

**MINISTRY OF THE ENVIRONMENT
WATER RESOURCES SECRETARIAT
STRUCTURING DIRECTORATE
PROJECT MANAGEMENT OFFICE
WATER RESOURCES PLANNING TEAM**

DESERTIFICATION

National Report

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**MINISTRY OF THE ENVIRONMENT
WATER RESOURCES SECRETARIAT**

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1 - PRESENTATION

This document was prepared by the Water Resources Secretariat of the Ministry of the Environment. It was initially discussed at a workshop in Recife, State of Pernambuco, on 7 May 2000. The workshop was held at the Secretariat for Science and Technology and Environment (SECTMA) of the Government of Pernambuco with the participation of representatives of the Superintendence for the Development of the Northeast (SUDENE), Joaquim Nabuco Foundation (FJN), SECTMA itself and the Water Resources Secretariat of the Ministry of the Environment, as well as the following non-governmental organizations:

- Semi-arid Articulation (ASA)
- Federation of Workers and Farmers of Pernambuco (FETAPE)
- Institute of Studies of Desertified Areas (INSTITUTO DESERT)
- Organization of Christian Evangelical Churches (DIACONIA)
- Secretariat of Science and Technology and Environment (SECTMA)
- Northeastern Society of Ecology (SNE)
- Pernambuco Association for the Defense of Nature (ASPAN)

As a result, an important contribution has been made to the National Report, so that the document now expresses more faithfully the problems association with the process of desertification in the country.

2 - SUMMARY

The Water Resources Secretariat of the Ministry of the Environment, in charge of conducting the National Policy on Desertification and Draught Control in the country, presents in this document a view of the desertification process occurring in the country, previous occurrences in the world and the current situation of the phenomenon in Brazil. Approximately 10% of the semi-arid region, or 98,595 km², have been very seriously affected; 81,870 km², seriously affected; and 393,897 km², moderately degraded. Economic losses associated with desertification are estimated at US\$ 300 million per year, and the cost of reclaiming affected areas would require US\$ 2 billion over a 20-year period.

This document sets forth the guidelines, objectives and strategies to combat desertification, emphasizing the modern view of integration and participation of public and private entities and non-governmental organizations, as well as the communities involved, with emphasis on the information process, education and training programs and the importance of decentralizing actions. The strategy adopted encourages investments on human resources and seeks to develop the sense of ownership required to ensure the sustainability of actions.

It is also a matter of Policies and Institutional Structuring and of the instruments that will enable the actions, highlighting the legal, institutional, economic/financial, and technical aspects. Great importance is attached to ecological/economic zoning of the territory, a necessary input in planning sustainable regional development.

In addition, this document covers various aspects of the desertification process, in terms of its actual dimension and degradation potential, the importance of environmental protection of the semi-arid, and the experience of the Water Resources Secretariat with hydrographic basins, which requires interactive and participatory procedures, as well as decentralized actions, as recommended in this document.

Lastly, the preparation of the future National Plan to Combat Desertification (PNCD) is discussed, together with the most relevant themes to be considered in its design, including the strategic components, financial resources and indicators to evaluate outcomes.

3 - BACKGROUND

The scientific community began discussing desertification in the 1930s, as a result of a phenomenon known as the Dust Bowl, which occurred in the American Midwest, whereby intense soil degradation affected an area of approximately 380,000 km², in the states of Oklahoma, Kansas, New Mexico, and Colorado. This phenomenon led scientists to initiate research and to call the process desertification, i.e., the occurrence of desert-like conditions in arid climate zones.

Ever since, researchers have focused on the phenomena that occur in the arid regions of the world subjected to periodical droughts. It is quite clear that these regions harbor extremely poor populations, as a result of their physical characteristics and natural limitations and are subjected to increased degradation.

Nevertheless, it was only in the 1970s that the international community acknowledged the economic, social and environmental impact of the phenomenon and established a worldwide action program to combat desertification. At the time, a terrible drought affected the Sahel, a region located below the Sahara desert, and more than 500,000 people died in a famine.

The international community has been discussing the desertification theme since 1977, when the United National Conference on Desertification was held in Nairobi, Kenya.

The Nairobi Conference produced the Global Action Plan to Combat Desertification, whose purpose was to implement global actions to combat desertification, with the voluntary participation of the countries represented in the Conference.

