Protecting Biodiversity *in situ* in the Amazonian Region of Brazil

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Abstract—Brazil has approximately 3.6 million km² (1.4 million mi²) of forest, with the majority concentrated in the Amazonian region. The Atlantic Forest was reduced to less than 8 percent of its original territory. Development activities are being implemented without consideration for the local environment, causing both biodiversity and habitat losses. Establishment of protected areas is one of the specific strategies to protect the biodiversity in situ, therefore, the Brazilian government has an international commitment to maintain 10 percent of the country's landscape under the integral protection regime. Environmentalists, communities, and environmental institutions have different points of view about biodiversity conservation or preservation in situ programs within the conservation units (protected areas), with the disagreement centering on natural resource use by the forest dwelling people within the conservation units.

Introduction

The biodiversity in the Amazon rainforest has been historically unknown, although it accounts for the biggest biodiversity on the Planet, habitat to more than one-fifth of all vascular plant species, one in eleven mammal species, and one in six bird species worldwide. The knowledge about its fauna and flora distribution is still incomplete and fragmented and yet this richness is threatened by the intensification of deforestation. This situation is aggravated by development activities associated with the root causes of biodiversity loss (Wood and Porro 2000) such as population growth, poverty, immigration, inequality, isolation/marginalization, cultural changes, macroeconomic policies, international trade factors, policy failures and poor environmental laws.

The impact of anthropic activities on the ecosystem in the Amazon is probably even bigger than what the official statistics indicate, about 15 percent of the original Amazonian forest is already destroyed (INPE 2001) and according to official data, as of the year 2020 the Amazonian forest will have lost 25 percent of its native coverage (WWF-Brasil 2001). The forest is being replaced by human activities; according to Fearnside (1995) the current deforestation rate in tropical areas is exceeding 150,000 km² (57,915.32 mi²) per year. Redford (2002) points out that 60 percent of available fresh water on the Planet is already being used by the human population and 83 percent of the earth's surface is being used in some productive way—he concludes that there is very little of the earth's surface that has not been substantially changed to suit the needs of industrialized human society.

In this context, the establishment of territorial spaces that are specially protected, mainly by the means of protected areas of restricted use, has been one of the oldest and still more efficient strategies to protect biodiversity. The Amazonian forest is the largest standing, sequential tropical forest and the last frontier on the Planet that contains extensive areas of contiguous dense forest. It has become the subject of the world's attention since the mid-1980s and especially after the Earth Summit, the UN Conference on Environment and Development in Rio de Janeiro in 1992, where its conservation policy guidelines started to be established. The increasing deforestation process seems to interconnect, in a catastrophic scenario, three contemporary tendencies that could lead to a global environmental disaster: global warming, ozone layer depletion and biodiversity loss.

The Deforestation Process in the Brazilian Amazon

Since the arrival of the Europeans in Brazil, the Amazon region, which encompasses 60 percent of the country's territory, has been considered an inexhaustible source of natural resources to fulfill the demand of human needs. The relative insulation of the region was broken at the end of the 1960s with the Amazon integration process under the military regime. Yet during the 1960s the deforestation of the region was envisaged as a necessity and the forest was considered a big challenge to be overcome. Until the late 1980s the governmental policy and programs in the Amazon region were strictly founded in the paradigm of progress, when deforestation started to become a concern of world attention. The deforestation rate was drastically increasing in the 1980s, reaching the highest rate in 20 years in 1995 (see fig.1). Every year deforestation rates are publicized, becoming one of the nation's biggest concerns. Modifications in the floristic cover of the Amazon forest has happened at an accelerated rate, 0.57 percent in 1975 increased to 12 percent in 1988. The increase in the deforestation rate at this point is an outcome of the governmental infrastructure constructions, colonization programs and agriculture and cattle expansion without an adequate public policy framework.

Currently, the main agents of deforestation are cattle raising activities, mechanized soybean expansion, illegal logging, construction of roads, and the agrarian reform settlements. According to Théry (1999), cattle raising and soybean production are occupying mostly the oriental and meridional part of the Legal Amazon (deforestation arch),

