



## Chapter IV

# Legislation, Policies and Programmes: Implementing Article 6 of the Convention on Biological Diversity

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### 4.1 Progress in Legislation

#### 4.1.1 The Federal Constitution of 1988

**T**he Federal Constitution of the Republic of 1988 provides the basis for a Brazilian programme for the conservation of biodiversity and its sustainable use, as well as for carrying out the commitments undertaken by Brazil in relation to the CBD. An entire chapter (Chapter VI: article 225) of The Federal Constitution is devoted to the environment (Box 4-1).

The Constitution states that it is the responsibility of the State “to preserve the diversity and integrity of the genetic patrimony of the country”, to define protected areas, to protect the flora and fauna and to foster environmental education. In addition a number of Brazilian biomes were declared “national patrimony.”

Chapter VIII (Articles 231 and 232) of the Brazilian Constitution is dedicated to the recognition of the rights of the Indians born and resident in national territory, today numbering about 330,000, and divided into 206 ethnic groups. This recognition includes “the lands traditionally occupied by Indians.”

The preservation of these lands is of major importance for the conservation of the biodiversity they contain, with a large part of the ecosystems on indigenous lands remaining relatively intact.

The 1988 Constitution includes the basic concepts and measures necessary for the protection of the country’s biodiversity. They demonstrate significant progress in the environmental conscience of Brazilian society, and have proved to be very important in terms of the country’s capacity to fulfil the terms established in the Convention on Biological Diversity.

Article 225 of the Constitution states that “all have the right to an ecologically balanced environment, which is an asset of common use and essential to a healthy quality of life, and it is the duty of both the Government and the community shall have the duty to defend and preserve it for present and future generations”.

According to the Federal Constitution, this implies a duty to “preserve and restore the essential ecological processes and provide for the ecological treatment of species and ecosystems,” and to “preserve the diversity and integrity of the genetic patrimony of the country”, in addition to defining “territorial spaces and their components which are to receive special protection”. These terms can only be altered or suppressed with legal authorisation.

One of the most important items in the Constitution is the requirement of an environmental impact study prior to any activities “which may potentially cause significant degradation of the environment”. This clause has given society a voice in the licensing of major works which are potentially damaging to the integrity of ecosystems and a threat to wildlife.

Another clause secures the protection of the flora and fauna, and forbids any practice that might put them at risk, result in the extinction of species, or submit animals to cruelty.

The Brazilian Amazon forest, the Atlantic forest, the Pantanal of Mato-Grosso, and the Brazilian coast are part of the ‘national patrimony’, and their use is conditioned to the preservation of the environment and natural resources. There have also been demands that the Cerrado (which originally covered nearly one-quarter of the country) and the Caatinga biomes (which covers a significant part of the Brazilian North-east), should also be considered “national patrimony”.

#### **4.1.2 Progress in National Legislation before 1992**

There was a considerable body of legislative measures for the conservation of biodiversity and its sustainable use well before the 1992 United Nations Conference on Environment and Development.

One of the most important components of Brazilian environmental legislation is Law No. 6,938, 31st August 1981, which established the National Environment Policy (Política Nacional do Meio Ambiente), and set up the National Environment System (Sistema Nacional do Meio Ambiente - SISNAMA) and the National Environment Council (Conselho Nacional do Meio Ambiente - CONAMA), as well as laying down a number of regulations for environmental management. One of these was environmental licensing

through environmental impact studies. CONAMA establishes the norms and criteria for the licensing of polluting or environmentally damaging activities and determines, whenever necessary, research on alternatives and of the possible environmental consequences of public or private projects (Box 3-2). The CONAMA Resolution No. 1, 23rd January 1986, established and regulated the requirements for environmental impact studies (Estudo de Impacto Ambiental - EIA) and the respective Environmental Impact Report (Relatório de Impacto Ambiental - RIMA).

Another important legal instrument for the environment and the conservation of biodiversity was Law No. 7.347, 24th July 1985, which defined civil public action for liability for damage caused to the environment, a legal instrument available to the Public Prosecutor’s Office, as well as state and municipal governments and civilian associations.

The country’s first Forest Code was approved in 1934 (Código Florestal, Decree No. 23,793, 23rd January 1934). Its precursor was the Regulation on Pau-Brasil (Regimento sobre o Pau-Brasil) of 1605. According to the Forest Code, all of the country’s forests constitute an asset of common interest to the people of the country, and property rights can be exercised only within the limitations proscribed by law, and the Forest Code in particular. The Forest Code distinguished between forests which are ‘protected’, ‘remnant’, ‘model’ and ‘for production’. In 1964, the Land Statute (Estatuto da Terra, Law No. 4.504, 30th November 1964), established rights and obligations concerning agrarian reform, and conditioned all actions within the agrarian reform to “the conservation of natural resources”, which it included among the social functions of property, as defined in the Federal Constitution prevailing at the time.

The Forest Code (current) was redefined in 1965 (Law No. 4,771, 15th September 1965). This law determined that the country’s forests and all other forms of vegetation are “assets of common interest to all the inhabitants of the country”. Property rights thus also came to be exercised within the limits established by this Law. This Law also defined Areas of Permanent Protection (Áreas de Proteção Permanente) as the forests and other forms of vegetation found alongside water courses, lagoons and headwaters, coastal sandy-soil (restinga), on the top or slopes of hills, on the slopes leading to coastal lowlands and plateaux and on land above 1,800 metres in altitude. Habitats for threatened fauna and flora and indigenous reserves were also included as Areas of Permanent Protection. The Law also prohibited the use of fire in forests and in “other forms of vegetation”, except when authorised by the forestry authority, with prison sentences of up to one year for offenders.

Law No. 4,771, 1965, established the power of the State to create National Parks, Biological Reserves, and National Forests, and determined the requirement of management

plans for the exploitation of forests. Another important measure was the creation of Legal Forest Reserves (Reservas Florestais Legais). In the eastern, central-west and southern regions, at least 20% of the native vegetation on each property must be preserved as a Legal Forest Reserve where only sustainable forestry practices are permitted. The Law also determined that iron and steel companies using charcoal must maintain their own forests for rational use. Forests in the north and northern central-west (Amazonia) were classed as "primitive", and the Law determined that at least 50% of the natural vegetation on each property must be preserved as Legal Forest Reserves. In 1996, a Presidential Provisional Measure increased the size of the Legal Forest Reserves on each property in this region from 50% to 80%, suspended the issue of licences for the export of mahogany and virola for two years, and demanded a review of all the existing licences. It also prohibited the clearing of forest for agriculture or cattle-ranching on properties where abandoned or under-used cleared areas already existed.

In 1967, the Fauna Protection Law (Law No. 5,197, 3rd January 1967, substituting Decree No. 24,645, 10th July 1934) established norms for protecting Brazilian wildlife, which then became considered State property. Replacing Law No. 5,894, the former Hunting Code (Código de Caça) of 1943, the Fauna Protection Law prohibited the use, persecution, destruction, hunting or capture of wild animals, with certain exceptions (collecting for scientific purposes and subsistence and amateur hunting, for example). Professional hunting and trade in wild forest fauna species became illegal.

National parks were the first fully protected area to be established in Brazil (the Itatiaia National Park was created in 1934), but Law No. 5,197 made provision for an additional protected area category, the Biological Reserve (Reserva Biológica). It also made created the category of Amateur Hunting Parks (Parques de Caça Amadorista), never established previously for lack of support from Brazilian society. It defined what constituted a crime against fauna and the respective penalties for infraction. Another clause prohibited the export of raw skins and hides of amphibians and reptiles. Law No. 653, 12th February 1988, classified the unauthorised hunting of wild animals as a crime without right to bail.

The establishment and the functioning of zoological gardens was regulated by Law No. 7,173, 14th December 1983.

Also in 1967, Decree-Law No. 221, 28th February 1967, created mechanisms for the protection of aquatic wildlife and incentives for fishing, in inland waters and in the sea. It considered "all plants and animals found in waters under Brazilian jurisdiction public property". This Decree-Law replaced the former Fishing Code (Código de Pesca) of 1938, Decree-Law No. 794. In 1987, Law No. 7,643, 18th December

1987, prohibited the hunting of cetaceans (whales and dolphins) in waters under Brazilian jurisdiction.

Law No. 6,513, 22nd December 1977 (regulated by Decree No. 86,176, 6th July 1981), defined Special Areas and Sites of Tourist Interest (Áreas Especiais e Locais de Interesse Turístico), including Ecological Reserves (Reservas Ecológicas) and Ecological Stations (Estações Ecológicas); areas designated for the protection of renewable natural resources, "areas of outstanding scenic beauty" and "hydromineral springs for public use", all subject to special rules for use and occupancy.

Law No. 6,902, 27th April 1981, established the norms for creating Ecological Stations and Environmental Protection Areas (Áreas de Proteção Ambiental - APAs). The former were defined as "representative areas of Brazilian ecosystems, designated for basic and applied ecological research, for protection of the natural environment and for developing conservationist education". At least 90% of the area in each Ecological Station should remain untouched, for the permanent preservation of the biota. The remaining area can be used for research, but without putting the species represented at risk. The State also has the power to decree Environmental Protection Areas as areas in which environmental protection is deemed of interest to ensure the well-being of the human populations and conserve or restore the local environment.

Edict No. 122, 19th March 1985, of the Brazilian Forestry Development Institute (IBDF), set out the regulations for the exploitation of the Paraná Pine (*Araucaria angustifolia*), one of the most important and threatened timber species in the south of Brazil. It also defined the regulations concerning the harvesting, transport, commercialisation and processing of ornamental, medicinal, aromatic and toxic plants, and prohibited the felling, sawing or commercialisation of the Brazil-nut tree (*Bertholletia excelsa*).

Decree 98,914, 31st January 1990, modified by Decree No. 1,922, 5th June 1996, made provision for and regulated the category of the Private Natural Heritage Reserve (Reserva Particular de Patrimônio Natural - RPPN). Today these private reserves amount to over 341,000 ha.

Decree No. 78, 5th April 1991, created the National Council for Protected Areas (Conselho Nacional de Unidades de Conservação), a consultative committee which includes representatives from IBAMA, a number of ministries and non governmental organizations, and specialists in the area.

In 1992, the Draft Law 2,892/92 which proposed a unified National System for Protected Areas (Sistema Nacional de Unidades de Conservação - SNUC), was submitted to the National Congress. It has yet to be approved.

### 4.1.3 Advances in Biosafety Regulations

Biotechnological research on animal, plant and micro-organisms has given rise to concern with regard to the release of genetically-modified organisms (GMOs) into the environment. This concern is reflected in Article 19.3 of the Convention on Biological Diversity which obliges the Contracting Parties as a group to consider the need for a 'biosafety' protocol to determine adequate procedures for the transfer, handling and use of GMOs resulting from biotechnology, that may have adverse effect on the conservation and sustainable use of biodiversity.

In Brazil, imports of non-native organisms require prior authorisation from the Ministry of Agriculture and Supply or from the MMA, and in some cases from both. A number of Decrees have established the regulations for such imports, even before the CBD. They include:

- Decree No. 24,114, 12th April 1934, establishes the norms for importing plants and plant parts, insects and micro-organisms for commercial or research purposes;
- Decree No. 24,548, 3rd July 1934, establishes the regulations for importing domestic stock for farming;
- Decree No. 221, 28th February 1967, establishes the norms for importing aquatic species at any stage of development.

In addition, the norms and regulations established by the Convention on International Trade in Endangered Species of Flora and Fauna (CITES) were already in force in Brazil, regulated by Decree No. 76,623, 17th November 1975.

New regulations were established after the signing of the CBD;

- Edict No. 74, 7th March 1994, of the Ministry of Agriculture and Supply, revised and updated norms of the Decree No. 24,114 of 1934, and established quarantine procedure for the exchange of live organisms destined for research in the biological control of pests, disease and weeds, as well as for other lines of research;
- Edict No. 29, 24th March 1994, of the Ministry of Environment, established the regulations for imports of wild organisms;
- Edict No. 142, 22nd December 1994, of IBAMA, prohibited the breeding or commercialisation of non-native catfish in the Amazon and Paraguay river basins, in order to protect the local fish communities and biological diversity.

In addition to these regulations, the Wildlife Department of IBAMA (*Departamento de Vida Silvestre - DEVIS*) has formalised agreements with specialist groups to assess the risk of imports of wild animals. For example, the quarantine of imported insects and micro-organisms is the responsibility of the National Centre for Research, Monitoring and Assessment of Environmental Impact (*Centro Nacional de Pesquisa, Monitoramento e Avaliação de Impacto Ambiental - CNPMA*) of EMBRAPA, which was also involved in establishing the procedures for importing biological control agents.

There are strict rules on importing plant germplasm. The material can only come into the country for research purposes and with special authorisation from the Ministry of Agriculture and Supply. The Phytosanitary Certificate must bear a declaration that the material is free from pests or pathogenic agents. All material of this type is submitted to inspection at the point of entry into the country. If the legal requirements have not been met or the material is contaminated, it is destroyed or put into quarantine.

Imported organisms received by the National Research Centre for Genetic Resources and Biotechnology (*Centro Nacional de Pesquisa de Recursos Genéticos e Biotecnologia - CENARGEN*) of EMBRAPA which have been liberated by customs, are taken to an insect-proof room where their condition is verified, and the material is fumigated with aluminium phosphate or transferred to new packaging. Samples are examined in laboratories for the presence of virus, fungi, nematodes and bacteria. All material is considered to be of high risk, and is subjected to quarantine. From 1978 to 1995, nine types of bacteria, 16 of fungus, seven nematodes, eight viruses and five insects were intercepted.

There are specific regulations for the quarantine of domestic and wild animals, for importing stuffed animals, for the control and inspection of animal-based products, for skins and hides, for medicines of veterinary use and for pathology products. Norms for the use of genetic engineering techniques and the release of GMOs in the environment are provided by Law No. 8,974, 5th January 1995. Decree No. 1,752, 20th December 1995, regulates this Law, and defines the attributes and composition of the National Technical Commission for Biosafety (*Comissão Técnica Nacional de Biossegurança - CTNBio*). Law No. 8,974 established the norms for the security and inspection for engineering techniques in the construction, transport, commercialisation, consumption, liberation and the destination of waste comprised of GMOs, not only for security but for the protection of biodiversity.

These activities may not be carried out by individuals, only by registered private or public companies, which assume the due commitment of responsibility. Companies are required to hold a Certificate of Quality in Biosafety (*Certifi-*

cado de Qualidade em Biossegurança – CQB), issued by CTNBio.

The genetic manipulation of human germ cells is prohibited, as is the production, storage or manipulation of human embryos destined to serve as available biological material.

Products from other countries containing genetically-modified organisms and destined for commercial or industrial use are only allowed into the country after a conclusive report from the CTNBio, and authorisation from the competent inspection organ. If available, technical reports from other countries are also analysed. The Law establishes various penalties for infraction, a number of them considered criminal.

The CTNBio is appointed by the President of the Republic. It includes eight, active specialists in the area of biotechnology: two in human health, two in animal health, two in agriculture and two in environmental aspects. It also includes representatives from the Ministries of Health, Agriculture and Supply, MMA, Education and Sport, Science and Technology, and External Affairs. The Committee also includes representatives of the official organs for consumer protection and for workers' health, as well as the business sector in this area.

CTNBio decisions must be approved by a two-thirds majority of its members. In October 1997, CTNBio authorised the first imports of genetically-modified soybeans, for use in the manufacture of vegetable oil and other products.

#### **4.1.4 Advances in Regulating Access to Biological diversity**

The first legislation concerning access to biodiversity in Brazil was Decree No. 22.698, 11th May, 1933. Decree No. 65.057, 26th August 1969, established the norms for scientific expeditions in the country, then already the responsibility of the Brazilian Science Council - CNPq of the Ministry of Science and Technology - MCT. According to the Decree, CNPq is responsible for authorising and supervising scientific expeditions or any other activities which involved exploration, survey, collection, filming or the audio-recording of scientific material by foreign institutions (official or otherwise) or individuals, by foreign religious or philanthropic associations, by Brazilian institutions working in collaboration with foreign agencies, or by private institutions or Brazilian individuals. In the case of foreigners, collected material leaving the country is inspected and inventoried, and representative samples or duplicates from the collection, as well as pressings, copies, photographs or drawings of the scientific material must be donated to an institution designated by CNPq.

Decree No. 98,830, 15th January 1990 also legislates on the collection of scientific material by foreigners. All foreign individuals or companies carrying out field work or travelling in the country to collect data, materials, biological specimens, mineral samples, or specimens of native or popular culture destined for study, diffusion or research are covered by this Decree.

All these activities require advance authorisation from the MCT, also responsible for supervising the scientific or cultural expeditions and analysing the results. Permanence in, or transit through, indigenous lands or federal protected areas, require permits from the National Indian Foundation (FUNAI) and IBAMA, respectively. Shipping collected material abroad requires advance authorisation from MCT, and CNPq emits the technical-scientific evaluation for this purpose.

Draft-Law 306/95 has been under discussion in the Brazilian Senate since 1995. It establishes the regulations and instruments of control for access to genetic resources in the country. The aim of this law is to increase the access to, and correct use of, these resources so as to permit a fair and equitable sharing of the benefits obtained from the use of genetic technology and from the associated knowledge held by indigenous societies and local extractivist communities. If this Draft-Law is passed, it will apply to biological and genetic resources in Brazil, the coast, the sea and islands under its jurisdiction, as well as migratory species. It will not apply to human genetic components, nor to the exchange of biological resources practised by local communities and indigenous societies, "for their own ends and based on customary practice". Surveys and the collection of biodiversity resources in Brazil will require prior authorisation and will have to be accompanied by the Brazilian technical-scientific institution designated for this purpose by the competent authority, which will also be required to report on any environmental impact and/or the necessary remuneration for the Union. Shipping genetic resources abroad will require advance and specific authorisation. The State will have the powers to restrict or prohibit access to national genetic resources in situations where species are rare, threatened, or of significance in terms of endemism, or where there is a threat to the ecosystem structure or functioning, or in any situation where genetic resources may be seriously diminished or lost to specific ecosystems. Any enterprise that obtains collective knowledge on the use of genetic or biological resources from indigenous societies or local communities, without complying with the Law will forfeit the intellectual property rights on the resources obtained. This Draft-Law has been widely debated in the National Congress and in segments of society since 1995. Three public audiences were held in 1996 alone, in Brasília, Manaus and São Paulo.

In July 1996, an Inter-ministerial Group for Access to Genetic Resources (Grupo Interministerial de Acesso a Re-

curso Genéticos - GIARG) was set up within the Home Office (Casa Civil) of the Presidency of the Republic, and coordinated by the MMA in order to discuss the Draft-Law and offer suggestions.

A "Workshop on Access to Biological Resources: Suggestions for its Regulation" was held in Brasília from 9th to 12th October 1996. It was promoted by the MMA and organised in conjunction with the Commission for Social Affairs (Comissão de Assuntos Sociais) of the Federal Senate, the Ministry of Agriculture and Supply through EMBRAPA, the World Wide Fund for Nature - WWF/Brazil, the Instituto Socioambiental - ISA, São Paulo, Vitae Civilis - Institute for Development, the Environment and Peace (Vitae Civilis - Instituto para o Desenvolvimento, Meio Ambiente e Paz), and the Advisory Group for Services to Projects in Alternative Agriculture (Assessoria de Serviços a Projetos em Agricultura Alternativa - AS-PTA).

When passed by Congress, the Law will be the basic instrument for regulating the exchange of biological materials, and especially the export of genetic material, its derivative products and associated knowledge. It will also create mechanisms to foster access to genetic resources and stimulate their conservation and sustainable use, in addition to ensuring that the country receives a fair and equitable participation in the benefits.

#### **4.1.5 Advances in the Legislation on Industrial Property**

The Government decided to update the legislation on the protection of industrial property in the early 1990s. Draft Law No. 824/91 on this subject was sent to the National Congress in April 1991, and subsequently passed through the Senate as Draft Law No. 115/93. The resulting Law No. 9,279/96, known as the new Law of Industrial Property, was approved by Congress on 10th April 1996, and sanctioned, without veto, by the President of the Republic on 14th May 1996. The Law was regulated by Normative Acts No.126, 15th May 1996 and No. 126, 3rd March 1997. A special period of 12 months (14th April 1996 to 15th May 1997), known as the 'pipeline', allowed for the registration of patents which had already been granted abroad but the products of which had not yet been marketed.

Debates on the Law of Industrial Property in Congress took into consideration the fact that a globalised economy stimulates investments in favourable and advantageous environments although it is also important to stimulate innovative activity within the country. In the terms of the Law No. 9,279 innovative inventions, activities and industrial applications can be patented for a period of 20 years. In the articles which refer to biodiversity, the law forbids the

patenting of "all or part of natural living beings and biological material found in nature, or isolated from it, including the genome or germplasm of any natural living being or natural biological processes." Plants and animals cannot be patented, with the exception of transgenic micro-organisms, defined in law as being "organisms that express, through direct human intervention in their genetic composition, a characteristic that cannot be achieved by the species in natural conditions." This, therefore, eliminates the possibility of patenting products extracted from the biological diversity of the country; those that are merely removed from their natural environment.

Certain categories of inventions which could not be patented according to the 1971 Industrial Property Code, such as pharmaceuticals, food and chemical products, and metal alloys, now can be according to the Law No. 9,279. Biotechnological processes, even those that resort to the use of micro-organisms found in nature, as in other chemical and physical processes, can also be patented. New cultivars, plants produced by programmes of genetic enhancement, are excluded from patenting, but can be protected through the Cultivars Protection Law (Lei de Proteção de Cultivares, No. 9,456, 25th April 1997).

By approving the new Industrial Property Law, Brazil is implementing its obligations undertaken internationally in the ambit of the Trade Related Aspects of Intellectual Property - TRIPS Agreement, part of the General Agreement on Tariffs and Trade - GATT, signed by Brazil in 1994 with effect from January 1995. TRIPS is the document implementing the agreement between the World Intellectual Property Organization - WIPO and the World Trade Organization - WTO. Brazil is also creating the necessary conditions to strengthen scientific and technological co-operation in a globalised environment, as well as to attract new overseas investments to the Brazilian market. Measures are being taken to ensure that Brazilian researchers and research institutions receive a return on the economic results of their intellectual efforts. In these terms, it is completely compatible with the current policy for industry, science and technology - both as an inducement to attract productive investments and the effective transfer of technology and as a means of rewarding the efforts of Brazilian researchers and inventors.

#### **4.1.6 Advances in Protection of New Species Legislation**

After five years of discussion, National Congress passed the Cultivar Protection Law No. 9,456, in force since 28th April 1997; an instrument with important repercussions in the area of foodstuff diversity. According to this Law, cultivars can be protected which are homogeneous, stable,

and clearly distinct from other existing cultivars, and the characteristics of which are maintained through successive replications.

The person responsible for developing new genetic material, or the company where he works, has the right to apply for a Certificate for Cultivar Protection (Certificado de Proteção de Cultivar), which guarantees the intellectual property and the right to receive royalties. To obtain this protection, the applicant must describe the characteristics of the cultivar and demonstrate its stability, homogeneity and distinctiveness, according to the norms laid down by the National Service for Cultivar Protection (Serviço Nacional de Proteção de Cultivares) created in April 1997 within the Ministry of Agriculture and Supply. The Certificate can be sold. Anyone commercialising protected species without authorisation is obliged to indemnify the holder of the certificate, and is also liable to a fine and the seizure of the product.

The agriculturalist using the species can reserve seeds or seedlings for his own use, either for consumption or for planting. Researchers can also use it as a source of variation in genetic improvement or in other scientific research. The Law also allows smallholders to reproduce cultivars for donation or exchange, or for subsistence farming.

The general framework of the new Cultivars Protection Law follows the model of the 1978 version of the Convention of the International Union for the Protection of Plant Products (União Internacional de Obtenções Vegetais - UPOV). Brazilian membership of this Convention was without doubt one of the most debated justifications in the discussions on this Law in National Congress. Although it follows the principle parameters of the UPOV 1978 Convention, the Brazilian Law already incorporates the protection of essentially derived varieties, a new concept that appeared in the 1991 version of the Convention to accommodate change in attitude brought about by biotechnology and genetic improvement.

During 1997, all the necessary legal instruments for Brazil to enter UPOV were approved by the Legislative and Executive branches of the Government. Final approval is still pending in the National Congress, but this should be resolved in early 1998, and subsequently allow for the Ministry of External Affairs to finalise the process Brazil's membership of UPOV.

#### **4.1.7 The Law of Environmental Crimes**

The Law of Environmental Crimes, No. 9,605, approved by National Congress on February 13th 1998, represents a major advance for the Brazilian Nation and its environment. It establishes and defines new forms of crime in the context

of technological advances and the globalisation of the world economy. It incorporates the guiding principles of modern penitentiary policy and penal theory in its emphasis on preferring penalties that restrict rights rather than imprisonment. It also restructures the previous legislation dealing with environmental crimes, a substantial part of which was inadequate, poorly defined or out of date. Among the main distortions were the lack of definition of exactly which activities were harmful to the environment and those having major impacts on the quality of life, the lack of legal norms and excessive severity towards crimes with only minor legal or social consequences. This meant that the majority of cases taken to court were improperly dealt with, and consequently no resolution for the environmental damage caused.

The new Law seeks to streamline sentences, making their duration more just and more compatible with the offence, as well as defining more clearly the circumstances that should increase or mitigate the penalty. Another aspect is the criminal responsibility of companies, which have to answer for infringements of the environmental law however they may have been committed, whether by decision of their legal or contracted representative, of their board in the interest of the company, or of anyone who by any means contributed to the crime, in proportion to their degree of responsibility. Similar legislation already exists in a number of countries, including the United States, Canada, France, New Zealand. The law also punishes any director, administrator, member of a technical council or board, auditor, manager, agent or representative of a company who knew of the criminal conduct but did nothing to prevent it.

The so-called restricting rights penalties (*penas restritivas de direito*), or simply alternative penalties, to replace prison sentences, places an excellent instrument at the Judge's disposal, allowing him to select the most appropriate option for the case, from the point of view of dealing both with the culprit and the environmental damage caused. Examples of options include: community service, making the guilty party do unpaid work in parks, public gardens or protected areas; temporary loss of rights, banning the culprit from entering any contractual relations with the state, receiving tax incentives or any other benefits and taking part in bidding processes for a period of five years; partial or total suspension of activities, in cases where there is negligence or disregard for legal rules and restrictions; financial service, which consists in the monetary payment of a sum fixed by the Judge to the victim or to the public or private institution involved; and, finally, house arrest, based on the culprit's self-discipline and sense of responsibility, allowing him to work, attend a course or take part in any authorised activity without custodial supervision, but requiring him to spend his free time in his home or other place where he habitually lives, as determined by the Judge.

The new law also provides for the compulsory liquidation of any company set up or used for the purpose of facilitating or hiding any environmental crime, and the transfer of its assets to the National Penitentiary Fund; it introduces the cancellation of punishment in exchange for reparation of the damage to the environment, highlighting the concept of environment versus the loss of liberty; emphasizing the concept of prevention, by introducing the crime of danger, which is expressed as the need to prevent dangerous conduct or activities; the criminalisation of any act that aims to kill, chase, hunt, catch or use native or migratory wildlife, without a licence from the appropriate environmental authority; criminalisation of ill-treatment of domestic and non-native animals; and finally it decriminalises hunting for reasons of hunger, in a state of necessity, in view of social and cultural imbalances, including the age-old tradition of subsistence hunting.