The United Nations Environment Program (UNEP) evaluations of the Global Action Plan to Combat Desertification show that the outcomes have been rather modest. The investments required were not made, most countries with serious desertification problems remain uncommitted to domestic actions and consistent human resources education and training programs have not been implemented.

During the United Nations Conference on Environment and Development (UNCED, Rio'92), the international community negotiated the International Convention to Combat Desertification and Draught on the basis of the discussions during the International Conference on Climatic Variations and Sustainable Development in Semi-arid Regions,

help in the State of Ceará in January 1992. The Convention was drafted during 1993 and concluded on 17 June 1994. Brazil, together with one hundred other countries, has agreed to participate in this Convention.

In compliance with Agenda 21 and the United Nations Convention to Combat Desertification, a workshop was held with the participation of institutions and experts involved in this theme for the purpose of discussing and defining the framework of a National Policy to Combat Desertification.

The outcomes of this inter-institutional and multidisciplinary effort shall support the formulation of desertification control policies that ensure:

- better living conditions for affected communities;
- increased capability of federal agencies to induce development accompanied by environmental sustainability; and
- determination of the international community to contribute to sustainable development at the global level.

On 22 December 1997, the National Council for the Environment (CONAMA), taking into account the previously described background, approved Resolution N° 238, which sets forth the National Policy to Combat Desertification.

4 - CURRENT DESERTIFICATION SITUATION IN BRAZIL

In Chapter 12 of Agenda 21, Desertification is defined as the degradation of arid, semi-arid and dry sub-humid lands as a result of various factors, among which climatic variations and human activities. “Land degradation”, in this context, covers the degradation of soils, water resources, and vegetation, as well as the debasement of the quality of life of the affected populations.

Desertification areas and deserts are two different things. The latter do not result from human interventions and contain several balanced ecosystems. Desertified land, on the other hand, does not offer minimum life-support conditions.

In Brazil, the areas covered by the desertification concept accepted by the United Nations are located in the semi-arid tropics.

The semi-arid tropic, according to the Superintendence for the Development of the Northeast (SUDENE), comprises 980,711 km², distributed among eight states of the Northeastern Region and municipalities in northern Minas Gerais State.

The ecology of the semi-arid is quite different. The region undergoes draught periods and dry seasons that affect practically all agricultural activities and particularly small and medium-size landholdings, causing serious socio-economic problems and mass migrations to other parts of the country.

Arid regions suffer from serious fresh water limitations because of the low rainfall indexes and unfavorable distribution of rainfall throughout the year. Although the scarce flora and fauna are adapted to these conditions, the population manages such resources inappropriately, seeking their own survival. The extreme water scarcity is also due to the unrestrained exploitation of water resources. It is difficult and extremely expensive to reclaim the production capacity of such areas. All these factors lead to extreme poverty and, thus, the population migrates to find better conditions of survival. Migrations, in turn, have a major impact on the already overburdened basic services in urban centers.

In Brazil, according to the diagnosis of the Ministry of the Environment, economic losses associated with desertification could be as high as \$ 300 million per year. Reclamation costs for the most seriously affected areas reach the US\$ 2-billion mark for a 20-year period. Areas with patent signs of degradation are called “desertification nuclei” and encompass a rather large area. Expressive examples can be found at Gilbués, in the State of Piauí; Iraçuba, in Ceará; Seridó; in the boundary between the states of Paraíba and Rio Grande do Norte; and Cabrobó, in Pernambuco. Environmental degradation processes, other than desertification, have been identified in other parts of the country, such as the well-know case of Alegrete, in the State of Rio Grande do Sul. Mention should also be made of the strong erosion processes taking place in the states of Paraná, São Paulo, Rondônia, and Tocantins. Although these areas present serious environmental deterioration, they do not fall within the scope of the United Nations Convention to Combat Desertification and Chapter 12 of Agenda 21. According to the 1991 Census, 17.8 million people live in the semi-arid region. This accounts for 42% of the total population of the Northeastern Region and 11% of the Brazilian population. The population of the semi-arid region is very traditional and mostly rural, with very little or no access to markets, extreme

difficulty in absorbing new technology, deeply ingrained habits, and a paternalistic relationship with the State.

These characteristics result in ambiguous social and political practices very different from those of urban populations that been modernized by the market and their free access to information.

This ambiguity is also reflected in a constant search for “protection” from state agencies and their representatives, and, on the other hand, on recurrent difficulties in absorbing available technical information produced by the state machinery to solve the problems of the population.