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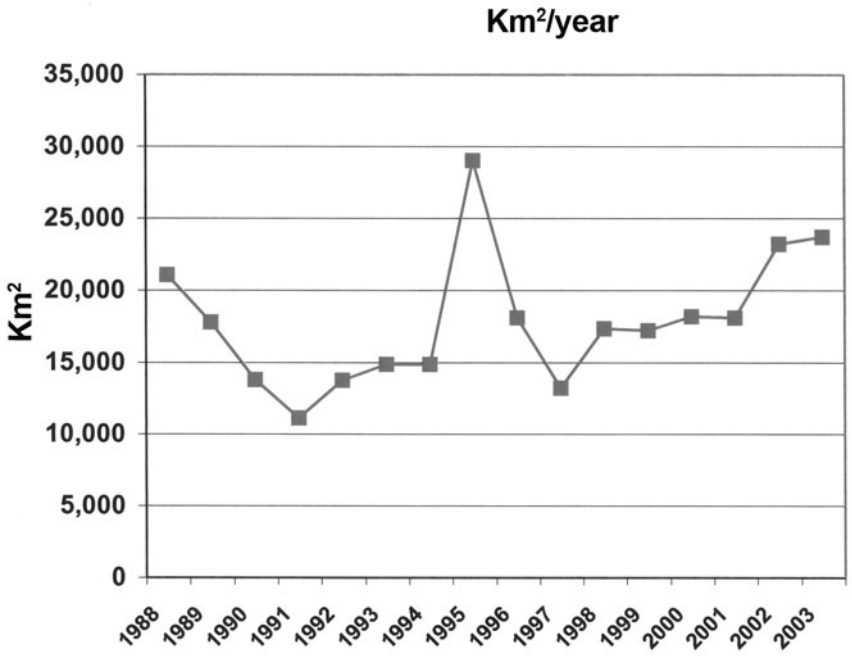

Figure 1—Deforestation rate per area—km² (INPE—National Insititute for Spatial Research 2003).

especially the areas within the Cerrado (Brazilian savannah) and deciduous forests, which is due to easier access for logging, if it is compared to the floodplains and to the dense pluvial forest ecosystems.

These activities, associated with the lack of policy enforcement, resulted in one of the highest deforestation rates in 2004 since 1988, reaching 26,130 km² (10,100 mi²). It is an indicator that the environmental policy instruments are not being effective or enforced well enough. Even if the policy instruments have been an outcome of long-term discussion which stimulated public participation based on the local knowledge of forestry, the impact of the development initiatives in the Brazilian Amazon are resulting in a fast pace destruction of the forest, with no regard to the conservation policy or sustainable development initiatives.

The Conservation Policy

At the beginning of the 21st century a better strategy still could not be found to protect biodiversity from human activities, the majority of which are causing serious damage to the environment, and mostly in an irreversible way, such as, species extinction. The protected areas are still the most effective strategy to protect and conserve biodiversity, therefore the Brazilian government assumed since Rio-92 an international commitment to keep 10 percent of the country's territory under the integral protection regime.

Brazil's territory encompasses a total area of 8,547,403 km² (329,942,300.62 mi²), currently 7 percent of the country's territory is being protected by the means of established protected areas, where 2.61 percent are protected areas for integral protection and 5.52 percent are for natural resource sustainable use (IBAMA 2005). In the Amazon region the tendency for the conservation policy has been in consonance with the countries in creating more protected areas for natural resource use than for integral protection (see fig. 2).

Nowadays, it is very clear that the relative displacement in the axis of the conservation approach in the Amazon is inseparable from the natural resource sustainable use issue (Albagli 2000). Even though Milano (2004) argues that the 2.61 percent of the country's territory that is under integral protection, where legally and technically human interference is not foreseen, there has been little success in conserving the country's biodiversity. He points out that

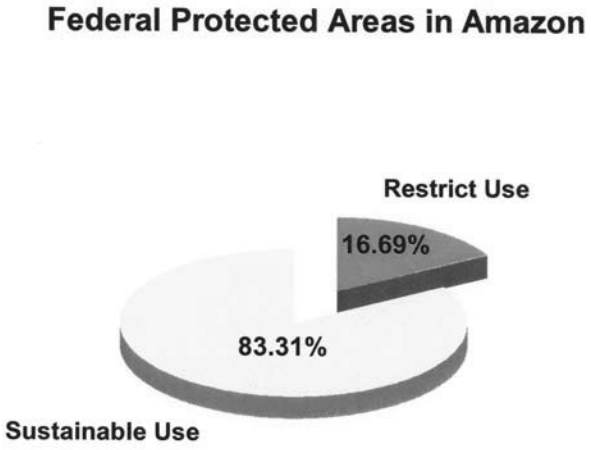

Figure 2—Federal Protected Areas in the Amazon (IBAMA—Federal Agency for the Environment 2005).

the urban population in Brazil is in the order of 78 percent of the total population, and even if 20 percent to 30 percent of the country's territory were under restricted protection, a large portion of land will remain for sustainable use for people dwelling in rural areas.

Conservation Law

The complete ecological and socioeconomic failure of public policies for development that were applied to the Amazon region during the 1970s has stimulated the search for new territorial organization models (land use and occupation) which are more concerned with long-term sustainability activities. New programs and initiatives are being applied with the aim of diminishing the negative impacts of anthropic activities as an attempt to avoid the threatening deforestation rates.

The federal environmental law 9985, from July 18, 2000, institutionalized the Conservation Units National Policy (SNUC). It was built as a system where the areas that are being protected by the federal government are linked with the state and county protected areas, integrating diverse systems.