It severely punishes practices harmful to Brazilian wildlife, such as destroying or damaging native or non-native forest or forest for permanent preservation; causing direct or indirect damage to protected areas; causing fires; letting loose fire balloons that might set fire to the forest or other vegetation; extractivist activities in forests set aside for permanent preservation; interfering with natural regeneration; receiving or acquiring timber and other plant products without a licence; making hardwood into charcoal and using power-saws without authorisation.

Pollution, toxic substances, the disposal of solid, liquid and gaseous wastes, residues, and oil or oily substances are also carefully dealt with in the Law of Environmental Crimes. Anyone who causes pollution of any kind to a point where it may result in harm to human health, or who causes the death of animals or the destruction of flora, can be punished with one to six years' imprisonment. The law also criminalises conduct considered reprehensible, such as defacing public property with graffiti, and carrying out large-scale construction work without an environmental impact study.

This legislation has also given the agencies that administer environmental policy a powerful instrument to contain the depredation of nature, with a number of possibilities for applying administrative reprimands: warnings, simple fines, daily fines; the confiscation of animals, products and by-products of plants and animals, tools, equipment or vehicles of any kind used in the unlawful activity; destruction of the product, or rendering it useless; suspension of the sale and manufacture of the product; embargo on the work or activity; demolition of the construction; partial or total suspension of activities; suspension or cancellation of registration, licence or authorisation; loss or reduction of tax incentives and benefits; loss or suspension of participation in lines of credit from official bodies; and banning from contracts with the Public Administration for a period of three years.

The new law highlights international co-operation for the preservation of the environment by stating that, except in cases affecting national sovereignty, public order or good customs, the Brazilian Government will offer all necessary co-operation to any other country, without onus, when asked, for the production of evidence, examination of objects and places, temporary presence of any prisoner whose evidence may be relevant to the decision of a case, and other forms of assistance permitted by the legislation in force or by the treaties to which Brazil is a party.

## **4.2 Advances in Sectorial Policy**

### **4.2.1 Brazilian Forestry Policy**

In recent years, the principal instrument for implementing the policy of biodiversity conservation in forests has been the PPG-7, with the financing of projects in the Amazon and the Atlantic forest.

From now on, progress will depend on combining efforts in the realm of this programme with policies defined by the Chamber of Policies for Natural Resources (Câmara de Políticas de Recursos Naturais), which functions under the jurisdiction of the Home Office (Casa Civil) of the Presidency of the Republic and by the Secretariat for Strategic Affairs (Secretaria de Assuntos Estratégicos - SAE). These combined efforts will be based on the Diagnosis and Ecological-Economic Zoning (Diagnóstico Ambiental e Zoneamento Ecológico) of the region, together with the programmes under way within the Amazon Agenda 21, with the Charter of Principles approved by the Governors of the Amazonian states, with the National Integration Policy for the Amazon Region (Política Nacional de Integração para a Amazônia Legal, proposed by the National Council for the Amazon Region [Conselho Nacional da Amazônia Legal - CONAMAZ] created by the President of the Republic), with the initiatives within the National Programme for Biodiversity (Programa Nacional da Diversidade Biológica - PRONABIO), and with other programmes developed by the federal public administration in the MMA, as well as other institutions such as the Ministry of Justice/FUNAI, and the Brazilian Science Council (MCT/CNPq). It will also depend on articulation with public and private universities, with the respective state research support foundations, with state and municipal governments, with international agencies, with the other Amazonian countries and with society, through NGOs and institutions representing the business sector.

PPG-7 itself is being reassessed. The question of the need to release new funds was debated at a meeting to review and discuss the activities so far developed, held in Manaus in November 1997. Up till then US\$ 211.67 million had been



invested (US\$ 188.99 million from donors and US\$ 22.68 from the Brazilian counterpart). When announced in 1990, the programme expected to invest US\$ 1.6 billion.

The experience gained has shown the need to consolidate the initiatives developed in the first phase. One of the most difficult areas is in the protection of indigenous lands and societies, to give Indians the means for physical and cultural survival within the demarcated limits, with a sustainability which also ensures the conservation of biodiversity. This process is becoming more and more complex with the encroachment of other cultures, as cultural adaptation tends to transform internal standards and lead to the adoption unsustainable practices. Proposals include ecotourism and forestry management.

Considerable further investment is needed to strengthening scientific and technological research in the Amazon. The National Institute for Amazon Research (Instituto Nacional de Pesquisas da Amazônia - INPA), Manaus, and the Emílio Goeldi Museum (Museu Paraense Emílio Goeldi - MPEG), Belém, are two long-standing Amazonian research institutes which combined have contributed more than any other institution in increasing our understanding the highly complex and varied ecosystems of the region. Besides these centres of excellence, new investments are needed to build up new research nuclei and the universities in Amazônia, to train researchers and to increase the human resources available.

Stability and regularity in the financing of the demonstrative projects is vital. The Atlantic Forest, along with Madagascar's coastal forest, is the most endangered tropical forest ecosystem in the world and new investments will also be necessary for the conservation of its highly endemic biota, the recovery of degraded areas and for environmental and forest management. The need to develop new partnerships, especially with the private sector, is evident. Entrepreneurs in the Amazon region are aware of the need to for models for the sustainable exploitation of the resources there.

### **Broad forestry policies**

At the 3rd Meeting of the United Nations' Commission for Sustainable Development (CSD) in 1995, Brazil proposed the creation of an Intergovernmental Panel for Forests to promote the protection of native forests through the articulation of policies which include economic, social and cultural aspects relevant to the sustainable exploitation of their resources. The proposal was approved.

The basis for the Brazilian proposal was a list of the causes for deforestation and the degradation of forested areas: 1) current standards of production and consumption; 2) poverty; 3) population growth; 4) lack of environmental

knowledge and education; 5) the terms of international exchange; 6) discriminatory commercial practices in the world markets, and; 7) non-sustainable policies and practices in agriculture, power generation, commerce and forestry management.

Analyses carried out by the MMA had demonstrated the need to include environmental costs in the evaluation of economic activities affecting forests. Specifically, it is necessary to take into account the true value of forests, as a provider of both products and environmental services, in the present and the future. This value should be included in the price of timber and non-timber products from the forests. The market in general has to date failed on this account, and prices do not adequately reflect the environmental costs of logging which leads to excessive exploitation and consumption. The analyses also showed the economic and social importance of logging in the Amazon region. In the state of Pará, for example, the timber industry comes second only to mining as a source of income, employment, exports and taxes. Disregarding the environmental costs, the production of raw timber increased from 4 million to 39 million m<sup>3</sup> a year (70% of the national total) between 1975 and 1991. In 1995 Brazilian timber exports reached US\$ 1.14 billion, 45% of which was from the Amazon states.

In most cases, however, the manner in which forest resources are exploited, even when 'legal', continues to be marked by empiricism, depredation and waste. The MMA report concluded that "Native forest resources are regarded as a stockpile, and their exploitation still corresponds to the liquidation of natural capital". These circumstances, mean that logging is like mining; a non-renewable resource. For every cubic metre of timber taken from the forest, on average two more are wasted. Predatory logging leaves behind a residue of broken dying trees, branches and dry leaves, favouring the spread of fires in the dry season. Highway construction, and the consequent expansion of agriculture and cattle-ranching, is another highly significant impact on the forests and their biodiversity, and is frequently accompanied by the invasion of indigenous lands and/or illegal logging.

In spite of the fact that the productive timber potential in the Brazilian Amazon region is assessed at 10 billion m<sup>3</sup>, these factors combined mean that there are already some regions, such as Paragominas in Pará, for example, where there is already a relative shortage of trees for the timber industry.

There has been some progress in the legislation dealing with these problems in recent years. Regulations concerning the transport of forestry products from plantations, the transfer of deposits, and the transport native or planted forestry subproducts such as ornamental, medicinal or aromatic plants, seedlings, roots, bulbs, vines and leaves of

native origin, as well as charcoal derived from native tree species, were established by the IBAMA Normative Edict No. 44, 6th April 1993.

An important step was taken with publication of the IBAMA Edict No. 71, 11th July 1994, which deals with some of the most important timber species. It created a system of control over sawn wood of mahogany (*Swietenia*), virola (*Virola surinamensis*), Paraná pine (*Araucaria angustifolia*) and 'imbuia' (*Ocotea porosa*). Timber of these species became subject to curtailment, requiring the approval of sustainable forestry management plans besides authorisation in cases of forest clearance.

Further regulations for the exploitation of primitive rain forest and other vegetation types in the Amazon were established by Decree No. 1,282, 19th October 1994. Exploitation is only permitted under the form of sustainable forestry management. One of the principles required by the Decree for this type of exploitation is the 'maintenance of biodiversity'. Projects involving more than 2,000 ha require an environmental impact study. The Decree renews the prohibition against the felling or commercialisation of Brazil nut trees (*Bertholletia excelsa*) or rubber trees (*Hevea brasiliensis*) in primitive or regenerating native forests. In addition, clear-cutting in the Amazon is restricted to areas selected by Ecological-Economic Zoning for alternative use of the soil. Landowners are obliged to maintain intact at least 50% of their property as a Legal Forestry Reserve (increased to 80% in 1996 by Presidential Provisional Measure in 1996).

The IBAMA Edict No. 83, 15th October 1996, created new regulations for the exportation of merchandise, products or subproducts of the Brazilian native or non-native flora. Charcoal, for use in the iron and steel industry or for domestic purposes, is the main destructive force in the Cerrado and Caatinga. Decree No. 750, 10th February 1993, prohibits the cutting down, exploitation or suppression of primary and secondary forest in advanced or medium stages of regeneration, in the Atlantic Forest. The IBAMA Normative Instruction No. 1, 25th February 1994, established guidelines for forestry management plans in the Caatinga.

The IBAMA Edict No. 113, 29th December 1995, set down the rules for the exploitation of primitive forests and other wooded areas in the southern, south-east, central-west and north-east of the country. Exploitation in these regions is conditioned to approval of sustainable management plans which, among other things, take in account the maintenance of regional biodiversity. This Edict also states that, where there is a significant concentration of babassu palm (*Orbygnia martiniana*), only 30% of the area may be cleared. It also forbade the cutting down or commercialisation of the pequi tree (*Caryocar brasiliensis*) in the Cerrado. For the north-east, a minimum of 20% of each property must be set aside as a Legal Forestry Reserve.

As can be seen, the principles and notions of sustainable forestry management are already provided for in the legislation on forest exploitation by 1994 (Decree No. 1.282, 19th October 1994). A number of measures proposed as a result of the MMA analyses, including many mentioned in the MMA "Environmental Guidelines for the Forestry Sector" (Diretrizes Ambientais para o Setor Florestal) have also been incorporated into the new legislation:

- Permanent suspension in economic instruments, fiscal, for example, which favour predatory or improper use of forest resources;
- Elimination of incentives for new agriculture and cattle-ranching projects in forested areas of the Amazon, and elimination of subsidies built into rural credit for agriculture in the region;
- Institutionalisation of the Green Protocol programme, which takes into account environmental protection in contracts of credit;
- Obligatory environmental impact assessment for any project requiring financing;
- Creation of a Regional Process, known as the 'Tarapoto Process', of the definition of criteria and principles for the sustainable management of Amazon rain forest, in the ambit of the Amazon Co-operation Treaty (Tratado de Cooperação Amazônica - TCA);
- Law No. 9,393, 19th December 1996, defines new regulations for Rural Land Tax. This Law states that parts of property not subject to land tax are: a) Areas of Permanent Preservation; b) obligatory Legal Forestry Reserves; c) areas declared by the competent body to be of ecological interest for the protection of ecosystems; d) areas unsuited for agriculture, cattle-ranching, fish farming, forestry or fruit. In the past, the concept of 'unproductive land', e.g. land liable to expropriation and agrarian reform, led owners to destroy forests for this reason alone.
- Law No. 9,393, 19th December 1996, states that for tax purposes, the entire usable forest area in each property is considered 'productive', provided it is part of a sustainable management plan, and not just the area used the previous year;
- Of extreme importance is the Provisional Measure 1,511, signed by the President of the Republic in July 1996, which alters Article 44 of Law 4,771/1965 (Forest Code). This states that in properties in the Amazon region in which the vegetation is forest, clear-cutting is allowed for 20% of the area of the property (not 50% as previously). This Measure has had the effect of not only reducing the forest area susceptible to clearing but also eliminates the possibility of further

forest destruction on properties which already have areas which have been cleared or degraded;

- When re-edited, this Measure was modified. Only small properties of up to 100 ha can be excluded from the restrictions imposed on clear-cutting forest for agricultural activities. This change is in keeping with the limits established by Law 9,393/96 for Rural Land Tax (Imposto Territorial Rural - ITR), which provides for exemption for small properties. The limit of 100 ha ensures subsistence for the smallholder and his family, while respecting the Legal Reserve ruling of a minimum of 50% of the forested area on the property;
- Decree 1,963, July 1996, suspended the issue of new permits for the felling of mahogany and virola and led to the cancellation of 70% of the previously-approved management plans.

The MMA also proposes to create reserves and make public land available for sustainable forestry under State control, management and administration, in such a way to recover means of access to resources and establish criteria and norms for their use and exploitation by the private sector. This will involve a model for the sustainable management of public forests. One of the first legal public tenders, in 1997 for the Tapajós National Forest, was cancelled because of land-ownership problems. A new tender will be published and it is expected that the model will be extended to other national forests (Florestas Nacionais - FLONAs).

The MMA considers it essential to provide support for development, modernisation and training in regional forestry industry, fitting economic-financial instruments and mechanisms to all stages of sustainable forestry production and increasing the total aggregated value of the products.

In March 1995, the Governors of the Amazon states approved a Charter of Principles (Carta de Princípios), which led to Decree No. 1,541, 27th July 1995, regulating the activities and powers of the National Council for the Amazon Region (Conselho Nacional da Amazônia Legal - CONAMAZ). CONAMAZ Resolution No. 4, 14th July 1995, presented a National Integrated Policy for the Amazon Region (Política Nacional Integrada para a Amazônia Legal) to the Presidency of the Republic. This Policy recommends a new development strategy, focused on respect for the diversity of the region, the articulation of economic, social and environmental factors, and the resolution of regional conflicts and inequalities. The Amazonia Project outlined substitutes former, outdated and piecemeal policies with integrated policies not only within the Brazilian Amazon but also between Amazonian countries.

The directives of this policy presuppose a new direction for economic growth and production in the area, as well as

internal and external integration, based on a new strategy for the management of the region. Underlying the policy is Ecological-Economic Zoning. This involves the division of the Amazon region into three basic types of zone, each with distinct purposes: 1) productive zones; 2) critical zones (requiring suitable technology for their management and 3) special zones, of two types: a) indigenous lands, Extractivist Reserves (Reservas Extrativistas - RESEXs) and other protected areas and b) sites of relevant historical, scenic or cultural interest for ecotourism, as well areas of strategic importance, frontiers or otherwise. The Ecological-Economic Zoning is carried out on a minimum scale of 1:250,000, and once concluded, economic activities will be restricted according to the limitations imposed, but with 50% minimum of the forest area on each property being designated as a Legal Forest Reserve. The Policy also considers the well-being of the resident human populations, including education, health, transport, and housing, training (technical and higher education), the resolution of problems of land-title, participation in decision-making, and due respect for ethnic and cultural differences.

In 1996, the Chamber for Policy on Natural Resources (Câmara de Políticas de Recursos Naturais) of the Home Office (Casa Civil) of the Presidency of the Republic approved a reformulation of the Brazilian Forest Policy (Política Florestal Brasileira), which will be implemented by various programmes:

- National Programme for Planted Forests (Programa Nacional de Florestas Plantadas);
- National Programme for Conservation and Sustainable Use of Native Forests (Programa Nacional de Conservação e Uso Sustentável das Florestas Nativas);
- National Programme for Monitoring and Control of Deforestation and Man-made Fires (Programa Nacional de Monitoramento e Controle dos Desmatamentos e Queimadas)
- National Programme for Production and Development of the Rational Use of Forest Biomass (Programa Nacional de Produção e Desenvolvimento do Uso Racional de Biomassa Florestal), to relieve pressure on native forests.

This reformulation identified a number of critical points which need to be resolved:

- Adjustment of federal and state policy for the growth of agriculture, colonisation and agrarian reform, to include the concept of sustainable use;
- Reversing predatory tendencies in the use of forest resources;
- Avoiding the predicted shortfall in forest raw material (especially in planted forests);

- Organising and controlling itinerant forestry;
- Updating data bases on production, trade, consumption and inadequate use (waste, deforestation and fires) of forest resources, to facilitate decision-taking;
- Achieving a reasonable assessment of agricultural growth, and the deforestation and burning which results;
- Making resources available for the use of the most up-to-date technology available for the action of monitoring and control.

The Chamber for Policy on Natural Resources also noted the need to set up a forestry base for the pulp and paper industry, which currently involves 1.5 million ha of plantations, which should double according to predictions of the future demands. For the period 1995 to 2005, it is expected that US\$ 13.5 billion will be invested by this industry, of which US\$ 2.0 billion will go to plantations. Today, Brazil is the world's biggest producer of short-fibre cellulose, the 7th biggest of long-fibre cellulose, and the 11th in paper manufacture. Making the raw material available from planted forests will reduce the impacts on natural forests.

The Policy for Rubber (*Política da Borracha*), re-defined by Law 9,749, 12th August 1997, also considers the conservation of Amazonian biological diversity. This Law substitutes all previous legislation on the subject and establishes an economic subvention, in force for eight years, for the costs producing Brazilian natural rubber to be equivalent to the costs of imported rubber. Pressure for this has increased now that imports have been liberalised, and also overcome a temporary crisis due to a reduction in the demand for rubber by agriculture. This measure, part of the Amazon Solidarity programme (*Amazônia Solidária*), has had significant influence in the maintenance of Extractivist Reserves (RESEXs) and the conservation of the biodiversity they contain. The Law includes a programme for improving the social and economic conditions of the rubber-tappers in the Amazon, as well as providing incentives for the multiple sustainable use of the forest. About 10% of Brazilian rubber production is extractivist, while there are more than 200,000 ha of rubber plantations.

Biodiversity conservation will also benefit from the negotiation, in progress, of a new Federal Pact (*Pacto Federativo*), between the Union, the states and municipalities in matters concerning the environment. The Pact prescribes a process of decentralisation, allowing for environmental control through civil institutions and by state and municipal councils.

Considering the reformulation of IBAMA, federal pacts are being signed with state environment institutions

regarding collaboration and the sharing of responsibilities in environmental and forestry management. Such pacts have already been signed with the states of Minas Gerais and Goiás. Negotiations are well under way with Paraná, Mato Grosso and Mato Grosso do Sul, and have also begun with the states of Amazonas, Pará, Ceará, Bahia and Santa Catarina.

#### 4.2.2 Environmental Directives for Fisheries

Annually, Brazil produces about 700,000 tons of fish, approximately 70% from the ocean, 20% from freshwater and nearly 10% from fish-farming, a practice which has grown considerably in recent years. There is room for expanding the national fishery industry, but the supposedly enormous potential represented by thousands of kilometres of ocean within Brazilian territory and some of the largest watersheds in the world, is not realised in large part for environmental reasons. Tropical waters tend to have high species diversity but a low biomass when compared to temperate waters. Most of the Brazilian coast is relatively unproductive.

For these reasons, the current fisheries policies differ from those of the late 1960s, when economic instruments to support production and promote regional development were not always compatible with the sustainability of the industry and its resources. At that time, policies were directed towards the industrial sector and the sizeable incentives made it difficult to assess the economic viability of fishing activities. The policies also ignored the large majority of small fishermen, despite the fact that at that time they accounted for 80% of national fish production. Policies, tended, therefore, to benefit only a few people, thus increasing socio-economic inequalities. They provided incentives for the export of prime products, while neglecting the administration of collectively significant production on a small-scale.

The fisheries sector still suffers, directly or indirectly, as a result of these misguided policies, based on the belief in the 1960s that the seas and oceans were inexhaustible and, therefore, of free access. Problems include the widespread degradation and occupation of ecosystems which are important for fisheries. Besides excluding fishing as a viable economic activity in many areas, the loss of productivity of the ecosystem as a whole has affected the fish stocks over wide areas. Together, these factors can be expressed as waste, over-dimensioning of the industry, lack of trained labour, and overfishing of the important species.

Many of these problems are reversible. Once tackled, and bearing in mind stocks in the Marine Economic Exclusive Zone, the potential of which has still to be fully exploited, the country could increase production considerably. This

sector of the economy, mostly informal, has a turnover of about one billion dollars a year, and about four million people directly or indirectly depend on it. Current policies aim for the sustainable development of the fishing industry. When drawing up new Environmental Guidelines for the Fisheries Sector (Diretrizes Ambientais para o Setor Pesqueiro), the MMA incorporated a number of documents and concepts such as the Code of Conduct for Responsible Fishing, published by the Food and Agriculture Organization (FAO) of the United Nations in 1995 and the Convention on Biological Diversity and Agenda 21.

These guidelines have been important in formulating present policy in the sector, and contributed to the Master Plan for Fisheries and Fish-Farming (Plano Diretor para a Pesca e Aquicultura Nacional) and their respective Basic Plans for Maritime Fishery, Continental Fishery and Fish-Farming (Planos Básicos para a Pesca Marítima, Pesca Continental e Aquicultura), within the ambit of the Executive Group for the Fisheries Sector (Grupo Executivo do Setor Pesqueiro - GESPE), established by Decree No. 1696, 13th November 1995. The aim of GESPE is to co-ordinate the ministries and institutions involved in the sector. These plans were discussed with the private sector (industry and small fishing fleets), NGOs, research and government institutions. They were concluded in 1997, and the Master Plan is now being examined by GESPE for final approval.

A number of measures are contemplated in the Master Plan:

- Updating current legislation, with discussion on the draft project for the Fisheries Law;
- The conception of the National System for Information on Fishery and Fish-Farming (Sistema Nacional de Informações da Pesca e Aquicultura - SINPESQ), in the final stages of completion, and which aims to collate and divulge information on fisheries;
- Technical support for the allocation of quotas of tuna within the ambit of the International Commission for Conservation of the Atlantic Tuna (ICCAT);
- The Programme for Assessment of the Sustainable Potential of Live Resources in the Economic Exclusive Zone (Programa de Avaliação do Potencial Sustentável dos Recursos Vivos da Zona Econômica Exclusiva - REVIZEE), under way since 1994;
- The National Programme for Coastal Management (Programa Nacional de Gerenciamento Costeiro - GERCO), under way since 1988 and having a direct interface with fisheries;
- Fishery Regulation (Ordenamento Pesqueiro) for the principal commercial species of the Coastal Zone,

with the participation of businesses and fishermen; the plans which regulate lobster and shrimp fishing in the south and south-east have already been concluded;

- The Programme for Continental Fisheries/Management by Watershed (Programa de Pesca Continental/Gerenciamento por Bacia Hidrográfica) which establishes the watershed as the planning unit to ensure the integrated management of natural resources. Most important are the Amazon and Paraná basins (already concluded) and the Araguaia/Tocantins basin (in progress). There is also the Programme for Integrated Management of the Natural Resources in the Sao Francisco Basin, the focal point of which will be fishing;
- The National Programme for the Development of Amateur Fishing (Programa Nacional de Desenvolvimento de Pesca Amadora), important especially for the south-east and the Pantanal of Mato Grosso.

### Coastal Management

In parallel with the Ecological-Economic Diagnosis, the MMA is co-ordinating the implantation of the National Programme for Coastal Management (Programa Nacional de Gerenciamento Costeiro - GERCO) involving all of 17 coastal states and the municipalities along the Brazilian Atlantic coast.

A central objective of GERCO is to realign public Union policies which affect the coastal zone to integrate the activities of the states and municipalities and incorporate measures for sustainable development. To this end, GERCO has been involved in: a training scheme which has included more than 100 technicians of state and municipal environmental agencies, as well as manuals and guides on coastal management techniques and options; a project for the elaboration of models and alternatives to improve the methodological basis for coastal zoning (diagnoses and scenarios); mapping; norms for management plans; and the construction of an analytical economic model, specifically to meet the needs of the Programme.

Some of the products resulting from these activities are:

- An evaluation of federal policies in tourism, transport, industry and urban development which impact coastal zones;
- A profile of the coastal zone of each of the 17 states;
- A macro-diagnosis of the Brazilian coast, including land occupation, natural physical features, vulnerability and risk potential, protected areas and legislation;

- Installation of the SIGERCO (Sistema Integrado de Gerenciamento Costeiro) database and training for its managers.

State plans have also been drawn up. Coastal zoning has been carried out in the state of Paraná; the east coast of Rio Grande do Norte; the northern coast of Bahia and Salvador/Bahia de Todos os Santos; the Island of São Luis, Maranhão; the lakes region in the state of Rio de Janeiro; the east of Ceará; the north of Rio Grande do Sul; Amapá; Greater Vitória and the south of Espírito Santo; Piauí; the south of Paraíba; the Salgado region in Pará; the extreme south and north coast of Sao Paulo, and the coast of Santa Catarina. State management plans and monitoring programmes have been developed in Rio Grande do Norte, São Paulo and Santa Catarina, and coastal zone databases have been set up in eight of the states.

### 4.2.3 Brazilian Agricultural Policy

Brazilian agribusiness accounts for about 40% of the nation's GNP. Receipts from exports represent, on average, more than one-third of the Brazilian total. Agriculture is still responsible for 25% of the jobs in the country.

Brazilian agriculture faces many difficulties and contradictions in the incorporation of programmes for conservation and the sustainable use of biodiversity. Some of have already been mentioned in the course of this report. Widespread and serious soil erosion by wind and water, excessive use of pesticides, uncontrolled use of water for irrigation, and conflicts generated by these problems with other sectors, are serious environmental problems affecting both agriculture and biodiversity conservation.

Many problems concerned with the use of water will be resolved with the publication of the regulations for the new National Policy on Water Resources (Política Nacional de Recursos Hídricos, Law No. 9433, 8th January 1997). Progress in biodiversity conservation should result from the limitations for the use of areas in the Amazon Region (preserving the forest), from the Green Protocol, and from the legislation on the Rural Land Tax already mentioned. Monitoring and combat of fires on farms and cattle-ranches, also already mentioned in this report, should also have significant positive effects.

The efforts to make agriculture and cattle-ranching more compatible with biodiversity conservation have a long history. Article 102 of the Agricultural Policy (Política Agrária, Law No. 8171, 1991, establishes that "the soil must be respected as a natural patrimony of the country", and, in Article 3, one of the objectives of the agricultural policy is to "protect the environment and ensure its rational use and the recovery of natural resources". Article 103 of this Law

establishes that the State will give special incentives to the owner who protects and conserves the native forest on his land, who recovers degraded areas or who suffers limitation in the use of his land in order to protect ecosystems. One of the incentives is priority in obtaining official credit. In addition, the owner is exempt from paying Rural Land Tax on the areas considered of Permanent Preservation or Legal Forest Reserves, or on other areas declared as of public interest for preservation. Article 12 defines that priority should be given to the improvement of natural genetic strains, to increase productivity and preserve genetic heterogeneity. Chapter VI, which deals with protection of the environment and conservation of natural resources, requires the State to:

- Preserve the environment and conserve natural resources;
- Discipline and control the rational use of the soil, the water, the flora and the fauna;
- Promote agro-ecological zoning;
- Develop programmes for environmental education;
- Promote the production of seeds and seedlings of native plants;
- Co-ordinate programmes to stimulate the preservation of headwaters;
- Adopt watersheds as units for planning.