It must be added that this dynamics also reflects structural problems, with strong reflections on the environment. When income opportunities and access to markets are structurally limited, there is a tendency to over-use existing resources, as a compensatory measure. This has medium-term effects on environmental quality and on the possibility of preventing migrations.

At present, the main economic activity in the *sertão* is subsistence-level multi-cropping, extensive cattle ranching and some irrigated agriculture centers. Traditional activities have faced repeated losses caused by climatic adversities, as well as problems resulting from the loss of soil productivity, with ensuing loss of market competitiveness. Many irrigated areas, on the other hand, already show signs of salinity, due to the lack of investment in drainage systems.

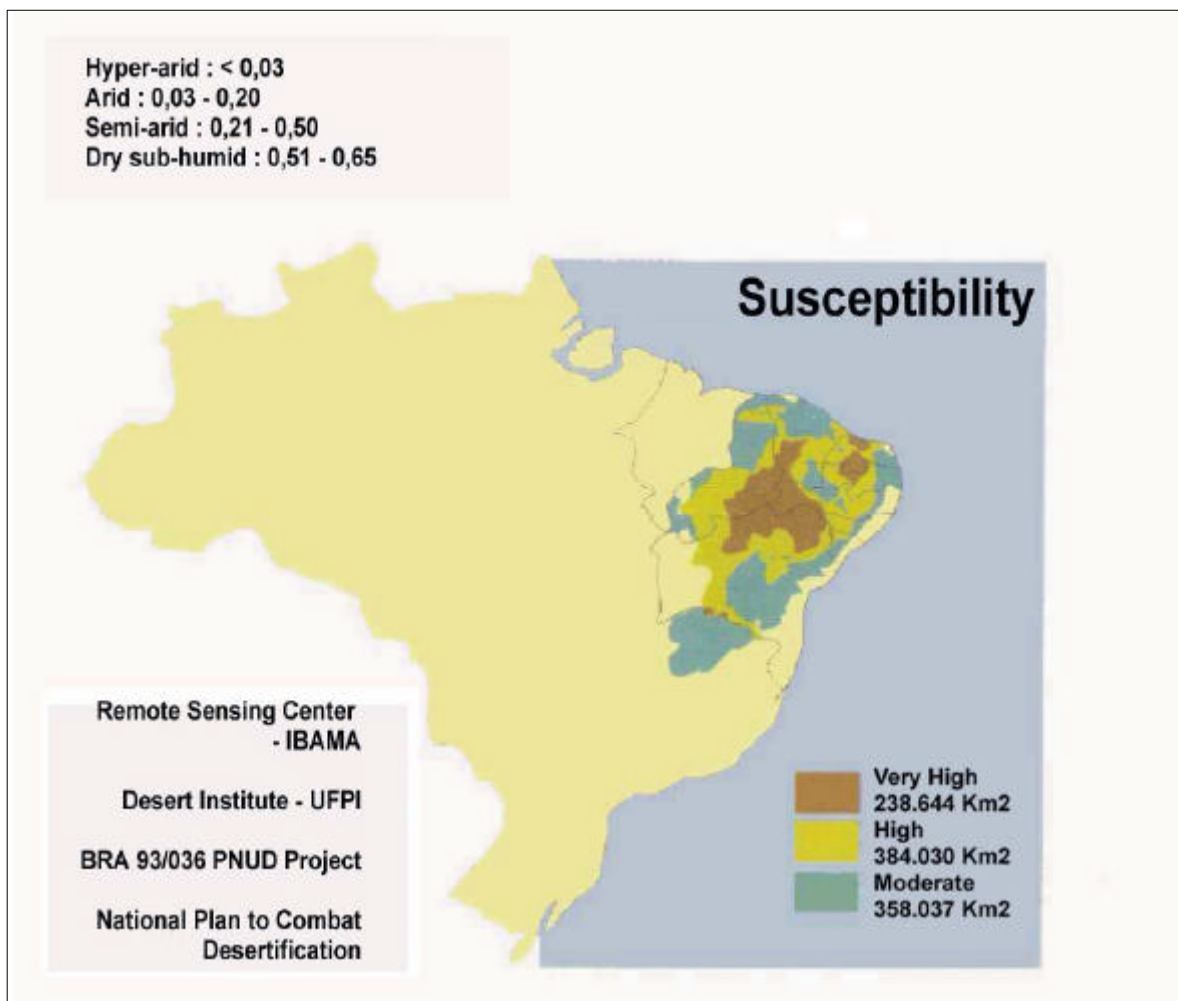
Available studies indicate that the desertification process in the semi-arid region is seriously affecting 181,000 km², with both diffuse and concentrated impacts on the territory.

