

MINISTRY OF THE ENVIRONMENT

Water Resources Secretariat

***National Action Program  
to Combat Desertification  
and Mitigate the Effects of  
Drought***  
**PAN-Brazil**

2004

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2004

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AND MITIGATE THE EFFECTS OF DROUGHT – PAN-Brazil**

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# Summary

List of Figures .....	x
List of Abbreviations and Acronyms.....	xi
List of Tables .....	xv
Presentation.....	xvi
Executive Summary .....	xvii
Introduction .....	1
Chapter I – Semi-aridity, Desertification and Climate Changes.....	3
1.1 Dimensions and Factors Responsible for the Process of Desertification.....	4
1.2 The Spaces Affected by the Droughts and the Official Semi-arid Region.....	6
1.3 Areas Susceptible to Desertification – ASD .....	13
1.3.1 Nuclei of Desertification .....	13
1.3.2 Semi-arid Areas and Dry Sub-humid Areas.....	16
1.3.3 Areas surrounding the Semi-Arid areas and the Dry Sub-humid Areas .....	17
1.3.4 New Areas in Process of Desertification .....	23
1.3.5 Chief Characteristics of the Areas Susceptible to Desertification – ASD ....	28
1.3.6 Relation of the ASD with the Caatinga Biome, the Drought Polygon and the Semi-arid Region of the FNE .....	36
1.4 PAN-Brazil, Global Warming and Climate Changes .....	38
Chapter II – Combating Desertification .....	41
2.1 The Previous Situation .....	41
2.2 What was done in the Northeast up to 1994 .....	46
2.3 Initiatives in the Period from 1994/1998 in Brazil .....	49
2.4 Actions put into Practice in Brazil in the Period from 1999/2003.....	52
Chapter III – Process of Construction of PAN-Brazil .....	54
3.1 Methodological Bases .....	54
3.2 Institutional Engineering.....	55
3.2.1 Technical Coordination to Combat Desertification – CTC .....	56
3.2.2 Work Groups .....	56
3.2.2.1 Interministerial Work Group – GTIM.....	56
3.2.2.2 Parliamentary Work Group.....	57
3.2.2.3 Work Group of ASA – GTCD .....	57
3.2.3 State Focal Points .....	58
3.3 The Process of Construction.....	59
Chapter IV – Strategy of the Action Program to Combat Desertification .....	66

4.1 Strategic Landmarks of the PAN-Brazil.....	66
4.1.1 Orientations of the United Nations Convention to Combat Desertification..	66
4.1.2 Strategic Orientation of the Federal Government.....	67
4.1.3 Declaration of the Semi-arid Region – DSA .....	68
4.1.4 Other Orientations .....	69
4.2 Thematic Axes of PAN-Brazil.....	69
4.2.1 Expression of the Thematic Axes .....	70
4.2.1.1 Reduction of Poverty and Inequality.....	70
4.2.1.2 Sustainable Increase of Productive Capacity.....	71
4.2.1.3 Preservation, Conservation and Sustainable Management of Natural Resources.....	73
4.2.1.4 Democratic Management and Institutional Strengthening.....	74
4.2.2 Significance of the Conception of the Thematic Axes in Combating Desertification.....	76
4.3 Focus of the Program.....	76
4.4 Objectives of PAN-Brazil.....	77
4.5 Challenges .....	77
Chapter V – PAN-Brazil Actions .....	79
5.1 Synthesis of the Principal Problems of the Brazilian Semi-arid Region and Criteria for the Selection of Programs .....	79
5.2 Reduction of Poverty and of Inequality .....	81
5.2.1 Chief Challenges for the Land Restructuring in the ASD.....	82
5.2.1.1 Policies and Existing Strategies .....	83
5.2.1.2 Chief Actions Proposed.....	84
5.2.2 Education.....	85
5.2.2.1 Policies and Existing Strategies .....	86
5.2.2.2 Chief Actions Proposed.....	87
5.2.3 Strengthening of Family Agriculture and of Nutritional Security .....	88
5.2.3.1 Policies and Existing Strategies .....	89
5.2.3.2 Chief Actions Proposed.....	90
5.2.4 Social Security.....	91
5.2.4.1 Health.....	92
5.2.4.2 Social Assistance .....	93
5.2.4.3 Social Welfare .....	93
5.3 Sustainable Increase of Productive Capacity.....	94
5.3.1 Chief Problems and Challenges .....	94
5.3.1.1 Farming Activities .....	94
5.3.1.2 Industrial Activities.....	95
5.3.1.3 Services.....	97
5.3.2 Existing Policies.....	99
5.3.3 Chief Actions .....	100
5.3.3.1 Improvement of the Infra-structure .....	100
5.3.3.2 Strengthening of Productive Activities.....	113
5.3.3.3 Improvement of the Flow of Investments .....	123
5.4 Preservation, Conservation and Sustainable Management of Natural Resources	123
5.4.1 Chief Problems and Challenges .....	124
5.4.2 Policies and Existing Strategies .....	124
5.4.3 Chief Actions .....	127
5.4.3.1 Improvement of the Instruments of Environmental Management....	128
5.4.3.2 Ecological-Economic Zoning (ZEE).....	128
5.4.3.3 Protected Areas.....	129
5.4.3.4 Sustainable Management of Forest Resources .....	133
5.4.3.5 Sustainable Management of the Lands in the “Sertão” .....	134



5.4.3.6 Revitalization of the Hydrographic Basin of the São Francisco River .....	136
5.5 Democratic Management and Institutional Strengthening .....	137
5.5.1 Monitoring and Evaluation Activities .....	137
5.5.1.1 Subsystem of Monitoring and Evaluation of Desertification .....	138
5.5.1.2 Subsystem of Monitoring and Evaluation of the Implementation Process.....	140
5.5.1.3 Subsystem of Monitoring and Evaluation of Impacts .....	141
5.5.2 Activities of Knowledge Improving .....	141
5.5.2.1 Ecological-Economic Zoning (ZEE).....	141
5.5.2.2 Early Warning Systems .....	142
5.5.3 Studies and Basic and Applied Research .....	142
5.5.4 Improvement of the Environmental Management System.....	142
5.5.5 Extending the Education and Qualification Activities.....	143
5.5.6 Extending the Participatory Capacity of Civil Society .....	144
5.5.7 Strengthening of the State Dynamics .....	144
5.6 Resources Required for the Implementation of PAN-Brazil .....	144
Chapter VI – Management System of PAN-Brazil .....	146
6.1 Bases for the Establishment of the Management Model of PAN-Brazil .....	146
6.2 Management Structure of PAN-Brazil .....	147
6.2.1 National Council to Combat Desertification – CNCD.....	148
6.2.2 Executive Secretariat.....	148
6.2.3 Technical Coordination to Combat Desertification – CTCD.....	149
6.2.4 National Seminar to Combat Desertification – SNCD.....	150
6.2.5 Review Committee for Implementing PAN-Brazil – CRIPAN.....	151
6.2.6 Science, Technology and Innovation Committee – CCTI.....	152
Chapter VII – Steps for Implementing PAN-Brazil .....	154
7.1 Synergy with the Conventions about Climate Changes and Biological Diversity ..	154
7.2 Immediate Steps .....	155
7.2.1 Juridical-legal Steps .....	155
7.2.2 Steps Linked to Popular Mobilization .....	155
7.2.3 Political Steps .....	156
7.2.4 Administrative and Operational Steps .....	156
Bibliography .....	157
Annexes .....	172
Annex 1. Area and Population of the Areas Susceptible to Desertification – ASD (Semi-arid Areas, Dry Sub-humid Areas and Surrounding Areas), in the Years of 1991 and 2000.....	173
Annex 2. Municipalities of the Semi-arid Areas of the Areas Susceptible to Desertification – ASD .....	174
Annex 3. Municipalities of the Dry Sub-humid Areas of the Areas Susceptible to Desertification – ASD .....	177
Annex 4. Municipalities of the Surrounding Areas of the Areas Susceptible to Desertification – ASD .....	179
Annex 5. Historical Antecedents of Related Events to Combat Desertification .....	180
Annex 6. Summary-Chart of the Contributions of the State Workshops .....	183
Annex 7. Agreed Indicators of Desertification .....	200

# *List of Figures*

FIGURE 1.1 – Northeast. Areas of Drought Incidence .....	9
FIGURE 1.2 – Original Drought Polygon, Final Drought Polygon and Semi-arid region of FNE .....	12
FIGURE 1.3 – Semi-arid Areas, dry Sub-humid Areas and Drought Polygon of 1989 ...	20
FIGURE 1.4 – Semi-arid Areas, Dry Sub-humid Areas and Semi-arid Region of FNE....	21
FIGURE 1.5 – Areas Susceptible to Desertification – ASD .....	22
FIGURE 1.6 – Nucleus of Aureolar Desertification in Bruno non-Calciic and Litholic Soils, in the Municipality of Coxixola, Paraíba .....	26
FIGURE 1.7 – Nucleus of Desertification, São João do Cariri, Cabaceiras, Paraíba .....	26
FIGURE 1.8 – Boqueirão Bridge (80,0 m X 3,0 m X 3.724 m), over the Boqueirão River, in Gilbués, Piauí .....	27
FIGURE 1.9 – Eco-regions proposed for the Caatinga Biome .....	40
FIGURE 3.1 – Institutional, Political and Operational Articulation for the Elaboration of PAN-Brazil .....	60
FIGURE 5.1 – Mining Titles in the Areas Susceptible to Desertification .....	98
FIGURE 5.2 – Biodiversity of the Caatinga Biome .....	132
FIGURE 6.1 – Management Structure of PAN-Brazil .....	147