The MMA has a representative on the National Council for Agricultural Policy (Conselho Nacional de Política Agrícola) to ensure that agricultural activities are compatible with environmental conservation objectives.

Since 1992, EMBRAPA has been implanting a Programme for Environmental Quality (Programa de Qualidade Ambiental). The analysis that resulted in this Programme pointed to the inadequate management of soils and the major problems of erosion, loss of top-soil, compaction, leaching, silting up of rivers and alterations in the functioning and characteristics of watersheds. Soil-erosion levels in the country vary from 0.4 to 27.4 tons per ha per year, depending on the region and the cultivation regime. Total yearly soil loss is estimated at 840 million tons. It is most serious in the states of São Paulo, Paraná, Rio Grande do Sul and Minas Gerais, where agriculture is long-standing, more intense and mechanised.

Abusive use of agrototoxic chemicals is also a serious problem. Brazil is fifth in the world in the use of insecticides, herbicides and fungicides. By 1991, the use of these products had reached an annual average of 1.27 kilos of active ingredient per ha, with about 50% of the products applied missing their target. In some cultures, such as tomatoes, applications have reached over 30 kilos/ha/year. Between

1964 and 1991, gross consumption of agrototoxic chemicals increased by 276.2%, whereas the area cultivated increased by only 76% in the same period.

Fertiliser consumption in 1994 was 10.5 million tons. It is estimated that 43% of the nitrogen, 41% of the phosphorus and nearly 100% of the salts drained off into watercourses comes from agriculture. It characterises both waste and an increase of these substances in environments for which they were not destined. They cause environmental changes, such as salinisation of soils and waters, eutrophication of watercourses, and changes in biological communities, including species composition and diversity.

The analysis also considers other impacts, such as the ever-increasing demand for water, inundation of areas appropriate for cultivation by hydroelectric plants, fires, clearing for pasture or agriculture, and the draining of naturally seasonally inundated lowlands (*várzea*).

Mechanised agriculture and the activities of small farmers each, in their different ways, lead to over-exploitation of natural resources and the modification of frequently extremely fragile ecosystems. Considering all these factors, the Programme for Environmental Quality of EMBRAPA included the following priority programmes:

- Assessment of the environmental impact of agricultural production systems;
- Assessment of the environmental impact of agricultural technology;
- Development of measures to mitigate the negative environmental impact of agricultural activities;
- Development of technology for environmental restoration;
- Assessment of the environmental impacts of the advance of the agricultural frontier in the north, north-east and centre-west;
- Assessment of the impact caused by agricultural activities in fragile environments in the central-west, south-east and south;
- Assessment of the environmental impact of the use in agriculture of agro-industrial, industrial and urban waste in the south-east and south.

An important part of the research effort of EMBRAPA has been dedicated to a number of projects which already respond to the recommendations outlined in a number of chapters of Agenda 21, notably:

- Chapter 11, Combating Deforestation, 20 subprojects involving 60 researchers - the recovery of degraded areas, sustainable systems of forestry management,

evaluation and conservation of forest diversity, introduction of selected germplasm;

- Chapter 12, Management of Fragile Ecosystems, 6 subprojects involving 18 researchers - revegetation of degraded areas, identification of appropriate plant species, conservation and recovery of fragile soils.
- Chapter 14, Promotion of Rural Development and Sustainable Agriculture, 171 subprojects with 510 researchers - recovery of degraded areas, technologies for agro-forestry systems, production of selected seeds, integrated control of pests and disease, agricultural zoning, sustainable management and conservation of soil and water, sustainable production of meat and milk, technology for small-scale production, organic agriculture.
- Chapter 15, Conservation of Biodiversity, 17 subprojects with 51 researchers - collection, characterisation and conservation of plant, animal and microbe species, quarantine of germplasm brought in from abroad.
- Chapter 16, Safe Environmental Management of Biotechnology, 61 subprojects with 180 researchers - biological control, integrated management, molecular markers, maintenance of agents for biological control, development of bio-insecticides, embryo-transfer, animal immunology, nitrogen fixation.
- Chapter 18, Protection of the Quality and Supply of Water Resources, 4 subprojects with 12 researchers - climatic evaluation, evaluation of water resources, water management, water quality for irrigation.

Also of importance for the conservation of biodiversity is the development of four strategic projects by the Ministry of Agriculture and Supply - MAA, in accordance with the commitments of the Brazilian Agenda 21 and the Pluriannual Plan of the Brazilian Government (Plano Plurianual do Governo - PPA) for the period 1996/99. These are:

- I. 'The Environment and Agricultural Zoning', involving studies of natural, genetic, forestry, and agro-forestry resources and of environmental quality;
- II. 'Social Development and Domestic Agriculture, Food and Education';
- III. 'Economic Development', which includes 'Agro-industrial Development' and 'Basic Investment' (technology, transport, storage);
- IV. 'Environmental Management in Agriculture' (rational use of agrototoxic chemicals).

Another important step to promote biodiversity and natural conservation with agricultural practices was the creation of the National Agricultural Forum (Fórum Nacional de Agri-

cultura) by the Ministry of Agriculture and Supply - MAA (Edict No. 535, 5th September 1996). It includes a number of thematic working groups, including one for sustainable agriculture (Grupo de Agricultura Sustentável). A diagnostic analysis carried out by this Group demonstrated that around 250,000 ha of forest are planted annually (mainly for the production of pulp, paper and charcoal), which is considered a positive contribution towards the conservation of biodiversity and natural resources. This meets about 24% of the industrial and domestic (firewood) demand. The remaining 76% translates into the additional unsustainable exploitation of approximately 3 million ha per year of native forests, mainly in the central-south of the country, and including parts of the Atlantic Forest.

The Sustainable Agriculture Group recommended a series of policies to:

- Increase the supply of forest raw material plantations to meet industrial demand;
- Ensure the long-term maintenance and management of natural forests by businesses as well as farmers;
- Increase the availability of modern technology in the sector, as well as information on the sustainable management of natural and replanted forests;
- Promote the restoration of degraded areas and those in the process of desertification;
- Promote the transition of itinerant agriculture to perennial systems in the Amazon.

The Group also suggests specific policies for familiar farming. There are now around 4.4 million establishments accounting for 22% of the total agricultural area, 60% of the labour force and 28% in total agricultural and cattle-ranching production. Their recommendations include such aspects as areas for plant sanitary defence, conservation of soils and water, commercialisation, training, the implantation of the ISO 14,000 agriculture, and biological diversity.

With regard to biological diversity, they propose: 1) developing national strategies, programmes and plans for increasing and broadening the genetic base for the principal cultures; 2) increase the genetic diversity available to producers; 3) strengthen capacity for the development of new cultures and varieties for specific local conditions; 4) exploit and promote under-used species; 5) expand genetic diversity territorially in order to reduce the vulnerability of the cultures; 6) conserve micro-organisms of interest for agriculture. Further proposals of note include: research to identify key components of biodiversity for the maintenance of natural cycles and processes; assessment of impacts on biodiversity caused by agricultural development projects; the establishment and maintenance of an infrastructure for

*in situ* and *ex situ* conservation of plants, animals and micro-organisms; the promotion of alternative production systems such as organic agriculture.

A number of important organic agriculture programmes are already being carried out in Brazil by, or in conjunction with, nongovernmental organizations, governments and international institutions.

- A Santa Catarina State Agricultural and Cattle-breeding Research Company (Empresa de Pesquisa Agropecuária do Estado de Santa Catarina -EPAGRI) project is testing and divulging no-till systems of commercial crops in rotation with green manure, which, by virtue of forming a substantial layer of dead cover, impedes the growth of weeds.
- Also in the south, over the last 25 years the Association of Studies and Rural Assistance (Associação de Estudos e Assistência Rural - ASSESSOAR) has been stimulating and promoting the use of green manure among farmers in the south-east of Paraná, in order to counter the drop in productivity of the soils through high levels of erosion in the region.
- In the east of the state of Minas Gerais (Zona da Mata), the Centre for Alternative Technologies in the Zona da Mata (Centro de Tecnologias Alternativas da Zona da Mata) has been giving advice to various groups of rural workers for programmes of soil conservation through agro-ecological practices.
- Since the early 80s, various sugar-cane farmers and co-operatives are using a wasp, *Apanteles flavipes*, for the biological control of the sugar-cane borer, thus eliminating the use of insecticide.
- The Ipê Centre for Ecological Agriculture (Centro de Agricultura Ecológica de Ipê - CAE-IPE) has been applying the principle of trophobiosis (plant nutrition management) to apple plantations, based on the principle that a well-nourished plant is not attacked by pests, disease or weeds.
- In the cocoa-growing region in southern Bahia, the Swiss agronomist Ernst Gotsh set up a management system for the Atlantic Forest combining environmental and economic benefits. Based on observation of plant succession, he reconstituted a cocoa plantation by selective weeding and thinning. Over seven years, 5 ha of secondary forest and 100 ha of degraded forest were transformed into agroforests full of wildlife.
- In Rondônia and Acre, a research programme has been studying a reforestation system using mixed species (Reflorestamento Econômico Consorciado e Adensado - RECA) since 1989. It combines the



cultivation of pupunha (*Bactris gasipaes*) with cupuaçu (*Theobroma grandiflora*), Brazil nut (*Bertholletia excelsa*) and palmheart (*Euterpe* spp.).

- Various NGOs of the Alternative Technology Project (Projeto Tecnologias Alternativas - PTA) Network have enabled farmers to regain self-sufficiency in seed supply by enhancing the value of local varieties in the south, south-east and north-east of the country. The Seed Network has reintroduced more than 200 local varieties of maize among agricultural workers. The experiment is supported by EMBRAPA and a similar has begun for beans.
- Two NGOs of the north-east, ESPLAR and CAATINGA, are developing and divulging proposals for improving strains of cattle and goats for small farmers working in semi-arid regions, and for the rational use of the vegetation of the Caatinga, also in partnership with EMBRAPA.
- The Advice and Services for Projects in Alternative Agriculture (Assessoria e Serviços a Projetos em Agricultura Alternativa AS-PTA) has set up and adapted methodologies for participative analyses for local development projects. One of these, the Rapid and Participative Agrosystem Diagnosis (Diagnóstico Rápido e Participativa de Agrossistema – DRPA) is being applied by various NGOs in a number of ecosystems;
- The Bio-dynamic Institute (Instituto Biodinâmica) of Botucatu, São Paulo, gives specialisation courses in biodynamic agriculture.

Considering the interface between agriculture and biodiversity, Brazil has made significant progress in biotechnology, mainly due to the work of the Brazilian Agricultural and Cattle-Breeding Research Company (Empresa Brasileira de Pesquisa Agropecuária - EMBRAPA).

Examples of such progress include:

- Brazilian and Japanese researchers have begun a study of wild rice populations in the Amazon region, which may lead to the identification of the genes responsible for resistance to disease and environmental stress.
- The results obtained by EMBRAPA in relation to nitrogen fixation in varieties of soybeans and other leguminous plants have resulted in savings in the use of fertilisers to the order of hundreds of millions of dollars a year.
- A project for the identification in maize germplasm collections of varieties and strains with genes and heterosis of importance to agronomy, with special

reference to resistance to the main diseases of maize. This project emphasises the importance of tropical germplasm in enhancement programmes.

- Research on the control of diseases of oranges caused by bacteria (citric canker, chlorosis). This programme is of special significance considering that Brazil is the world's largest exporter of concentrated orange juice;
- Studies to combine improvement with the characterisation of the molecular structure of germplasm, to increase the resistance of cattle to diseases and increase productivity;
- Mapping of the sugar cane genome, and the development of biodegradable plastics from sugar cane.
- Techniques for propagation by cloning, and programmes of genetic improvement of eucalyptus have facilitated considerable expansion in the paper and pulp industry, promoting the use of plantations and reducing dependence on native forests.
- Some projects are being carried out which involve the production of genetically modified organisms (GMO), for example, the production of virus-resistant potatoes, and herbicide-resistant beans, soybeans and sugar cane.

In addition to these projects, several new species of maize, cotton and soybean, genetically modified with the *Bacillus thuringiensis* (Bt) gene for resistance to insects, which have been produced by private international companies, are being tested on a small scale. They have been approved by the National Technical Commission for Biosafety (Comissão Técnica Nacional de Biossegurança- CTNBio) of the Ministry of Science and Technology - MCT.

Genetic modification, as such, does not make the organism safe or dangerous. Lack of experience and the potential of these organisms for certain impacts emphasise, however, the need for a preventive strategy, to ensure adequate safety in this area, which is so promising and of such fundamental importance for the future of mankind.

#### 4.2.4 National Policy for Water Resources

Brazil is privileged in terms of water resources. According to the World Resources Institute (WRI-1994/95), annually the country has 5,190 km<sup>3</sup> of renewable water resources, 12.7% of the 40,673 km<sup>3</sup> available world-wide. Outlet is on average 258,000 m<sup>3</sup> a second and, according to the MMA Secretariat for Water Resources (Secretaria de Recursos Hídricos - SRH), the mean availability per capita is 50,810 m<sup>3</sup>

a year. The water resources available differ widely from basin to basin (Table 4-1). Adequate watershed management is decisive for the conservation of biodiversity in the different Brazilian biomes, as well as for the maintenance of the social and economic activities in each. For this reason, of major importance was the approval by National Congress (sanctioned by the President of the Republic) of Law No. 9,433, 8th January 1997, which established a new National Policy for Water Resources (Política Nacional de Recursos Hídricos) and created the basic principles for their adequate management.

- Water is an asset in short supply and of economic value;
- One use of water should not exclude or prejudice another;
- The use of water requires permission;
- The use of water must be paid for;
- Water resource management will be managed in units comprised of watersheds, a single basin, sub-basin or a group of basins, supervised by committees, with the regional Water Board as the Executive Secretary, and representatives from the State, consumers, and civilian society;
- In case of water shortage, priority will be given to domestic supply.

The new policy provides for a National System for Water Resources (Sistema Nacional de Recursos Hídricos), and Water Resource Plans are being prepared using the watershed as the basic management unit, characterising each in terms of their uses in socio-economic terms. These Plans will allow for a diagnosis of the current status of water resources; an analysis of alternatives for population growth, productive activities and changes in soil use; a comparison between availability of water resources and future demand; the definition of strategies and priorities to improve water quality and its rational use; the definition of priority measures and programmes; the definition of priorities for granting access; guidelines and criteria for water rates; and the definition of proposals for creating areas subject to restriction for the protection of water resources.

The National Plan for Management of Water Resources is in preparation, and adjustments will have to be made to state management plans already existing so as to make them compatible. The MMA Secretariat for Water Resources is co-ordinating the work, and also dealing with specific proposals for the integrated management of the watersheds of the Rio São Francisco and the upper Rio Paraguai, with funding from the Global Environment Facility - GEF and

**Table 4-1.** Area and output of some hydrographic regions in Brasil.

Region/watershed	Area (km <sup>2</sup> )	Mean volume (m <sup>3</sup> /s)	% of total output
Amazonas	6,112,000	128,900	72.46
Tocantins	757,000	11,300	6.35
North Atlantic	242,000	6,000	3.37
North-east Atlantic	787,000	3,130	1.76
São Francisco	634,000	3,040	1.71
East Atlantic <sup>1</sup>	242,000	670	0.38
East Atlantic <sup>2</sup>	303,000	3,710	2.08
Paraná	877,000	12,540	7.05
Uruguai	178,000	4,040	2.27
South Atlantic	224,000	4,570	2.57
<b>Total</b>	<b>10,356,000</b>	<b>177,900</b>	<b>100.00</b>

<sup>1</sup> From Japarutaba (Sergipe) to Pardo (Bahia).

<sup>2</sup> From Jequitinhonha (Minas Gerais/Bahia) to Paraíba do Sul (São Paulo/Minas Gerais/Rio de Janeiro).

Source: Barth *et al.* (1987).

assistance from the United Nations Development Programme - UNDP, the Organization of American States - OAS, and the Instituto Interamericano de Cooperação para Agricultura - IICA.

Law 9,433 also provides for a National Council for Water Resources, the supreme organ for defining norms and deliberating over conflicts. The Council will include representatives of the State, users and society. Several Brazilian states are forming state committees for the management of watersheds, and defining criteria for granting rights for the use of water and water rates.

### Programme for Conservation and Revitalising of Water Resources - PCRRH

A Programme for Conservation and Revitalising of Water Resources (Programa de Conservação e Revitalização de Recursos Hídricos - PCRRH) is being developed within the MMA/SRH. The aim is to upgrade water quality and supply where necessary, and carry out measures for the conservation of water resources where possible.

Some of the specific objectives of this Programme are as follows:

- Raise and maintain the availability and quality of water for rural and urban populations;
- Ensure greater regularity in the flow of rivers and watercourses in the wet and dry season;
- Replant/conserves forests bordering water courses;
- Reduce water-borne diseases;
- Make the population aware of the need of sustainability of natural resources;

- Promote correct integrated management of the soil and water;
  - Stimulate the organization of rural producers to find collective solutions to their problems and to invest in productive and social infra-structure;
  - Rationalise efforts and the use of Federal Government, state and municipal financial resources, according to the necessities and priorities identified by rural producers;
  - Facilitate integrated actions between the community and government organs, based on planning for the use and management of natural resources in watersheds;
  - Contribute to participative management of water resources;
  - Reduce the cost of treating water supplied to urban population;
  - Increase production and productivity, with an increase in profitability through reduction in production costs.
- Jucu and Santa Maria (ES);
  - Piranhas-Açu (RN and PB);
  - Araranguá (SC);
  - Canindé and Piauí (PI);
  - Moxotó, Capiá, Ipanema, Traipu and Piauí (AL);
  - Tributaries of the Rio São Francisco in Pernambuco (PE);
  - Xingozinho, Curitiba, Jacará, Capivara, Gararu, Poção, Betume and Riacho Jacaré (SE).

In addition to the Master Plans for Watersheds, there are many projects, subprojects and actions are being implemented, which in the future they will become part of PCRRH.

The Master Plans for Watersheds will provide the basis for the future elaboration of PCRRHs at state level. They are long term, and will contribute not only to a more comprehensive and rational use of water resources, but will also deal with such aspects as flood prevention, river quality, erosion control and the protection of forests and other ecosystems. They will include recommendations on hydric and institutional management of the environment.

The Master Plans consist of:

- A Diagnosis;
- Elaboration of the Plan;
- Proposal of an Integrated Management Model for Water Resources.

Currently, Master Plans for Water Resources are being drawn up for the following basins:

- Verde Grande (MG and BA);
- Paracatu (MG and DF);
- Paranaíba (MG, GO, MS and DF);
- São Matheus (MG and ES);
- Mucuri, Itanhém, Peruíbe, Jucuruçu and Buranhém (BA and MG);
- Tributaries of the Rio São Francisco in Minas Gerais (MG);

- Good Water Project (Projeto Água Boa);
- Control over desertification;
- Soil desalinisation;
- Restoration (Protection) of degraded areas and gallery forests in watersheds;
- Project for Municipal Sustainable Development 'Adopt a River Basin' (Projeto de Desenvolvimento Sustentável de Municípios 'Adote uma Bacia');
- Project for Basic Studies of Water Resources (Projeto de Estudos Básicos de Recursos Hídricos);
- Project for the Treating of Effluents and Solid Residues (Projeto Tratamento de Efluentes Líquidos e Resíduos Sólidos);
- Project for the Monitoring and Improving Multiple Uses of Water Resources (Projeto Monitoramento e Aprimoramento dos Usos Múltiplos dos Recursos Hídricos);
- University Network for Co-operation over Waters (Rede Universitária de Cooperação pelas Águas - RUCA);
- Programme for Sustainable Development of Inundated Forests in the Amazon Region (Programa de Desenvolvimento Sustentável das Várzeas da Amazônia Legal - PRODEVAL).

#### 4.2.5 Master Plan for the Environment and the Electricity Sector

The largest single component in Brazil's energy supply comes from hydroelectric power (37%) - a natural renewable

resource. Advances in the hydroelectric sector do have, however, environmental impacts, involving especially the loss of biodiversity. For this reason, the Master Plan for the Environment and the Electricity Sector (Plano Diretor de Meio Ambiente do Setor Elétrico) established at the beginning of the decade that concessions for hydroelectric plants could only be authorised by the National Agency for Electric Power (Agência Nacional de Energia Elétrica - ANEEL) after a demonstration that the enterprise would meet environmental questions satisfactorily. A Manual of Studies of the Environmental Effects of Electricity Systems (Manual de Estudos de Efeitos Ambientais dos Sistemas Elétricos) has been available since 1986.

In 1986, CONAMA Resolution No. 01/1986 determined that environmental impact studies (Estudo de Impacto Ambiental - IEA) are obligatory for works in the sector. Only after approval of this study and the resulting report (Relatório de Impacto Ambiental - RIMA) could the competent body issue the licence to begin construction, which still has to comply with a number of conditions before obtaining a licence to operate. Another CONAMA Resolution, No. 10/1987, established as a pre-requisite for licensing large-scale enterprises that a minimum of 0.5% of the total costs of the enterprise would go towards the cost of implanting and maintaining an Ecological Station in the immediate region.

The National Commission for Nuclear Energy (Comissão Nacional de Energia Nuclear - CNEN) is responsible for the licensing of nuclear generators, and one of the most important aspects considered is the environmental impact. The 10-Year Plan for Expansion in the Electricity Sector 1990/99 was based on the fact that the greater part of expansion in generating capacity (including thermoelectric reactors) would come from hydroelectric power, because of lower costs and significantly less impact. Forty-seven new hydroelectric power stations are planned, along with 18 thermoelectric, seven carbon-fired, two nuclear and nine of other types.

Up to December 1989, 60 hydroelectric power stations with over 30 MW capacity were in operation in the country, giving a total of 52,225 MW. Their reservoirs covered 23,847 km<sup>2</sup>, or 0.28% of the country. The expansion programme previews that another 13,191 km<sup>2</sup> will be flooded in the near future.

Three of the large power stations planned for the northern region will have significant impact on the environment. The power stations in the expansion plan will affect around 100,000 people. They will also affect some 8,000 people in indigenous land, from 17 ethnic groups. In the Amazon region, 3,336 km<sup>2</sup> will be flooded, which, added to the 5,437 km<sup>2</sup> already flooded, gives 8,773 km<sup>2</sup>, or 0.18% of the region.

In execution is the Plan for Conservation of Electric Energy (Plano de Conservação de Energia Elétrica - PROCEL) which

aims to economise 0,25% of energy consumption each year over the next 20 years. Alternative systems, based on eolic (wind) energy, for example, are being set up in some States, such as Ceará and Paraná, but as yet only on a small scale.

#### 4.2.6 National Policy for the Control of Desertification

Brazil signed the International Convention on Combat of Desertification and Drought in 1994. In order to comply with the commitments in the document, the MMA and the Brazilian Agency of Co-operation (Agência Brasileira de Co-Operação - ABC) signed an agreement of technical co-operation with the United Nations Development Programme - UNDP for the preparation of a National Plan for Combating Desertification (Plano Nacional de Combate a Desertificação - PNCD). The Esquel Brasil Foundation (Fundação Esquel Brasil - FGEB) is the implementing agency with support from the United Nations' Food and Agriculture Organization - FAO and the United Nations Environment Programme - UNEP. A workshop was held to set out a framework for the national policy for control over desertification.

Following the parameters for desertification established by the United Nations, the areas in Brazil which fall into this category are those covered by the semi-arid tropics, although the MMA has also identified a number of other areas with high environmental degradation of this sort, the worst in Alegrete, in the state of Rio Grande do Sul, and the microregion of Jalapão, in the state of Tocantins.

According to the Superintendency for Development of the North-east (Superintendência do Desenvolvimento do Nordeste - SUDENE) the semi-arid tropics cover an area of 980,711 km<sup>2</sup>, including eight states in the Brazilian north-east and the north of the state of Minas Gerais. Areas suffering desertification are shown in the "Map of Susceptibility to Desertification" (Mapa da Susceptibilidade à Desertificação), published in 1992 by the Desert Nucleus/IBAMA (Núcleo Desert/IBAMA).

There are a number of different ecosystems within Brazil's semi-arid region. Droughts and aridity are a serious problem for agriculture and cattle-ranching and most especially for the small to medium-sized properties. This results in serious and chronic socio-economic problems, and migration on a large scale to other regions in the country, including the Amazon.

According to the census of 1991, the population of the semi-arid region numbered 17.8 million, around 42% of the total for the North-east, and 11% of the country as a whole. The population is traditionally rural, with little or no access to commercial markets, and a minimum capacity for absorbing

new technologies. Natural resources are over-exploited, seriously affecting wildlife, environmental quality and the permanence of human populations.

Studies have shown that desertification in the semi-arid North-east is seriously affecting an area of 118,000 km<sup>2</sup> (12% of the region), with impacts being both local (concentrated) and diffuse. Examples of widespread impacts include soil erosion, destruction of the Caatinga vegetation, hunting, and degradation of water resources. The concentrated impacts result in areas of true desert. According to an analysis by the MMA, economic losses through desertification can reach US\$ 800 million a year. Over a 20-year period, restoration of the worst-affected areas is estimated at a cost of US\$ 2 billion.

The objective of the National Policy for Control over Desertification (Política Nacional de Controle da Desertificação) is to achieve sustainable development in regions subject to drought and desertification. Among other procedures, this includes:

- Proposals for environmental management and use of natural resources in the Caatinga and transition areas;
- Proposals for the prevention of desertification, and the restoration of areas already affected;
- Actions to prevent environmental degradation in the transition areas between the semi-arid, sub-humid and humid regions;
- Co-ordination between government and non governmental organizations to establish economic and social development models compatible with the conservation of natural resources and social equality in the region;
- Co-ordination of federal, state and municipal action;
- Strengthening the municipalities, with a view to the development of local strategies for control over desertification.

The principal instrument for this Policy is the National Plan for Combating Desertification (Plano Nacional de Combate a Desertificação - PNCD), in preparation and including the participation of civilians.

The Plan has the following components:

1. Institutional strengthening and interaction;
2. Strengthening and increasing communication and the availability of information on desertification;
3. Managerial and technical training for people managing natural resources in areas subject to desertification;

4. Creating awareness among the people involved in sustainable development in areas of risk;
5. Creating operational capacity at the local level for control over desertification;
6. Elaborating strategies for monitoring, the prevention of desertification processes, and the restoration of desert areas;
7. Definition of priority projects and actions.

All these objectives are already being studied in detail. The MMA has been developing and taking part in a number of initiatives within this general strategy for combating desertification. They include, among others, the elaboration of the National Plan for Combating Desertification, participation in the Desertification Information and Documentation Network (Rede de Informação e Documentação em Desertificação - REDESERT), and support for municipalities with Desertification Nuclei (Núcleos de Desertificação), through institutional organization and training. These initiatives are being developed in co-operation with regional and national institutions, among them being the Ceará Foundation for Meteorology (Fundação Cearense de Meteorologia- FUNCEME), the Federal University of Pernambuco, the Joaquim Nabuco Foundation (Fundação Joaquim Nabuco), the Semi-arid Tropics Research Centre (Centro de Pesquisa do Trópico Semi-Árido - CPATSA), the Mid Sao Francisco Faculty (Faculdade do Médio São Francisco), the Desert Institute (Instituto Desert), IBAMA, the National Institute for Space Research (Instituto Nacional de Pesquisas Espaciais - INPE) and the Applied Economics Research Institute (Instituto de Pesquisa Econômica Aplicada - IPEA).

Currently, efforts are being concentrated on the formulation of the Policy and the implementation of some of its recommendations, most especially the REDESERT programme and support for institutional strengthening of the municipalities where desertification is most intense.

