

**BIODIVERSITY
EXPERIENCES WITH ACCESS AND BENEFIT SHARING**

**THE SECOND REGIONAL WORKSHOP
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Biodiversity - Experiences with benefit sharing

Introduction:

The United Conference on Environment and Development represented a turning point in the way the international community was addressing the issue of the conservation of the natural resources. The international community exerted a biased pressure on the need to preserve natural resources, directing their criticism exclusively towards the degradation of the tropical rain forests, neglecting the severe environmental degradation caused by the process of industrialization of the developed countries throughout the centuries, and by their patterns of consumption and production. Approved during the United Nations Conference on Environment and Development, held in Rio de Janeiro, in 1992, the Convention on Biological Diversity was the very paradigm of the Rio Conference. The Convention recognized that Governments have the sovereign right to explore their own genetic resources in the implementation of their national environmental policies and the principle of common but differentiated responsibilities. Foremost, the CBD reiterated sustainable development as the means for countries to achieve development and better conditions of life for their peoples.

Brazil was the first signatory of the Convention on Biological Diversity (CBD) and, since then, has been endeavoring to fulfil the commitments involved. In order to fulfill this objective, it is necessary to handle carefully and with pragmatism the complex biodiversity issues covered by the CBD, such as:

- I. Considering biodiversity in all its different forms;
- II. Planning for conservation of biological diversity, the sustainable use of its components and a fair and equitable sharing of the benefits derived from the use of genetic resources;
- III. Considering options for the management of biological diversity;
- IV. Considering the principal means to promote the rational use and management of biological diversity; and
- V. Guaranteeing the recognition of the country origin of the resources.

There are different levels of responsibilities and interests between the Parties to the Convention: the countries which are sources of, and conserve, biological diversity, and the others that are the main users of such biodiversity (the industrialized countries). Both groups of countries are aware of the need to halt the rates of extinction of biodiversity, but for the first one, their genetic heritage is also a tool for development and, thus, has to be used in a sustainable way, bearing in mind the need to preserve biodiversity for the oncoming generations and, at the same time, to achieve better life conditions for their people.

As a matter of fact, this multitude of interests is reflected in the concept of differentiated responsibilities in tackling the subject of biodiversity. According to this concept, the developed countries have to assist the developing ones in their efforts towards the conservation and sustainable use of the genetic resources – always bearing in mind the ultimate goal of sustainable development – by the transference and development of sound technology, as well as the provision of financial resources to developing countries. The guarantee of a fair and equitable sharing of commercial and scientific benefits arising from the development of biotechnological products between the countries providing the genetic resources and those using them would be a concrete evidence of the feasibility of this "partnership".

Biodiversity can be considered as a kind of “insurance” for the future against the unexpected, representing a possibility to provide alternative paths for development, in response to eventual shortages of suppliers. The Commission for Genetic Resources of the United Nations' Food and Agriculture Organization (FAO) has pointed out that more than half of the varieties of the world's twenty most important seeds – such as rice, wheat, maize, oats, beans and peas – have been lost since the beginning of the century, together with their unique, specific and irreplaceable genes, which allowed for adaptation to different soils, climates and diseases. Biodiversity holds the key to substituting increasingly scarce materials, especially those of mineral origin, which is of utmost importance regarding the ever-increasing rate of growth of the world population.

The World Market for Biotechnological Products:

The importance of the biotechnological production in the world economy and the growing environmental awareness of the populations have increased the demand for natural products, be it for the production of medicines or for more sound technological processes to be used in chemistry industries worldwide. It is estimated that ecobusiness will reach, until the end of the decade, levels of trade of around US \$ 580 billion – the double of the values attained in 1990. In the USA alone, 25% of commonly prescribed pharmaceutical products contain active ingredients derived from plants, and there are over 3,000 antibiotics derived from microorganisms. It is estimated that the turnover in the chemical pharmaceutical industry is US\$ 200 billion a year for products based on biodiversity.

These products and processes can be applied both in the improvement of the alternative use of the existing products and in the development of better techniques for collecting and storing these goods.

