, do not fall into any category.

6. PRESENT SITUATION

Of the 13 areas recommended in the First Stage of the System Plan for Conservation Units, seven have been established in the Brazilian Amazon. Additional areas have been established in neighbouring countries and a composite overview has been published (Wetterberg, Prance and Lovejoy, 1981).

For the Brazilian portion of the Amazon, the Second Stage was released at the time this paper was prepared and, up to the moment of its presentation, obviously no unit had been created yet, but will be in the near future.

It is thus evident that Brazil has taken a giant step forward in the planning of its systems for conservation units, by creating seven new units in the Amazon in

the last three years, totalling about 7,000,000 ha. It is also clear, however, that there is still a great deal to do, for the second stage of the Plan was introduced only in April, 1982—and there still remain three stages.

The goal established in "An Analysis of Nature Conservation Priorities in the Amazon", which is endorsed by the government, is that of guaranteeing a minimum of 18,500,000 ha for the Brazilian Amazon in national parks and biological reserves and 5,000,000 ha for the region outside the Amazon, totalling 23,500,000

ha. This implies that about 13 million ha need to be added to the existing 10.4 million ha to complete the system.

It is necessary to implement this system of conservation units, guarantee its integrity, provide the national parks and other protected areas with effective management and control, and prepare them to facilitate scientific research and to receive visitors. We can then feel fairly confident that the natural diversity of Brazil will be conserved for future generations.

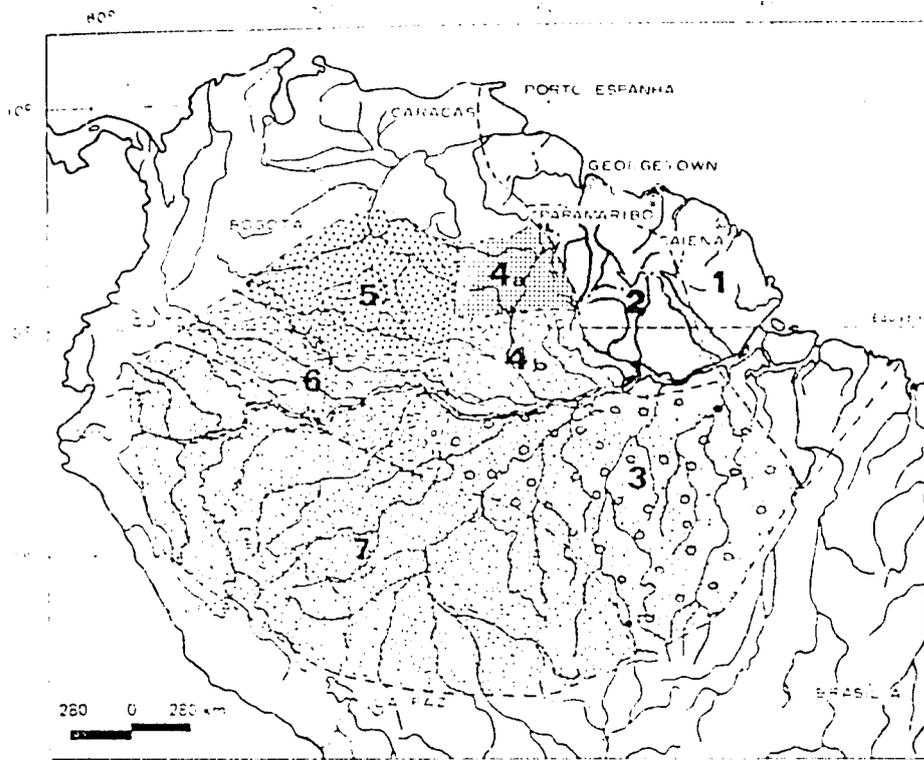


Figure 1. The seven Phyto-geographic regions of the Amazon. Source: Padua.

- 1 Atlantic Coast
- 2 Jun-Trombetas
- 3 Xingu-Madeira
- 4a Borama
- 4b Manaus
- 5 Upper Rio Negro
- 6 Solimões-Amazonas
- 7 Southwest