# *List of Abbreviations and Acronyms*

- ADENE - Development Agency of the Northeast
- AL - Alagoas
- AMAVIDA - Maranhão Association for the Conservation of Nature
- ANA - National Water Agency
- APL's - Local Productive Arrangements
- APNE - Plant Association of the Northeast
- ASA - Articulation in the Brazilian Semi-Arid
- ASD - Areas Susceptible to Desertification
- ASPAN - Pernambuco Association for the Defense of Nature
- ATER - Technical Assistance and Rural Extension
- BA - Bahia
- BNB - Bank of the Northeast of Brazil S. A.
- BNDES - National Bank of Economic and Social Development
- CCC - United Nations Framework Convention on Climate Change
- CCD - United Nations Convention to Combat Desertification
- CDB - Convention on Biological Diversity
- CDM - Clean Development Mechanism
- CE - Ceará
- CEF - Caixa Econômica Federal (The Federal Savings Bank)
- CHESF - Hydroelectric Company of the São Francisco
- CNA - National Agriculture Confederation
- CNIR - National Registry of Rural Real Estate
- CNPq - National Council of Scientific and Technological Research
- CNSAN - National Conference of Food and Nutritional Security
- CNUMAD - United Nations Conference on Environment and Development
- CODEVASF - Company for Development of the Valleys of the São Francisco and Parnaíba
- CONAB - National Supply Company
- CONAMA - National Environment Council
- CONSLAD - International Conference and Latin-American Seminar on Desertification
- COP - Conference of the Parties
- CPATSA - Center of Farming Research of the Tropical Semi-Arid Region

- CRA-BA - The Environmental Resource Center of Bahia
- CTC - Technical Coordination to Combat Desertification
- CTHidro - Water Resources Sector Fund
- CVSF - São Francisco Valley Commission
- DED - Deutscher Entwicklungsdienst (German Service for Technical and Social Cooperation)
- DNOCS - National Department of Works against the Droughts
- DNPM - National Department of Mineral Production
- DSA - The Semi-Arid Region Declaration
- EMATER - Technical Assistance Company and Rural Extension
- EMBRAPA - Brazilian Agricultural Research Corporation
- ENOS - El Niño - South Oscillation
- ES - Espírito Santo
- ESALQ - “Luiz de Queiroz” Superior School of Agriculture
- FADURP - Apollonio Salles Foundation of Educational Development
- FAO - Food and Agriculture Organization of the United Nations
- FGEB - Esquel Group Foundation of Brazil
- FGV - Getúlio Vargas Foundation
- FIDA - International Fund of Agricultural Development
- FINEP - Studies and Projects Financing Organization
- FNE - Northeast Financing Constitutional Fund
- FNMA - National Environment Fund
- FUNDEF - Maintenance and Development Fund for Primary School Teaching and Giving Value to the Teaching Profession
- GEDS - Study Group of Desertification of the Seridó Area
- GEF - Global Environment Facility
- GM - Global Mechanism
- GTCD - Work Group to Combat Desertification of the ASA
- GTIM - Interministerial Work Group
- GTZ - Deutsche Gesellschaft für Technische Zusammenarbeit (German Technical Cooperation Agency)
- IBAMA - Brazilian Institute of Environment and Renewable Natural Resources
- IBGE - Brazilian Institute of Geography and Statistic
- ICID - International Conference on Impacts of Climate Variations and Sustainable Development in Semi-Arid Regions
- ICMS - Tax on the Circulation of Merchandise and the Rendering of Services
- IDH-M - Index of Human Development – Municipal
- IICA - Interamerican Institute for Cooperation on Agriculture
- INCRA - National Colonization and Agrarian Reform Institute
- IOCS - Works Inspection against the Droughts
- IPCC - Intergovernmental Panel on Climate Change

- IPEA - Economic and Applied Research Institute
- IPEANE - Agricultural Research and Experimentation Institute of the Northeast
  - MA - Maranhão
- MCT - Ministry of Science and Technology
- MDA - Ministry of Agrarian Development
- MDIC - Development, Industry and Foreign Commerce Ministry
- MDS - Ministry of Social Development
  - MG - Minas Gerais
  - MI - Ministry of the National Integration
- MMA - Ministry of the Environment
- MPME - Micro, Small and Medium-sized Businesses
- MPOG - Ministry of Planning, Budget and Management
- NEAD - Agrarian Studies and Rural Development Nucleus
  - OCB - Brazilian Cooperatives Organization
- OCB's - Community Grass Roots Organizations
  - OEA - Organization of American States
  - OMS - World Health Organization
  - ONG - Non-Governmental Organization
- P1MC - Education and Social Mobilization Program for Living with the Semi-Arid Region: One Million Cisterns
- PAN-Brazil - National Action Program to Combat Desertification and Mitigate the Effects of Drought
  - PB - Paraíba
- PBHCF - Ten Year Water Resources Plan of the Hydrographic Basin of the São Francisco River
- PDHC - Dom Helder Câmara Project
  - PE - Pernambuco
- PFE's - State Focal Points to Combat Desertification
- PGPM - Guaranteeing Minimum Prices Policy
  - PI - Piauí
- PIB - Gross National Product
- PIMC - International Panel on Climate Changes
- PNAP - National Program of Protected Areas
- PNCD - National Plan to Combat Desertification
  - PNF - National Forests Program
- PNMA - National Environment Program
- PNRA - National Agrarian Reform Plan
- PNRH - National Water Resources Policy
  - PPA - Pluriannual Investments Plan
- PROÁGUA - Water Resources Development Program

- PROBIO - Project for Sustainable Conservation and Utilization of Brazilian Biological Diversity
- PRODES - National Program for De-pollution of Hydrographic Basins
- PROINFA - Incentive Program for Alternative Sources of Electric Energy
- PRONABIO - National Biological Diversity Program
- PRONAF - National Program for Strengthening Family Agriculture
- RESAB - Education Network of the Brazilian Semi-Arid Region
- RIOD - International Network of NGO's on Desertification
- RN - Rio Grande do Norte
- RPAA - Regional Institute of Appropriate Small-scale Cattle-raising
- SAB - Brazilian Semi-arid Region
- SAF - Agroforest System
- SE - Sergipe
- SEBRAE - Brazilian Support Service for Micro and Small Businesses
- SECTMA-PE - Science, Technology and Environment Secretariat of Pernambuco
- SEMA-SE - Environment Secretariat
- SEMACE - State Environment Superintendence of Ceará
- SEMARH-PB - Extraordinary Secretariat of the Environment, Water Resources and Minerals of Paraíba
- SIAPREH - System of Accompanying and Evaluating the Implementation of the Water Resources Policy in Brazil
- SIG - Geographic Information System
- SINGREH - National Water Resources Management System
- SISNAMA - National Environment System
- SNUC - National Conservation Units System
- SRH - Water Resources Secretariat
- SUDENE - Northeast Development Superintendence
- TNC - The Nature Conservancy
- UFPI - Federal University of Piauí
- UN - United Nations
- UNDP - United Nations Development Program
- UNEP - United Nations Environment Program
- UNICEF - United Nations Children's Fund
- UC - Conservation Unit
- USA - United States of America
- ZCIT - Intertropical Convergence Zone
- ZEE - Ecological-Economic Zoning

# *List of Tables*

TABLE 1.1 – Relations between Population, Area and GNP of the Northeast of SUDENE and of the Semi-arid Northeast, in Various Years .....	11
TABLE 1.2 – Pilot Areas for Investigation about Desertification in the Brazilian Semi-arid Region .....	15
TABLE 1.3 – Demographic Aspects of the Semi-arid, Dry Sub-humid, and Surrounding Areas and of the Areas Susceptible to Desertification – ASD .....	19
TABLE 1.4 – Classification of Susceptibility to Desertification based on Aridity Index ...	30
TABLE 1.5 – Northeast Tropic Semi-arid. Environmental Degradation Levels by Soil Class.....	31
TABLE 1.6 – Desertification in the Semi-arid Region; Area and Population Affected.....	31
TABLE 1.7 – Area, Population and Number of Municipalities in the Northeast of SUDENE, in the Different Delimitations of the Semi-arid Region and in the Areas Susceptible to Desertification – ASD, in 2000.....	32
TABLE 1.8 – Number of Municipalities of the Areas Susceptible to Desertification, by State .....	33
TABLE 3.1 – Schedule of the State Workshops Realized in 2004.....	61
TABLE 3.2 – Methodology for the Elaboration of the PAN-Brazil .....	63
TABLE 5.1 – Current Situation of the Implementation Process of the Water Resources Policy Instruments in the States Inserted in the PAN-Brazil Region.....	107
TABLE 5.2 – Area Irrigated by the Different Irrigation Methods in the Brazilian Northeast (1999 -2000).....	114
TABLE 5.3 – Indicators Agreed on by the Three Countries .....	139

# *Presentation*

The areas susceptible to desertification in Brazil are characterized by long periods of drought, followed by others of intense rains. Both processes, droughts or intense rains, customarily provoke significant economic social and environmental damage, which tends to affect with greater force that less-favored part of the population. Thus, the poorest people are the most affected by climate variability.

The process of elaborating the National Action Program to Combat Desertification and Mitigate the Effects of Drought – PAN-Brazil has taken into consideration the knowledge accumulated by the local population, which represents a methodological advance and a demonstration of maturity of the government and of civil society. The final result, written down in this document, demonstrates the struggle against desertification should be a process where everyone, government and society, share experiences, knowledge, obligations, and responsibilities. This attends to the insistent demands, chiefly with respect to the necessity of advancing from the emergency actions against the effects of the drought or of the floods, to long-lasting actions which make up the various areas of action of public authorities and of the different social groups.

In accordance with the guidelines of the Environment Ministry – integrated environmental policy; social participation and control; Sustainable development; and strengthening of the National Environment System – PAN-Brazil tried to integrate actions and programs of several ministries, considering the demands of the local governments and of society, and thus, the presupposition of participatory democracy.

By means of this National Action Program to Combat Desertification, Brazil is taking a great step forward in relation to its commitments given to the United Nations Convention to Combat Desertification and begins to be able to count on a guiding instrument for the process of transforming the reality of the areas susceptible to desertification in the scope of the sustainable development policies.

PAN-Brazil arises strengthened by the pacts established between the relevant social actors, who have contributed much in the process for elaboration and who will play a central role in its implementation. The communion of efforts between persons and institutions with effective action in the region is the simplest most efficacious and long-lasting formula for the construction of a better society for all.