#### **4.2.7 Environmental Directives for the Mineral Sector**

Given the need to deal with the environmental questions in the mining industry, and their repercussions in biodiversity conservation, in 1997 the MMA defined a number of Environmental Directives for the sector. These directives were in keeping with the concept of sustainable development and the commitments assumed through UNCED, Agenda 21 and the CBD. Mineral extraction is of increasing economic importance in the country. Mineral derivatives (metallurgy, cast iron, fertilisers, cement, petroleum derivatives, etc.) represents about 28% of GNP, with direct employment, not

counting open-cast mining and civil construction, accounting for about 100,000 jobs. In order to formulate these directives, diagnostic analyses have been carried out on three of the larger mining subsectors: metallic and non-metallic minerals (for industrial use and fertilisers); minerals for direct use in civil construction; and placer-mining (gold and precious stones). Some of the major problems revealed by this analysis include:

- Inadequacy of the forms of control in providing a uniform treatment for large mining companies, small companies extracting sand, and individual open-cast miners;
- A lack of clear definition of the attributes of organs involved in environmental control, and lack of co-ordination between them;
- The enormous numbers of clandestine operations, and consequently major and widespread harmful environmental effects through pollution and/or the abandon of degraded areas;
- No deposits being made to guarantee the restoration of degraded areas;
- High environmental cost due to inadequate technologies for extraction and processing.

Based on these diagnoses, the MMA defined a number of lines of action in the mineral sector. They include:

- The clear definition of competencies and attributes;
- Integrated inspection;
- Review of the legal instruments;
- Establishment of a single channel for processing permits, independent of the number of environmental organs which need to be consulted.

Incentives were also established for the adoption of environmental management systems and the use of adequate technology. Attempts are also being made to integrate the three government levels (federal, state and municipal) for environmental management for the sector into one single system. It was also decided to set up a Reference Centre for the recommended technologies for the sector, providing information by electronic and traditional means.

Finally, programmes were formulated for training personnel, for giving support to the development of environmental technologies, for incentives to research in environmental control, and for discussion on new concepts relative to 'perpetual responsibility' and 'the potentially responsible parties'. Specific projects are being defined for each.

## 4.2.8 Environmental Education and Public Awareness

The United Nations Conference on the Human Environment, held in Stockholm, June 1972 (the Stockholm Conference), resulted in establishment of the International Environmental Education Programme - IEEP by UNESCO and the United Nations Programme for the Environment - UNEP in 1975. The first Intergovernmental Conference on Environmental Education was held in 1977 in Tbilisi (USSR), in fulfilment of Recommendation 96 of the Stockholm Conference. The Tbilisi Conference resulted in a framework of aims and objectives, guiding principles and strategies for the development of environmental education.

The United Nations Conference on the Environment and Development - UNCED, held in Rio de Janeiro in June 1992, identified the fundamental challenges facing international government policy in the next millennium. Various documents, all signed by Brazil, came out of the Rio 92 Conference. Chapter 36 of Agenda 21 was dedicated to environmental education, political education, and training, and presents an action plan for sustainable development to be adopted by the countries, with a new perspective for international co-operation.

The unofficial Treaty of Environmental Education for Sustainable Societies and Global Responsibility was signed by a number of civilian organizations at the Rio 92 Conference. It informally recognises "education as a dynamic process in permanent construction", involving as such a constant process of debate and reflection, and that "environmental education for an equitable sustainability is a permanent learning process based on respect for all forms of life".

Environmental education is one of components of the 'Ten-Year Plan of Education for All 1993-2003' of the Ministry of Education and Sport (Ministério de Educação e do Desporto - MEC), within the basic education needs of children, teenagers and adults.

Article 13 ('Public Education and Awareness') of the Convention on Biological Diversity states that:

"The Contracting Parties shall:

(a) Promote and encourage understanding of the importance of, and the measures required for, the conservation of biological diversity, as well as its propagation through media, and the inclusion of these topics in educational programmes; and (b) Cooperate, as appropriate, with other States and international organizations in developing educational and public awareness programmes, with respect to conservation and sustainable use of biological diversity."

Chapter 36 (Promoting Education, Public Awareness and Training) of Agenda 21 states that "Education, raising of public awareness and training are linked to virtually all areas in Agenda 21, and even more closely to the ones on meeting basic needs, capacity-building, data and information, science, and the role of major groups."

Coherent with the commitments assumed by Brazil, environmental education is included as one of the principles and aims within the National Policy for the Environment (Law No. 6,938/1981). The Federal Constitution is explicit in defining environmental education as a State obligation.

Article 205 of the Federal Constitution states that "Education, which is the right of all and duty of the State and of the family, shall be promoted and fostered with the cooperation of society, with a view to the full development of the person, his preparation for the exercise of citizenship, and his qualification for work." In article 225: "All have the right to an ecologically balanced environment, which is an asset of common use and essential to a healthy quality of life, and both the Government and the community shall have the duty to defend and preserve it for present and future generations (...) - To ensure the effectiveness of this right, it is incumbent upon the Government to: (...) promote environment education in all school levels and public awareness of the need to preserve the environment". In general, State Constitutions reflect the same principles, and there exists, therefore, a fundamental legal basis for carrying out the recommendations of Article 13 of the Convention on Biological Diversity.

### **Primary Education**

Over the last two years, the Ministry of Education and Sport (MEC) has been proposing some significant changes in primary education. These changes reflect the explicit bases and aims in the Constitution of the Federal Republic of Brazil. Law 9,394, 20th December 1996, established the guidelines and bases for national education. Section III (on primary education) stated: "Primary education, with a minimum of eight years, obligatory and free in the public school, has as its objective the basic formation of the citizen, by means of (...) II -an understanding of the natural and social environment, the political system, technology, the arts and the values on which society is based."

In Brazil, however, some 2.7 million children do not frequent school. They are children between 7 and 14 years old who do not have access to primary education, a basic requisite for them to exercise their full rights and duties as citizens. In 1998, Brazil began the programme 'Every Child at School' (Toda Criança na Escola). Another initiative is the programme of minimum-wage scholarships, created by some city councils and governments to conciliate educational objectives for the more deprived strata of the population.

In addition to opening more places for pupils in schools, it is necessary to create the conditions for them remain there and achieve the required academic success; implying as such a major improvement in the quality of teaching. The Secretariat for Fundamental Education (Secretaria de Educação Fundamental - SEF) of MEC has elaborated the National Curricular Parameters, proposing an education based on citizenship, in which the aim is to promote school-teaching projects linked to the development of capabilities pertinent to the realities of each student. The National Curriculum proposes the inclusion of themes which traverse the various disciplines taught, indicating the means and methods by which this can be done. These themes include: ethics, environment, cultural plurality, health and sexual guidance. The environmental theme deals with such basic notions as natural elements, physical and social factors, and the concepts of sustainability, diversity, values and attitudes. These measures, taken by MEC, local governments and society combined, will contribute to the fulfilment of Article 13 of the CBD.

### **The National Programme for Environmental Education - PRONEA**

The educational responsibilities of the State do not exclude the public in general from the process. This is made clear by the heading of the Constitutional Article 225 in reference to an ecologically-balanced Environment, which states that "both the Government and the community shall have the duty to defend and preserve it for present and future generations".

There is a need for co-ordinated action between the National Environment System (Sistema Nacional do Meio Ambiente - SISNAMA) and the Education System, capable of channelling the efforts of the three levels of Government into consolidating legal commitments. The legal dispositions make it clear that the public, in return, must take part in this process, as its object as well as its agent, whenever possible.

Research has shown that most of the Brazilian population, regardless of their educational level or the region where they live, do not relate the current Brazilian developmental models with the environmental degradation widespread in the country. In general, the introduction of environmental aspects to school curricula is incipient. Environmental education is also highly diverse in the way it is conceived and the way it is treated. It is generally included in the physical and biological sciences, focusing essentially on nature, and fails to incorporate social, cultural and economic dimensions. Its teaching is limited by the small amount of research in this area, particularly from a theoretical-methodological point of view, as well as by the absence of teacher training and the lack of co-ordination between government agencies.

The MMA, with technical support from IBAMA and the Ministry of Education - MEC, have carried out studies with a view to promoting a broad Programme of Environmental Education (Programa de Educação Ambiental) in Brazil, putting the Constitutional dispositions into effect and, as a result, the international commitments to which Brazil is a signatory. These studies have allowed for the elaboration of the principles and the broad framework of co-ordinated action for the Programme. They have been submitted to the Ministry of Science and Technology - MCT and the Ministry of Culture in order to engage their support in their respective areas of competence.

The National Programme for Environmental Education (Programa Nacional de Educação Ambiental - PRONEA) was approved by the President of the Republic on 21st December 1994, by means of the Inter-ministerial Exposition of Motives No. 2, published in the *Diário Oficial da União* on 22nd December 1994. Putting this programme into effect is the responsibility of the MMA, the Ministry of Education and Sport, the Ministry of Culture and the Ministry of Science and Technology.

The principles which inspired the Programme for Environmental Education are as follows:

1. As Environmental Education is a constitutional duty attributed to the State, it requires the joint effort of the Union, the states and the municipalities.
2. State responsibility does not exclude the national community's participation in the process. To the contrary: besides being the global beneficiary of environmental education, the community should become an essential partner of the State in the promotion of educational action and in directing social conscience towards environmental preservation for present and future generations.
3. The main aim of environmental education should be to develop an integrated understanding of the environment in its multiple and complex relations, involving physical, biological, social, political, economic, cultural, scientific and ethical aspects.
4. Environmental preservation also contemplates the sustainable use of natural resources: that is to say that access to these resources by present generations should permit equal access in the future. In short, the aim is to ensure that natural assets are used with responsibility and conscious of the present and future rights of humanity.
5. The encouragement of a single consciousness between the country's regions and between the country and the international community, working for the construction of a society that is environmentally stable and socially just.

In accordance with these essential principals and guidelines, the actions of the National Programme for Environmental Education are based on two perspectives:

- Making environmental education in schools, for present and future generations, less basic in its approach and more systematic.
- Improvements in effective environmental management, with the development of a public conscience or the production of information suited for the various segments of society. The aim is to reach the three segments that will have particular influence on the expected success of the Programme, namely decision-makers, the users of natural resources, and those who work in the field of communication.

The MEC and the MMA are responsible for co-ordinating the establishment of the National Programme for Environmental Education, each according to their respective competence, and without prejudicing the attributes and initiatives of other federal organs. IBAMA will participate actively with the technical-administrative organs involved.

PRONEA is based on seven lines of action:

- Environmental education via formal education;
- Education in environmental management;
- Specific environmental education campaigns for the users of natural resources;
- Co-operation with the media and the social communicators;
- Co-operation and integration of communities on behalf of environmental education;
- Co-operation within and between institutions;
- Creation of a network of centres specialised in environmental education, including universities, technical colleges and information centres throughout the country.

### **The National Environment Fund - FNMA**

The National Environment Fund (Fundo Nacional do Meio Ambiente - FNMA) has supported various initiatives in environmental education, including training courses, environmental awareness campaigns, publications and promotional material (videos, booklets, books, periodicals, information leaflets and audio-visual material). This support has been provided through collaborative agreements with government institutions (for example, universities, research institutes, state environmental organizations, municipalities), and non-profit-making NGOs, throughout the country.



From its inception, in 1989, to the end of 1997, the Fund has supported 533 projects, representing a wide range spread environmental actions in Brazil, and totalling about US\$ 27,550,000 in funding. Of these 533 projects, 153 (29%) have been in environmental education, 35% of the total spent. The FNMA support for environmental education has increased significantly since it was first created. In 1991, when funding was effectively begun in 1991, environmental education comprised only 12.7% of the projects supported, while in the last three years the average has risen to 35%.

The FNMA has funded projects on demand, not inducing or directing the presentation of projects of specific thematic areas. The numbers shown above reflect, therefore, an increasing concern and mobilisation of civil society in terms of environmental conservation.

## Organization and Dissemination of Information

### The Internet

The Internet was first introduced to Brazil in 1990 with the National Research Network (Rede Nacional de Pesquisa - RNP), a programme of the Ministry of Science and Technology - MCT, and run by the Brazilian Science Council - CNPq. Initially it was restricted to the academic community, but it now includes practically all segments of society and, in keeping with world trends, has shown an enormous growth over the years.

In January 1997, 194 countries were linked to the Internet and the number of hosts connected to the network are growing exponentially. Apart from the number of computers connected to the network, there has also been an increase in the number of Web servers, today the principal instrument for the dissemination of online information, and a powerful resource for programmes at a distance.

INTERNET2 is a project to develop advanced applications to meet the requirements of research, teaching and learning. INTERNET2 will allow for the use of collaborative applications in real time, teaching at a distance, and interactive applications, giving a virtual proximity through an advanced communication infrastructure over a wide range.

Examples of applications include teaching, libraries on-line, and information dissemination and tele-information (where the environment is reproduced, the presence and movements of the participants are perceived, and the participants can manipulate information and see the results in real time).

Through the National Research Network - RNP, the Ministry of Science and Technology - MCT has been monitoring the developments of INTERNET2 and taking part in a number of working meetings with the leaders. The participation of Brazil and its higher education institutions

and research centres was included in an agreement on co-operation in technology for education signed in October 1977, on the occasion of President Clinton's visit to Brazil.

Besides monitoring the development of the Internet, particularly in the USA, there are other MCT projects and initiatives which seek to consolidate informatics in Brazil. These projects include:

- The Multi-institutional Thematic Programme in Computer Science (Programa Temático Multi-institucional em Ciência da Computação - ProTeMCC), which seeks to contribute to the enhancement of research and the training of personnel in Computer Science;
- The Softex project, which aims to transform Brazil into a centre of excellence in the production and export of software;
- The National System for High Performance Processing (Sistema Nacional de Processamento de Alto Desempenho - SINAPAD), financed by the research support fund Financiadora de Pesquisas e Projetos - FINEP. It is a national network for services in the field of distributed computation, with emphasis on High Performance Processing (Processamento de Alto Desempenho - PAD).

It is important to include 'biodiversity and sustainable development' on the agenda of these projects as a priority theme for the country and to reap the benefits from the technology now being developed in this area.

### Information on the Network

Brazil was one of the pioneers in the field of distributed information systems, firstly, due to its participation in the Biodiversity Information Network - BIN21, described in detail in Chapter V, and subsequently through the consolidation of the Biodiversity Information Network - Brazil (Rede de Informação em Biodiversidade - Brasil - BINBr). These initiatives have had, and still have, a very important role in creating public awareness through dissemination of information. The BINBr aims to give the Government and society the necessary information for the establishment of priorities and the carrying out of activities which lead to conservation and sustainable use of biodiversity in the country.

One of the aims of the BINBr is to make the scientific and legal information on biodiversity available to the non-specialist community (or at least point to where it is available), especially for schools. Examples include:

- *Miconia* Interactive Key (<http://www.bdt.org.br/bdt/miconia/indice>) which illustrates the characteristics which determine the classification of the species of

this genus of plants with photographs and drawings, work of a team from the State University of Campinas - UNICAMP,

- Restoration of Gallery Forest (<http://www.bdt.org.br/bdt/ciliar/>), a joint study carried out by the São Paulo Forestry Institute (Instituto Florestal, São Paulo) and the 'André Tosello' Tropical Foundation for Research and Technology (Fundação Tropical de Pesquisas e Tecnologia 'André Tosello');
- The list of Endangered Species (<http://www.bdt.org.br/bdt/redlist/>) containing links to the conservation programmes, work of the Tropical Data Base (Base de Dados Tropicais - BDT) team of the 'André Tosello' Tropical Foundation for Research and Technology (Fundação Tropical de Pesquisas e Tecnologia 'André Tosello');
- Understanding the Environment (<http://www.bdt.org.br/bdt/sma/entendendo>), published by the São Paulo Secretariat of the Environment (Secretaria de Estado do Meio Ambiente de São Paulo) (<http://www.bdt.org.br/bdt/sma/>).
- Guide to Denunciations of 'Acts of Aggression to the Environment: How and Who to Appeal to', a manual drawn up by the Fundação SOS Mata Atlântica (<http://www.bdt.org.br/bdt/sos.mata/guia>).
- Deforestation in the Brazilian Amazon (<http://www.inpe.br/amz.htm>), a text written jointly by the National Institute for Space Research (Instituto Nacional de Pesquisas Espaciais - INPE) and IBAMA.
- Protected areas in the state of São Paulo (<http://www.bdt.org.br/bdt/sma/probio/ucsp>), produced by PROBIO/SP of the São Paulo Secretariat of the Environment.

Another aim is to bring together the various academic communities and NGOs working on biodiversity conservation through the maintenance of a directory of specialists (<http://www.bdt.org.br/bdt/whobio/>) and collaboration in collaborative workshops, such as:

- Bases for the Conservation and Sustainable Use of Cerrado Areas of the State of São Paulo (<http://www.bdt.org.br/bdt/sma/cerrado/>), promoted by the São Paulo Secretariat of the Environment (Secretaria de Estado do Meio Ambiente de São Paulo);
- Priority Areas for the Conservation of the Biodiversity of the North-eastern Atlantic Forest (<http://www.bdt.org.br/bdt/workmata/>), promoted by Conservation International do Brasil - CI do Brasil, the Fundação Biodiversitas, and the Ecological Society of the North-East (Sociedade Nordestina de Ecologia - SNE);

- Patterns of Biodiversity of the Atlantic Forest of the South-east and South of Brazil (<http://www.bdt.org.br/workmatasud/>) promoted by Conservation International do Brasil (CI do Brasil), the Fundação Biodiversitas, Fundação SOS Mata Atlântica, and the 'André Tosello' Tropical Foundation for Research and Technology (Fundação Tropical de Pesquisas e Tecnologia 'André Tosello');
- Biodiversity of the State of São Paulo - BiotasP (<http://www.bdt.org.br/bdtbiotasp/workshop/>) a collaborative effort of the São Paulo State Science Research Foundation (Fundação de Amparo à Pesquisa do Estado de São Paulo - FAPESP), the State University of Campinas - UNICAMP, and the 'André Tosello' Tropical Foundation for Research and Technology (Fundação Tropical de Pesquisas e Tecnologia 'André Tosello');
- Biodiversity: Technological Prospects and Opportunities (<http://www.bdt.org.br/bdt/paper/padctbio/>) financed by the Support Programme for Scientific and Technological Development (Programa de Apoio ao Desenvolvimento Científico e Tecnológico - PADCT), through the research support fund Financiadora de Pesquisas e Projetos - FINEP

### Television and the Press

Environmental topics are now widespread in the mass media, such as TV, magazines and newspapers. In recent years, Brazilian television has changed from programmes originating almost exclusively from abroad, to ones which are produced nationally, regionally and locally and incorporating Brazilian ethics and cultural values.

A good example is the TV Cultura, a public television station maintained by the Padre Anchieta Foundation (Fundação Padre Anchieta). It is an educational channel with programmes based on four fundamental points: Education, Culture, Information and Entertainment. TV Cultura launched the programme *REPÓRTER ECO* in February 1992, the first TV newsreel devoted exclusively to scientific documentaries and news items on the environment. *REPÓRTER ECO* reports on environmental technology in Brazil and abroad, ecotourism, environmental education, experiments in sustainable development, wildlife projects and wildlife conservation and research.

In 1973, TV Globo launched 'GLOBO REPÓRTER', a weekly documentary programme on controversial topics of general interest. In the last few years, this programme has given more and more time to Brazil's environmental questions.

The environment is also increasingly evident in the national press. Many newspapers and magazines have a re-

gular column on the environment, or science and technology. Examples include:

- The publication of an entire issue devoted to the Amazon by the magazine *Veja*;
- *Ciência Hoje*, the monthly magazine of the Brazilian Society for the Advancement of Science (Sociedade Brasileira para o Progresso da Ciência - SBPC).
- The publication of a magazine *Superinteressante*, totally dedicated to questions connected with science and technology and the environment.
- *Globo Ciência*, published by the Brazilian television company TV Globo;
- *Agência Estado*, with its column on science and technology.
- *Folha Ciência*, the science supplement of the newspaper *Folha de São Paulo*.

#### **Interaction between Policy-makers and the Community**

The Government understands that the implementation of the Convention on Biological Diversity in Brazil offers opportunities and challenges, and depends on an effective dialogue between the various levels of Government (federal, state and municipal), and civil Society, including the business sector, the environmental non governmental organizations (NGOs), academics, and scientists.

A number of initiatives illustrate the Government's real commitment to working in partnership. In June 1994, the Federal Government and leaders of civil society signed a Declaration of Intentions, during the Workshop 'Partnership between the Government and Society for Biodiversity', and in July 1994 the Government set up a parity Government-Civil Society Working Group to define the bases for the National Biodiversity Programme (Programa Nacional da Diversidade Biológica - PRONABIO). PRONABIO was established by Decree No. 1.354, 29th December 1994.

In July 1996, the MMA organised a Seminar and Workshop 'Conservation of Tropical Ecosystems: Conceptual Advances and Revision of the Methodologies for Evaluation and Monitoring'. During the event, a series of recommendations were drawn up, which were used by PRONABIO and submitted to the Convention on Biological Diversity.

Some examples of partnership between the Government and Society:

- Discussion of the law of access to genetic resources ([www.bdt.org.br/bdt/index/legislacao/acesgen/](http://www.bdt.org.br/bdt/index/legislacao/acesgen/));

- Discussion on the consolidation of environmental legislation ([www.bdt.org.br/bdt/consolidacao/](http://www.bdt.org.br/bdt/consolidacao/));
- The discussion promoted by the São Paulo Secretariat of the Environment (Secretaria de Estado do Meio Ambiente de São Paulo) through its State Programme for the Conservation of Biodiversity - PROBIO/SP on the conservation and sustainable use of the Cerrado areas of the State of São Paulo ([www.bdt.org.br/bdt/sma/cerrado/](http://www.bdt.org.br/bdt/sma/cerrado/)).

#### **4.2.9 Directives for a National Ecotourism Policy**

Tourism in natural areas, including those of significant biological diversity, of great scenic beauty, and the protected areas of the National System of Protected Areas (Sistema Nacional de Unidades de Conservação - SNUC), comprise an important alternative strategy for the conservation of natural resources and biodiversity, realising the potential of ecosystem and wildlife conservation as an important economic activity for the country and the regions involved.

Conventional tourism today represents the highest growth rate in the context of the world economy, with a turnover of around US\$ 3.5 trillion per year. It has shown a 57% increase in its activities in the last decade alone. It is estimated that in 1994, tourism globally generated about 204 million jobs, which implies that one in every nine workers in the world is connected with this economic sector. These figures demonstrate its importance and the need for Brazil to take advantage of its potential to generate growth, foreign currency and employment.

It is estimated that 10% of the activities in the tourist sector are today represented by what has come to be known as ecotourism, which is growing at a rate of about 20% per year. Given the potential for the exploitation of Brazil's vast natural heritage for ecotourism, the Federal Government, through the Ministry of Industry, Trade and Tourism (Ministério de Indústria Comércio e Turismo) and the MMA, established an Inter-ministerial Working group in 1994 (Inter-ministerial Decree No. 01/94, 20th April 1994) to draw up guidelines for a national ecotourism policy.

Summarised in the document 'Guidelines for a National Ecotourism Policy' (*Diretrizes para Uma Política Nacional de Ecoturismo*), released in 1995, are the parameters and guiding principles for organising ecotourism, whereby all parties (operators, tourists and conservation) will benefit.

The document defines ecotourism as a part of the tourist trade which uses the natural and cultural heritage sustainably, promotes its conservation, and seeks to cultivate an environmental awareness through the interpretation of the

environment and the well-being of the populations involved. It is, as such, a viable alternative to reconcile economic growth, strengthening regional and local economies, with the conservation of the natural and cultural heritage.

Based on the attractions represented by natural resources and the cultural heritage, ecotourism obviously depends on their conservation for its survival. At the same time, by representing a way of deriving economic benefit from the areas conserved, ecotourism can and should foster the involvement of local populations. This can be done by strengthening the traditions and cultural identity of local communities and providing training to help turn them into the services and infrastructure necessary for ecotourism.

Significant economic, environmental and social benefits can be derived from ecotourism, including: diversification of regional economies by encouraging the establishment of small businesses; keeping the population in the countryside; local job creation; improvement in regional and local facilities, transport, communications and sanitation; alternative sources of income for protected areas; the reduction of impacts on the natural and cultural heritage and scenic landscapes; benefits for the management and infrastructure available for protected areas; and environmental awareness.

Basic and necessary conditions for the harmonious development of ecotourism in Brazil, included in the guidelines laid down in the National Policy, are the correct dimensioning of the number of visitors and the frequency and types of transport, suitable parameters for the necessary infrastructure, and respect for and enhancement of local culture and traditions.

Brazil has a continental area of 8.5 million km<sup>2</sup>. A complex and varied geomorphology, an enormous range of aquatic systems, and climates, ranging from equatorial through semi-arid and tropical and subtropical to temperate, produces a highly significant ecosystem diversity: the Amazon rain forest, the Atlantic forest, the Cerrado, the Pantanal of Mato Grosso, the Caatinga, the Araucária forest, the Campos Sulinos, mangrove swamps, and the varied coastal and island ecosystems along a coastline of over 7,500 km, among many others.

One of the main mechanisms for conservation of protected areas is the National System for Protected Areas - SNUC, with its federal component covering 4.59% of the country in the form of National Parks (PARNA), Biological Reserves (REBIO), Ecological Stations (ESEC), Environmental Protection Areas (APA), Extractivist Reserves (RESEX), National Forests (FLONA) and Private Natural Heritage Reserves (RPPN). Protected areas maintained by the states and municipalities bring the percentage to over 8.6%.

While respecting the fact that ecological fragility of many areas is incompatible with visitation, the protected areas system is without doubt one of the main targets for ecotourism in the country. For this reason, it is necessary to expand the network of protected areas, taking into account the fragility of many ecosystems, the degree to which they are threatened, and their importance for the conservation of biodiversity. In parallel, it is necessary to complete the implantation of already existing and legally sanctioned areas, to resolve their problems of land ownership, and to supply them with the necessary infrastructure and trained personnel.

The Inter-ministerial Workgroup on Ecotourism (MCT-MMA) established a series of goals for the co-ordination of action between governmental organizations and between Government and the private sector and local communities, for setting up the necessary infrastructure and specialised training for the development of ecotourism:

- Making ecotourism activities compatible with the conservation of natural areas;
- Strengthening inter-institutional co-operation;
- Facilitating the effective participation of all the various sectors involved in ecotourism;
- Training in ecotourism;
- Promoting, fostering and providing incentives for the necessary infrastructure for ecotourism;
- Promoting the use of ecotourism as a vehicle for environmental education.

To achieve these goals, nine lines of action have been indicated along with strategies for their execution, which together form a list of priorities and responsibilities to be shared by the appropriate governmental institutions, the private sector connected with ecotourism, NGOs and local communities. The controlled and co-ordinated development of ecotourism in the country will involve: 1) regulating the sector, 2) inter-institutional strengthening and integration, 3) training, 4) quality control over the ecotourism, 5) information management, 6) incentives, 7) implantation of, and improvement to, infrastructure, 8) environmental awareness on the part of tourists, and 9) community participation.

#### **4.2.10 Integrated National Policy for the Amazon Region**

Announced in 1997, the National Integrated Policy for the Amazon Region (Política Nacional Integrada para a Amazônia Legal) aims to improving the quality of life for the population through sustainable economic growth, full use

of the natural and cultural potential, the internalisation and more equal distribution of the region's wealth. This requires a new strategy for development, centred on respect for the internal diversity, co-ordination of the economic, social and environmental dimensions, and a reduction in inequality and regional conflict. In practice, this means placing the Amazon question as one of national significance and working towards increased integration with the other Amazon countries.