Chemistry, Pharmaceutical and Cosmetic Industry:

The more impressive economic potentiality of biodiversity lies in the discovery of new drugs derived from biological resources. In the world drug market, estimated in more than US\$ 320 billion dollars a year, approximately 40% of the medicines are originated directly or indirectly from natural sources (30% flora and 10% fauna, including microorganisms). Moreover, it is estimated that 25 thousand plant species are destined for the production of medicines worldwide, including not only those originated by synthesis from natural products, but those commercialized as fitoherapeutic products. According to the World Health Organization, 85% of the world population (around 4 billion people), especially those of the poorest and developing countries, use plants to cure their diseases.

The medicine and cosmetics business in Brazil reached US\$ 18 billion dollars in 1996 – 25% of the medicines are derived from natural plants. It is a growing market, with great perspectives of expansion and in conditions to receive new and additional investments. Rain forests are unique sources of microorganisms, which produce many new compounds of antibiotic action and immunology depressor drugs that make viable, for instance, surgeries for organs transplant.

Today, it is calculated that there are approximately 120 clinical products in the allopathic medicine, which were originated from plants used by indigenous groups. These drugs are commercialized in great quantity in France, Italy, United Kingdom, Asian countries and in the USA.

Another area of interest is the research of toxins found in some animals' poisons. Brazil holds a great and diverse number of poisonous animals, and most of them are located in the Amazon region.

Agroindustry:

Brazil is the third biggest food exporter, with a highly mechanized agriculture and the largest continental area of arable soils. Brazil is competitive in genetics and in the process of genetically improving seeds.

It is estimated that the world demand for food will double in the next fifty years. The developed countries' capacity to expand the supply of food is, on the other hand, limited. Thus, the production of food will demand new products that enhance agrobusiness. Developing countries, rich in biodiversity, will constitute the natural ceilings of the future. The World Bank estimates that in the year 2000 the market for biotechnological products for agriculture will reach US\$ 10 billion.

In Agrochemistry, animal toxins are used for the development of a new generation of highly selective and rapidly biodegradable bio-pesticides, oriented for the production of healthier aliments.

In Brazil, biotechnology will be decisive to reduce the costs of production and to increase the competitiveness of agriculture. Fixing nitrogen in some kinds of vegetables can enhance productivity in agriculture. The diversity of the Amazon flora will permit the selection of vegetal species – preferably eatable non toxic ones –, which would be capable to adapt in rather poor soils and to produce great quantities of biomass. These plants will be further studied regarding their capacity to produce genes and proteins of industrial interest, as well as new materials, such as biopolimers.

The biodiversity of the Amazon region:

According to the National Conservation Report of December, 1997, Brazil is the country with the greatest biodiversity in the world, the first among the 17 countries that hold in their territories 70% of the animal and vegetal world species. Brazilian biodiversity is the biggest regarding plants, river fishes and mammals, the second regarding amphibia, the third regarding birds, and the fifth in reptiles.

There are 55 thousand species or 22% of the world total: 524 mammals, 517 amphibia, 1622 birds, 468 reptiles, more than 3000 species of river fishes and between 10 or 15 million insects.

In the planet, there are more than 250 thousand vegetal species, 30% of which are eatable. Men, throughout the centuries, have not used more than 1% of these plants for their living. Actually, only 0.2% of the world species constitute the basis of human nourishment.

The greatest part of the existing plants is found in tropical countries – it is believed that 55 thousands exist in Brazil. The humid rain forest, which covers around 7% of the planet, contains approximately 50% of the world biodiversity.

The humid rain forests of the Amazon region are remarkable for its striking biodiversity, which is rich not only regarding the variety of biological species, but also of ecosystems and of genetic diversity within a same specie. There are approximately in the Amazon region 30 thousand plant species, 300 mammals species, 2000 fish species, 2 million arthropod species and millions of microorganisms species. These numbers are, of course, not definitive, due to the extreme richness of the region and to the technical difficulty to identify and categorize the species.

The future of the Amazon region depends on the way its richness will be managed. Sustainable management is the alternative to provide the proper management of biodiversity, in a way to reconcile ecological equilibrium, sustainable development, improvement of the quality of life of the local population, economic growth, modernization, technological development and the insertion of the forest's products and services in the national and international economic flows.

Sustainable management is the very basis of the initiatives adopted by the Government of Brazil to handle the extreme potential of the Amazon region, regarding its economic, social and cultural dimensions. Foremost, the projects to sustainably manage and preserve biodiversity in the Amazon region are oriented to the development of endogenous technological capacity, as a result of the strengthening of the cooperation between the Government and the civil society – mainly the academic and private sectors.