Marina Silva  
Environment Minister



# *Executive Summary*

This document reflects the work done along 2003 and 2004 by governmental and non-governmental entities dedicated to the construction of the National Action Program to Combat Desertification and Mitigate the Effects of Drought – PAN-Brazil. Besides attending to a commitment assumed by the Brazilian Government at the time the United Nations Convention to Combat Desertification (CCD) was ratified, this work also reflects the commitment of the current government with the process of transformation of Brazilian society, centered on the search to eradicate poverty and inequality, and having as a model to be imitated the ethic of sustainable development, a concept explained in Agenda 21.

PAN-Brazil assumes a greater significance to the extent that it makes reference to and tries to create prosperous conditions for a region with great social and productive deficits, results of an environmental, social economic and political history which frequently constitutes a desolating picture of poverty and misery.

Following the definitions of the CCD applied to the Brazilian case, the Areas Susceptible to Desertification – ASD are predominantly concentrated in the Northeast region of the country including the semi-arid and dry sub-humid spaces besides some areas equally affected by drought phenomena in the States of Minas Gerais and Espírito Santo, in the Brazilian Southeast adjacent to the dry sub-humid or semi-arid spaces.

The desertification, according to the Convention, is the land degradation in the arid, semi-arid and dry sub-humid zones of the planet. It means the destruction of the basis of natural resources, as a result of the action of man on his environment, and of natural phenomena, such as climate variation. It is a process, almost always slow, which undermines, which corrodes little by little, the capacity of a community to survive.

It should be emphasized that in the Brazilian case, the degree of knowledge of these processes and of their extent is still precarious and needs to be perfected. However, the recognition does not exclude the existence of the phenomena, nor their gravity.

Altogether, the ASD, object of the action of the PAN-Brazil, represent 1,338,076 km<sup>2</sup> (15.72% of the Brazilian territory) and include a population of more than 31.6 million inhabitants (18.6% of the population of the country). In relative terms it has a rainfall greater than other similar regions of the planet and also presents an elevated population density; besides this, its space consists of a single biome, the Caatinga.

The multiple and complex reasons for the occurrence of the desertification phenomena are treated in the various chapters and sections of this document. For now, it is enough to emphasize that the development model used along various decades has contributed, unfortunately, for the establishing of the processes of desertification and determined the speed of its occurrence.

In a few words, one can point out that over a varied gamut of geoenvironmental units, in their majority quite vulnerable to human action, a uniform and inadequate distribution of land has occurred allied to a disorganized urban expansion, and over which also uniformly occur the destruction of vegetation, the inadequate management of forest resources, the use

of inappropriate agricultural and cattle-raising practices and the socio-economic effects of climate variation. The consequence of this verification is the degradation or desertification in several degrees of severity.

As a result, the social ills become more extensive and productive capacity is reduced, bringing it about that currently the ASD present, despite the human pressures, a situation of low dynamics or economic stagnation, with the resulting vicious circle of social problems. In the search for a way to survive the inhabitants of the ASD, as well as the environment, become more and more vulnerable and fragile.

Despite the problems identified and the vulnerability pointed out, there do exist successes and reasons for hope

In the most recent years, new economic opportunities have arisen in the regions, represented by the introduction of soybean culture in the dry, sub-humid part of the ASD and by irrigated cultivation of fruit trees in the semi-arid area. These activities create new wealth, but at the same time, generate concern and reactions referring to their socio-environmental form and impacts.

On the one hand, the expansion of soybean cultivation was founded on intensive monoculture in capital and the cultivation of fruit trees generates additional problems of income concentration. On the other hand, the social actors and the governmental institutions test and implement in the productive sphere, innovating actions centered on appropriate technologies for the ASD and cataloged under the denomination "Living with the Semi-arid Region".

These experiences and practices start out from the verification that all the civilizations that flourished in arid, semi-arid and dry sub-humid areas respected the limits and potentialities of their natural and human environments, and defined patterns specific and typical for allocation of the population, for use of the natural and socio-economic resources. These patterns have as a common element the careful management of scarce resources (chiefly the soil and water). The giving of value to the knowledge of traditional populations and the making social capital dynamic, anchored in networks of individuals and helping entities procedures are quite different from the social patterns of productions and of consumption experienced in temperate regions.

This effort is supported in the strategic perception that the ASD in Brazil need to be dynamic spaces and of productive and social prosperity. The ASD, due to the current situation, have frequently been regarded as "problem areas" or "depressed," requiring policies, treatments and interventions of an emergency character or assistance practices. In the new perspective, these areas are perceived as capable of contributing in an efficacious and efficient way for the development of the country.

Due to this situation, the federal and state governments and civil society, in partnership have undertaken the construction of this document, the process of which was characterized by mobilization of the social energies of the ASD, the search for the recuperation of the capacity to plan on participatory bases, reaffirmation and consolidation of hopes and demands, and by setting the bases for the construction of new social pacts. Operational, financial questions, and the relatively short term for the realization of this effort constitute the elements which make even more significant advances difficult.

The necessary methodological articulation between the scientific, technical aspects and the practical and traditional knowledge emerging from civil society was a great challenge, not always overcome. Even so, in this process, hundreds of individuals and governmental and non-governmental institutions, both in the federal as well as in the state sphere, were involved, contributing with dedication and to the best of their capacity.

These dynamics were oriented by some guiding documents, which are:

- The CCD – besides the attention to fulfilling obligations assumed by Brazil before the CCD, the process of construction of PAN-Brazil was limited to the concept of a Program oriented to the insertion of the theme in the global planning of the Country, as well as in the search for social and institutional pacts;
- The Agenda 21 – of the various contributions and commitments derived from it, fundamental concepts and recommendations were adopted for the sustainable development in all its amplitude, and, even more, renewed attention was given to the specific policies of protection for the environment;
- The Declaration of the Semi-Arid Region – figures as the central instrument of the contributions of civil society, incorporating propositions constructed starting from the realization of the COP 3 (Recife-PE, 1999) by the network denominated Articulation in the Semi-Arid - ASA;
- The National Environment Conference – realized for the first time in the history of the Country in 2003, treated the questions relative to combating the desertification, taking into consideration the various proposals arising from the state debates; and
- The strategies and the macroobjectives of sustainable development proposed in the Strategic orientation of the Government, which is the instrument that governs the formulation and the selection of the programs which integrated the Pluriannual Investment Plan (PPA 2004 - 2007). These represent the saving of the commitments assumed by the current president of the Republic during the electoral campaign of 2003. It is important to emphasize that the PPA was also the result of a broad debate in society in general, which makes it very close, for example, to the guidelines emanated from the CCD.

In this way, the “thematic axes” are derived from these documents which orient the debates, the deliberations and the technical, political and institutional processes, for the construction of consensus and pacts which constitute the PAN-Brazil. Four fundamental axes were chosen, corresponding to the macro-objectives of the federal government, that is to say:

- Combating poverty and Inequality;
- Sustainable Expansion of Productive Capacity;
- Preservation, Conservation and Sustainable Management of Natural Resources; and
- Democratic and Institutional Strengthening.

Starting from these axes, a set of actions and proposals was determined founded on various instruments, programs, and projects in implementation by the federal government, described and committed in the budget of the federal government for the period 2004-2007. In the same way, proposals, recommendations and suggestions were listed, resulting from participatory processes developed, which should be detailed and committed to, considering that PAN-Brazil is a dynamic process.

The proposals of action focused on Axis 1 – Combating Poverty – assure that combating inequality will be centered on the redistribution of credits by means of agrarian reform and the improvement of fundamental education. It established that the combating of poverty and food and nutritional insecurity will be done by an action integrated between the several governmental programs of support for family agriculture, as well as between the emergency programs of income distribution, such as the programs Fome Zero (Zero Hunger), Family Scholarship and other instruments of social assistance. It reaffirms the importance of developing, with respect to the set of national policies (including the social security system), mechanisms and specific measures for the regions susceptible to the processes of desertification.

The actions derived from axis 2 – Sustainable Expanding of Productive Capacity – consider the current problems and strategies against desertification in the ASD. Such actions reaffirm that family agriculture is the central and dynamic element in the construction of processes of sustainable development of the ASD, to the extent that this is one of the chief economic segments where one can, with relatively low costs and risks, guarantee increased production positively alter the levels of poverty and inequality, as well as guarantee the sustainable management of natural resources and the aspects of broadening citizenship and of democratic administration of public policies.

With respect to irrigated agriculture, the document emphasizes the concern about the question of prevention and control of salinization in irrigated perimeters, indicating the urgent need to formulate specific programs of prevention and control of salinization.

In Axis 2, the importance of expansion of the service sector (public and private) was also established as a factor to broaden the capacity of generate wealth and income in the ASD, chiefly for attending the most critical social deficits.

With respect to the questions of preservation, conservation and sustainable management of natural resources (Axis 3), one tried to assure adherence to the special proposals for the ASD to constitutive elements of the environmental policy of the Federal Government. Proposals, such as improvement of environmental management, broadening protected areas, water resources management, sustainable use of forest resources, revitalizing important hydrographic basins, and making economic ecological zoning on an appropriate scale were developed in harmony with the current guidelines and actions which are being done by the Ministry of the Environment.

Finally, in Axis 4, the democratic management and institutional strengthening were defined as actions, in the sense of deepening and consolidating the democratic experience, generally, the strong insistence upon the participation of civil society at all levels.

The management model for PAN-Brazil respects this group of commitments. The creation of a National Council to Combat desertification, of a committee for the follow-up of the review of implementation of PAN-Brazil and the proposal to realize every four years a national seminar on desertification demonstrate the will to broaden and consolidate the bases for combating desertification in the country with an effective process of social control.

It should be pointed out that PAN-Brazil cannot be considered concluded or even conclusive. In fact, it is a momentary picture of a journey already begun, but which is surely far from its end.