In areas of diffuse impact, the environmental damage includes soil erosion, impoverishment of the *caatinga* and degradation of water resources, with direct effects on the quality of life of the population.

In the areas where the effects are concentrated in a small part of the territory, damage is very serious indeed. This is called a Desertification Nucleus.

The susceptibility map of Brazil (map 1) prepared by the Ministry of the Environment (MMA) on the basis of the work of the Remote Sensing Center of the Brazilian Institute for the Environment and Renewable Natural Resources (IBAMA)

includes three susceptibility categories: **high, very high and moderate**. The first two categories refer respectively to arid and semi-arid areas, determined using the Aridity Index (formulated by Thornthwaite in 1941). The third category results from the difference between the perimeter of the *Polígono das Secas* and that corresponding to the other categories. It is characterized by anthropic areas. Thus, out of 980,711 km² of susceptible areas, 238,644 km² are **very high** risk areas; 384,030 km² are **high** risk areas; and 358,037 km² are considered **moderately susceptible** to desertification.



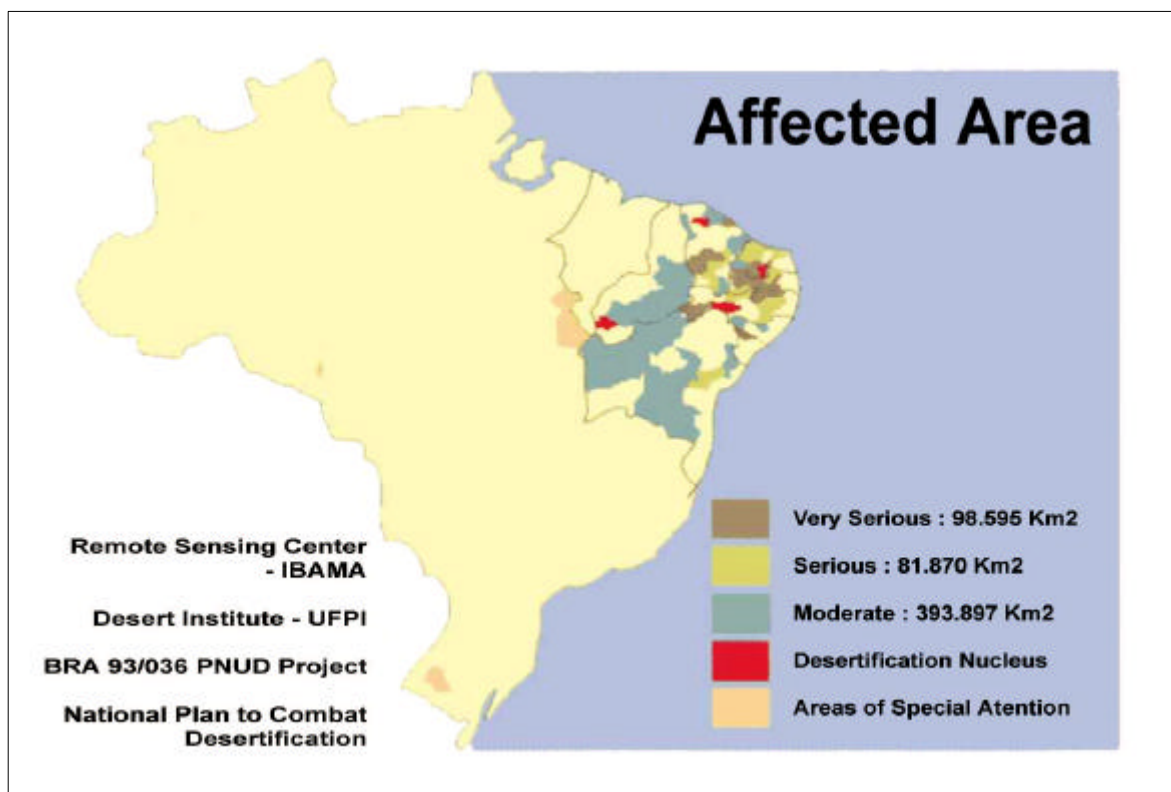
Map 1

Available studies indicate that 98,595 km² fall within the very seriously affected area, which is close to 10% of the semi-arid area. In turn, 81,870 km² of the territory are seriously affected and the remaining areas subjected to anthropic actions, or 393,897 km², suffer from moderate degradation (map 2).