Technical and scientific sectors in Brazil:

Brazil is part of a minor group of developing countries that hold a relatively developed scientific research area, with an efficient academic system and solid research institutions. Although able to develop a great number of activities regarding the conservation and management of its biodiversity, Brazil does not possess yet all the necessary expertise to permit the full acknowledgement of its biodiversity.

Science in Brazil has improved a lot in the last decade – its growth rates are higher than the world pattern – and this improvement has turned into concrete economic gains for the private sector.

Regarding the two branches of science and technology – basic research and development –, Brazil is doing better in the first. The publication of articles in the specialized international press increased three times in 15 years: a rate of growth that is 57% higher than the world average.

Development of technology, on the other hand, is not doing so well. As a matter of fact, the countries that experienced a significant technological advancement in the last 10 years were the ones that developed scientific research in partnership with the private initiative. Brazil is only now beginning to adopt such model. In 1997, investments in science and technology in the country reached 1,2% of the GDP (approximately US\$ 10 billion, according to the Ministry of Science and Technology). Such increase is the result of the bigger share of participation of the private sector: investments were made both by the Federal Government and the private sector, which alone was responsible for 30% of the total.

Moreover, investments for the training of human resources, both in the country and abroad, are of US\$ 800 million per year. As a result, there has been an improvement in the quality of the scientific production, especially regarding books, articles and post graduation theses.

Brazil is responsible, today, for 0.8% of the world scientific knowledge. Such number means that 0.8% of the total amount of scientific articles published in well-known magazines are written by Brazilian scientists. It may seem a modest figure, but it represents an increase of Brazilian publications abroad, between 1981 and 1995, from 1.916 to 5.249 a year – a growth that is 57% higher than the world average.

Through a period of 40 years, this ongoing investment resulted in the consolidation of 7.300 qualified research institutions, with more than 27 thousand researchers. Many of these groups work on basic and applied areas of chemistry,

pharmacology, biosciences and biotechnology. The researchers work not only in the academic sector, but also giving support to private enterprises of the area.

Brazilian industries have been increasing their profits by using new products and technologies that are the result of technological research. Nevertheless, they invest little in research itself and even fewer in the development of new products. In the last five years, investment in technology increased in 5% the profits of Brazilian enterprises, according to a research made by the National Association for Research and Development of the Industrial Enterprises. Paradoxically, the percentage of researchers who work directly at industries in Brazil is only 10%. In Germany, for instance, 75% of them work at industries.

The Government of Brazil is developing programs to revert this situation. The country is striving to attain better patterns of technological development, especially in the field of biodiversity and genetics, always bearing in mind its commitment to implementing sustainable development.

The more recent and promising program is the Brazilian Program of Molecular Ecology for the Sustainable Use of the Amazon Biodiversity – PROBEM.

Amazon PROBEM:

PROBEM is the result of a joint initiative of the scientific community, private sector, Federal Government and the governments of the Amazonian states. It is one of the strategic projects of the present Government, included in the Multi Year Federal Development Plan – the so-called "Advance Brazil". PROBEM was included in the framework of the priority projects of the Presidency of the Republic – the Brazil in Action Program – , with a budget of R\$48 million (approximately US\$25 million) for the period 1999 – 2002.

A "social organization" – the Brazilian Association for the Sustainable Use of the Amazon Biodiversity, or BIOAMAZONIA – was created, in 1998, to coordinate the implementation of PROBEM. "Social organizations" represent a new modality of partnership between the Federal Government and the civil society. BIOAMAZONIA is a civil society, of collective interest, regulated by a Management Contract. It is a kind of non-governmental public organization, with a private pattern of management.

BIOAMAZONIA was created, basically, to enhance the development of bio-industry in Brazil and, especially, in the amazon region. The project is based on "generation of knowledge", with an emphasis on research and transfer of state-of-the-art technology, through the establishment of partnerships with national and international research institutions and enterprises. It is meant, also, to contribute to diversify the productive structure of the Amazon region and, in particular, of the Tax Free Zone of Manaus.