This policy starts from certain presuppositions:

1. The Amazon has become industrialised and urbanised;
2. Internalisation of revenue and employment has been unequal and a substantial number of Amazon inhabitants fail to share the benefits;
3. Exploitation of natural resources has been chaotic and, in most cases, predatory, resulting in poverty and significant environmental degradation.

Reversal of these processes requires a new developmental profile: one that is socially just, environmentally sustainable, economically efficient and ethical. The new paradigm lies, essentially, in a model of conservation and respect for natural resources, restructuring parameters of costs and benefits, and decentralisation. New technologies demand the use of natural elements previously ignored or destroyed, as is the case of biodiversity as a source of biotechnology.

There are many challenges to be faced:

- a. Isolation and vast distances, making access to work, assets, services and markets difficult;
- b. Vulnerability of the ecosystems;
- c. Intense and uncontrolled migration to, and within, the region;
- d. A tendency for the drop in prices of products *in natura*;
- e. New methods of production that save raw materials, energy and other inputs.

In the initial stages, some of these factors combined result in the loss of external competitiveness, a major challenge which needs to be carefully dealt with in the coming years. For all these reasons the Amazon Project implies a concerted effort to replace the plethora of sectorial policies by a single integrated policy covering the social, economic and environmental dimensions. It will be essential to improve the co-ordination between federal, state and municipal governments, as well as between governments and society, creating a new federative pact, in which decisive importance will be given to the National Council for the Amazon Region

(Conselho Nacional da Amazônia Legal - CONAMAZ), chaired by the President of the Republic, and including all the Ministers of State and the nine Amazonian state governors.

The general guidelines of the project begin with a re-orientation of economic growth, with the following objectives:

- Technological renewal of activities with a recognised environmental and social impact (mining, prospecting, timber exploitation, cattle-ranching, and others);
- Modernisation and revitalisation of traditional activities (fishing, extractivism, agriculture and fluvial transport);
- Implementation of relatively recent activities, such as silviculture, bioindustry and ecotourism;
- Equipping urban centres with the necessary infrastructure.

In this context, the plan is to restructure the metallurgic-mining complexes that already exist and make them less environmentally damaging, as well as ensuring the non-predatory use of resources in new mining complexes.

Manaus was declared a Tax Free Zone in order to raise levels of quality and productivity, as well as to encourage technological modernisation. The agro-industrial complexes will have to submit to norms that prevent deforestation and degradation of water and soil resources. Efforts will also be made to set up new industries linked to natural renewable resources and biodiversity, based on advanced technology and regional knowledge.

The most important instrument for territorial management in the Amazon will be Economic-Ecological Zoning. There are three basic types of zones, each for different uses:

- Productive zones, in which the use of natural resources, incorporating new technology, can guarantee a better quality of life to the population;
- Critical zones, which, due to the peculiarities of their environmental systems, require appropriate technologies for their management;
- Special zones, including indigenous areas, extractivist reserves and protected areas, areas of significant historical, scenic and cultural interest, appropriate for ecotourism strategic, and frontiers.

The transport policy for the region must increasingly be based on the river network, integrated with other modes. In the towns, the priority will be given to health, basic sanitation and housing.

The financial resources will come from a reformulation of the Constitutional Fund for the North (Fundo Constitucional do Norte - FNO), from the National Integration Programme (Programa de Integração Nacional - PROTERRA), from the Integrated Amazon Programme (Programa Amazônia Integrada) of the Brazilian Bank for Economic and Social Development (Banco Nacional de Desenvolvimento Econômico e Social - BNDES), from the Bank of Brasil (Banco do Brasil) and funds from the Pluriannual Plan (Plano Plurianual), besides federal, state and municipal budgets. They will be reinforced by resources from overseas loans and foreign government donations. In addition, it is intended to allocate part of the resources obtained in relation to tax exemptions and a new funding mechanism, the Fund for the Scientific and Technological Development of the Amazon (Fundo de Desenvolvimento Científico e Tecnológico da Amazônia).

#### **4.2.11 The Amazonia Agenda 21**

The Amazonia Agenda 21 (Amazônia Agenda 21) is being implemented by the MMA, with the participation of the state governments of the region. The central objective is to formulate integrated policies and carry them out in partnership with the main actors in the Amazon process: Federal, State and Municipal Governments, NGOs, trade unions, co-operatives, traditional and indigenous populations, churches, business people, scientists, and financing institutions, besides universities and research institutions of the region and of other Amazon countries.

One of the projects to arise in the ambit of the Agenda is that of biological corridors (see section 4.3.3).

Other Agenda objectives are:

- Inclusion of Amazon questions in school curricula, in order to make it a national, not just a regional, concern;
- Integration of the Brazilian Amazon with the Amazonian regions of other countries;
- Ensuring the multiple use of resources (soil, water, biodiversity), without any one being prejudicial to or excluding another;
- Regulation of activities for the prospecting and use of mineral resources;
- Creation of programmes for traditional populations;
- Guarantee of the rights of indigenous peoples;
- Creation of efficient systems of surveillance and protection;
- Execution of economic-ecological zoning.

In 1997, the MMA established a Working Group (Decree No. 271, 4<sup>th</sup> December 1997) to complete the elaboration of the Agenda 21- Amazonia, which will be submitted to the National Council for the Amazon Region - CONAMAZ. This group will include representatives of the Ministry itself, the Superintendency for Amazon Development (Superintendência de Desenvolvimento da Amazônia - SUDAM), the Secretariat for Strategic Affairs (Secretaria de Assuntos Estratégicos - SAE) of the Presidency of the Republic, the Forum of Planning and Environment Secretaries (Fórum dos Secretários de Planejamento e do Meio Ambiente), the Regional Association of Municipalities - North Region (Associação Regional dos Municípios - Regional Norte), the Regional Co-ordinating Commission for Amazon Research (Comissão Coordenadora Regional de Pesquisas para a Amazônia - CORPAM), the Amazon Working Group (Grupo de Trabalho Amazônico - GTA), the Federation of Industries of the State of Amazonas (Federação das Indústrias do Estado do Amazonas) and of Pará (Federação das Indústrias do Estado do Pará).

Specialists, research institutions and entities representing society may also be invited to take part in the group, which will have six months to finish its work.

#### **4.2.12 The Brazil Agenda 21**

Carrying out its commitments to the UN Conference on Environment and Development - UNCED during 1996, the Executive Secretariat of the MMA co-ordinated a series of seminars to discuss the methodology of the Agenda 21-Brazil. The conclusions of these seminars, together with reports prepared by the MMA Executive Secretariat's technical group and by external consultants, served as inputs for the first version, subsequently presented to the Commission of Sustainable Development and the Agenda 21, at the end of June 1997.

After being reviewed by a subcommittee, the version was sent back to the Commission, which incorporated other decisions, leading to the second version. This version then received new contributions from ministries, institutions and consultants, giving rise to the third version, reviewed by the Commission at the end of October 1997. The fourth version was produced in 1997. This latest version is now undergoing its final review by the members of the Commission.

In the course of this process, it was decided that the Agenda 21-Brazil should be the framework for a project for sustainable development, which simultaneously provides for conservation and environmental quality, fair and equitable sharing of natural riches, and the permanent search for growth, economic efficiency and democratic participation. In addition, it must be the result of participative planning, in which national and local priorities are defined and tackled in

partnerships, forming a plan of action to which all interested parties are committed.

The Agenda 21- Brazil thus aims to contribute to establish the strategic benchmarks for a Brazil 21st Century Project (Projeto Brasil Século 21), which will mobilise society and encourage participation, summing two convergent fields of action: 1) construction of general and strategic objectives for national sustainable development, as well as the definition of the lines of action of the Federal Government in partnership with society and the other components of the Federation; 2) the promotion of local Agendas.

To facilitate the implementation of a sustainable development model, the Agenda 21-Brazil is based on a number of premises:

- Involvement of different members of society in the establishment of partnerships;
- Compliance with federative principles;
- Managerial and mobilising character of the means;
- Systemic and inter-sectorial approach between the economic, social, environmental and institutional dimensions, based on a vision of the future prospects.

A number of strategies will be used to promote discussion, debate and the convergence of ideas on the objectives, strategies and lines of action. They include a series of thematic seminars and the production of partial reports to divulge the concept of sustainable development and identify successful experiments. Information will also be placed on a homepage on the Internet, and documentaries will be produced for television programmes. A set of indicators will also be selected to facilitate the monitoring of sustainable development and a number of actors and agencies will be mobilised for the construction of Local Agendas.

The Agenda 21-Brazil should concentrate on critical issues, vulnerable aspects and the potentialities, within the following themes:

- Sustainable towns;
- Sustainable agriculture;
- Regional integration and infrastructure;
- Management of natural resources;
- Reduction of social inequalities;
- Scientific and technological development.

The Commission's Executive Secretariat is supported by the UNDP/MMA Project- BRA 94/016.

## 4.3 Integrated Programmes for Biodiversity

### 4.3.1 National Environment Programme - PNMA

To meet the commitments undertaken under the CDB, a number of integrated programmes are being developed for the conservation and sustainable use of Brazil's biological diversity.

The first of these is the National Environment Programme (Programa Nacional do Meio Ambiente - PNMA) of the Brazilian Government, underway, in collaboration with the United Nations Environment Programme - UNEP, since 1987. It has three objectives:

- The strengthening of institutions and the legislative and normative legal structure for the environment;
- Reinforcement of the protection for the areas of greatest environmental importance;
- Broader protection for the ecosystems at risk through degradation.

These three vectors define the components of the PNMA in its first phase: institutional development, protected areas, and ecosystem conservation.

The National Environment Programme - PNMA, concentrating mainly on protected areas, was approved in 1989, financed by a loan from The World Bank, a donation from the German Reconstruction Bank - KfW and with a counterpart contribution from the National Treasury. This first phase involved the largest credit operation for the environment ever negotiated with multilateral agencies, US\$ 166.4 million. The Programme began effectively in 1991.

The PNMA was revised in 1994 to include the following components:

- Institutional development (US\$ 28.5 million);
- Protected areas (US\$ 44.9 million);
- Protection of ecosystems (Pantanal of Mato Grosso, Atlantic forest coastal management and environmental management for the south coast of Rio de Janeiro) (US\$ 36.15 million);
- Decentralised state projects (US\$ 61.5 million); co-ordination (US\$ 19.3 million), and a technical reserve (US\$ 3.5 million).

In total, the PNMA, therefore, involved resources amounting to US\$ 193,791,487.00.

Actions on behalf of institutional development resulted in several advances:

- Installation of a computer network in MMA and IBAMA, benefiting productivity, planning capacity and co-ordination; communications, and the quality of information and administrative control;
- The establishment of a nation-wide Documentation and Information Network (Rede de Documentação e Informação - RENIMA);
- The establishment of a remote sensing network, the 'Associated Remote Sensing Network' (Rede Associada de Sensoriamento Remoto), vital for the planning of territorial management and the inspection of the use and conservation of resources;
- Training of more than 1,700 technical staff and administrators of the National Environment System (Sistema Nacional do Meio Ambiente - SISNAMA).

Regarding protected areas, the PNMA resulted in the recuperation and consolidation of the infrastructure of 18 National Parks, five Biological Reserves, five Ecological Stations and three Environmental Protection Areas, distributed throughout the country, covering approximately 56,000 km<sup>2</sup>, and about one-third of the protected areas administered by IBAMA.

From 1994, so-called decentralised projects were carried out by municipal governments, community organizations and NGOs. They have resulted in 90 projects involving aquaculture, restoration of gallery forests, agroforestry systems, ecotourism, and the restoration and sustainable use of natural resources benefiting around 19,000 families.

These projects involved 277 local councils, 112 state government agencies, seven federal agencies, and 145 community and non governmental organizations: 541 institutions in all. The PNMA was concluded in 1996. The Final Report for the PNMA (BRASIL/MMA 1997) provides more information.

### **4.3.2 Pilot Program for the Protection of the Tropical Forests of Brazil - PPG-7**

A considerable amount of the progress has been achieved in the conservation and sustainable use of biological diversity in the Amazon in recent years as a result of the Pilot Program for the Protection of the Tropical Forests of Brazil PPG-7 (Programa Piloto para a Proteção das Florestas Tropicais do Brasil - PPG-7). This international programme

involves Russia, Germany, the United States, France, the United Kingdom, Italy, Japan and Canada, all countries belonging to the G-7 along with the Brazilian Government. Part of the funds donated was used to set up the Rainforest Trust Fund - RTF, a multilateral fund with various donors, administered by The World Bank.

To date, the PPG-7 has received US\$ 211.67 million, US\$ 22.68 of which was from the Brazilian Government. A further US\$ 61.49 million is being negotiated in the short term. For the planned destination of these resources, see Table 2-37.

The PPG-7 is comprised of four subprogrammes:

- Natural Resources Policy (Política de Recursos Naturais);
- Protected Areas and Management of Renewable Natural Resources (Unidades de Conservação e Manejo de Recursos Naturais Renováveis);
- Science and Technology (Ciência e Tecnologia);
- Demonstrative Projects (Projetos Demonstrativos).

The 'Natural Resources Policy' subprogramme involves the development of a model for integrated environmental management between federal, state and municipal governments and the community. The Integrated Environmental Management Projects (Projetos de Gestão Ambiental Integrada), involving Economic-Ecological Zoning, Monitoring and Environmental Control, are still in their final phases of development in some of the states.

The 'Protected Areas and Management of Renewable Natural Resources' subprogramme, estimated at US\$ 125 million, is divided into six subprojects: 1) Extractivist Reserves; 2) Protection of Indigenous Lands and Peoples in the Amazon Region; 3) Support for Forest Management in the Amazon Region; 4) Management of Natural Resources in Inundated Forests (várzeas); 5) Parks and Reserves; and 6) Monitoring and Control of Deforestation and Man-made Fires in the Amazon Region. The subprojects of Extractivist Reserves (budget US\$ 9.5 million) and Protection of Indigenous Lands and Peoples in the Amazon Region (budget of US\$ 22.7 million) are already underway.

The 'Science and Technology' subprogramme is dedicated to training researchers and financing research for the environmental, economic and social sustainability of the Amazon. It consists of two subprojects: Science Centres (Centros de Ciência) and Directed Research (Pesquisa Dirigida). The first is to support two important research centres, the National Institute for Amazon Research (Instituto Nacional de Pesquisas da Amazônia - INPA) in Manaus, Amazonas, and the Emílio Goeldi Museum (Museu Paraense Emílio Goeldi - MPEG), in Belém, Pará. To date this subproject has received US\$ 15 million. The Directed Research



subproject is currently supporting 23 research projects studying Amazon ecosystems and management models specifically to improve the quality of life of local populations. To date it has received US\$ 6 million.

The 'Demonstrative Projects' Subprogramme has received US\$ 19.0 million from donors and US\$ 3.0 million as counterparts from the beneficiary institutions. Proposals for 517 projects have been received for the Amazon (373) and the Atlantic forest (144), totalling US\$ 81.6 million. Seventy-nine projects have been approved for the Amazon and 18 for the Atlantic forest, totalling US\$ 83.03 million. Of the projects underway, 35 are the responsibility of NGOs and 27 the responsibility of producer associations. The others are distributed among trade unions, indigenous organizations and community associations. The majority of the projects are related to enhancement, processing and commercialisation of agroforestry products.

### 4.3.3 Ecological Corridors Project in the Amazon and the Atlantic Forest

The sixth project of the 'Protected Areas and Management of Renewable Natural Resources' subprogramme, within the ambit of PPG-7, and in the final phase of preparation, is the Parks and Reserves Project (Projeto Parques e Reservas), for the *in situ* conservation of the Brazilian tropical forests through the integration of private and public protected areas in selected Biological Corridors. Specific targets are the implementation of model areas which are high-priority in terms of biodiversity, the expansion of the system of Private Natural Heritage Reserves (RPPNs), and the preservation of very large blocks of tropical forest, through the integration of local populations and the institutions involved in the management of the various protected areas.

These Biological Corridors were conceived as wide expanses of priority forest ecosystems, delimited in large part by the existing or proposed protected areas and the ecological communities they contain. The integrated management of the biological corridors aims to facilitate connectivity for wildlife populations, thereby increasing the long-term chance of survival of species and the maintenance of evolutionary processes on a large scale. It represents an alternative to the 'ecological islands'.

IBAMA is the executive agency for the project, specifically the Directorate for Ecosystems (Diretoria de Ecossistemas - DIREC), in collaboration with state and municipal governments and NGOs. Seven priority corridors have been proposed. Five of these are in the Amazon and two in the Atlantic forest. Together, they represent 25% of the Brazilian rain forests and are estimated to cover the geographical distributions of about 75% of the animal and plant species in the two biomes (Figure 2-29).

1. The Central-Amazon Corridor, which includes wide expanses of flooded forests and *terra firma* forest in the Rio Negro and Solimões basins. The flooded forests in this corridor are biologically extremely diverse, with many endemic species. The Corridor includes the Mamirauá Reserve for Sustainable Development, the Anavilhanas Ecological Station, the Tefé National Forest, the Jaú National Park, the Adolfo Ducke Forest Reserve, nine other protected areas and 14 indigenous areas.
2. The North-Amazon Corridor, on the border between the north of Brazil and Colombia and Venezuela. There are mountains and high-altitude ecosystems (*tepuis*) still practically untouched there. The Corridor includes the Pico da Neblina National Park, the Roraima National Forest, the Serra do Aracá State Park, a further 17 protected areas and 20 indigenous areas.
3. The West-Amazon Corridor is particularly diverse in bird species, primates and plants. It is probably the richest part of the Amazon region in terms of diversity. It includes the Serra do Divisor National Park, the Chico Mendes Extractivist Reserve, the Rio Preto-Jacundá Extractivist Reserve, and 30 other protected areas and 30 indigenous areas.
4. The South-Amazon Corridor, vital for the protection of the fauna and flora between the southern tributaries of the Amazon/Solimões: the Rios Tapajós, Madeira, Xingu and Tocantins. It includes protected areas in three states (Amazonas, Pará and Maranhão), including the Tapajós National Forest, the Amazon National Park, the Gurupi Biological Reserve, three more protected areas and 20 indigenous areas.
5. The Corridor of the South-Amazon Ecotone (Amazon-Cerrado), in the transition between the Amazon and the Cerrado savannahs. It is an ecosystem threatened by the advance of the agricultural and cattle-ranching frontier. It includes the Araguaia National Park on the island of Bananal (state of Tocantins) and 17 indigenous areas in the states of Amazonas, Mato Grosso and Tocantins.
6. The Central Corridor of the Atlantic forest, with areas of extremely high diversity and endemism in the states of Espírito Santo, Minas Gerais and southern Bahia. It includes the Sooretama Biological Reserve, the Linhares Forest Reserve, the Una Biological Reserve, the Monte Pascoal National Park, the Serra do Caparaó National Park, and other protected areas and indigenous areas which, together, form a mosaic of forest fragments.
7. The Southern Atlantic Forest Corridor (Serra do Mar Corridor), the largest continuous stretch of the Atlantic forest and the most viable for conservation. This corridor includes 27 protected areas, including

the Serra do Mar Area for State Environmental Protection (São Paulo), the Serra da Mantiqueira Environmental Protection Area (Minas Gerais), the Serra da Bocaina National Park and the Itatiaia National Park (Rio de Janeiro), and the Guaraqueçaba Environmental Protection Area (Paraná).

The Biological Corridor Project is programmed for two phases, each with a five-year span. In the first phase studies and projects will be concentrated in the Central-Amazon Corridor and the Central Atlantic Forest Corridor.

#### **4.3.4 Programme for Assessing the Sustainable Potential of Living Resources of the Exclusive Economic Zone - REVIZEE**

The Brazilian Marine Exclusive Economic Zone (Zona Econômica Exclusiva Marinha Brasileira) covers a strip extending from the 12 to the 200 mile limit, measured from the base lines used for calculating the width of Brazil's territorial sea. In this zone Brazil has sovereign rights for purposes of exploration and exploitation, the conservation and management of biotic and abiotic natural resources, the waters on the sea-bed, the sea-bed and its subsoil and any other activities relating to the exploration or exploitation of the zone for economic purposes.

Brazil has the right to regulate marine scientific investigation and the protection and conservation of the marine environment in the Exclusive Economic Zone under its jurisdiction, as well as the construction, operation and use of all types of artificial islands, installations and structures.

The Programme for Assessing the Sustainable Potential of the Live Resources of the Exclusive Economic Zone (Programa de Levantamento do Potencial Sustentável dos Recursos Vivos da Zona Econômica Exclusiva - REVIZEE), results from the commitment undertaken by Brazil when ratifying, in 1988, the UN Convention on the Law of the Sea, in force since 16th November 1994, and incorporating its principles into Brazilian legislation, both through the Federal Constitution of 1988 and through Law No. 8,617, 4th January 1993. The Programme is essential for Brazil to safeguard its sovereign rights for the purposes of exploration and exploitation, and the conservation and sustainable management of the live resources of the Exclusive Economic Zone.

REVIZEE constitutes the main aim of the IV Sectorial Plan for Sea Resources (IV Plano Sectorial para os Recursos do Mar - IV PSRM), in force from 1994 to 1998. The Programme, within the ambit of the Inter-ministerial Commission for Sea Resources (Comissão Interministerial para os Recursos do

Mar - CIRM), is run by an Executive Committee, with its General Co-ordination carried out by the MMA, with representatives from the Ministry of the Navy, the Ministry of Education and Sport, the Ministry of Science and Technology, the Brazilian Science Council - CNPq, the Secretariat of the Inter-ministerial Commission for Sea Resources (Secretaria da Comissão Interministerial para os Recursos do Mar - SECIRM) and IBAMA, which co-ordinates the REVIZEE operations.

REVIZEE is being implemented in three stages: 1) Determination of the distributions, seasonality, abundance and sustainable potential of live Exclusive Economic Zone (EEZ) resources, using techniques for fish prospecting and the evaluation of stocks; 2) Obtaining extensive climatological, physical, chemical, geological and biological data for an understanding of the dynamics of the live resources in the EEZ; and 3) analysis of the sustainable potential and prospects for their exploitation, based on co-ordinated information on abundance, demographics, life histories, and environmental characteristics.

For the purposes of the REVIZEE, the EEZ was divided into four regions, based on oceanographic and biological characteristics of the predominant substratum. The execution of the Programme is decentralised. In each of the four areas, research is co-ordinated and carried out by a Regional Subcommittee, made up of scientists and researchers from universities and marine research institutions in the respective regions. It is an applied research programme to provide data for the national fisheries. Each Subcommittee has representatives from the regional fishing sector.

Despite the importance of the Programme for Brazil, its financial resources are limited to those provided by the MMA budget, CNPq scholarships, and fuel provided by PETROBRÁS for the oceanographic and fish prospecting surveys. Further information is available in a number of publications.

#### **4.3.5 National Biodiversity Programme - PRONABIO**

Complying with the commitment taken on under the CBD, on 29th December 1994, "World Biological Diversity Day", the Brazilian Government set up the National Programme for Biodiversity (Programa Nacional da Diversidade Biológica - PRONABIO) (Decree No. 1,354, 29th December 1994) It is a programme of the MMA, and is being financed by the National Treasury, and other funds raised in the country and abroad, from governmental, private and multilateral agencies.

Following the directives of the Inter-ministerial Commission for Sustainable Development (later replaced by

the Commission for Sustainable Development Policies and the National Agenda 21 [Comissão de Políticas de Desenvolvimento Sustentável e da Agenda 21]), PRONABIO promotes partnerships between the State and civil society for the conservation of biodiversity, the sustainable use of its components and the fair and equitable sharing of the benefits derived from it. It includes the following activities:

- Definition of methodologies, instruments and processes;
- Promotion of international co-operation;
- Promotion of research and studies;
- Production and dissemination of information;
- Training of human resources, institutional enhancement and public awareness-raising;
- Development of demonstrative actions for the conservation of biodiversity and sustainable use of its components.

This initiative is based on the premise that effective knowledge, conservation and sustainable use of Brazilian biodiversity (flora, fauna, micro-organisms and ecosystems) will depend on effective action, both by government agencies and by private entities. PRONABIO is implemented by a Co-ordinating Commission, composed of two representatives from the business sector, two academics, two representatives of environmental NGOs, and six representatives of the Federal Government, encompassing the Environment, Science and Technology, Agriculture, Health, Planning and External Relations.

Initially PRONABIO was devoted to establishing the *modus operandi* of the Co-ordinating Commission, its interaction with civil society and with other levels of government, in the definition of priority themes, and the identification of funding agencies to support initiatives directed towards the conservation and sustainable use of Brazilian biodiversity.

Two mechanisms were decided on for the establishment of internal funding mechanisms. One, was the government Project for the Conservation and Sustainable Use of Brazilian Biological Diversity (Projeto de Conservação e Utilização Sustentável de Diversidade Biológica Brasileira - PROBIO) to provide for the leverage of resources to obtain appropriate and up-to-date information for decision-making by the Government and society, including biome inventories and status assessments, and demonstrative projects. The other, linked to private enterprise in line with government policies for sustainable development, will be consolidated as a financially independent and flexible long-term fund, the Brazilian Biodiversity Fund (Fundo Brasileiro para a Biodiversidade - FUNBIO). This fund was also intended to

interact directly with the private sector, particularly the business sector, as a way of attracting them to productive partnerships and, at the same time, awakening interest in the broad issues of conservation, sustainable use and benefit-sharing of the use of biological diversity. (These mechanisms are described below.)

Besides these two large-scale projects, PRONABIO has been involved in a series of smaller initiatives. Among them are a series of workshops and seminars described below.

The Workshop 'Priorities for the Conservation of the North-eastern Atlantic Forest' was held on the island of Itamaracá, state of Pernambuco, in December 1993. It was organised by Conservation International do Brasil, the Biodiversitas Foundation (Fundação Biodiversitas), and The North-eastern Ecology Society (Sociedade Nordestina de Ecologia - SNE) supported by the MMA. Another similar meeting was later held in Campinas, focusing on the Atlantic forest in the south and south-east. As a result of these workshops, an electronic information network was set up, the Atlantic Forest Technology Network (Rede de Tecnologia da Mata Atlântica - RTC), co-ordinated by Conservation International do Brasil but within the Tropical Database of the André Tosello Tropical Foundation for Research and Technology (Fundação Tropical de Pesquisas e Tecnologia 'André Tosello'). This communication network publicise and contributes to databases and methodologies linked to biodiversity in the Atlantic Forest. The RTC currently includes 11 NGOs, as well as the São Paulo State Programme for Biodiversity Conservation (Programa Estadual para a Conservação da Biodiversidade, São Paulo - PROBIO-SP), the Minas Gerais State Forestry Institute (Instituto Estadual de Florestas, Minas Gerais - IEF/MG) and the Mello Leitão Biology Museum (Museu de Biologia Mello Leitão - MBML).

The Biodiversity Information Network - BIN 21 was set up as a result of the workshop 'Linking Mechanisms for Biodiversity Information', held by the Tropical Database (Base de Dados Tropical - BDT) of the André Tosello Tropical Foundation for Research and Technology, in Campinas, São Paulo, in February 1994. It was supported by the MMA, the Brazilian Science Council - CNPq through the Training Program for Strategic Activities of the MCT (Programa de Capacitação de Recursos Humanos para Atividades Estratégicas - RHAE/MCT) and the United Nations Environment Programme - UNEP.