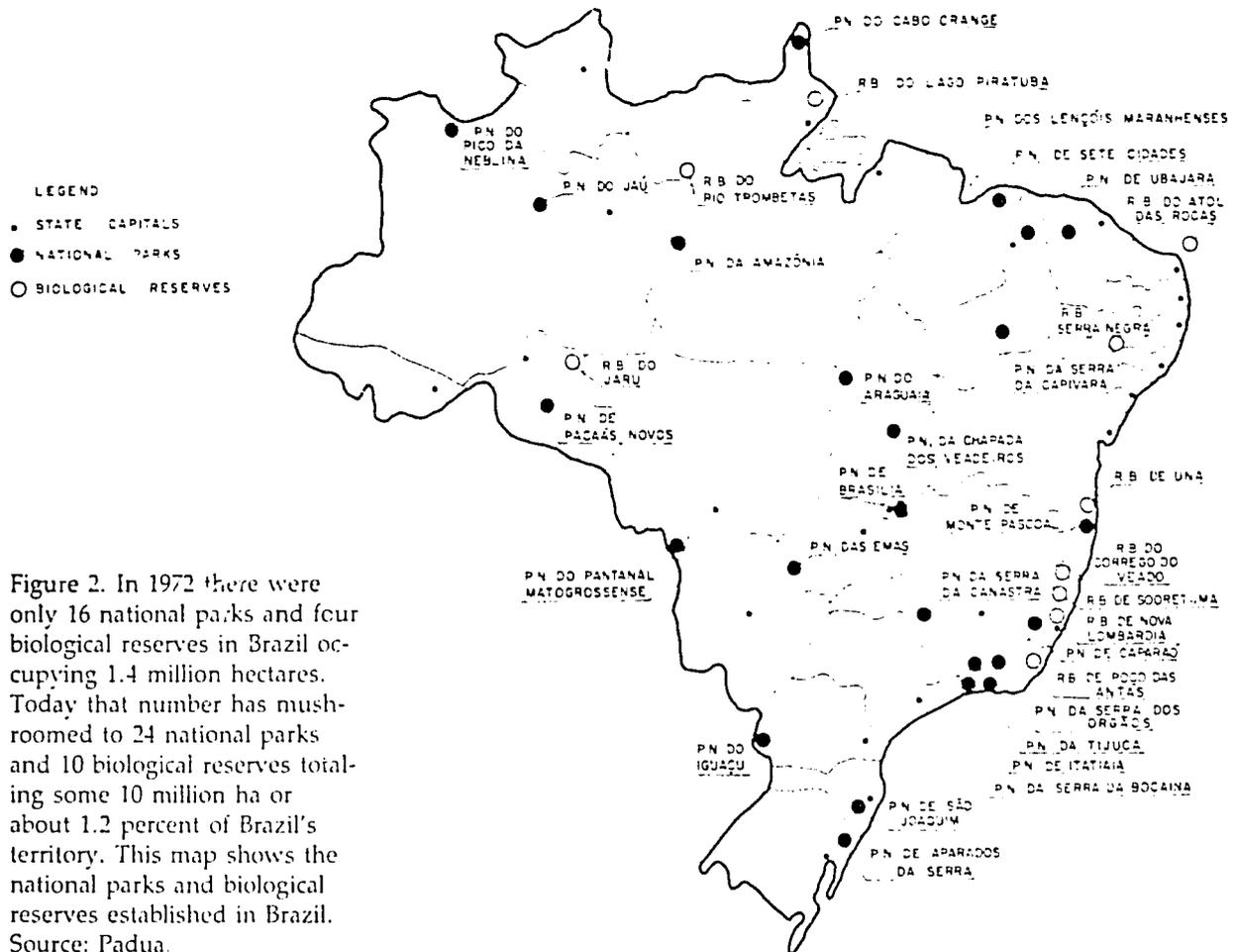


Figure 2. In 1972 there were only 16 national parks and four biological reserves in Brazil occupying 1.4 million hectares. Today that number has mushroomed to 24 national parks and 10 biological reserves totaling some 10 million ha or about 1.2 percent of Brazil's territory. This map shows the national parks and biological reserves established in Brazil. Source: Padua.

Figure 3. The Amazon has nine major vegetation types. Source: Padua.