Finally, the contribution of hundreds of persons and institutions should be emphasized, particularly from entities of civil society and of state governments. In the same way, one emphasizes the contribution of the Brazilian Congress, through its federal deputies and senators from the ASD states. One also desires to register here the technical and financial contribution offered by international cooperation, especially that of the CCD and of its world mechanism, of the German Government by means of the GTZ and of the DED; of the PNUD; of the IICA, without which such a rich process of participatory construction hardly would have taken place.

# *Introduction*

The National Action Program to Combat Desertification – PAN-Brazil is the fruit of a process of involvement and social participation, which had its birth and development encouraged in a unique way by the simple act of sharing.

In the entire process of negotiation and construction of PAN-Brazil, meetings, workshops and gatherings were held involving various social actors (around 400 organizations and 1,500 persons) with activities in the Areas Susceptible to Desertification (ASD) and with the intention of interacting kinds of knowledge and constructing the bases for the PAN-Brazil.

In this process one should emphasize the broad and well-known participation of those states inserted in the ASD: of the Interministerial work Group (GTIM), instituted by means of Environment Ministry Resolution N<sup>o</sup>. 265, of June, 2003; of the State Focal Points (representing civil society, the state governments and parliamentary representatives at the federal and state levels); and of the Articulation in the Brazilian Semi-arid Region ASA (which is comprised of about 1,200 social organizations acting in the ASD) in the promotion of mobilization and social development as well as in the formulation of the document itself.

The action of the most varied social actors in the process of the construction of PAN-Brazil contributes to the broadening and deepening of democracy in the country, in a shared and participatory way. The construction of pacts involving these actors and the federal government should strengthen, more and more, their extreme need to promote actions combating desertification in the full sense, that is (i) combating poverty and inequality (ii) broadening in a sustainable way the productive capacity of the region; (iii) preserving, conserving and promoting the sustainable management of natural resources.

The PAN-Brazil has proved to be an orienting tool for implementing actions articulated in the control and combat of desertification, as well as for the broadening of social agreements involving the most diverse segments of society.

The document presented here has its premises based on the model of sustainable development. The first chapter treats of the concepts related to semi-aridity, desertification and climate changes as central elements for the definition of areas susceptible to desertification, and climate changes as central elements for the definition of areas susceptible to desertification in the country (focus of PAN-Brazil). In Chapter II, one presents a brief history of the actions developed in Brazil about combating desertification. Chapter III shows in an objective way the construction of PAN-Brazil, while in the following Chapter (IV), one describes the strategic marks and central axes of the program. Chapter V details the central axes to be established in the scope of the thematic axes (including the governmental programs already going on and the contributions coming from the process of constructing PAN-Brazil.

For greater effectiveness in implementing the program, it is necessary to have a management structure involving instances at various levels (strategic, tactical and operational), supported by a coherent process of social inspection and this prerogative is properly treated in Chapter VI.

In the last chapter VII, one points out the importance of promoting synergy between the Conventions of Combating Desertification, Climate Changes and Biological Diversity.

It is important to note that this document represents, besides being a commitment assumed by the Country in 1997, when it signed the United Nations Convention to Combat Desertification, a broad political and social effort to establish the basis to combat desertification in Brazil.

João Bosco Senra  
Water Resources Secretary of the Environment Ministry  
National Focal Point of the CCD in Brazil

## *Chapter I*

# **SEMI-ARIDITY, DESERTIFICATION AND CLIMATE CHANGES**

In a general perspective, the semi-arid areas are characterized by an imbalance between the supply and demand for natural resources, vis à vis the basic needs of the populations which inhabit them. In a specific way, these territorial portions present different details because they are submitted to special conditions of climate, soil and vegetation, social relations of production, and consequently different lifestyles. The landscape variations can be more or less accentuated. In these areas there are moments when it rains more or less; in which the soil is fertile, already had become degraded or has been submitted to intense processes of denudation; in which the vegetation becomes thinner and less vigorous; and the scarcity or lack of basic food comes to be a frequent occurrence.

The semi-arid and dry sub-humid zones have in droughts their common element for the arid zones, for this climate phenomenon is characterized by the absence, scarcity, reduced frequency, limited quantity and bad distribution of pluviometrical precipitation during the rainy seasons.

Beside the droughts, the degradation of the lands in the arid, semi-arid and dry sub-humid areas, called desertification is the result of various factors, including those caused by climatic variations and human activities, this last factor being chiefly due to the inadequate use of natural resources, for example, soil, water and vegetation.

It is fundamental to pay attention to the fact that the advance of desertification is not peculiar to critical zones like the African Sahel<sup>1</sup>, situated on the South border of the Sahara desert " Areas that do not show the ecological facies typical of the known desert, as those of Africa and Asia`, where landscapes of extensive level plains predominate with little or no vegetation, also run the risk of being transformed into deserts."<sup>2</sup>

The processes of desertification in the Brazilian semi-arid spaces began to be formally identified in the 1970's. A pioneer study, done at that time by the Pernambucan ecologist João Vasconcelos Sobrinho, informed that there was about to arise "a great desert with all the ecological characteristics which lead to the formation of the great deserts existing today in other regions of the globe." The desert which was being formed there would be "an atypical desert, different from the typical Sahara Desert, by the occurrence of rain and the nature of the soil, but with the same implications of non-inhabitability" and this was proved by the "diminution of the potomatographic network of the region." For the above-mentioned researcher, the unstable ecological balance which one observed there "created by the climate and soil conditions, permits only a precarious existence to those live beings who inhabit this strip, chiefly the vegetation covering which lines it, at the cost of an immense effort to adapt and survive. This imbalance was the creator of the great deserts. Once a prolonged drought has arisen, or the hostile invention of man has occurred, principally by

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<sup>1</sup> Made up of countries such as Senegal, Mauritania, Mali, High Volta, Niger and Chad.

<sup>2</sup> CARVALHO, Otamar de. A economia política do Nordeste (The political economy of the Northeast); secas, irrigação e desenvolvimento (droughts, irrigation and development). Rio de Janeiro, Campus, 1988, p. 67.

successive burnings of land, this destroys the precarious ecological structure and the desert is implanted.”<sup>3</sup>

Afterwards, one presents the elements that make up the spaces related to the most common delimitations of the Northeast Semi-arid region: i) Dimensions and Factors Responsible for the Desertification Processes; ii) Spaces affected by the Droughts in the Northeast and the Official Semi-Arid Region; iii) Space which the object of action of PAN-Brazil; and iv) PAN-Brazil, Global Warming and Climate Changes.

## 1.1 DIMENSIONS AND FACTORS RESPONSIBLE FOR THE PROCESS OF DESERTIFICATION

In line with the presuppositions established by Agenda 21, the United Nations Convention to Combat Desertification – CCD defines desertification as a process which culminates in the degradation of the lands in the arid, semi-arid and dry sub-humid zones, as a result of the action of diverse factors, with emphasis on climate variations and human activities. In the same line of thinking, land degradation is understood as corresponding to the degradation of the soils of water resources, of the vegetation and of biodiversity. It means, finally, the reduction of the quality of life for the populations affected by this combined set of these factors.

The degradation and the desertification constitute serious problems. Such problems affect 33% of the earth’s surface where 2.6 billion people (42% of the total world population) lives. These problems are especially acute in the sub-Saharan region, where more than 200 million people reside. There about 20% to 50% of the lands are degraded. The degradation of the soil is also severe in Asia and Latin America as well as in other regions of the globe.<sup>4</sup>

In Latin America more than 516 million hectares are affected by the desertification. As a result of this process, one loses 24 billions of tons a year of the arable layer of the soil, which affects negatively agricultural production and sustainable development.<sup>5</sup>

The causes and, at the same time, the consequences, of the degradation and of the desertification are frequently the poverty and food insecurity, combined with the severe variations of the hydrological cycle, such as droughts and floods.

Globally, the area affected by the drought increased more than 50% during the Twentieth century, while the changes in the humid areas remained relatively unaltered. It is important to emphasize that floods and droughts go together. In particular, the drought is a natural phenomenon, the length and extension of which present a chance character. Despite this, scientists attribute some relation with the phenomenon of El Nino. During the events of El Nino, the drought is endemic in Australia, Indonesia, Southeast Asia, Northeast of Brazil,

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<sup>3</sup> VASCONCELOS SOBRINHO, João. *O deserto brasileiro* (The Brazilian Desert). Recife, UFPE/Imprensa Universitária, 1974, p. 7.

<sup>4</sup> SNEL, Mathilde e BOT, Alexandra. “Some suggested indicators for land degradation assessment of drylands”. In: “**Land Degradation Assessment in Drylands-LADA**”, International Electronic Mail Conference, accomplished in October, 09, November, 11, 2002. APUD: ADAMS, C. R. and ESWARAN, H. “Global land resources in the context of food and environmental security”. In: GAWANDE, S. P. Ed. *Advances in Land Resources Management for the 20<sup>th</sup> Century*. New Delhi: Soil Conservation Society of India, 2000: 35-50. available in: <<http://www.fao.org/ag/agl/agll/lada/emailconf.stm>>. Access in 21.07.2004.

<sup>5</sup> See with respect to this: Food and Agriculture Organization of the United Nations-FAO. *A new framework for conservation-effective land management and desertification control in Latin America and the Caribbean Guidelines for the preparation and implementation of National Action Programs*. Rome, FAO, 1998. Available in: <<http://www.fao.org/docrep/W9298E/W9298E00.htm>>. Access on 21.07.2004.



and parts of Africa. But during the event La Nina, the preferred locations of the drought change to other parts of the world, including North America and South America.<sup>6</sup>

These changes exercise an excessive pressure on the natural resources and the adoption of survival strategies, which exhaust the resources by the inadequate use of the earth, the immediate causes of which are the inappropriate use and the degradation of the soil, of the water, and of the vegetation; loss of biological diversity<sup>7</sup>, which affects the structure and the function of the ecosystem.<sup>8</sup>

The discussion of the causes and consequences of desertification, degradation of soils and the occurrence of drought is a complex and little understood matter. Drought occurs frequently in areas affected by desertification, corresponding to a characteristic of regional climate in that which refers to its chief causal determinants. The relation of desertification and drought, on the one hand, and human influence on the other, has not yet been completely explained. Occasional droughts, due to the seasonal factors or inter-annual variations of rains) and severe droughts of long periods can be caused or aggravated by human influence on the environment, reduction of vegetation covering, change of the effect of albedo, local climate changes, greenhouse effect etc.). Thus, human activities contribute to accelerate the process of desertification, aggravating its negative consequences for people.