Table – Diagnostic of areas affected by desertification in the Northeastern Region, by seriousness of occurrence.

State	Total Area (km ²)	Area affected in absolute terms (km)			Area affected in relative terms (%)		
		Moderate	Serious	Very Serious	Moderate	Serious	Very Serious
Alagoas	27,731	6,256	-	-	22.56	-	-
Bahia	561,026	258,452	10,163	-	46.10	1.81	-
Ceará	148,016	35,446	16,366	26,993	24.05	11.06	18.24
Paraíba	56,372	-	8,320	32,109	-	14.76	57.06
Pernambuco	98,307	-	28,356	22,883	-	28.84	23.28
Piauí	250,934	86,517	-	3,579	34.48	-	1.43
Rio Grande do Norte	53,015	5,154	18,665	8,337	9.72	35.21	15.72
Sergipe	21,994	2,071	-	4,692	9.42	-	21.33
TOTAL	1,548,672	393,897	81,870	98,595	25.43	5.28	6.36

Source: Desertificação – III COP/MMA/SRH



Map 2

Environmental impacts can be realized through the destruction of biodiversity, diminished availability of water resources due to silting of water courses and reservoirs, and physical and chemical soil losses. These factors reduce the biological potential of the land, decreasing agricultural productivity to the detriment of the population.

Social losses are clearly expressed in the major social changes arising from the growing loss in the production capacity of families. Migration follows, breaking down the families and having a heavy impact on the urban zones, which rarely can provide basic services for the migrating masses.

5 - GUIDELINES, OBJECTIVES AND STRATEGIES TO COMBAT DESERTIFICATION AND DROUGHT

5.1 - Guidelines

- To strengthen the knowledge base and information and monitoring systems development for regions susceptible to desertification and draught, including the economic and social aspects of these ecosystems;
- To combat land degradation through soil conservation, as well as forestation and reforestation activities;
- To develop and strengthen integrated development programs in areas susceptible to desertification;
- To develop comprehensive programs against desertification in harmony with environmental planning;
- To develop protection and compensation actions against the effects of draught, in order to protect the communities and minimize migratory flows;
- To promote technical, social and financial actions to support the communities located in areas subject to the effect of droughts;

5.2. - Objectives

For the purpose of achieving sustainable development in regions subject to desertification and draught, the National Policy to Combat Desertification should:

- Design proposals for environmental management and natural resources use in the *caatinga* and transition areas, without compromising their long-term viability;
- To design short, medium and long term proposals to prevent desertification and recuperate areas thus affected;
- To undertake preventive action against environmental degradation in transition areas from semi-arid to dry sub-humid regions, for the purpose of protecting the different ecosystems;
- To contribute to networking among governmental and non-governmental agencies with a view to establishing a model of economic and social development that harmonizes the need to conserve natural resources and social equity in the semi-arid region;
- To articulate actions at the federal, state and municipal levels of government in order to ensure the implementation of local activities to combat desertification and the effects of draughts; and
- To contribute to the strengthening of municipalities, with a view to developing local strategies to combat desertification.

4.3. - Strategies

Among contemplated government actions, there is the adoption of a natural resources management model that includes the modern social-mobilization approach. This is a very important principle, since it enables stake holders to be duly aware of the problems involved and, therefore, to exert some influence in the decision-making process on the best use of these resources.

In this context, workshops, seminars and public consultations will be held for the purpose of widely disseminating information about the current situation in the areas affected by the desertification process, explaining the causes and effects of desertification and their impact on the quality of life of the population directly or indirectly affected by the phenomenon.

Community participation in searching for solutions to the problem and, later on, in presenting the solutions to be implemented to solve the desertification process is also

important, because it assures both credibility and visibility to the investments made by private or public agencies.

This is a permanent forum of discussions very similar to the public hearings held when the Water Resources Master Plans for the Hydrographic Basins were being designed. The communities will become increasingly aware of their responsibilities and, thus, empowered to engage in fruitful partnership schemes with governmental and other organizations for the effective execution of the programs presented in pre-selected areas within the National Program to Combat Desertification.

In addition to social mobilization, the strategy for implementing desertification control actions is also based on two major principles, namely, integrated approach and partnership.