A partnership between the Brazilian Foundation for Sustainable Development (Fundação Brasileira para o Desenvolvimento Sustentável - FBDS) and the World Wide Fund for Nature - WWF/Brazil, resulted in the organization of a workshop 'Partnership between the Government and Society for Biodiversity', in Rio de Janeiro, in June 1994, supported by the MMA. The aim was to create a partnership between the Government and the business, academic and

environmentalist sectors. Besides the exchange of information, the workshop resulted in a Declaration of Intent of co-operation between leaders in these sectors for the implementation of the Convention on Biological Diversity.

The workshop 'Conservation of Biodiversity in Tropical Ecosystems: Conceptual Advances and Revision of Methodologies of Evaluation and Monitoring' was held in June 1996, in Rio de Janeiro. It was organised by the MMA, in partnership with the National Council for Scientific and Technological Development - CNPq, the Federal University of Rio de Janeiro, and the International Union of Biological Sciences - IUBS. The workshop analysed the deficiencies and problems in the systems of inventorying and monitoring biodiversity. Recommendations were made for the improvement and standardisation of current techniques, as well as regarding indicator species and species groups.

The MMA held a workshop 'Clearing-House Mechanism on Biological Diversity: the Role of Special Interest Networks' in October 1995, hosted by the Tropical Data Base - BDT of the 'André Tosello' Foundation for Tropical Research and Technology in Campinas. The aim was to make a concrete contribution to the International Biodiversity Information Network BIN 21, co-ordinated by Brazil through the BDT to the Conference of the Parties of the Convention on Biological Diversity for the definition of the pilot phase of its Clearing-House Mechanism.

The 'André Tosello' Foundation for Tropical Research and Technology hosted another workshop on 29th April - 1st May 1996 - 'Biodiversity: Prospects and Technological Opportunities'. It was supported by the MMA and financed by the Financiadora de Pesquisas e Projetos - FINEP.

The workshop 'Access to Biological Resources: Proposals for Establishing Norms' was promoted by the MMA in partnership with EMBRAPA, the Federal Senate and several NGOs, in October 1996. It discussed mechanisms for the control of access to the country's genetic resources and resulted in recommendations submitted to the Co-ordinating Commission of the National Biodiversity Programme (Programa Nacional da Diversidade Biológica - PRONABIO) and to the Inter-ministerial Group for Access to Genetic Resources (Grupo Interministerial de Acesso a Recursos Genéticos - GIARG) set up by the Federal Executive to prepare the government position on the issue and also to make suggestions to the National Congress.

Another Brazilian Government initiative was the drafting of 'The Brazilian Report on the Status of Phylogenetic Resources for Food and Agriculture' (*Relatório Brasileiro da Situação dos Recursos Fitogenéticos para Alimentação e Agricultura*), by the Brazilian Agricultural and Cattle-Breeding Research Company (Empresa Brasileira de Pesquisa Agropecuária - EMBRAPA), through its National Research

Centre for Genetic Resources and Biotechnology (Centro Nacional de Pesquisa de Recursos Genéticos e Biotecnologia - CENARGEN) together with the United Nations Food and Agriculture Organization - FAO. The preparation of the Sub-regional Report for South America was also co-ordinated by EMBRAPA/CENARGEN, in co-operation with the MMA, through the General Co-ordination of Biological Diversity (Coordenação Geral de Diversidade Biológica - COBIO). The report described the status of phylogenetic resources, identified the national capacity for their conservation and sustainable use for agriculture and food production, and identified weaknesses and obstacles. It also produced a review of the level of development of the necessary techniques and methodologies and identified informational shortcomings.

Another workshop, in March 1997, supported by IBAMA and the MMA, was held in the Centre for Fishing Research and Extension of the North-East (Centro de Pesquisa e Extensão Pesqueira do Nordeste - CEPENE), in Tamandaré, state of Pernambuco. The theme was 'Brazilian Coral Reefs: Research, Integrated Management and Conservation'.

In partnership with the German Technical Co-operation Agency (Deutsche Gesellschaft für Technische Zusammenarbeit - GTZ), IBAMA promoted the International Workshop on "Monitoring Biodiversity in Protected Areas", in Pirenópolis, Goiás, in June 1997. The aim was to examine alternatives and methods for a monitoring system for the evaluation of the effectiveness of biodiversity conservation in federal protected areas.

In March 1997, at the time of the International Conference Rio +5, and during the workshop 'Agenda 21- Brazil - Utopia Achieved', a panel sponsored by the MMA and the Institute for Society, Population and Nature (Instituto Sociedade, População e Natureza - ISPEN) discussed the 'Implementation of the Commitments on Biodiversity in Agenda 21 and the Convention on Biological Diversity: Supply and Demand of Financial Resources'. The MMA also contracted the ISPEN to carry out the subproject 'Survey and Characterisation of Biodiversity Projects in Brazil between 1986 and 1996'. The results are described in Chapter III.

As biodiversity is perceived in different ways by different interest groups and its value can be assessed according to different criteria (ecological, genetic, economic, social, scientific, educational, cultural, recreational or aesthetic), the practice of enhancing these environmental resources must be progressively included in government decisions, so as to orient policies and investments in the most efficient way possible. Once criteria have been defined, decisions on the environment can be assessed in economic terms. For this reason, the MMA contracted a specialist from the Institute of Applied Economic Research (Instituto de Pesquisas Econômicas Aplicadas - IPEA), Ronaldo Seroa da Motta, to draft

a 'Manual of Economic Evaluation of Environmental Resources- Techniques and Case Studies in Biodiversity' (Manual de Valoração Econômica dos Recursos Ambientais - Técnicas e Estudos de Caso em Biodiversidade). This study was carried out in collaboration with the UNDP and the National Association of Centres of Post-Graduation in Economics (Associação Nacional de Centros de Pós-Graduação em Economia - ANPEC). The Manual is divided into three parts: Part I- Basic Principles of Environmental and Welfare Economics; Part II- Methods of Environmental Evaluation; Part III – Selected Case Studies in Biodiversity. As a follow-up, a course will be held by IBAMA and EMBRAPA for professionals interested in working on environmental problems.

#### 4.3.6 Project for the Conservation and Sustainable Use of Biodiversity - PROBIO

The Conservation and Sustainable Use of Brazilian Biodiversity Project (Projeto de Conservação e Uso Sustentável da Diversidade Biológica Brasileira - PROBIO) is the result of an agreement signed by the Brazilian Government and the Global Environment Facility - GEF and the International Bank for Reconstruction and Development (IBRD) in June 1996. National Treasury funding amounted to US\$ 10 million along with concessionary resources from the GEF, also to the value of US\$ 10 million.

PROBIO is linked to the Department for Policy-Making and Environmental Programmes (Departamento de Formulação de Políticas e Programas Ambientais - DEPAM) of the Secretariat for the Co-ordination of Environmental Affairs (Secretaria de Coordenação dos Assuntos do Meio Ambiente - SMA) of the MMA, and administered by the General Co-ordination of Biological Diversity (Coordenação Geral da Diversidade Biológica - COBIO), and the Brazilian Science Council - CNPq.

The resources available to COBIO amount to US\$ 2,989,708, made available through an agreement with UNDP, and for investment over five years through the Management Project for Brazilian Biodiversity (Projeto Gestão da Diversidade Biológica - BRA 95/012).

The published call for proposals for PROBIO support was restricted to a specific theme - Research and the development of demonstrative projects and assessments for the conservation and sustainable use of biodiversity in Brazilian biomes. As part of the negotiations between the MMA and GEF/IBRD, seven subprojects are being implemented from a set of 11 selected during the negotiation phase of the Donation Agreement. All the subprojects financed by PROBIO shall be concluded by 2001, when the Project for the Conservation and Sustainable Use of Brazilian Biodiversity ends.

#### Subproject 'Evaluation and Priority Actions for Conservation of Biodiversity in the Cerrado and Pantanal Biomes'

The subproject 'Evaluation and Priority Actions for Conservation of Biodiversity in the Cerrado and Pantanal Biomes' (Avaliação e Ações Prioritárias para Conservação da Biodiversidade no Bioma Cerrado e Pantanal) was the first of these seven subprojects. It was co-ordinated by the Pró-Natureza Foundation (Fundação Pró-Natureza - FUNATURA), with the collaboration of the following institutions: Conservation International do Brasil (CI do Brasil), the Biodiversitas Foundation (Fundação Biodiversitas), the Institute for Society, Population and Nature (Instituto Sociedade, População e Natureza - ISPN), the 'André Tosello' Tropical Foundation for Research and Technology (Fundação Tropical de Pesquisas e Tecnologia 'André Tosello') and the University of Brasília - UnB. The aim is to establish priorities for conservation of the Cerrado and Pantanal biomes, using expert knowledge and including the participation of diverse sectors of society. PROBIO has been allocating resources to this subproject since December 1996, and the final sum will amount to R\$ 260,000.00 (equivalent to US\$260,000.00).

The subproject defines the Cerrado biome *sensu latu*, including, from open grasslands to scrub savannah, upland moorlands, to the various forest formations, palms forests and swamps (*buritizal/veredas*), gallery forests, and mesophytic forests, and the peripheral cerrados in the adjoining biomes (Amazonia, Atlantic forest). The Pantanal of Mato Grosso was specifically included as its biota has broad affinities with the cerrado, even though it can be distinguished by its socio-economic characteristics and by the preponderance of areas liable to flooding. The subproject will result in specialised reports and analyses, and digital maps and databases, which will be presented in workshops involving the participation of a large number of experts from government institutions, universities, and NGOs.

Widespread anthropogenic transformation of the Cerrado could potentially cause a significant loss to biodiversity, especially in view of the limited number of protected areas, those existing being inadequately managed and concentrated in just a few regions of the Cerrado. Endemism in the Cerrado is significant, especially for plants, but little is known about species' distributions there, although some important research projects have been underway since the 1980s.

The products of the subproject include:

- An analysis of the biological wealth of the Cerrado and its potential for use;
- Identification of priority areas for conservation, based on criteria of biodiversity, the integrity of the

ecosystems and the opportunity for conservation actions;

- Assessment of options for sustainable uses of the Cerrado compatible with conservation of biodiversity.

A major workshop will be held in March 1998, and follow-up projects, actions and measures will carry on for another two years. The first partial report on the activities of the subproject (March/September 1997), has been prepared after a preparatory meeting in December 1996.

### **Other Subprojects for Evaluation and Priority Actions for Conservation of Biodiversity in Brazilian Biomes**

Another four subprojects for Evaluation and Priority Actions for Conservation of Biodiversity by Biome are in the final phase of selection and the contracts are being drawn for the institutions involved. These projects will be executed in 1998. The biomes selected are those of the Amazon forest, the Atlantic forest, the Coastal and Marine Zone, and the Caatinga.

#### **Subproject 'Biodiversity Information Network'**

The second of the subprojects already underway is that of the 'Biodiversity Information Network - BIN/BR' (Rede de Informação em Biodiversidade), the establishment of a major interactive information network on biodiversity and the sustainable use of natural resources, available for research and administrative and political decision-making. Over three years, resources totalling R\$ 1,400,000 (equivalent to US\$ 1,400,000) will be transferred to the André Tosello Tropical Foundation for Research and Technology (Fundação Tropical de Pesquisas e Tecnologia 'André Tosello') which will co-ordinate the network.

The BIN/BR will complement similar projects, either in progress or programmed, such as the National Documentary Information Network on the Environment (Rede Nacional de Informação Documentária sobre Meio Ambiente - RENIMA), co-ordinated by IBAMA, and the Network for Sustainable Development in Brazil (Rede para o Desenvolvimento Sustentável do Brasil - RDS), co-ordinated by the Ministry of Science and Technology. Internationally, the BIN/BR will link with BIN/21 (Biodiversity Information Network - Agenda 21) and with the Clearing-House Mechanism of the Convention on Biological Diversity.

This subproject has the following aims and strategies:

- Set up a Co-ordinating Committee, composed of representatives from government organs and NGOs, to draw up guidelines and co-ordinate the development of the network, and to establish an Executive Secretariat;

- Carry out an assessment and diagnosis of the Information Centres in the country, with a view to their selection and integration in the BIN/BR Co-operating Centres, with support for infrastructure, technical assistance and training;
- Foster links with Network users, through a training programme and by divulging the services and information available;
- Support the expansion of the National Research Network (Rede Nacional de Pesquisa RNP/MCT), using its communication network, which has a national coverage and international links;
- Contribute towards the establishment of a national policy for compatible information systems, using the Internet protocol;
- Establish mechanisms for gathering, analysing and divulging information for analyses, diagnoses, assessments and workshops on biomes within the scope of PROBIO, through the adequate structuring of the data bases and creation of discussion lists and information newsletters;
- Develop a programme for research and tests on hardware and software, using innovative models of communication and database management.

#### **Subproject 'Conservation of Plant Genetic Resources'**

The third subproject is that of 'Conservation of Plant Genetic Resources' (Conservação de Recursos Genéticos Vegetais) co-ordinated by the National Research Centre for Genetic Resources and Biotechnology (CENARGEN) of EMBRAPA. An important collaborator in this subproject is the 'Luiz de Queiroz' Higher School of Agriculture (Escola Superior de Agricultura 'Luiz de Queiroz' - ESALQ), Piracicaba, of the University of São Paulo. Its aim is to consolidate an integrated model for in situ conservation of the genetic diversity and the genetic resources in the Cerrado, Atlantic forest and the Amazon forest. Resources of around R\$ 599,900.00 (equivalent to US\$ 599,900.00) have been allocated for this subproject.

The urgency for this subproject is determined by the fact that economic activities in most of the tropical forests have been eliminating and/or selectively exploiting species and producing major environmental changes. Forest fragmentation, the isolation of populations, and the increase in deforestation are gradually eliminating species, altering the genetic structure of populations, and reducing genetic diversity. One of the difficulties in conserving and managing tropical forests lies in the immense species diversity. This aspect will be studied with the use of predictive species-models or models involving groups of species with similar

ecological/genetic characteristics, for decision-making for *in situ* and *ex situ* conservation and sustainable use.

Models are being proposed for five ecological groups, according to such parameters as ecological characteristics (successional stage), demographic features (common or rare) and the demographic responses to disturbance (increasing or decreasing the likelihood of population extinction). The groups will be tested predictive powers using empirical data on certain representative species, including genetic diversity, their reproductive system, regeneration and seed physiology, dispersion, and demographic data. The model groups will be studied in protected areas of about 30,000 ha (or more) in the Amazon rain forest (the Ferreira Penna Research Station, Melgaço, state of Pará), the semi-deciduous Atlantic forest (the Rio Doce State Park, Marliéria, state of Minas Gerais) and the Cerrado (the Brasília National Park, Federal District).

The subproject will include important aspects of *in situ* and *ex situ* conservation, focused on recommendations for improvements in management, such as sustainable seed stocks from existing protected areas. Another aspect of the research will be the classification of arboreal seeds, according to their physiology and life history parameters, and requirements for their storage and maintenance.

Aims of the subproject are:

- Inventories and population surveys of target species in protected areas;
- Classification of the genetic diversity of the selected species and determination the basic features of their population biology and reproductive ecology, data necessary for natural propagation and evaluation of their potential for cultivation outside the areas under study;
- Detailed recommendations to improve management and the control of sustainable seed stocking from existing protected areas;
- Classification of seeds of arboreal species, according to their physiology and life history variables, important for their storage and maintenance;
- Involvement of the community and governmental and non governmental organizations in the preservation of protected areas, and in the development of local programmes for sustainable use;
- Train personnel for divulging the results and to extend programmes outside protected areas;
- Conservation of phylogenetic resources, and co-operation between institutions and researchers to obtain genetic material of species with potential for sustainable use or which require programmes for re-introduction. The subproject will increase our knowledge of the genetic diversity present, and carry

out extension and training programmes and produce guidelines and recommendations, in the three biomes (Amazon rain forest, Atlantic forest and Cerrado).

### **Subproject 'Conservation and Restoration of Biodiversity in Gallery Forests of the Cerrado Biome'**

The fourth subproject already contracted is the Conservation and Restoration of Biodiversity in Gallery Forests of the Cerrado Biome (Conservação e Recuperação de Biodiversidade em Matas de Galeria do Bioma Cerrado), being developed by EMBRAPA, through the Research Centre for Agriculture and Cattle-Breeding in the Cerrado (Centro de Pesquisa Agropecuária do Cerrado - CPAC), and with the support of the Foundation for Scientific and Technological Enterprise (Fundação de Empreendimentos Científicos e Tecnológicos - FINATEC). The aim is to develop and test models for the conservation and recovery of the biological diversity of gallery forests in the Cerrado biome, especially in small watersheds in the Federal District and adjacent regions in the states of Goiás and Minas Gerais where human activities are the main threat to the conservation of biodiversity.

Resources for this subproject will amount to R\$ 800,000 (equivalent to US\$ 800,000) over three years. The main objectives include:

- The conservation and restoration of the biodiversity of the gallery forests in agricultural areas of the Cerrado;
- Establish and disseminate results of multidisciplinary research on strategies for the conservation and restoration of the biodiversity of gallery forests;
- Support for local communities in the development of technologies for the conservation and restoration of gallery forest compatible with agricultural activities.

A basic first step will involve biological inventories to characterise biological diversity in these ecosystems. Successional processes and competition will be studied in terms of their relevance for the restoration and maintenance of gallery forests, and in the modification of damaging agricultural practices. The participation of local population will be vital for all stages of the subproject, but especially in identifying appropriate technologies for the conservation and restoration of gallery forests.

Results from the initial stages of the subproject include:

- Characterisation of the biodiversity of the gallery forest of the Cerrado of central Brazil, including species lists for the flora, fauna and micro-organisms, as well as surveys of local attitudes to the role of gallery forests for agriculture and wildlife;

- Monitoring of disturbances to gallery forest and the conservation of key species; biodiversity indicators; development, with the participation of local communities, of technologies for the conservation and restoration of gallery forest, compatible with the socio-economic conditions and the environment on each property;
- Planting of a minimum of 100 experimental ha in degraded and/or disturbed areas, with gallery forest species;
- Establishment of a network of at least 10 'reference farms', on which surveys will be carried out for the characterisation and diagnosis, as well as the monitoring and evaluation, of experimental strategies to form the basis for the testing and dissemination of successful technologies.

The first partial report, for the period March-September 1997, has already been drafted. Also taking part in this subproject are the Departments of Zoology, Phytopathology and Forestry Engineering of the University of Brasilia, the Institute for Society, Population and Nature (ISPN), the National Centre for Genetic and Biotechnological Resources (CENARGEN/EMBRAPA) and the Federal University of Uberlândia, Minas Gerais.

#### **Subproject 'Management of a 'Special Area' for the Region of Guaraqueçaba/Paraná'**

The fifth subproject is the Management of 'Special Area' for the Region of Guaraqueçaba, Paraná, (Gerenciamento de 'Área Especial' para a Região de Guaraqueçaba, Paraná) is being co-ordinated by the Society for Research on Wildlife and Environmental Education (Sociedade de Pesquisa em Vida Selvagem e Educação Ambiental - SPVS). It is developing a scientific and technical model for biodiversity conservation in the Atlantic forest, through co-operation between the public and private sectors. The subproject involves resources of R\$ 709,300 over three years.

The subproject is centred on the largest remaining patch of Atlantic forest on the Brazilian coast, which is covered by a complex of federal, state and private protected areas and forms part of the Atlantic Forest Biosphere Reserve (Reserva da Biosfera da Mata Atlântica - UNESCO, 1991).

Aims of the subproject include:

- To consolidate the region's complex of protected areas through integrated management;
- To reduce the threats to its biological diversity;
- To provide assistance to the local population to promote the sustainable use of its natural resources;
- To carry out biological and socio-economic research to develop test and promote models for the

sustainable use of natural resources, and to establish a system of regional institutional integration and monitoring.

The subproject contains four components, each with specific activities:

- Strengthening technical capacity for planning and management;
- Public participation;
- Planning and management;
- Co-ordination.

The protected area complex includes an Environmental Protection Area, a National Park, an Ecological Station, an Area of Significant Ecological Interest and the Biosphere Reserve, in addition to state and private areas.

Although the area is relatively well preserved, there are considerable human pressures, such as: predatory extractivism for some forest resources; inadequate use of the soil; poverty (around 9,000 craft fishermen and small farmers); and overfishing of some marine resources. The first interim report on activities March to September 1997 has already been prepared.

#### **Subproject 'Conservation and Restoration of the Atlantic Forest Coastal Lowlands, Based on the Functional Analysis of Biodiversity, in Linhares, Espírito Santo'**

The subproject 'Conservation and Restoration of the Atlantic Forest Coastal Lowlands, Based on the Functional Analysis of Biodiversity, in Linhares, Espírito Santo' (Conservação e Recuperação da Mata Atlântica de Tabuleiros, com Base na Avaliação Funcional da Biodiversidade, em Linhares, Espírito Santo) is developing a technical and scientific model for the conservation of biodiversity in important remaining patches of the Atlantic forest in northern Espírito Santo, totalling about 50,000 ha and the largest single remaining area to the north of Rio de Janeiro. Resources for this subproject amount to R\$ 700,200 (equivalent to US\$ 700,200).

The main objective is to obtain technical and scientific information on the Atlantic forest ecosystems and their forest and soil (edaphic) communities in forest fragments, for the restoration of secondary forests and degraded areas. It will involve collaboration between IBAMA, EMBRAPA, the Technical Assistance and Rural Extension Agency of Espírito Santo (Empresa Estadual de Assistência Técnica e Extensão Rural - EMATER/ES), the Vale do Rio Doce Company (Companhia Vale do Rio Doce - CVRD), universities, including the Federal University of Rio de Janeiro (UFRJ) and the Centre for Nuclear Energy in Agriculture (Centro de Energia



Nuclear na Agricultura - CENA/USP) of the University of São Paulo, and the rural community.

The restoration technologies will be developed and tested in areas surrounding the Sooretama Biological Reserve and Linhares Forest Reserve, and used for environmental education projects with local communities.

The components of the subproject include:

- A geographical information system to monitor forest fragments in the region;
- An assessment of the diversity of the key communities for the functioning of the ecosystem; concentrating especially on the arboreal community; functional roles of the species in natural regeneration; and the edaphic communities, which maintain humus layers and soil fertility;
- Field experiments involving multi-species plantations (40 or more species, generally native) to assess techniques for restoring areas of permanent preservation and degraded secondary forests and also to establish methodologies for the transfer of the successful techniques;
- Assessment of the activities in transferring techniques for the restoration of degraded areas and secondary forests to local and regional communities, using the field experiments, planting and maintenance manuals, meetings, courses, etc.; the proposal for environmental education on biodiversity includes both informal education (meetings and courses with rural landowners and environmental specialists) and formal education (a programme for 2<sup>nd</sup> and 3<sup>rd</sup> grade school classes); also planned is film documentary (French-Brazilian co-production) and a partnership with a new doctoral course in biodiversity offered by the Federal University of Rio de Janeiro; as well as participation in national and international scientific meetings to divulge the results.

The Federal University of Rio de Janeiro is co-ordinating the research. The José Bonifácio University Foundation (Fundação Universitária José Bonifácio) is administering the finances. The first interim report covering the period March to September 1997 has already been prepared.

### **Subproject 'Recovery and Management of the Natural Ecosystems in the High Altitude Wetlands of Pernambuco and Paraíba'**

The subproject 'Recovery and Management of the Natural Ecosystems in the High Altitude Forests of Pernambuco and Paraíba' (Recuperação e Manejo dos Ecossistemas Naturais de Brejos de Altitude de Pernambuco e Paraíba) is

being co-ordinated by the Federal University of Pernambuco - UFPE and its Development Support Foundation (Fundação de Apoio ao Desenvolvimento - FADE). Project participants include the Federal University of Paraíba - UFPB, and the North-eastern Ecology Society (Sociedade Nordestina de Ecologia - SNE). It is also supported by a number of government organizations and NGOs, including the Caruaru Municipal Council, the Pernambuco State Company for Technical Assistance and Rural Extension (Empresa Estadual de Assistência Técnica e Extensão Rural - EMATER/PE), IBAMA and private companies. Resources amount to R\$ 731,400 (equivalent to US\$ 731,400).

High altitude humid forests, called *brejos*, occur along some of the mountain ranges in the semi-arid region of the North-east. They result from orogenic rainfall, and many have been destroyed and all are degraded at least to some extent, and they are considered the most threatened of the ecosystems of the north-east of Brazil. The vegetation is quite distinct from the Caatinga, with a high level of endemism, and elements of the Atlantic forest and the Amazon forests. They are important faunal refuges during the dry season and the prolonged droughts typical of the region.

The principal aims of this subproject include:

- A systematic assessment of environmental conditions (physical, biological and human) in the high altitude inland forests;
- Environmental education with local communities, disseminating the results of the research on the vegetation, fauna, water resources and land use patterns;
- A zoning of the Agreste region for the rational management of land use and the recovery of the native biota in selected areas.

The subproject will be conducted at two levels: 1) demonstrative projects, covering a wide area of the eastern part of the high-altitude forest of Borborema and; 2) a detailed pilot project in an area around the Brejo dos Cavalos, Caruaru, Pernambuco. The components include: a) assessment of current land use patterns; b) water resources; c) vegetation; d) fauna and e) environmental education.

Specific activities include:

- Assessment, characterisation and management of water resources;
- Floristic and phytosociological inventories, identifying the rare or endemic species, reproductive strategies, and the selection of species for cultivation and propagation;

- Inventory of the spatial and ecological distributions of the fauna, their status and monitoring of indicator species;
- Environmental education programmes;
- Co-operation from associations, co-operatives, local government, and private landowners in the conservation of the brejos;
- Selection of areas for conservation, restoration, reforestation and multiple use; conservation of threatened species (germplasm and captive breeding) and management recommendations.

The expected products, at the end of three years, are:

- A Plan for the Conservation of the High Altitude Forests of Pernambuco and Paraíba;
- Environmental Zoning for the municipality of Caruaru;
- A Management Plan for the Vasconcelos Sobrinho Ecological Park (Brejo dos Cavalos).

The first interim report, from March to September 1997, has been submitted.

#### **First Public Tender for Grant Proposals**

As planned in the Donation Agreement signed by the Brazilian Government and GEF/IBRD, further subprojects in the ambit of PROBIO will be solicited by public tender. Published at the end of 1997, the first PROBIO tender called for projects under the theme of 'Fragmentation of Natural Ecosystems', a universal problem in conservation and considered a severe limitation to opportunities for the sustainable use of Brazilian biodiversity. Fragmentation reduces the number of habitats, isolates remaining areas, and results in habitat degradation and biodiversity loss. It is a process intimately linked with human activities, such as agriculture, cattle ranching, forestry, mining, urban development, hydroelectric dams and roads. Fragmentation affects all of the Brazilian ecosystems, including forests, cerrado, savannah and coastal and aquatic systems.

The first PROBIO tender will involve resources of R\$ 4 million (equivalent to US\$ 4 million), already approved by the Co-ordinating Commission for the National Biodiversity Programme - PRONABIO. The sum of US\$ 2 million will come from the GEF, and US\$ 2 million from the Brazilian Government, and The National Council for Scientific and Technological Development - CNPq will provide a further R\$ 2 million (equivalent to US\$ 2 million).

The tender calls for applied research projects, and the experimental development of demonstrative projects for the

conservation and sustainable management of natural ecosystems in the process of fragmentation and the restoration of those already fragmented.