The severity of the desertification depends on factors which vary in time with the region or the country. For the United Nations Organization for Agriculture and Food FAO, the factors responsible for the greatest severity of desertification can be thus qualified:

- The rigor of the climate conditions during the period considered (particularly in terms of annual precipitation);
- The population pressure and the style of life of the persons involved; and
- The level of development of the country and the quality of the preventive measures adopted.<sup>9</sup>

Thus, the combating of desertification is a part of the process of battle for life, which should be spelled out in the socioeconomic development programs of the areas affected. Moreover, one of the key aspects for the success of these programs refers to the participation of the persons directly affected by the aforementioned process.

This approximate understanding of the problem is usually denominated global and participatory, being based on five principles, thus conceived by FAO:

- i. **The principle of integration**, which affirms the necessity of improving solidarity between the generations and between the local consumers of natural resources

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<sup>6</sup> Cf. OVERPECK, Jonathan & TRENBERTH, Kevin (ors.). "A multimillennia perspective on drought and implications for the future". In: Intergovernmental Panel on Climate Change-IPCC. Workshop IPCC, 2003, 18-21, November, Tucson, Arizona, p. 6. available in: <<http://www.ipcc.ch/pub.tucson.pdf>>. Access in: 20.05.2004.

<sup>7</sup> Biological diversity signifies the variability of living organisms of all origins, including among others, the earth and marine ecosystems, and other aquatic ecosystems and the ecological complexes of which they are a part; also including diversity within species, between species and of ecosystems (CDB, Article 2)

<sup>8</sup> See about the matter: i) MAGALHÃES, Antônio Rocha & BEZERRA NETO, Eduardo. Org. **Impactos sociais e econômicos de variações climáticas e respostas governamentais no Brasil. (Social and economic impacts of climate variations and governmental answers in Brazil)** Fortaleza, Official Press of Ceará, 1991; ii) MAGALHÃES, Antônio Rocha & REBOUÇAS, O. E. "The effects of climatic variations on agriculture in Northeast Brazil." In: PARRY, M. L.; CARTER, T. R. & KONIJIN, N. T. Editors. **The impact of climatic variations on agriculture**. Dordrecht, IIASA & UNDP, 1988. V. 2. (Assessments in Semi-Arid Regions.); e iii) MAGALHÃES, Antônio Rocha. "Drought and policy responses in the Brazilian Northeast". In: WILHITE, D. A. Editor. **Drought assessment, management and planning: theory and case studies**. Norwell, Massachusetts, Kluwer Academic Publishers, 1993.

<sup>9</sup> Cf. Food and Agriculture Organization of the United Nations-FAO. **Symposium on land degradation and poverty**. Rome, Italy, FAO, International Fertilizer Industry Association-IFA, 2000, p. 3. Available em: <<http://www.fao.org/docrep/X5317E/x5317e00.htm>>. Access in: 14.04.2004.

and other inhabitants of the planet. This principle also includes the necessity of combining the traditional knowledge with recent experimental knowledge of the ecological and socioeconomic environments;

- ii. **The principle of concerted efforts**, which involves the participation of the people in decision-making, from the local level, being expressed by diverse forms of understanding, such as: the internal concerted effort in the local community itself, which makes it capable of working out its very own decisions, to organize actions, to manage its lands and to resolve conflicts between its members; The concerted efforts between the communities, which is necessary when they belong to the same hydrographic basin or use the same space or the same sources of resources; the concerted efforts between the local and regional communities and national institutions, the concrete form of which should be organized by the Government; and the concerted efforts between development and assistance organizations (government technical services, NGK's etc.), the starting off of which has contributed to avoid the occurrence of contradictions between the programs, making the best use of facilitators and of the effects of support they furnished;
- iii. **The principle of space planning**, considered fundamental to guarantee the consistency of the actions;
- iv. **O principle of decentralization** of the decision-making power and of allocation of resources, the exercise of which is essential for the success of the activities of control of desertification; and
- v. **O principle of sustainable aid** with flexible intervention is important for the areas of rural development and for the control of desertification. The sustainability requires that governments and international financing agencies be committed on the long term, and that the funds that they can make available be compatible with the planning stages of the beneficiary countries. The CCD denominates this principle "partnership agreement." According to FAO, the flexible intervention has two components: the offer of flexible technical aid to the communities, which should be provided in the sense of adapting the action programs to the needs of transformation and to the local contexts; and flexible financing and accounting procedures, on the basis which specific financial support should be provided which can attend the initiatives, provision for which had not been foreseen. (FAO, 2000: 6-9)

## **1.2 THE SPACES AFFECTED BY THE DROUGHTS AND THE OFFICIAL SEMI-ARID REGION**

The droughts do not occur in a uniform way along the semi-arid spaces of the Northeast. There can be years of total drought, with effects observed in all the areas of the Semi-arid Region, and years of partial drought, in which the problems of the drought are found only in some areas of the states of the Northeast.

The areas most affected by the droughts in the Northeast are those which are to be found under the direct influence of the Intertropical Convergence Zone-ZCIT, whether one is treating of annual or pluriannual droughts. The empirical evidence available indicates that the climate variability resulting from the action of the ZCIT combines with the factors which determine the pluviometric system of the Woodland Zone and in the meridional Northeast.

The moment this set of factors is articulated is when the large-scale droughts occur – annual ones (as in 1951, 1958 and 1970) and pluriannual ones (as from 1979-1983).<sup>10</sup>

The areas most affected by the droughts are those where their occurrence depends on the action of the ZCIT. These areas present a certain physical homogeneity. In them the soils are relatively poorer than in the remaining geoeconomic zones of the Northeast-Woodland Zones, agreste or of the Cerradões of Bahia, where the rainfall measurement is around 400mm to 800 mm of annual rains. In the interior of the areas affected by the droughts there is a space, already called the “semi-arid core”,<sup>11</sup> where the droughts occur with frequency between 81% and 100% (Figure 1.1) In this space, the climate variability is extremely accentuated.

These areas were cultivated, until the middle of the 1970's by the group of activities cattle – cotton – food crops. The workers and small landowners who got their living from the activities of this complex supported themselves from the part which was theirs in the cultivation of cotton and of the food crops. The disorganization of these activities reached its limit as a result of the impacts of the drought of the years 1979 -1983, reinforced by the entrance of the bicudo pest<sup>12</sup> in the cotton plantations of the semi-arid, starting from 1980. Since then, the agriculture of this region has lost one of its chief sources of income and of employment (Carvalho, 1988).

The droughts give a merely apparent homogeneity to the semi-arid region, but the physical, climate and environment differences of this region are shown by the ecological facies of the natural regions which comprise it and answer for its diversity. Side by side or making up varied groups, the natural regions of the Sertão, of Seridó, of the Curimataú, of the Caatinga of the Carrasco<sup>13</sup> and of the Cariris Velhos share the area of the official occurrence of the droughts.

For more than two centuries, human and economic occupation of these spaces was structured around activities of the above-mentioned productive complex. Such activities were complemented by the exploitation of important mineral resources, which achieved singular importance in some parts of that territory. It was this that occurred in States like Rio Grande do Norte, Paraíba, and Bahia. The Seridó of Rio Grande do Norte became famous for the occurrence and exploitation of precious metals, as gold, ferrous metals (tungsten) minor metals (tantalum, columbita, beryl and lithium), industrial and refractory materials (mica) ceramic materials (white clay) construction materials (plaster) and precious and semi-precious stones (beryl, aqua-marine and corundum).<sup>14</sup>

The semi-arid spaces of the Northeast present, besides this the greatest physical-territorial extent, vis-à-vis the other natural spaces which shape and structure the Brazilian Northeast. It is certain that “the semi-arid areas of the Northeast acquired notoriety due to the occurrence of droughts and the relative scarcity of natural resources. Because it is a matter of a densely populated space, it has become famous for its poverty. These areas are

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<sup>10</sup> NOBRE, Carlos, BARROS, Helix & MOURA FÉ, Joss de Inchoate (1993) – **O clima, a água e a seca no Nordeste brasileiro**. Brasília, Space Research Institute – INPE. Weather Forecasting Center and Climate Studies of the National Space Research Institute of INPE-CPTEC, 1993.

<sup>11</sup> Cf. CARVALHO, Otamar de. **A economia política do Nordeste (The political economy of the Northeast)**. Op. cit., especially Chapters 2 and 3. This area in the form of a “horseshoe,” as one can see in Figure 1.1, corresponds to the heart of the semi-arid area.

<sup>12</sup> This is the **Anthonomus grandis** Boheman, one of the most destructive pests which attacks the cotton plant.

<sup>13</sup> About the characterization of these regions, see: i) DUQUE, J. Guimarães. **Solo e água no polígono das secas. (Soil and Water in the Drought Polygon)** 4th ed. Fortaleza: DNOCS, 1973; and ii) DUQUE, J. Guimarães. **O Nordeste e as lavouras xerófilas (the Northeast and its Xerophilous Crops)**. 1<sup>st</sup> ed. Fortaleza: Banco do Nordeste do Brasil, 1964.

<sup>14</sup> Extraordinary Ministry for the Coordination of Regional Organisms – MECOR. Superintendence for the Development of the Northeast – Sudene (1966) – **I Plano diretor de desenvolvimento econômico e social: 1961-1963. (First Guideline plan of social and economic development** Recife, Sudene, 1966, p. 223-229.

considered as one of the most densely populated semi-arid spaces in the world, in the observation made by Jean Dresch, in 1956, registered by the professor Aziz Ab'Saber, during the International Geography Congress held that year in the city of Rio de Janeiro.<sup>15</sup>

The droughts affect totally or in part the States of Piauí, Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Alagoas, Sergipe, Bahia and Minas Gerais. It began to affect in a more visible form parts of the State of Maranhão, during the drought which occurred in the period of 1973-1983. Other lesser occurrences also were observed in Maranhão in some of the annual droughts of the decade of 1990.