The need for an integrated approach derives from the fact that the concept of fighting desertification in the context of a developing country cannot be separate from the concept of fighting poverty and finding sustainable development solutions. Desertification is a typically multi-sectoral phenomenon whose approach requires close coordination of the technical programs associated with reforestation, water and soil conservation and agricultural development, on the one hand, and human and social development, on the other. Consequently, it is essential to ensure coordination among the various sectors of activity at the local, regional and national levels.

The strategy of the National Program to Combat Desertification is also based on a decentralization policy that delegates substantial decision-making and management powers to the municipalities. Thus, it becomes clear why the municipal management and monitoring capability should be strengthened.

As regards partnership, the implementation of the program requires close coordination of all stakeholders in society at the national level and cooperation with foreign partners, such as sub-regional agencies and the donors. At the national level, partnership agreements should be drawn between public sector partners, the private sector and civil society organizations. At the municipal level, such agreements will materialize by consensus among the official municipal bodies and the representatives of the local civil society.

These three elements – participation, integration and partnership – should be permanently strengthened through an awareness, information and education program that reaches all sectors and decision-making centers of society. Although the most important stakeholders are found in the rural communities, the whole of society – citizens, state services, NGOs, professional and non-professional associations, etc. – should be made aware of the importance of the National Policy to Combat Desertification and of their respective responsibilities as partners.

To the extent possible, local associations should be in charge of implementing most actions at the municipal level. The various ongoing experiences and projects have shown that the local communities are extremely good at implementing work related to soil and water conservation, increased water availability for domestic consumption or irrigation, and reforestation. In fact, this strategy encourages investments in human resources and develops the sense of ownership required for the sustainability of the actions.

In order to take the physical (relief, hydrography, soils, etc.) and socio-economic elements in due consideration, it is also necessary to define a land management policy. The current approach focuses on management by hydrographic basin, as well as by ecological and socio-economic unit, as clearly defined in law.

In other words, because of the comprehensive nature of the actions to be executed, the National Policy to Combat Desertification should permeate various government areas and this requires effective inter-institutional networking, which should even include international organizations, in order to guarantee effective results.

6 - POLICIES AND INSTITUTIONAL STRUCTURING

The National Policy to Combat Desertification will be implemented by means of different instruments that will ensure its viability. These instruments are legal/institutional, economic/financial and technical/informational in nature. Emphasis could also be given to Ecological-Economic Zoning, as a valuable instrument to provide input in planning sustainable regional development.

As regards the legal/institutional instruments, a series of legal provisions will be available for the implementation of the National Policy to Combat Desertification. These provisions harmonize the existing natural resources conservation legislation with the

control and recuperation requirements of areas undergoing desertification. To that end, a detailed review of the existing legislation should be made, together with other government agencies. Next, as set forth in the United Nations Convention to Combat Desertification, specific legislation should be drawn up.

As regards the strengthening of the mechanisms to control and combat desertification and in view of the multi-disciplinary and multi-sectoral nature of the theme, actions should be undertaken to sensitize the various sectors of government and society to the problems, as well as to involve them in the process of designing new development strategies and policies for areas susceptible to desertification and draughts. The economic/financial aspects associated with the implementation of the National Policy to Combat Desertification should contemplate and improve on existing initiatives, as required, especially those arising from the Green Protocol and the existing legislation on granting loans. Also contemplated are studies to evaluate the existing tax incentives for the purpose of harmonizing development priorities and the need to conserve natural resources.

It is necessary to emphasize the need for public awareness and adequate dissemination of the technical information and indicators to be used as instruments to achieve the proposed objectives and goals.

According to the new structure of the Brazilian State, the Ministry of the Environment (MMA), through the Water Resources Secretariat in the Structuring Directorate DPE/SRH and under the Project Management Office, is in charge of conducting the National Policy to Combat Desertification.

The master plans develop their actions in fine tuning and integration with public entities, private entities and community hydrographic associations.

Designing numerous Master Plans using this integrationist and participatory approach has provided the Water Resources Secretariat of the Ministry of the Environment an extremely valuable expertise, possibly unparalleled in the country, making it confident to participate in this work and to validate the work undertaken by society.

This experience should be extremely useful in implementing the future National Plan to Combat Desertification.