The projects submitted will be examined for their technical-scientific excellence and social relevance. The theme is a broad one, and it is expected that the projects will cover many aspects of the problem, and will be multi-disciplinary involving partnerships between different areas of expertise. Participation of private enterprise is encouraged as a means of strengthening links with the Government in investing in the conservation and sustainable use of Brazilian biodiversity.

The Tender targets universities, research institutes, public and private companies, and governmental (federal, state or municipal) and non governmental organizations which have direct or indirect involvement with the theme. The Tender is also of interest to institutions in charge of environmental planning and the management of public or private protected areas, to agricultural, cattle-breeding, and mining organizations, to companies or consortiums involved in dam construction, roads, waterways, and forest exploitation or any other activity which is the cause of ecosystem fragmentation.

#### **4.3.7 Brazilian Biodiversity Fund - FUNBIO**

The Brazilian Biodiversity Fund (Fundo Brasileiro para a Biodiversidade - FUNBIO) was conceived from the need for an efficient, clear-cut and long-term mechanism to fund priority projects for the conservation and sustainable use of biodiversity in Brazil. It began as a result of negotiations between the Brazilian Government and The World Bank/Global Environmental Facility (GEF) to create a fund, outside the government sphere, capable of attracting the private sector. The aim was to support initiatives directed towards the implementation of commitments undertaken by Brazil in the Convention on Biological Diversity, in accordance with the guidelines established by the competent government organs.

FUNBIO is the largest fund for biodiversity projects established in any country with resources from GEF. It is also the first biodiversity fund to formally include the private sector in the broadest sense. Its mission is to foster and support associations between governmental and non governmental agencies, academic institutions and private enterprise for the conservation and use of biodiversity in the country. The Getúlio Vargas Foundation (Fundação Getúlio Vargas) administers the fund, not only for the flexibility this provides in attracting and dealing with the private sector but also in fund raising, on national and international levels.

Established in 1995, in Rio de Janeiro, FUNBIO is managed by an autonomous Board, consisting of leaders in distinct areas related to the theme of biodiversity in Brazil: the academic/scientific sector, the government, the NGOs, entrepreneurs and representatives of the FGV. The Board defines general policy and priorities and has 16 effective members and 16 substitute members.

Initial funding was US\$ 10 million donated by the GEF, with a commitment by FUNBIO to find additional resources from such as the private sector in Brazil and abroad. For every US\$ 250,000 raised by FUNBIO, GEF contributes a further US\$ 500,000, for an additional US\$ 10 million. The resources in question, totalling US\$ 25 million, will be deposited in a pay-back fund projected for 15 years. Money already made over by GEF is invested in the financial market and administered by the Rothschild Trust Fund. On the basis of this initial support, FUNBIO has the mission to set itself up as a long-term fund for financing projects on the conservation and use of biodiversity in Brazil.

The innovative nature of FUNBIO has drawn attention to its potential for initiatives outside the normal scope of the majority of the environmental financial mechanisms which support biodiversity in Brazil. Its flexibility and ability to deal with different sectors of society, including the private sector, provides opportunities for testing new initiatives, not only in supporting research and development projects but also in the formation of partnerships and fund-raising.

Its first tender for projects was published in January 1997. The priority areas were:

- Sustainable Management of Natural Forests
- Conservation of Natural Ecosystems on Private Properties
- Sustainable Management of Fishery, Agriculture and Biodiversity Resources
- Management of Protected Areas.

Proposals were accepted from federal, state and municipal public companies and institutions, private profit-making and non-profit-making organizations, and legally established co-operatives and associations and consortiums from the private and public sector. The Tender did not quote maximum values for proposals, so as not to encourage quotes for projects tailored to the stipulated limit. Most of the project presented were in the order of R\$ 200,000.

The response to the 1996/1997 Tender was beyond expectation. A total of 1,083 enquiry letters were received, and project proposals totalled around US\$ 218 million, nearly 100 times the US\$ 2.4 million available for the period. The highest demand was for 'Agriculture and biodiversity' (around 30% of the proposals). 'Sustainable management of

natural forests' and 'Conservation of ecosystems in private areas' each accounted for 19%; "Sustainable management of fishery resources" 16%; and 'Management of protected areas' 15%. Demand was greatest for projects in south-east (34%), followed by the north-east (19.5%), the north (18.3%), the south (16.6%) and the central-west (11.6%) Pilot projects on sustainable use (33.5%) and biodiversity conservation (27.8%) predominated.

Of significance was the fact that proposals from the public sector contributed 42.4% of the projects, testifying to the scarcity of resources available for demand even within government organizations. NGOs contributed 20%, projects involving partnerships totalled 14.4%, universities and research centres 13.5%, private enterprise 6%, and producer associations 3.7%.

Of the total demand, 35% (308 proposals) were considered of high quality, and 12% (129 proposals) complied with the objectives of the Fund. In view of the limited resources available, however, only 69 projects were short-listed. After a rigorous second stage of selection, 29 projects were recommended for FUNBIO financing. Of these, 10 projects were supported, limited by the resources available. Representatives of the Executive Secretariat visited each of the approved projects, in order to check on the viability of the project, negotiate budgets.

The projects approved were as follows.

1. Sustainable management of natural forests:

- A pilot project to create new markets for ecological Amazon rubber, organised by the Mixed Producers' Co-operative of the Iratapuru Valley (Cooperativa Mista de Produtores do Vale Iratapuru - COMARU), in partnership with the company Amazontec Market Technology Ltd. Based in Amapá, the project aims to increase the income of the Iratapuru community, while conserving the tropical forest through the sustainable exploitation of the rubber trees. To this end, it will research technology to give added value to rubber, create new markets for forest products, enhance the intellectual property rights of the local communities, demonstrate the viability of partnerships between communities, technical groups and the private sector in the search for solutions to the problems of conservation and development, train extractivist producers, construct a pilot factory for rubber production and detail a marketing strategy with a view to launching the product on international markets.
- A project co-ordinated by the National Council of the Biosphere Reserve (Conselho Nacional da Reserva da Biosfera da Mata Atlântica) to inventory forest resources in the Atlantic forest, identifying and characterising forest resources with significant socio-

economic importance, the sustainable use of these resources, assessment of the current socio-economic impacts and potential for sustainable management. The project includes 14 Brazilian states, and covers areas where the exploitation of forest resources has a significant regional or local economic impact. It also includes a survey of the resources, identification of factors inhibiting sustainable management in order to provide information for public policies for this sector, the organization of producers, identification of important areas for native species of economic interest which should be protected as national genetic reserves, environmental licensing and certification, as well as the publication of an 'Inventory of Forest Resource Management of the Atlantic Forest'.

## 2. Agriculture and biodiversity:

- A project of the organization 'Advice and Services to Projects in Alternative Agriculture' (Assessoria de Serviços a Projetos em Agricultura Ambiental - AS-PTA) which will examine means to reduce genetic erosion in a number of regions of the country, through the identification, rescue, characterisation, improvement, multiplication, and conservation of seeds of local varieties of maize, beans and manioc, as well as the maintenance of the conserved varieties in the CENARGEN germplasm bank. The project should benefit 1,800 agricultural workers from 94 communities in 24 municipalities through the local production of seeds that are more productive and more economical in the use of inputs (fertilisers, agrototoxic chemicals, soil correction). It will also produce, as a result, a document suggesting alternatives for current public policies for the conservation of agrobiodiversity.
- The Project for the conservation and sustainable use of natural resources in the mid-west of Paraná will implement, monitor and publicise validation and reference units for alternative technologies in agriculture. It will be co-ordinated and executed by the Foundation for Rural Economic Development in the Mid-West of Paraná (Fundação para o Desenvolvimento Econômico Rural da Região Centro Oeste do Paraná). The project will also promote environmental awareness, training, and the exchange of experiences among families in the rural areas of the region.

## 3. Sustainable management of fishery resources:

- A project for assessing and evaluating fishery resources in the Brazilian Exclusive Economic Zone, organised by the MMA. Linked to Brazil's capacity to meet international commitments, the project will map the submarine relief and obtain basic environmental parameters to correlate populations of principal species with the dominant environmental

conditions. It will also analyse the geological and oceanographic variables of production-process indicators associated with fishing productivity, and carry out an assessment of fishery resources, evaluating their abundance, their potential for capture, their spatial distribution and seasonality. In addition, the project plans to contribute towards the conservation and sustainable use of biodiversity, and reduce pressure on traditionally exploited stocks, by perfecting dragnet-catching techniques and disseminating them among the fishing community, making their management, recovery and conservation possible.

- A pilot project to support the implementation of participative fishing management in the central Amazon. Organised by the Amazon Institute for Sustainable Management of Environmental Resources (Instituto Amazônico do Manejo Sustentável dos Recursos Ambientais - IARA), under IBAMA, this project will increase the number and the quality of community fishing associations, increase representation by fishermen in participative fish management systems, increase the number of municipal fishing forums, improve the managerial capacity of the institutions associated with the administration of fishing, and create an (inter)institutional system for monitoring.

## 4. Management of Protected Areas:

- A project organised by the Institute of Higher Religious Studies (Instituto Superior Estudos de Religiosos - ISER), in partnership with the administration of Tijuca National Park, Rio de Janeiro, to develop a participative management model for the Park and increase the income arising from it. It involves analysis of the roles of the administrative, political and institutional spheres in the running of the Park, as well as identifying the factors which limit efficiency in its management, based on the involvement of governmental and non governmental sectors.
- A project for participative planning in the elaboration of a management plan for the Itatiaia National Park, organised by the Brazilian Foundation for Sustainable Development (Fundação Brasileira para o Desenvolvimento Sustentável - FBDS). The aim is to prepare this park to meet the growing demand for tourism, minimising the environmental and social impacts to the park and the region. It will also define strategies for the implantation of concessions for services which will benefit the park by means of an efficient autonomous administration, and will develop and test a model of participative planning and management to make the administration more efficient; and define a programme for public use.

#### 5. Conservation of natural ecosystems in private properties:

- A Project organised by the Boticário Foundation for Protection of Nature (Fundação O Boticário de Proteção à Natureza) for the construction of a centre of excellence in the conservation of biodiversity and for the promotion of sustainable development. It will provide training courses in management and administration of protected natural areas, in assessment and evaluation of biodiversity, in principles and practices of environmental education, in environmental education in protected areas, and in training park guards, using the Salto Morato Reserve as a practical model. In addition, it will train the local community in sustainable use of resources and in the practice of zero-impact economic activities, by means of courses on handicraft and the training of tour guides.
- A project for the implantation of Private Natural Heritage Reserves (RPPN), organised by the Directorate of Ecosystems (Diretoria de Ecossistemas - DIREC)/IBAMA. It will support the establishment of a pilot-unit in a reserve in each biome (Amazon, Cerrado, Atlantic forest and Caatinga), for management models capable of providing ecological and economic sustainability. It will result in the publication of a manual for setting up and managing RPPNs, and will contribute to increasing the use of this type of protected area for conservation on private lands.

FUNBIO has begun a series of studies, some in partnership with other institutions with similar interests, to generate support for fund-raising. To this end, FUNBIO staff are also undergoing training for the analysis and operation of potentially lucrative business projects for the fund.

### 4.3.8 Integrated Programme for Ecology - PIE

The Integrated Programme for Ecology (Programa Integrado de Ecologia - PIE) was approved by the National Forum of Co-ordinators of Post-Graduate Courses in Ecology (Fórum Nacional de Coordenadores de Cursos de Pós-graduação em Ecologia) and consolidated by a Co-ordinating Commission nominated by the president of the Brazilian Science Council - CNPq, by Edict PO -11/1997.

PIE institutions include:

- The Ministry of Science and Technology, through the Brazilian Science Council - CNPq and the Financing Agency for Research and Projects (Financiadora de Pesquisas e Projetos - FINEP);

- CNPq, co-ordinator of the Programme, also responsible for its Executive Secretariat;
- The Ministry of Environment - MMA;
- The Ministry of Education and Sport - MEC, through the Higher Education Authority (Fundação Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - CAPES); and
- The National Forum of Co-ordinators of Post-Graduate Courses in Ecology, with four effective and four substitute members on the Co-ordinating Commission.

The mission of the Programme is to establish policies for the development of Ecological training and research in Brazil, to develop information networks, to support international co-operation, to participate in instrumental and methodological standardisation, to promote institutional development and collaborate with other government programmes, with the Commission for Policies for Sustainable Development and with the Agenda 21 - Brazil.

PIE has two subprogrammes. The first is Training and Research in Ecology (Capacitação e Pesquisa em Ecologia - CPE). In 1997 it resulted in grants and support for ten projects submitted to the first and second calls of Tender 001/97. Seven projects were approved but classified as Second Priority, to await 1998 budget resources.

The second subprogramme is for the structuring and implementation of a network of Sites for Long Term Ecological Research (Pesquisas Ecológicas de Longa-Duração - PELD). The information provided by researchers and the site proposals were compiled into a document which provided background data for discussions at the Foz do Iguaçu Workshop (see below), held in June 1997, and the eventual selection of the appropriate sites on 23rd September 1997, which were announced via Internet on the CNPq homepage.

Two sites were listed for the Brazilian coastal: the Coastal Region of the State of São Paulo (Região Costeira do Estado de São Paulo - RECESP), and the estuary of the Lagoa dos Patos and Adjacent Coast (Estuário da Lagoa dos Patos e Região Costeira Adjacente).

The workshop 'Long-Term Ecological Research: A Programme for Latin America' was held in Foz de Iguaçu from 9th-13th June 1997, in order to discuss the priorities and basic requirements for a Brazilian network of a long-term ecological research, and how it could be integrated into similar international programmes. The workshop was sponsored by the institutions which make up the PIE, Furnas Centrais Elétricas S.A. and Itaipu Binacional. Some thirty scientists from Brazil, Argentina, Paraguay, the USA and Venezuela took part in the event.

A third call for the Tender 001/97 resulted in about 30 proposals for Long-Term Ecological Research in the pre-selected sites, which will be evaluated and judged in April 1998.

#### **4.3.9 Brazilian Programme for Molecular Ecology for the Sustainable Use of Amazonian Biodiversity - PROBEM**

The Brazilian Programme for Molecular Ecology for Sustainable Use of Amazon Biodiversity (Programa Brasileiro de Ecologia Molecular para o Uso Sustentável da Biodiversidade da Amazônia - PROBEM) of the MMA resulted in the creation of the Centre for Amazon Biotechnology (Centro de Biotecnologia da Amazônia) in November 1997. The total projected cost of the project is US\$ 55 million, which will be invested in the construction of the facilities, laboratory equipment and staff over a period of five years.

The Centre will concentrate on the industrial use of biological products in the Amazon which are as yet unexplored or underexploited, maintenance of a germplasm collection, and research on molecular biology, phytochemistry, animal poisons and insect-insect and insect-plant interactions.

Basically the Centre will promote the use of natural Amazonian biological resources already in use, with emphasis on bioprospection and industrial use in the short to medium term in the following main areas: pharmaceutical products, such as antibiotics, anti-neoplastic drugs, substances to combat hypertension, neuroactive substances, and immunomodulators; and diverse products, such as materials for cosmetics, natural colouring agents, flavouring, essential oils, biodegradable polymers, pheromones, selective bioinsecticides and enzymes of biotechnological interest.

This bioindustrial pole will be set up within the Tax Free Zone of Manaus, where of industries and other activities receive tax incentives and subsidies. It is expected that companies should begin to invest in the opportunities opened up by the Centre in the areas of pharmaceutical products, bioinsecticides, enzymes of biotechnological interest, essential oils, antioxidants, natural colouring and flavouring. PROBEM/AMAZÔNIA will also provide for the involvement of traditional local communities, especially extractivist and indigenous groups, through contracts for the identification and collection of products of the regional flora and fauna.

PROBEM/AMAZÔNIA will be supported by governmental and non governmental institutions in Brazil and abroad, and will involve the participation of national and foreign researchers. It will be co-ordinated by a

commission of Brazilian experts in the areas, advised by a top-level international committee.

The mission of PROBEM/AMAZÔNIA is high quality basic research on the potential of natural resources for exploitation and the conservation of biodiversity in the Amazon. Its activities will include the training skilled technical and scientific personnel as well the development of applied research on chemical products of pharmaceutical or agroindustrial interest, promoting the sustainable development of the region. This programme provides for a first phase in which the scientific and entrepreneurial credibility of universities and research institutions will be used to set up a structure formalising mechanisms for the establishment of a Consortium. This Consortium will articulate national groups of proven competence in the area to foster the systematic discovery of new substances of socio-economic interest. This process will include the collection of samples, taxonomic research, data banks, maintenance of collections, preparation of extracts, analyses of the properties of samples, the development of production mechanisms, and agreements regulating the rights of the parties involved.

Partnerships will be formed to facilitate the establishment and development of bioindustries in the Amazon region. This process provides for:

- The System of Sample Collection (Sistema de Coleta de Amostras - SCA);
- The System of Preparation of Extracts (Sistema de Preparação de Extratos - SPE);
- The System for the Determination of Extract Properties (Sistema de Determinação das Propriedades de Amostras - SPA);
- The Co-ordination Nucleus (Núcleo de Coordenação - NCO).

The System of Sample Collection - SCA will be composed of groups from local universities and research institutions and other public and private institutions in the region. Biotic samples will include bacteria, algae, fungi, protozoans, animals and plants. The collection strategies will be defined by the Consortium. The intention is to engage specialised personnel, particularly taxonomists and technicians in universities, using, contributing to and improving the infrastructure already existing. Training courses are planned which will cover such topics as

- Notions of taxonomy;
- Preservation of samples;
- Management of data banks;
- Jungle survival skills.

The collectors will participate in a major programme of exploration, collecting samples under the supervision of taxonomists and other senior researchers. The systematic inventories involved in the SCA will contribute to an understanding of Amazonian biological diversity, and as such to its conservation. Ecosystems will be sampled systematically, and the institutions involved will be expected to provide support for preliminary classifications, germplasm banks and the database. Each will ideally maintain its own database and its own collections. The samples prepared will be sent to the nearest laboratory for the preparation of extracts, or to the Reference Laboratory for Extract Samples (Laboratório de Referência de Produção de Extratos - LRPE).

The System of Preparation of Extracts - SPE will be comprised of the Amazon institutions with specialised laboratories to produce extracts of the samples collected by the SCA. The extracts will be preserved and coded, and part of them sent to the LRPE, which will be established in the Amazonia Biotechnology Centre in Manaus. The LRPE will distribute samples of the extract among the various groups comprising the System for the Determination of the Properties of Extracts. The LRPE will also work to improve and develop techniques for the production of extracts, standardise the procedures for the production of extracts and train technicians. It will also maintain laboratories for the production of special extracts and the systematisation of procedures.

The System for the Determination of the Properties of Extracts - SPA will be made up of the institutions involved in prospecting the properties of the samples and their socio-economic interest. Local and national institutions may take part in the SPA and, when necessary, screening companies with advanced technologies. This will involve joint ventures with the Consortium or with one of the companies of the system.

Partnerships will be sought with well-established research groups in chemistry and biology in Brazil so as to begin exploration as quickly as possible, and develop the advanced methodologies necessary for this large-scale prospecting.

The Consortium will have a Reference Laboratory for Biological Assays (Laboratório de Referência para Ensaios Biológicos - LREB) located in the Butantan Institute in São Paulo, fully equipped for the purpose. It will concentrate mainly on animal toxins and antigens, and act as a nucleus for the development of advanced screening technologies, the standardisation of biological tests, and staff training.

The Molecular Structures Laboratory of the State University of São Paulo - UNESP, Rio Claro will be responsible for advanced studies on chemical structures and chemical syntheses.

The SPA will have a number of partners among institutions throughout the country.

- The Phytochemistry Department, the Tropical Diseases Department, and the Molecular Biology Laboratory of the National Research Institute of Amazonia (Instituto Nacional de Pesquisas da Amazônia - INPA), Manaus.
- The Analysis Centre (Central Analítica), the Biotechnology Laboratory and the Natural Products Laboratory of the University of Amazonas (Fundação Universidade do Amazonas - FUA), Manaus;
- The Natural Products Laboratory of the Federal University of Pará, Belém.
- Biotechnology and Chemical Analysis Laboratories of the Agroforestry Research Centre of Eastern Amazonia (Centro de Pesquisa Agroflorestal da Amazônia Oriental - CPATU/EMBRAPA), Belém.
- Biology and Medicinal Plant Sectors of the Agroforestry Research Centre of Western Amazonia (Centro de Pesquisa Agroflorestal da Amazônia Ocidental CPAA/EMBRAPA), Manaus.
- The Tropical Diseases and Natural Products Laboratories of the Oswaldo Cruz Foundation (Fundação Oswaldo Cruz - FIOCRUZ), Rio de Janeiro.
- The Natural Products Laboratory of the Federal University of São Carlos, São Carlos, São Paulo.
- The Natural Products Laboratory of the Department of Organic Chemistry, Institute of Chemistry (Instituto de Química/USP) of the University of São Paulo.
- The Laboratory for the Bioanalysis of Pheromones of the Federal University of Viçosa, Viçosa, Minas Gerais.
- The Laboratory of Protein Chemistry, Biophysics and Molecular Biology of the University of Brasília, Brasília.
- Laboratory for the Purification and Characterisation of Proteins, Biotechnology Centre of the Federal University of Rio Grande do Sul, Porto Alegre.
- Crystallography Laboratory of the Institute of Physics of São Carlos, University of São Paulo.
- Biological Control and Molecular Biology Laboratories of the National Centre for Research on Genetic Resources and Biotechnology (Centro Nacional de Pesquisa de Recursos Genéticos e Biotecnologia (CENARGEN/EMBRAPA), Brasília.
- Institute of Antibiotics, Federal University of Pernambuco, Recife.

- Molecular Virology Laboratory, Federal University of Rio de Janeiro.
- Pathology and Pharmacology Nuclei, Federal University of Ceará, Fortaleza.
- Institute of Biomedical Sciences, University of São Paulo.
- Biotechnology Centre of the University of Caxias do Sul - UCS.

The Co-ordination Nucleus will be based at the Amazon Biotechnology Centre, with all the necessary administrative infrastructure, software and computer equipment for a data bank, and a legal department.

### **4.3.10 Programme for the Biodiversity Conservation in the State of São Paulo - PROBIO-SP**

In 1995, the Secretariat for the Environment (Secretaria do Meio Ambiente - SMA) of the state of São Paulo set up a programme for the Conservation of Biodiversity in the State of São Paulo (Programa para a Conservação da Biodiversidade do Estado de São Paulo - PROBIO-SP), specifically with a view to implementation the recommendations of the Convention on Biological Diversity - CBD and to provide the basis for a state policy for the conservation and sustainable use of biodiversity.

PROBIO/SP counts on the collaboration of various areas with SMA, as well as a number of other organizations and institutions. Its initial role was to publicise the CBD and related subjects (<http://www.bdt.org.br/bdt/sma/probio>), and organise, co-ordinate and participate in meetings. São Paulo is the only state so far to have set up a specific programme for biodiversity.

Activities already carried out through PROBIO-SP include:

- A workshop on the Cerrado of the state of São Paulo, in partnership with a number of public and private institutions. This resulted in a report defining and delimiting priority areas for conservation, as well as the establishment of a multidisciplinary group for the evaluation of requests for clearance licensing in Cerrado areas, which has negotiated with rural landowners to maintain and extend their Legal Forest Reserves;
- A workshop on forest fauna, in partnership with the Federal University of São Carlos, for the definition of a list of threatened species for the state. The list was made official by an Edict dated 6th January 1997;

- The establishment of a database on protected areas and the development of legislation for the state system); monitoring the elaboration of a number of management plans.
- The drafting of an agreement to regulate the access to genetic resources and derivatives in the protected areas in the state.
- Participation in a number of discussions on the conservation of biodiversity at national level, and in the National Environment Council (Conselho Nacional do Meio Ambiente - CONAMA).
- Participation in discussions on granting legal title to the communities originating from *quilombos* [communities of runaway slaves], and also on the alignment of their rights and interests with the conservation of biodiversity.
- The execution of nine Environmental Management Plans (Planos de Gestão Ambiental - PGAs) with financing from the German bank KfW, in protected areas in the Atlantic Forest. They include the Ilhabela State Park, the Serra do Mar State Park (the Caraguatatuba, Picinguaba, Santa Virgínia and Cubatão Nuclei), the Ilha do Cardoso State Park, Pariquera Abaixo State Park, the Bananal Ecological Station, and the Chauás Ecological Station. The Intervales State Park also carried out its Management Plan, and was the first area in which the methodology adopted for the other areas was tested. The development of the PGAs, used an adaptation of the ZOOP method for structuring information and decision-making, which involved local communities working side by side with technical staff in the definition of the actions necessary for the protected area in question.
- Macro-zoning, establishment and regulation of Environmental Protection Areas (APAs). A macro-zonation of the basins of the Rio Mogi-Pardo and Rio Grande (94 municipalities and some 35,000 km<sup>2</sup>) was established; the Tietê Várzea APA was regulated; the Jundiá-Cabreúva APA is being regulated; and the APAs of Sertão Bocaina, Sapucaí Mirim and Ituparanga were created and regulated.
- Participation in the efforts of the state government to delimit the territories occupied by some regionally distinct traditional populations and delimit and regulate their land title. Measures to promote sustainability in palm heart extractivism (replanting and processing), and training in ecotourism within a programme of the SMA.
- Promotion of a joint Seminar on “Managing Marine Diversity: Preparing Brazil for 1998 - The International



Year of the Sea”, with the Association of Environmental Science Professionals Associação dos Profissionais em Ciências Ambientais - ACIMA). This event resulted in a number of recommendations being submitted to the SMA.

## 4.4. Towards a National Biodiversity Strategy - ESNABIO

### 4.4.1 Procedures Adopted and Partial Results

Article 6 of the Convention on Biological Diversity determines that the signatory countries must “develop national strategies, plans or programmes for the conservation and sustainable use of biological diversity”. The first stage is, therefore, the development of a National Strategy for Biological Diversity (Estratégia Nacional de Diversidade Biológica - ESNABIO).

Although many public and private efforts have been dedicated to initiatives of this sort, they have yet to constitute a complete and co-ordinated strategy. Many questions have still to be tackled:

- Disparity in the conservation efforts for the main Brazilian biomes;
- Limited access to information on biodiversity;
- Limited participation of local communities, NGOs and the business sector in government projects;
- Limited number of partnerships between the public and the private sector for the sustainable use of biodiversity.

Based on these premises, the strategy should analyse the information available in the country, identify objectives and potential targets for conservation, and the needs, opportunities and impacts, and propose the actions and investments necessary to attain the proposed objectives. It should also include complementary studies on the present state of knowledge on Brazilian biodiversity, human and institutional capacity, policies and legal structure, the causes of biodiversity loss, a survey of costs and benefits, and identification of the needs for a) *in situ* and *ex situ* conservation; b) sustainable use; and c) sharing of the benefits.

The first challenge is access to Brazilian biodiversity. The second is how to preserve this legacy, in large part still unknown. The third, and most complex, is the formulation and establishment of developmental model which will ensure the sustainable use of biodiversity as a whole.

During the workshop ‘Government and Society in Partnership for Biodiversity’, held in June 1994, the MMA made a pledge to leaders in business, academic/scientific communities, environmental NGOs and government sectors to establish a partnership between Government and civil society for the implementation of the CBD commitments.