The areas officially recognized as having the common occurrence of droughts were delimited in 1936. To attend to the resident populations in those areas, the federal government delimited them under the name of Drought Polygon in 1936<sup>16</sup> at that time the area of the Polygon included a surface of 672,281.98 km<sup>2</sup>. This Drought Polygon was considered an official area of the occurrence of droughts in the Northeast until 1989, when a new delimitation was made. From 1936 to 1989, the surface of the Polygon was extended and passed from 672,281.98 km<sup>2</sup> to 1,085,187 km<sup>2</sup>.

The figure of the Drought Polygon no longer exists; it was substituted by the figure of the Semi-Arid Region of the Constitutional Fund for Financing the Northeast – FNE. This region came to correspond to the official area of the occurrence of droughts in the Northeast, in 1989, by force of the orientations established in the Federal Constitution of 1988. Its delimitation was made according to the dispositions of Law N° 7,827, of 9.27.1989, which instituted the FNE.<sup>17</sup>

The Semi-Arid Region of the FNE includes the space inserted “in the area of action of the Northeast Development Superintendence – Sudene, with annual average pluviometric rainfall equal or inferior to 800 mm (eight hundred millimeters), defined in a determination of that Autarchy.” According to the law referred to, the Semi-Arid Region of FNE included, in 2000, a surface of 895,254.40 km<sup>2</sup>, then made up of 1,031 municipalities.<sup>18</sup> On the same date, its population was 19,326,007 inhabitants. Of this total, 56.5% resided in urban areas and 43.5% in rural areas. Its demographic density was 21.59 inhabitants/km<sup>2</sup>.<sup>19</sup>

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<sup>15</sup> AB'SABER, Aziz Nacib. “Nordeste sertanejo: a região semi-árida mais povoada do mundo; fragmentos de leitura-diversos autores” (“Northeast sertão: the most populous semi-arid region in the world; fragments of readings - diverse authors”). In: AB'SABER, Aziz Nacib. “Sertões e sertanejos: uma geografia humana sofrida” (“Sertões and Sertanejos: a suffering human geography”). **Estudos Avançados (Advanced Studies)**, University of São Paulo, Institute of advanced Studies, vol. 1, nº 1: 7-68, São Paulo: IEA, 1987, p. 60. (Dossier Dry Northeast).

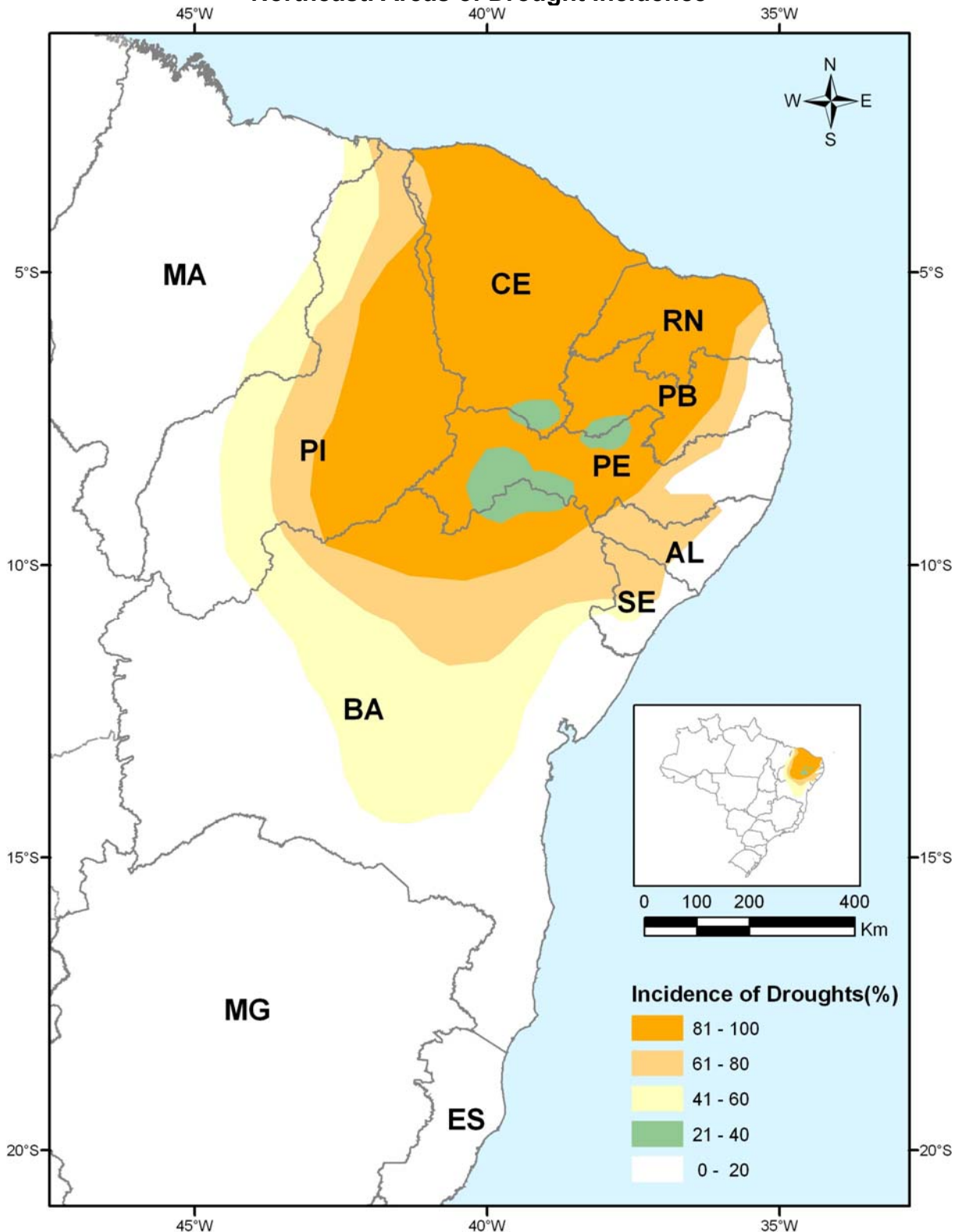
<sup>16</sup> According to the discipline established by Law N° 175, of 01.01.1936.

<sup>17</sup> Together with the Constitutional Funds for Financing the North – FNO and of the Central-West – FCO.

<sup>18</sup> By the Interministerial Determination N° 06, of March 29, 2004, The National Integration Ministry and the Environment Ministry constitute a Work Group to which was given the task of redefining the limits of the Semi-arid Northeast. In terms of this Determination, The Work Group – GT will present a Specific Report on the subject, in which more precise technical elements should be present about the limits of the semi-arid Northeastern spaces. The Report of this Work Group GT also will be able to recommend the realization of new studies and proposals which can give subsidies for the future decisions of the National Integration Ministry about the definition of the municipalities which should be integrated in that region, contemplating objectively the definition of the technical criteria to give a basis for such decisions. The delimitation referred to has a central proposition how to judge the criteria which orient the efficacious application of the resources of the FNE.

<sup>19</sup> See about the subject: i) CARVALHO, Otamar de & EGLER, Cláudio A. G. **Alternativas de desenvolvimento para o Nordeste semi-árido (Alternatives of development for the semi-arid Northeast)**. Fortaleza: Banco do Nordeste, 2003; e ii) SANTOS, Lucia Cristina. **O semi-árido setentrional: subsídios ao planejamento do desenvolvimento subregional. (The semi-arid north: subsidies for the subregional development planning** Recife: Sudene, March, 2003. (Master's degree thesis. Master's degree thesis – TCM, presented for the Professional Master's Degree in Public Management for the Development of the Northeast, on March 18, 2003).

**FIGURE 1.1**  
**Northeast. Areas of Drought Incidence**



SOURCE: CARVALHO, Otamar de et alii. **Plano integrado para o combate preventivo aos efeitos das secas no Nordeste (Integrated Plan for preventive combating of the effects of the droughts in the Northeast)**. Brasília: Interior Ministry – MINTER, 1973, p. 141. (Redesigned by Claudio A. G. Egler. Cf. CARVALHO, Otamar de & EGLER, Claudio A. G. **Alternativas de desenvolvimento para o Nordeste semi-árido (Alternatives of development for the semi-arid Northeast)**. Fortaleza, CE, Banco do Nordeste do Brasil, 2003.)

Starting in 1989, Sudene stopped using the term Drought Polygon<sup>20</sup> as a reference about the official area where droughts occur. Thus, Sudene began to produce information for the Semi-Arid Region of the FNE, a region which includes part of the states situated in the Area of Activity of Sudene, made up of Maranhão, Piauí, Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Alagoas, Sergipe and Bahia, and for the Area of Minas Gerais of The Drought Polygon. The Area of Activity of Sudene – or Northeast of Sudene, as it also will be called here – covered, up to 1998, an surface of 1,662,947 km<sup>2</sup>.<sup>21</sup>

This area was expanded by another 134,118,00 km<sup>2</sup>, because of the dispositions of Law nº 9,690, of July 15,1998.<sup>22</sup> With these additions, the Northeast of Sudene came to cover a surface of 1,797,939.70 km<sup>2</sup>. Due to this, the Semi-Arid Region of FNE consisted of 53.8% of territory of the Northeast of Sudene in the years of 1970, 1980 and 1991. Due to the expansion of the area of activity of Sudene, starting in 1998, this participation was reduced to 49.78%. (Table 1.1)

The population of the Semi-Arid Region of FNE corresponded to 38% of the population of the Northeast in 1970. It dropped to 36.23% in 1980, but rose again in 1991 to 40.79%, again diminishing in 2000, when the proportion remained at 36.22%. These variations were due, on the one hand, to the increase in the administrative area of Sudene, and on the other hand, to the reduction of the surface of the Semi-Arid Region of the FNE. (Table 1.1)

Variations of a slightly different nature occurred in relation to the GNP of this region, which dropped from 28.41% of the GNP of the Northeast in 1970 to 25.59% in 1980 - and to 19.84% in 1991, as one can see on Table 1.1. This reduction of almost ten percentage points between 19870 and 1998 was due to a great extent to the effects of the droughts which occurred in the decade of 1980 and of 1990.