7 - NATIONAL PLAN TO COMBAT DESERTIFICATION

7.1 - Strategic Components of the Plan aiming at articulating and organizing regional actions to control desertification

- **Institutional strengthening and interaction**

To create an institutional articulation capability in institutions in any way involved with the theme of desertification, in order to facilitate the design and implementation of the National Plan to Combat Desertification (PNCD).

- **Strengthening communication and flow of information about desertification.**

To create an information and documentation network on desertification and draught with the participation of institutions doing research and/or generating information relevant to the PNCD.

- **Management and technical training on natural resources management in areas subject to desertification.**

Providing education and training to work on research, control and recovery of areas affected by the desertification process.

- **Awareness, sensibility and mobilization of sustainable development stakeholders in areas subject to the risk of desertification.**

To disseminate among the population of areas subject to the risk of desertification evaluations and information relevant to the prevention, control and recuperation of desertification, as well as information about the control of the effects of draught, fostering community participation in the design and implementation of the PNCD.

- **Economic and social promotion of families**

Encouraging family enterprises or partnerships (ecotourism, agriculture, agro-industries, handicrafts, etc.) with a view to ensuring economic and social sustainability.

- **Creating an operational capability to combat desertification at the local level.**

To create technical and institutional conditions to support emerging initiatives of the populations in the desertification nucleus with a view to interrupting the desertification process and recuperating degraded areas.

- **Designing monitoring, prevention and recuperation strategies for the areas affected by the desertification process.**

To design strategies to use natural resources of the *caatinga* in a sustainable manner, as well as monitoring, prevention and recuperation proposals focusing on areas subject to the desertification process.

- **Defining priority actions and projects**

To define a set of priority actions and projects to be developed with a view to preventing desertification and recuperating areas affected by this phenomenon.

- **Assistance**

Supporting technical and financial assistance agencies with a view to increasing the value of regional products, emphasizing home economics and, thus, promoting all aspects of the work of women and young people.

- **Technology**

Encouraging the adoption of widely recognized, sustainable technologies adapted to Brazilian conditions to improve water supply (reverse osmosis desalination, roof/cistern systems to collect/store rainfall, etc.); these technologies should use alternative sources of energy whenever possible.

7.2 - Financial Resources

- **National**

A bill sent to the National Congress (2000 Appropriations Bill) includes R\$ 400,000.00 for this purpose, in addition to a general amendment for the Northeast Region in the amount of R\$ 2 million and specific state amendments totaling R\$ 4,550.00 distributed among different states in Brazil.

- **International**

Although no international financial resources are yet available, it is believed that such resources shall be available opportunely, since they are an indispensable support to combat desertification and draught in Brazil.

- PNCD should support effort to obtain national and international financial, special financial resources.

6.3. - Indicators to evaluate the outcomes

In view of the causes and level of environmental degradation in areas susceptible to the desertification process or subject to severe draughts, it is possible to establish a series of indicators that represent or express the progressive recuperation of such areas. This particularly true in the case of degradation due to:

- a) anthropic actions with an impact on the natural resources and
- b) adverse or extreme climatic conditions.

These two groups of causes, acting simultaneously, increase the potential deleterious effects by baring the soil and opening an easy avenue for their increasingly fast de-structuring from wind and water erosion.

A fundamental aspect in designing the National Plan to Combat Desertification is the evaluation of the desertification process, namely:

- a) detailed evaluation of the scope of degradation in the Desertification Nuclei;
 - b) evaluation of the potential expansion of areas affected by the desertification process;
 - c) evaluation of the risk of or susceptibility to desertification of areas not yet affected;
- and

d) ranking the seriousness of the problem in areas already affected by desertification.

The resulting chart should provide the physical parameters required for designing the National Plan to Combat Desertification.

In order to evaluate the level of recuperation of the degraded areas the following indicators are being suggested:

- recuperation of degraded area, in ha/year;
- reforested protection areas, in ha/year;
- areas covered by terracing, contour belts and protection strips, in m/ha;
- environmental protection actions in mining areas. The following information would be required: location, type of operation and percentage of protected area as percentage of the total mining area;
- level of satisfaction of the communities involved or harmed and of the municipal authorities with regard to the situation the previous year, expressed in a 1-10 scale;
- reduction of anthropic activities deleterious to the environment, as percentage of the area subject to anthropic action;
- implementation of alternative sources of income in terms of type of use, number of people involved, as a percentage of the whole community and anticipated production.

8- ANNEX

DESERTIFICATION SUSCEPTIBILITY MAP FOR BRAZIL

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