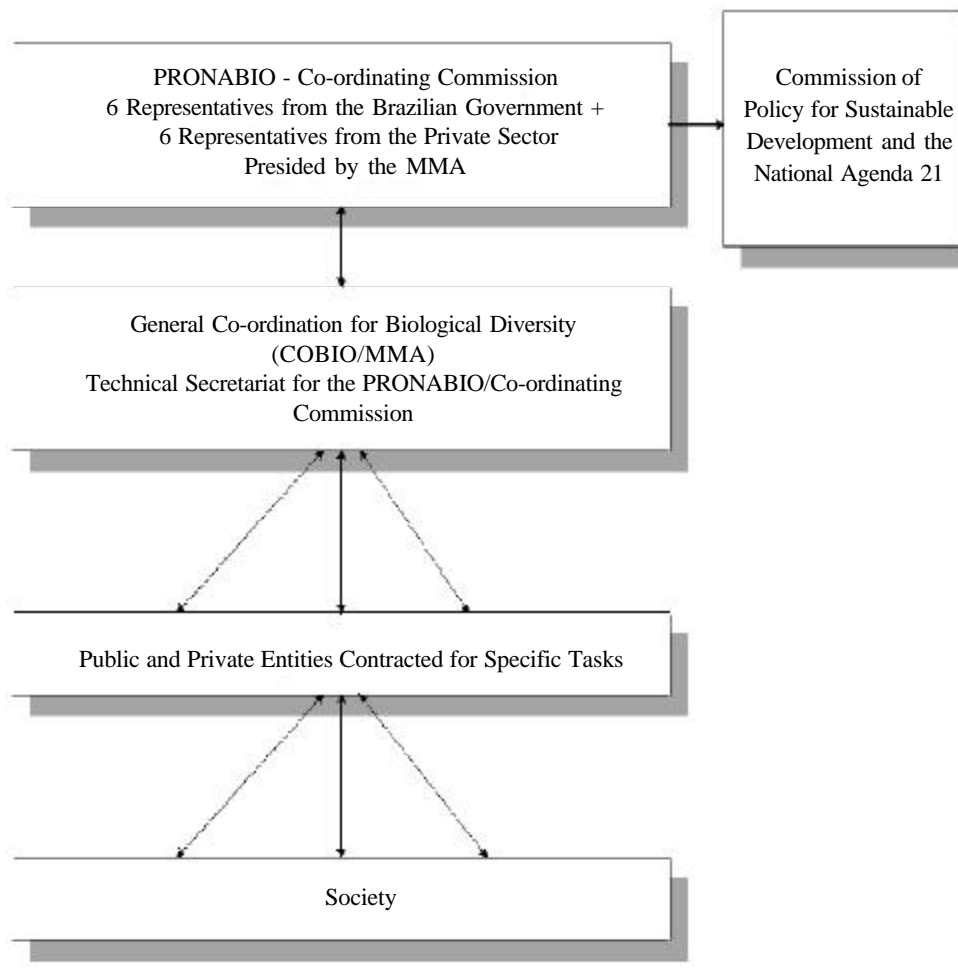
The MMA has set up a parity Working Group with six members from the government and six from civil society, to advise the government on the creation of a national biodiversity programme.

The project ‘National Biodiversity Strategy and Report to the Convention on Biological Diversity’, (Estratégia Nacional de Diversidade Biológica e Relatório para a CDB) supervised by the co-ordinating commission of PRONABIO with operational support from the General Co-ordination of Biodiversity (COBIO) was approved in July 1996 by the GEF Working Group linked to the International Affairs Secretariat (Secretaria de Assuntos Internacionais - SEAIN) of the Ministry of Planning and Budget (MPO). In September 1996 it was approved by the External Financing Commission (Comissão de Financiamentos Externos - COFIEX), linked to the MPO, and in March 1997 it was approved by the GEF Council.

Funds totalling US\$ 950,000 were negotiated with the GEF to carry out the Project of the National Biodiversity Strategy (ESNABIO) drawn up by the General Co-ordination of Biodiversity (COBIO). They are administered by the United Nations Development Programme (UNDP).

The General Co-ordination of Biodiversity (COBIO) is responsible within the MMA, for the preparation the National Strategy. COBIO is part of the Department for the Formulation of Environmental Policies, (Departamento de Formulação de Políticas Ambientais) which itself is part of the Secretariat for the Co-ordination of Environmental Affairs (Secretaria de Coordenação de Assuntos do Meio Ambiente) of the MMA.

An important aspect in the elaboration of the Strategy is the full participation of the various economic and social segments of society involved with biodiversity. A number of steps are being taken to involve the greatest possible number of institutions in the various phases (Figure 4-1):



**Figure 4-1.** System of consultation and elaboration of the National Biodiversity Strategy (ESNABIO).

- Review, by thematic working groups, of the principal articles of the Convention, for the preparation, through a national workshop, of the Basis for a National Strategy;
- Meetings in partnership with state environment organizations (Organizações Estaduais de Meio Ambiente - OEMAs);
- Sectorial meetings, in partnership with the business community;
- Drafting, approval and publication of the proposal for the National Strategy;
- The ESNABIO project is designed to last 18 months, at the end of which the document will be submitted to the highest ranks of the public administration for approval.

In the first stage, 10 Thematic Working Groups (Grupos de Trabalho Temáticos - GTTs) are producing reviews of the key articles of the CBD. The GTTs will identify the status of the implementation of these articles in Brazil, as well as the agencies and structures available, resources, needs, potential targets, threats and opportunities. Final reports will indicate the priorities, recommendations, methodologies and instruments for each set of articles.

The publication of the Strategy will eventually underpin the elaboration of the action plan for the conservation and sustainable use of Brazilian biodiversity.

#### 4.4.2 Evaluation of Brazilian Biomes

As an important instrument for the preparation of the National Biodiversity Strategy, the Co-ordinating

Commission of PRONABIO has approved subprojects to evaluate the status and identify priority actions for the conservation of Brazilian biomes, in the ambit of PROBIO.

- For the Atlantic forest biome, including mountain moorlands (*campos rupestres*) and grassland, *restingas* (coastal sandy soil scrub and forest), mangrove swamps, Araucaria pine forests and the *Campos Sulinos* (open savannah in the south), co-ordinated by the NGO Conservation International do Brasil.
- For the Coastal and Marine Area, co-ordinated by the Bio-Rio foundation (Fundação Bio-Rio);.
- For the Amazon forest biome, co-ordinated by the Socio-environmental Institute (Instituto Sócio-ambiental - ISA);
- For the Caatinga biome, including the deciduous forests and remaining humid forest patches (*brejos*). (the selection of the executing agency is still in progress);
- For the Cerrado biome, including the Pantanal and the mountains moorlands (*campos rupestres*), co-ordinated by the Pró-natureza Foundation (Fundação Pró-Natureza - FUNATURA), with the help of the Biodiversitas Foundation (Fundação Biodiversitas), the University of Brasília, Conservation International do Brasil, and Institute for Society, Population and Nature (Instituto Sociedade, População e Natureza - ISPN).

The main objectives of these assessments are:

- Knowledge of the biological diversity and potential for sustainable use of the Brazilian biomes;
- Characterisation of the main biotic communities, including indicators of key species and surveys of threatened species and their status;
- Analysis of socio-economic trends, including the potential for use of the natural areas and their importance for human communities, and public policies that affect biodiversity (transport, energy, production, infrastructure, land taxation, etc.)
- Assessment of the current status of Brazilian biomes in relation to human impacts;
- Identification of priority areas for conservation and restoration, based on criteria of biodiversity and ecosystem integrity;
- Identification of options for the sustainable use of natural resources, compatible with the conservation of its biodiversity;

- Estimates of the costs and benefits of the protection of biodiversity.

Complementary initiatives have been, and are being, developed. They include:

- Public hearings and workshops on access to genetic resources;
- Studies on agricultural policy and biodiversity;
- Studies of forestry policy;
- Studies of policy for fisheries;
- Consultations and workshops on the Brazilian system of protected areas;
- Drafting of a report on plant genetic resources.

The first of these assessments, the results of which are already available, was on the Cerrado biome. The aims were to produce a report on the biodiversity and the socio-economic restrictions concerning the use and conservation of the biome, to indicate priority areas for conservation in the Cerrado and the Pantanal, and to discuss strategies for conservation and the use of biotic resources in the region. The Cerrado biome was considered *sensu lato*, including, besides the open savannahs of central Brazil (open savannah, scrub savannah to *cerradão* [woodland] and mountain moorland), certain characteristic forest formations (*veredas* [palm savannah characterised by *Mauritia* palms], gallery forest, and semi-deciduous moist forests), the peripheral cerrados in São Paulo and Paraná, and Amazon savannahs in the states of Pará, Amazonas, Roraima and Amapá, similar to the Cerrado. The Pantanal of Mato Grosso was included because its rivers drain the Cerrado, and there is considerable biotic overlap, although it can be clearly distinguished in its socio-economic features and by the predominance of flooded ecosystems.

The preparatory phase for the assessment of the Cerrado biome was begun in 1996, with funding from GEF/The World Bank, and supervised by the MMA and support from the Financing Agency for Research and Projects (Financiadora de Pesquisas e Projetos - FINEP). Consultants were contracted to carry out ecological and taxonomic assessments on mammals, birds, reptiles and amphibians, bees, and also to review non-biotic factors and the protected areas system. A planning meeting was held on 10th-11th December 1996, supported by the MMA and the Boticário Foundation (Fundação O Boticário de Proteção à Natureza), involving 63 participants, including academics and scientists, NGOs and government representatives, to assess the thematic reports and plan a workshop "Priority Actions for Conservation of Biodiversity in the Cerrado and the Pantanal" (see below).

Digital mapping of the Cerrado was concluded in 1997 by the Biodiversitas Foundation (Fundação Biodiversitas), complementary to the consultancies begun in 1996. It included the following themes: Botany, Invertebrates, Aquatic Biota, and Assessment of Cerrado Deforestation by Remote Sensing. The Homepage for the workshop was placed on the Internet, and a listserver was established for the discussion of topics on the Cerrado and the Pantanal.

The workshop was held in Brasília from 23rd-27th March, 1998, with 215 participants from Brazil and abroad, representing environmental and social NGOs, federal, state and municipal governments, multilateral finance organizations, universities, research centres and private enterprise.

The specific aims of the workshop were:

- Define priority areas for conservation of biodiversity in the Cerrado and the Pantanal;
- Define priority action **Table 4-2**. Species richness of various taxons of the Cerrado Region **Neotropicals** for conservation in these areas, including wildlife inventories and research and management, recovery of degraded areas and the creation of protected areas;
- Evaluate options for the use of natural resources in the Cerrado and the Pantanal compatible with the conservation of biodiversity;
- Evaluate and propose models for the sharing of benefits from the economic use of biodiversity from the Cerrado and the Pantanal.

Two days of this workshop were set aside for meetings of thematic groups (Botany, Invertebrates, Amphibians and Reptiles, Mammals, Birds, Aquatic Biota, Social Development, Economics, Protected Areas, Non-Biotic Factors, Systems Models and Databases). During these meetings, priority areas and actions were defined for each taxonomic group. Following this, cross-cutting regional analysis groups were set up, each composed of specialists from all the thematic areas. These groups spent two days analysing conservation priorities for each Cerrado sub-region, focusing on the biodiversity and the opportunities offered in the socio-economic context. Combining the maps produced by each of the regional groups resulted in the final priority area map. The result was seventy priority areas for conservation throughout the Cerrado and the Pantanal (Figure 4-2) and including savannah/cerrado regions elsewhere in the country. Diagnoses of priority actions, including the creation of protected areas, inventories of flora and fauna, recovery of degraded areas and sustainable management or use, are being drawn up for each priority area. A network of ecological corridors, linking the priority areas identified, was proposed for the Pantanal.

The results of the thematic groups were surprising. Biodiversity in the Cerrado is rich, even considering the limited information available (Table 4-2). Although still only estimates, endemism was found to be very high in the woody plants (44% of the species) and the bees (about 50%).

All of the thematic groups indicated the lack of knowledge on the animal and plant groups they were dealing with. No adequate inventories on birds are available for about 70% of the area of the Cerrado; new insect species are collected frequently; one new genus and three new species of mammal were described in the 1990s. Twenty-one priority are almost completely, or totally, unknown in terms of their plant communities, particularly in the Cerrado regions of the states of Tocantins and Bahia.

Regarding the fish fauna, rivers with falls or rapids (tributaries of the Rio Tapajós, for example) tend to have very unusual and highly endemic species at the headwaters. About 60% of the species collected during an expedition to the headwaters of the tributaries of the upper Rio Arinos (Tapajós basin) were new to science.

The existing protected areas of the Cerrado cover only 1% - 3% of the biome. The thematic group on protected areas came up with a number of concrete recommendations, including regulation of land rights in existing APAs, a qualitative improvement in the RPPN programme, the hiring of personnel for the protected areas, dissemination of the idea and importance of strictly protected areas, and incentive for the creation of large (more than 300,000 ha) areas in the significant remaining patches of Cerrado.

Regarding socio-economic aspects and human occupation of Cerrado, the report prepared by the Institute for Society, Population and Nature - ISPN demonstrated the rapidity of economic development in the region. Grain production in the core area of the Cerrado increased by 62.07% over a period of nine years, although the increase was not entirely due to the occupation of new areas, which, in the same period, increased by 19.25%. It is in large part due to cultivars with higher productivity, mechanisation and improved labour. After this nine-year increase, production slowed or dropped in 1990, with the prevailing economic climate of the Fernando Collor presidency.

According to ISPN, the total population in the core area of the Cerrado has almost doubled in the last 26 years, but the rate of increase has taken a sharp downturn in the last five. In 1996, the rate of population growth in the Cerrado core was above the 13.8% registered nation-wide for the same year. Although the core area of the Cerrado municipalities corresponds to about one-third of the country, it is still an area of low-density population, less than the average for the entire country. Pressure from human activities, however, is high, with a tendency to increase in the Cerrado

and Pantanal region in the future, stimulated by monetary stability and large investments planned for the improvements in transport.

A paper by Mantovani and Pereira presented at the workshop based on satellite images 1987-1993, showed that 67.1% of the region is populated or highly modified. Only three areas of the Cerrado or the Pantanal were found to be reasonably conserved: one of the Cerrado areas in the region near the Piauí, Maranhão and Tocantins state borders; a second area in the region near the Tocantins and Mato Grosso state border, and one in the Pantanal of the state of Mato Grosso do Sul.

The workshop collated key information to guide biodiversity conservation efforts in the Cerrado and the Pantanal. The combined efforts of the experts in the biological diversity of the region, the representatives of governmental and non governmental sectors, and the representatives of private enterprise and social movements, made it possible to produce informed and concrete recommendations for priority actions for conserving this biome.

#### 4.4.3 The National Focal Point for the Clearing-House Mechanism - CHM of the Convention on Biological Diversity

Brazil is in the final phase of developing its National Focal Point for the Clearing-House Mechanism - CHM, as foreseen in the Convention on Biological Diversity - CBD (Article 18.3). It will contain information on the implementation of the CBD, the actions co-ordinated by the National Programme for Biodiversity - PRONABIO, and on biodiversity in general and in Brazil. It will be decentralised, with national and international pointers.

The Brazilian Clearing-House will be integrated with other Clearing-House Mechanisms within the ambit of CBD in such a manner as to permit the exchange of information, technology and experiences between the Parties. The principal aim is to facilitate the implementation in the country of all the articles and work-programmes contained in CBD. For this, the Brazilian CHM is being developed in Hypertext Mark-up Language - HTML, to make it available on the Internet.

Pages in HTML are being written to explain the importance of the CBD for Brazil and the world, with a view to raising the awareness of the academic community, the Government, non governmental organizations and the entrepreneurial sector, as well as the public in general. These pages will cover the problem of biodiversity loss and the importance of

**Table 4-2.** Species richness of various taxons of the Cerrado Region

Taxon	Neotropical Region	Cerrado	Endemic
Fungus <sup>1</sup>		24,000	?
Angiosperm Plants <sup>2</sup>		6,387	?
Birds <sup>3</sup>		837	28
Mammals <sup>4</sup>		185	18
Butterflies <sup>5</sup>	40,000	10,000	?
Termites <sup>5</sup>	443	129	?
Bees <sup>5</sup>	7,000	809	417
Social Wasps	547	139	?
Ants <sup>5</sup>	2,223	100	?

? indicates number of unknown species.

#### Sources:

<sup>1</sup> Dianese *et al* (1997).

<sup>2</sup> Mendonça *et al* (1997). EMBRAPA *Cerrados*, Planaltina, DF.

<sup>3</sup> Silva, J.M.C. (1995)

<sup>4</sup> Marinho-Filho, J. (1998).

<sup>5</sup> Raw, A. (1998).

sustainable development. To emphasise the importance of biodiversity in Brazil, the public will be informed of the economic value it currently represents for the country (in proportion to the GNP, for example), besides the economic benefits arising from biotechnology. Biodiversity should be seen and understood as an opportunity for use and not just as an onus for conservation. Partnerships will be fostered with organizations with expertise and relevance in the area of themes broached by CBD. The public will have access to the guidelines set down for implementing the CBD, and what is being done in the country in favour of biodiversity, including the projects underway and the financial mechanisms available for their execution. A database on projects under way in the area of biodiversity, naming the institutions which finance them, has almost been completed.

The Brazilian CHM contains meta-data (information on information). While the CHM examines one database on biodiversity and makes pointers for the data, the meta-data describes the contents, where the information originated, in Brazil or abroad, information on the quality of the source, the format, the source and how to access information. The documents produced in the CBD decision-making process will be made available on the Internet. Also available will be a calendar of events so that any interested party can participate with contributions for the construction of a Brazilian position with regard to the themes under discussion. It is a mechanism for maximum participation. Research into Brazilian legislation on biodiversity will also be made available. The logo CHM will be used on the Internet to facilitate location of the Brazilian Clearing-House site. On this site there will be a profile of Brazil giving special services such as libraries, universities and search mechanisms. The system is being designed in Portuguese for the local community and in English for the international. Because of its penetration, the CHM should have a relevant role in information

dissemination and consultation during the preparation of the National Strategy for Biodiversity.

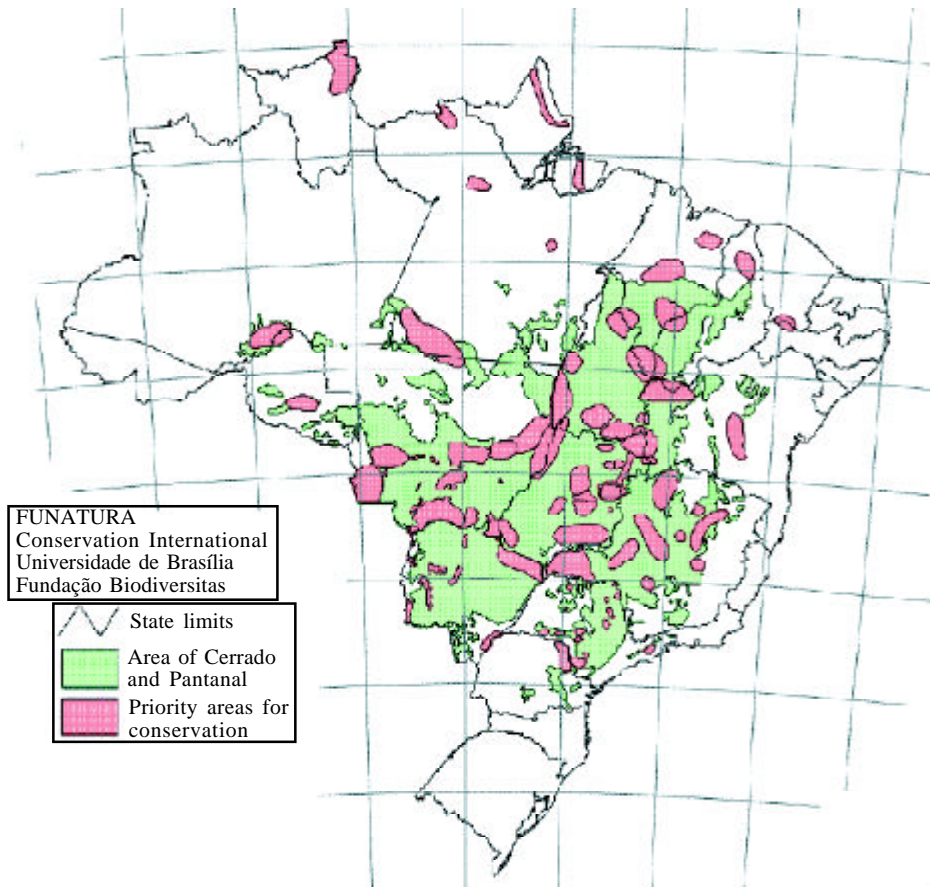
#### 4.4.4 Other Initiatives

Many other initiatives besides the biome assessments will have to be undertaken for the completion of ESNABIO, in accordance with the CBD. The most important of these include:

3. Trans-sectorial analysis from a national perspective and not just at the level of biome;
4. Evaluation of current requirements and a cost/benefit study of proposed actions, also from a national viewpoint.

A future step will involve a comparison at the national level of the priorities and requirements identified for each biome. The availability of national statistics will be necessary to determine priorities and strategies at national, regional and sectorial levels. This requires a consolidation of the information biome by biome, including the species' distributions and the definition of biogeographic patterns.

The task of identifying options for implementing the CBD, including the establishment of the specific priorities and options for each biome, should be carried out with the full participation of a wide spectrum of people. The state environmental organizations - OEMAs, each with their different perspectives and administrative structures, will play an important role in defining national priorities and responsibilities. The hundreds of national and regional NGOs, landowners and the Brazilian companies, which have already assumed greater responsibilities in environmental concerns, and civilian society should be widely consulted in the formulation and support of coherent and just strategies.



**Figure 4-2.** Priority areas for conservation in the Cerrado and Pantanal in Brazil.

**Source:** workshop *Ações Prioritárias para a conservação da Biodiversidade do Cerrado e Pantanal*, Brasília, 1998.

1. A survey of capacity in human resource terms. This will require a national assessment, in so far as this capacity does not always correspond to the geographic boundaries of a biome. In many cases, it will be necessary to enlist private institutions and professional organizations of national standing;
2. Surveys of national policy and the framework of norms and regulations, in which some aspects can only be evaluated from a national perspective, such as trade agreements or themes of national security;

Two national workshops will be held in 1998 as part of the process of preparing the ESNABIO proposal. The first of these, reviewing progress to date and the work of the Thematic Working Groups - GTTs, will result in a document: 'Bases for a National Biodiversity Strategy'. The second workshop will also discuss the sectorial and state findings.

The project is carefully structured, and the methodology used is based on the 1993 UNEP guidelines: *Guidelines for Country Study on Biological Diversity* (UNEP, 1993); on

the *Canada Country Study of Biodiversity: Taxonomic and Ecological Census, Economic Benefits, Conservation Costs and Unmet Needs* (Ottawa 1992); and on the document *Biodiversity in Canada: a Science Assessment for Environment Canada* (Ottawa 1994). It also takes into account the experience of other countries in the preparation of their own national strategies, documented in *National Biodiversity Planning: Guidelines on Early Country Experiences* (WRI/UNEP/IUCN).

Bearing in mind the size of Brazil and the diversity of its biomes, the process of compiling and collating information will only be completed at the end of the first year of the project. The first steps in the elaboration of the ESNABIO will be taken prior to the conclusion of data collection, so as to avoid delay. A preliminary report will serve as the basis for the initial stages of ESNABIO for ample consultation. Further information will be added, and adjustments and refinements carried out at later stages. The final report will be prepared when the information base is complete and will be the baseline document for the execution of the Strategy.

The preliminary report, 'Bases for a National Biodiversity Strategy', will result from a national workshop and will include the work of the GTTs and consultations via the Internet. After the state and sectorial consultations, the document will be revised in a three-day national meeting to be held in Brasilia in 1998, with the same groups that took part in the national workshop to define the initial document. The recommendations arising from this meeting, together with the complete results of the data collection (the biome biodiversity evaluations and complementary information) will be incorporated in a final document putting forward the ESNABIO proposal. This will be revised by thematic working groups from the CBD and the PRONABIO Co-ordination Commission, and then be submitted to the Minister of the MMA for approval. This project does not include the preparation of an Action Plan for the ESNABIO implementation, which will be developed from a decentralised initiative only following ESNABIO approval.

The Federal Government expects conclude, and adopt, the National Biological Strategy by the end of the first semester of 1999.

**Box 4-1**

**The Constitution and the Environment**

Promulgated in 1988, the new Constitution of the Federal Republic of Brazil refers to the environment in the following articles:

“Article 225. All have the right to an ecologically balanced environment, which is an asset of common use and essential to a healthy quality of life, and both the Government and the community shall have the duty to defend and preserve it for present and future generations.

Paragraph 1 – In order to ensure the effectiveness of this right, it is incumbent upon the Government to:

- I. preserve and restore the essential ecological processes and provide for the ecological treatment of species and ecosystems;
- II. preserve the diversity and integrity of the genetic patrimony of the country and to control entities engaged in research and manipulation of genetic material;
- III. define, in all units of the Federation, territorial spaces and their components which are to receive special protection, any alterations and suppressions being allowed only by means of law, and any use which may harm the integrity of the attributes which justify their protection being forbidden;
- IV. demand, in the manner prescribed by law, for the installation of works and activities which may potentially cause significant degradation of the environment, a prior environmental impact study, which shall be made public;
- V. control the production, sale and use of techniques, methods or substances which represent a risk to life, the quality of life and the environment;
- VI. promote environmental education in all school levels and public awareness of the need to preserve the environment;
- VII. protect the fauna and the flora, with prohibition, in the manner prescribed by law, of all practices which represent a risk to their ecological function, cause the extinction of species or subject animals to cruelty.

Paragraph 2 – Those who exploit mineral resources shall be required to restore the degraded environment, in accordance with the technical solutions demanded by the competent public agency, as provided by law.

Paragraph 3 – Procedures and activities considered as harmful to the environment shall subject the guilty party, be they individuals or legal entities, to penal and administrative sanctions, without prejudice to the obligation to repair the damage caused.

Paragraph 4 – The Brazilian Amazonian forest, the Atlantic forest the Pantanal Mato-Grossense and the coastal zone are part of the national patrimony, and they shall be used, as provided by law, under conditions which ensure the preservation of the environment, therein included the use of mineral resources.

Paragraph 5 – The unoccupied land or lands seized by the states through discriminatory actions which are necessary to protect the natural ecosystems are inalienable.

Paragraph 6 – Power plants operated by nuclear reactor shall have their location defined in federal law and may not otherwise be installed.”

(Translation from: Federative Republic of Brazil: Constitution 1998 - The Federal Senate Secretariat of Documentation and Information, Under-Secretariat of Technical Editions, Brasília, 1994)



**Box 4-2**

**Ratification of the Convention on Biological Diversity**

Brazil was the first country to sign the Convention on Biological Diversity, during the UN Conference on Environment and Development, held in Rio de Janeiro, 5th-12th June 1992.

Less than two years later, by Legislative Decree No. 2, 3rd February 1994, the National Congress ratified the text. The decree established:

“Any act that may result in revision of the said Convention, as well as any complementary adjustment which, in the terms of Article 49 section 1 of the Federal Constitution may bring “any charges or commitments that go against the national property” is subject to the approval of the National Congress”.

Section 1 of Article 49 establishes that the National Congress has exclusive competence to “decide conclusively on international treaties, agreements or acts which result in charges or commitments that go against the national property”.

The ratification document (Legislative Decree No. 2/94) was deposited with the United Nations on 28th February 1994. The CBD came into force in Brazil 90 days later, on 29th May 1994.