The surface of the Semi-Arid Region of the FNE – delimited as a disciplinary demand for the application of financial resources of FNE – continues to correspond, currently, to the 895,254.40 km<sup>2</sup> already mentioned. The limits of the Semi-Arid Region of the FNE<sup>23</sup> are shown in Figure 1.2, in which are also included the limits of the figures of the original Drought Polygon (delimited in 1936) and of the Drought Polygon in its final form in 1989.

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<sup>20</sup> LINS, Carlos José Caldas & BURGOS, Ivonete Sultanum (1989) – **Região semi-árida (Semi-arid region)**. Recife: Sudene/DPG/PSU, Jun, 1989. <sup>21</sup> In the administrative area of Sudene the following institutions were active: Banco do Nordeste, Departamento Nacional de Obras Contra as Secas – DNOCS e Companhia de Desenvolvimento do Vale do São Francisco

<sup>21</sup> In the administrative area of Sudene the following institutions were active: Banco do Nordeste, Departamento Nacional de Obras Contra as Secas – DNOCS e Companhia de Desenvolvimento do Vale do São Francisco – Codevasf. The area of activity of the Banco do Nordeste was the same as that of Sudene; that of DNOCS was restricted to the old territory of the Drought Polygon; and that of Codevasf to the basin of the São Francisco River, the surface of which (640,000 km<sup>2</sup>) had 57% inserted in the area of the drought Polygon.

<sup>22</sup> This Law, written by senator Júnia Marise (PMDB – MG), established the inclusion of new municipalities of Minas Gerais and of municipalities of the state of Espírito Santo in the Area of Activity of Sudene. Thus, to the additions of new areas of Minas Gerais (88,070.80 km<sup>2</sup>) to the **Northeast of Sudene**, because of the dispositions of Law nº 9,690/1998, – as a result of the amendments presented by federal deputies of the state of Espírito Santo – another 46,047.120 km<sup>2</sup> of territory of Espírito Santo also were added to the **area of activity of Sudene**. The calculations presented here are based on information of Sudene, especially those contained in the following document: National Integration Ministry (MI). Superintendence of Development of the Northeast – Sudene (2003) – **Northeast of Brazil em numbers**. Recife, Sudene, 2003.

<sup>23</sup> A new proposal for the delimitation of the Semi-Arid Region of the FNE is being elaborated by a work group formed by representatives of MI, Adene, Codevasf, DNOCS, ANA and Ibama, aiming to incorporate other criteria besides the pluviometric precipitations of 800 mm.

**TABLE 1.1**  
**RELATIONS BETWEEN POPULATION, AREA AND GNP OF THE NORTHEAST OF**  
**SUDENE AND OF THE SEMI-ARID NORTHEAST, IN VARIOUS YEARS**

SPECIFICATION	NORTHEAST OF SUDENE AND SEMI-ARID REGION OF FNE			
	1970	1980	1991	2000
Surface of the Northeast of Sudene (km <sup>2</sup> ) <sup>24</sup>	1.662.947	1.662.947	1.662.947	1.797.065,00
Surface of the Semi-arid Region – RSA – FNE (km <sup>2</sup> ) <sup>25</sup>	895.254,40	895.254,40	895.254,40	895.254,40
Population of the Northeast of Sudene (inhab.)	29.115.002	35.974.182	43.751.261	53.434.693,00
Population of the RSA – FNE (inhab.)	11.079.573	13.034.487	17.847.287	19.354.317,00
GNP of the Northeast of Sudene (US\$ 1.00 in 1998)	25,524,443,306	64,956,226,188	<sup>26</sup> 81,228,378,220	<sup>27</sup> 109,345,281,499.00
GNP of RSA – FNE (US\$ 1.00 in 1998)	7,252,588,547	16,621,373,469	16,115,473,162	23,574,106,841.00
Relation between the Surface of the RSA – FNE and of the NE of Sudene (%)	53,84	53,84	53,84	49,82
Relation between the Population of the RSA – FNE and of the NE (%)	38,05	36,23	40,79	36,22
Relation between the GNP of the RSA – FNE and of the NE (%)	28,41	25,59	19,84	21,56

**SOURCES OF BASIC DATA:** i) LINS, Carlos José Caldas & BURGOS, Ivonete Sultanum (1989) – Região Semi-árida (Semi-arid Region). Recife, Sudene/DPG/PSU, June, 1989. ii) National Integration Ministry. Sudene (1999) - Região Nordeste do Brasil em números (Northeast Region of Brazil in Numbers). Recife, Sudene, 1999; iii) IBGE. Censo Demográfico de 2000 (Demographic Census of 2002); characteristics of the population and of the domiciles - results of the universe; and iv) CARVALHO, Otamar de & EGLER, Claudio A. G. Alternativas de desenvolvimento para o Nordeste semi-árido (Development alternatives for the semi-arid Northeast). Fortaleza, CE, Banco do Nordeste do Brasil, 2003.

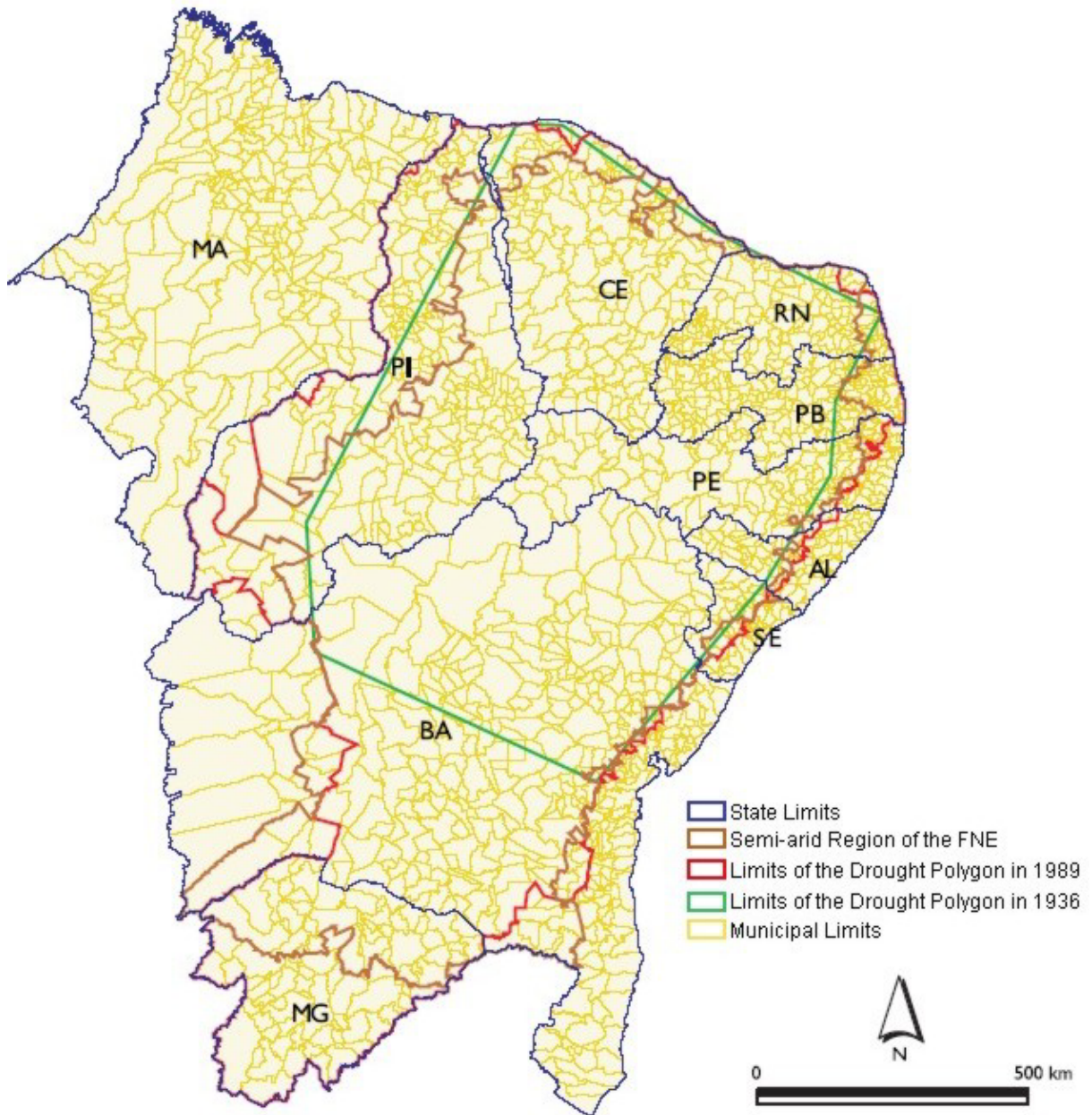
<sup>24</sup> The surfaces of the Northeast of Sudene and of the Semi-Arid Northeast, for the years 1970,1980 and 1991, were taken as equal to that of the year 2000. The possible existing differences in those three years are small, and for this reason it is possible to adopt such a procedure.

<sup>25</sup> The Semi-Arid Northeast here considered refers to the Semi-Arid Region of the FNE, that is, the official semi-arid, worked on by the Banco do Nordeste do Brasil, for the purposes of application of financial resources of the Constitutional Fund for Financing the Northeast.

<sup>26</sup> This value of the GNP corresponds to the year 1990, for the Northeast as well as for the Semi-Arid Northeast..

<sup>27</sup> The value of the GNP (of the Northeast and of the Semi-Arid Northeast) refers to the year 1998.