The conservation units (protected areas) are defined as a dichotomy between two different groups: the one of integral protection that is divided in Ecological Station, Biologic Reserve, National Park, Natural Monument, Wildlife Refuge; and the natural resources sustainable use group divided in Environmental Protected Area, Area of Relevant Ecological Interest, National Forest, Extractives Reserve, Fauna Reserve, Sustainable Development Reserve, Natural Heritage Private Reserve. Since the year 2000, many things have been changing in regard to the policy for protected areas in Brazil, even if the majority of these areas are still under government management (at the federal, state and county levels) the participatory approach starts to be adopted and traditional peoples (indigenous people, river dwellers, colonists, rubber tappers, slave descendent communities, etc.) started to be considered part of the environment. The traditional knowledge (TKS) is now being incorporated into the conservation unit protection and management. Two conservation units, the Extractive Reserves (RESEX) and the Sustainable Development Reserves (RDS) belong to the sustainable use group and allow the presence of forest-dwelling and the use of natural resources within the reserves area.

The RDS was originally created in the state of Amazonas with the objective of implementing actions for the sustainable use of resources. Through the traditional peoples' elaborate system of knowledge about the ecology and practical uses of flora and fauna resources is a basis for livelihood strategies. In this sense, traditional knowledge of rain forest ecosystems is an important component of biodiversity conservation. The RDS is defined by SNUC as a natural area that serves as a shelter for traditional peoples, whose subsistence is based on natural resources sustainable use. TKS plays a fundamental role in the protection of nature and biological diversity (SNUC 2000).

The reserves were established with the objective to implement sustainable development actions through traditional knowledge about the ecology and practical uses of flora and fauna resources as a basis for livelihood strategies. In this sense, traditional knowledge of rain forest ecosystems is an important component of biodiversity conservation. RESEX is defined at SNUC as an area that is utilized by traditional peoples, subsistence is based on resource extraction complementary with subsistence agriculture and the raising of small animals. They have basic objectives to protect the way of life and culture of these populations, assuring sustainable use of natural resources (SNUC 2000). The Sustainable Development Reserve (RDS) is defined as a natural area that contains traditional peoples with existence based on sustainable systems of natural resource use, developed across generations and adapted to local ecological conditions, playing a fundamental role in nature protection and maintenance of ecological biodiversity (SNUC 2000: Article 20).

The reserves are managed by a Deliberative Council which is formed by the institution responsible for its management (president), public institutions representatives, civil society organizations and local residents of the RDS. It must have a management plan that is approved by the Deliberative Council; the natural resources used by the dwellers will be ruled by the management plan and by article 23/SNUC, which allows the replacement of forest coverage for subsistence agriculture practices and commercial logging only to be admitted on sustainable bases and only under the zoning specifications.

Another significant change in the conservation policy was the inclusion of indigenous land within the scope of the law 9985 SNUC as part of the protected areas national system. The logic of this approach is to emphasize the importance of indigenous lands as a reservoir of biodiversity and traditional knowledge of forest management. There is an inevitable convergence between indigenous land rights and biodiversity conservation associated with the rescue of many different ethnic groups. Indigenous rights and policy development for land tenure issues have demonstrated a considerable improvement since the 1980s. Currently, there are approximately 366 indigenous lands in a territory encompassing 98.5 million ha (243.4 million acres) (FNUAI 2004).

Conclusions

For most of the 500 years that have elapsed since Europeans arrived, much of the Amazonian forest has experienced a long respite from significant clearing. Only within the past two decades have the rates of destruction and degradation of neo-tropical forest become unprecedented in human history. Development initiatives such as cattle raising activities, mechanized soybean expansion, illegal logging, construction of roads and the agrarian reform settlements, are gradually invading protected areas. Environmental laws have not been obeyed and enforcement has also failed.

Although Brazil has one of the world's most modern environmental laws, it hasn't been enough to avoid the primary forest destruction, especially in the Amazonian region. This situation is aggravated by the lack of personnel dedicated to enforcement activities and due to the monitoring and control in large areas with difficult access. This is one of the reasons for the complete failure of enforcement in the protected areas. Meanwhile, illegal exploitation of the forest invades the protected areas, the laws are disobeyed, the control fails and the quality of the area is gradually destroyed.

Even if Brazil has made important strides towards a conservation policy in the Amazon, the reality is still that far more forested areas have been allocated to logging than to protected areas. Within the scope of SNUC many logged forest areas have been incorporated as a multifunctional protected area category. The key for conservation in Brazil is to find the balance among the multifunctional protected areas, restricted use protected areas, indigenous land and development initiatives. It must be based on the knowledge of the ecology of the forest and offer at the same time benefits to the economy as well as to forest dwellers and for the biodiversity.

It seems that all the effort undertaken to develop a comprehensive conservation policy based on a participatory approach, has been in vain with the deforestation rate reached in 2004, one of the highest in history. The country's politicians, instead of making sure that the conservation law is being enforced and supporting the environmentalist's initiatives, is tending to give more incentives to the agribusiness activities. It is no surprise that Brazil has become one of the leading producers of cattle meat and soybean worldwide.

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