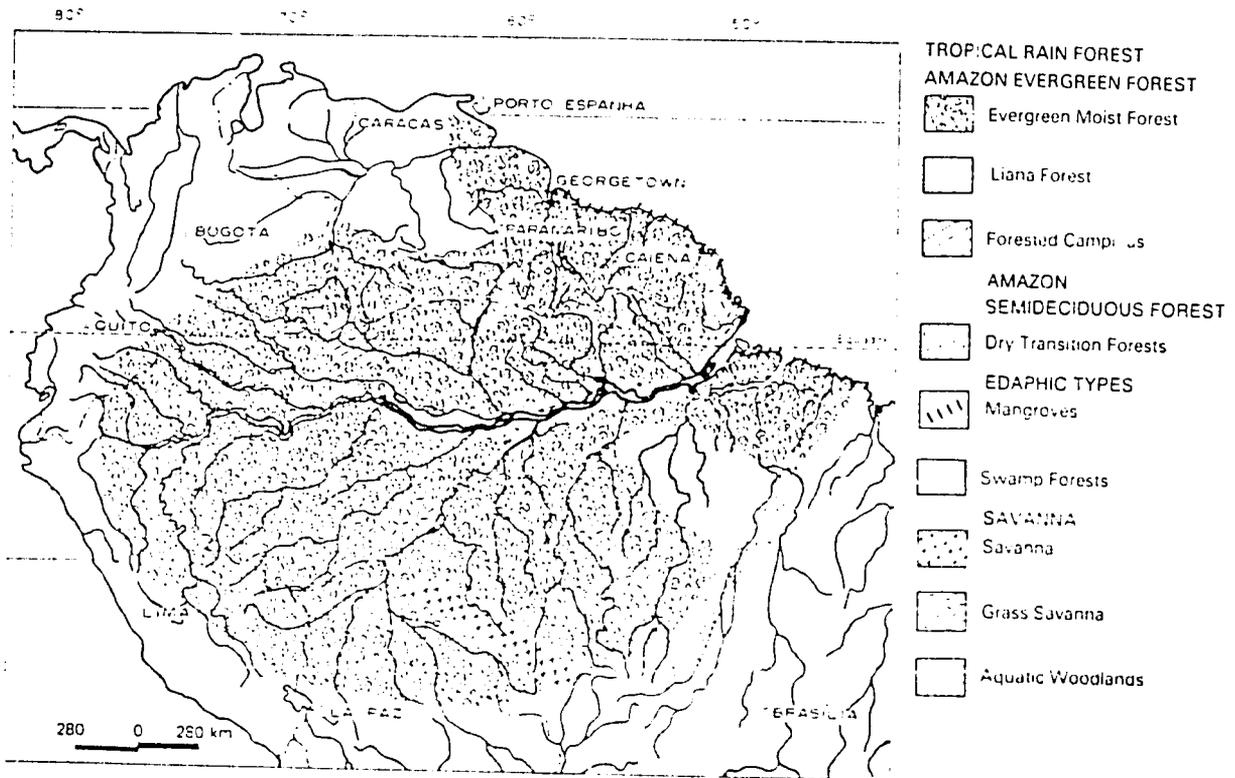
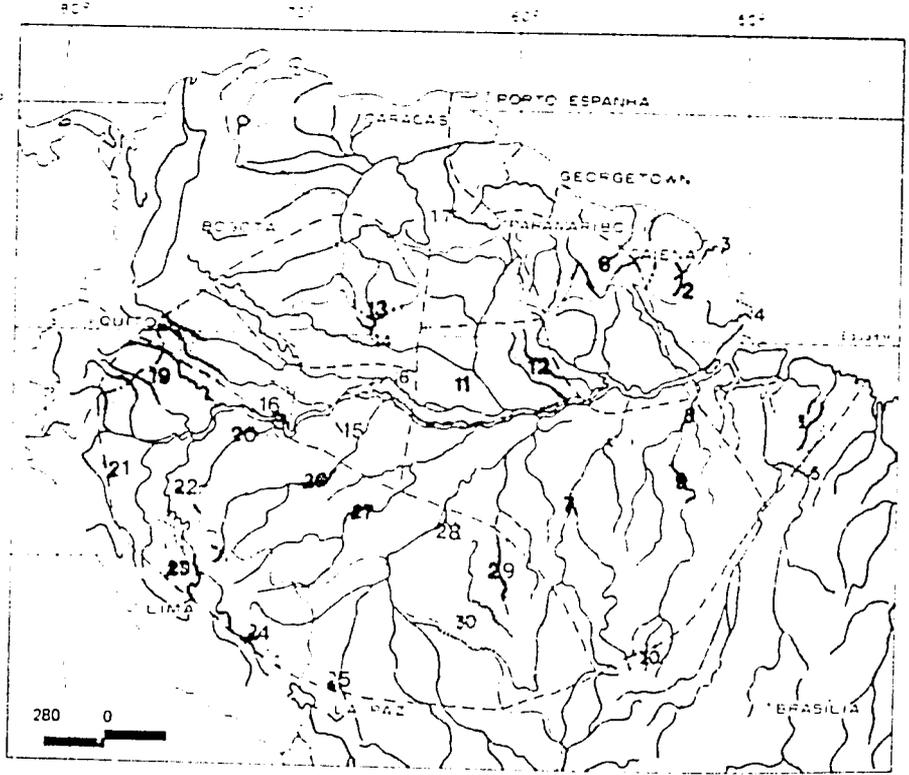


Figure 4. General areas recommended for habitat protection include: 1) Bacia do Capim. 2) Oiapoque. 3) Cabo Orange. 4) Cabo Norte. 5) Maraba. 6) Guiana. 7) Ponta do Flechal. 12) Altamira. 9) Caxinduba. 10) Upper Xingu. 11) Jau. 12) Jatapu. 13) Pico da Neblina. 14) Cuxiaua. 15) Cutiuua. 16) Loreto. 17) North Napo. 18) Panau. 19) South Napo. 20) Javari. 21) Huallaga. 22) Serra do Divisor. 23) Ucayali. 24) Inambari. 25) Yungas. 26) Eirunepe. 27) Purus. 28) Marmelos. 29) Serra das Oncas. 30) Parecis. Source: Padua-Parks Magazine, Vol. 6, No. 2, 1981.



First priority
 Second priority

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