BIOAMAZONIA aims at obtaining highly value added industrialized products, with market potentiality, through the intensive use of state-of-the-art technologies that are adequate for the management and conservation of biodiversity. It is also destined to promote training of human resources and to provide the necessary conditions to permit the maintenance of these people in the amazon region. BIOAMAZONIA is formed of two Councils – Administrative and Technical-Scientific –, both created in 1999.

One of the most important concrete achievements under BIOAMAZONIA will be the creation of the Biotechnology Center of the Amazon – BCA – which is expected to be finished until the end of 2000. The Center is located in the Industrial District of Manaus, and is expected to be an innovative and advanced research and development

institution. BCA will be coordinated by BIOAMAZONIA and will, in its turn, coordinate a set of national laboratories and groups of researchers, all dedicated to research on the Amazonian biodiversity.

BCA will be a complex of laboratories of international standard, oriented for the development of biotechnological and pharmaceutical products, as a result of basic and applied research, involving transfer of technology, certification, labeling and control of industrial property, as well as the commercialization of products, services and technology.

A set of bioindustries will be developed in the Free Tax Zone of Manaus, an area which already holds thousands of industries and other economic activities. The objective of PROBEM/Amazonia is that new enterprises begin to invest in the opportunities to be created by the Biotechnology Center of the Amazon, especially in the field of pharmaceutical products, cosmetics, food products, bio-pesticides, essential oils, etc.

In March of 2000, BIOAMAZONIA and Axial Bank celebrated a partnership for the establishment of a Working Group to implement and manage the Permanent Fund for the Amazon Biodiversity – PFAB. This Fund is conceived to receive donations by bilateral and multilateral agencies, as well as private sector investments, regarding all phases of bio-prospection (access, screening, discovery of active substances, biological tests, patents), with a view to making BCA and PROBEM/Amazonia financially independent.

Biotechnological Center of the Amazon (BCA):

The BCA will be coordinated by BIOAMAZONIA and integrated by all institutions involved in the project. The Center is connected to a set of laboratories and national research groups. It will be divided in two main branches: natural products and biotechnology. The Center will be able to receive finances and donations and to establish partnerships with enterprises – all activities that are necessary for the implementation of the projects.

The Center will be formed by a set of laboratories, oriented to develop or consolidate in the Amazon region relevant areas for biotechnological development, such as trades, patents and protection of grains; development and transfer of technology; information on natural and biotechnological products and its commercial perspectives.

Additionally, the Center will aim at enhancing existing areas of knowledge, such as bioprospection, with an emphasis on the production of pharmaceutical products (antibiotics, anti-neoplastic) and others, like cosmetics, flavoreurs, etc.

Foremost, the Center has as its basic precepts the involvement of the local traditional communities (especially indigenous people and ‘extrativistas” groups), by means of contracts, in the activities of identification and collecting of the regional fauna and flora. Such activities, together with the proper sharing of the benefits, will be developed in accordance with the draft laws on access to genetic resources that are under consideration in the National Congress.

Private investments:

The non governmental public organization BIOAMAZONIA, created to manage PROBEM/Amazonia and the Biotechnology Center of the Amazon, is able to develop multiple partnerships with the private sector – national or international –, all activities

being regulated by the national law and by specific contracts between parts, involving the following modalities:

- direct investments, through joint ventures, on specific projects for the development of products and technologies;
- the rights of the Parts are assured by legislation, contracts and mutual commitments, involving intellectual property, royalties and other means of participating in the results of the projects;
- participation in a fiduciary fund for the maintenance of a permanent flow of investments on projects conducted by the set of laboratories and the Biotechnological Center;
- specific contracts aiming at training of human resources, certification for products and processes; etc.

The policy of the Brazilian Government for the Amazon region is administered by the Special Secretary for Regional Politics, of the Budget and Planning Ministry, through the Superintendence of the Free Tax Zone of Manaus (SUFRAMA). This policy is based on two intermingled areas, which aim at, respectively, turning the industrial structure of Manaus into a more specialized, competitive and sustainable one, and promoting investments in the inner of the Amazon region. The sectors of election will be those that permit harmonizing the equation profits/conservation: they should provide economic gains and permit the conservation and management of the natural resources. Thus, the projects will succeed in strengthening the social-economic structure of the region and in assuring for the inhabitants their right to education, health and work.

The industries that are going to settle in the Free Tax Zone of Manaus have some facilities to establish themselves in the area, such as low land prices and basic infrastructure provided by the SUFRAMA.