**FIGURE 1.2**  
**ORIGINAL DROUGHT POLYGON, FINAL DROUGHT POLYGON AND THE SEMI-ARID REGION OF THE FNE**



SOURCE: Carvalho & Egler, 2003.

One emphasizes, finally that the Semi-Arid Region of the FNE – as an official area of drought occurrence – can have its limits expanded in the course of a great drought in the Northeast, when municipalities not included in it<sup>28</sup> – but affected by the scarcity and irregularity of the rains – justifies the implementation of emergency measures of attending populations submitted to the rigors of climate. However, once the effects of a specific drought have passed, the emergency measures of support for the population ceases to be in effect, which had been put into practice as extraordinary measures. This was what happened, for example, in the areas of the Coastal Zone – Forest of the Northeast, during the drought of 1987, and in areas of Maranhão, in the course of the drought of 1993.

<sup>28</sup> Because they do not meet the criteria of rain averages lower than 800mm per year.



### 1.3 AREAS SUSCEPTIBLE TO DESERTIFICATION – ASD

The actions of PAN-Brazil will be executed, for the most part, in the Brazilian Northeast where one finds spaces climatically characterized as semi-arid and sub-humid dry areas. Such spaces are inserted in the lands of the States of Piauí, Ceará, Rio Grande do North, Paraíba, Pernambuco, Alagoas, Sergipe, Bahia and the north of Minas Gerais. But there are areas of the States of Maranhão and of Espírito Santo where the environmental characteristics, now seen, suggest the occurrence of processes of degradation, tending to transform them into areas also subject to desertification, in case one does not adopt measures of environmental preservation and conservation.

The space which is the object of the activity of PAN-Brazil, characterized as Areas Susceptible to Desertification – ASD, are described herewith: i) Nuclei of Desertification; ii) Semi-Arid and Sub-humid Dry Areas; iii) Areas Surrounding the Semi-Arid and Sub-humid Dry Areas; iv) New Areas Subject to Processes of Desertification; v) Chief Characteristics of the Areas Susceptible to Desertification – ASD; and vi) The Relation of the ASD with the Caatinga Biome, The Drought Polygon and the semi-Arid Region of the FNE.

#### 1.3.1 Nuclei of Desertification

The process of desertification began to be studied in Brazil in the decade of the 1970's. The majority of scholars of the subject agree that the propositions of the CCD about the determining factors of desertification, that is, that it is a result of various factors, including climatic variations and human activities.

The results of human activity is principally erosion, particularly the laminar type (with occasional occurrences of small areas affected by erosion in deep cuts or “voçorocas”) and the processes of soil salinization, both in the areas of non irrigated agriculture as well as in irrigated agriculture. These types of degradation also are also known and present similarities to those observed in other regions of the world. They begin with the destruction of the natural vegetation covering and by their interaction of the human activities with the variations of climate and weather, the material conditions are created for the establishment of the processes of desertification.

The areas submitted to the processes of desertification in the Brazilian Semi-Arid areas according to the research done by one of the pioneers in the study of this subject, “present a typical denouncing physiognomy, easily recognized by anyone who flies over the area at a low altitude of 50 meters to 150 meters above the ground, and soon afterwards, does land investigations for better detailing. In the areas affected, the vegetation shows a reduced size, some species showing symptoms of dwarfing (Pereiro, *Aspidosperma sp*), and diluted concentration, that is with greater permeability than in the remaining areas, generally coinciding with the presence of hyperxerophyte caatinga. In this type of caatinga and soil, desertification can arise spontaneously, existing thus, the possibility of its preexistence in the Northeast, before the appearance of the colonizer. All the hyperxerophyte caatinga is an area presumably weakened with the process of desertification, which becomes more accentuated with each annual cycle and, principally after each drought. When the rainy season returns, one sees an effort to recuperate which is not always totally recovered. And thus, in this uncertain balance between recuperation and degradation it is difficult to discover, the condition which will prevail. But if man interferes negatively, then it is certain that the desertification prevails.”<sup>29</sup>

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<sup>29</sup> VASCONCELOS SOBRINHO, João. *Processos de desertificação no Nordeste do Brasil: sua gênese e sua contenção* (Processes of desertification in the Northeast of Brazil: its genesis and its containment). Recife: Sudene, 1982. p. 25-26.

Among the factors responsible for the occurrence of the processes of desertification,<sup>30</sup> one of its consequences should be emphasized: the destruction of the stocks of seeds, as a result of the degradation of the native vegetation covering of a given area. This fact not identified by any other author, until then (1983), this factor plays an extraordinary role in the advance of desertification. In fact, in the “region of the northeast caatingas, the fruits mature at the end of the rainy season, almost in a generalized way, in the majority of the arboreal and herbaceous species, remaining hanging from the branches for some time. Upon loosening and falling to the ground, they do not germinate at once, for the resistance of the covering and other artifices of nature impede immediate germination. If they germinated, they would die almost immediately, because of not resisting the long dry season, with the brusque and total interruption of the rains. A germination, however, occurs rapidly as soon as the first rains fall, for the coverings were intensely worn down by the action of the elements.” The burning of land done for the preparation of new soils to cultivate plays a great destructive role in the environment. “For one understands that the restoration of the vegetation covering, depends on the preservation of these stocks of seeds.” (Vasconcelos Sobrinho, 1983: 31).

A striking evidence about the occurrence of processes of desertification is given by the form with which certain spots of soil appear in the semi-arid northeast. These spots appear to be fleshless, like epidemic eruptions. They are areas of shallow soils, almost reduced to rocks surfacing without the capacity to retain water, for once the rains have ceased, they become immediately dehydrated. The soils of these areas also present deficiencies with respect to nutrients, a fact which contributes to intensify their vocation for desertification. The climate is the same for the nearest areas, when one observes the specific differences in function of the type of soil. This means that besides the general factors which command the processes of desertification, there are local factors determining for the conditions of soil. For this reason, it is possible to find fertile spots do soils at the side of spots already made into desert or in the process of desertification (Vasconcelos Sobrinho, 1983:26.)

It is the occurrence – isolated or aggregated – of these spots which determines the process of constitution of the areas denominated by Vasconcelos Sobrinho as Nuclei of Desertification. They are of a varied size; the spots which indicated the formation of these nuclei present the chief layer of the soil<sup>31</sup> strongly eroded (restricted to rocky surfacing). In these places the vegetation recovers only a little or not at all, even in the periods of rain. The Nuclei of Desertification have a double conceptual importance: either they are characterized as having the maximum effect of the process of environmental degradation, or they represent their most important indicator. These nuclei present a tendency to expand to the detriment of their neighboring areas. (Vasconcelos Sobrinho, 1983:27.)

The nuclei of desertification also can be found in an isolated form outside of the degraded areas. They are the so-called Solitary Nuclei of Desertification, constituted as a direct result of the action of man. These nuclei occur in intensely and constantly cultivated areas. The Solitary Nuclei of Desertification also comes as a result of the “borrowing” of marginal land for highways, for the construction of acceleration lanes for highways. Their areas are difficult to recuperate, for their constitution is based on the cost of restoring the soil that was totally removed.

The environmental conditions of the Areas Susceptible to Desertification – ASD (chiefly those climate, soil, water and vegetation), associated to the pressure exercised on the natural resources by human action (population pressure, inadequate forms of use and of

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<sup>30</sup> Unstable ecological equilibrium in the semi-arid areas resulting from the factors of climate and of soil and the action of man.

<sup>31</sup> The so-called horizon “A”.

occupation of the soil, among others), has been contributing to the setting off of the processes of desertification in some of its sub-regions.

With the collaboration of Professor Vasconcelos Sobrinho, in 1977, Sudene began the study of those areas in the process of desertification. This study had in mind to identify the areas most affected by the phenomenon and select those considered most critical as pilot areas, for the effects of mapping. In this way Vasconcelos Sobrinho selected six pilot areas, specified in Table 1.2.

Following the line of research begun by Vasconcelos Sobrinho, the Nucleus Desert, of the Federal University of Piauí – UFPI, made new studies in the decade of 1990 for the International Latin-American Conference and Seminar on Desertification – CONSLAD. To this effort, supported by the Environment Ministry, was joined that of Embrapa, by the intermediation of the CPATSA (Embrapa Semi-Arid Program).

These studies brought new evidence about the areas submitted to the processes of desertification. In the scope of the Environment Ministry, in the year 1993, actions against the desertification were supported by the Project BRA93/036-“Preparation for the National Plan to Combat Desertification – PNCD.” Using resources coming from this project, in March and November of 1966 field trips were made in four areas, among which six are mentioned in Table 1.2, where one verified that the principal cause of the intense degradation of these areas was the substitution of the caatinga with agriculture and cattle-raising, as well as mining (Gilbues) , extraction of clay of alluvial soils (Seridó) and removal of wood for use as firewood. These areas were characterized as high risk areas for desertification, and became known as desertified nuclei, specifically Gilbués, Irauçuba, Seridó and Cabrobó.

**TABLE 1.2**  
**Pilot areas for Investigation about the Desertification in the Brazilian Semi-arid Region**

PILOT AREAS SELECTED	STATES	NATURAL REGIONS AND/OR HOMOGENEOUS MICRO-REGIÖNS	MUNICIPALITIES
1	Piauí	Caatinga and Cerrado	Gilbués, Simplicio Mendes, Cristino Castro, Ribeiro Gonçalves, Correntes, Bom Jesus and neighboring municipalities
2	Ceará	Inhamuns	Tauá, Arneiroz, Mombaça, Aiuaba, Catarina, Saboeiro, Irauçuba and neighboring municipalities
3	Rio Grande do Norte	Seridó	Currais Novos, Acari, Parelhas, Equador, Carnaúba dos Dantas, Caicó and Jardim do Seridó
4	Paraíba	Cariris Velhos	Juazeirinho, São João do Cariri, Serra Branca, Cabaceiras and Camalaú
5	Pernambuco	Sertão Central	Salgueiro, Parnamirim, Cabrobó, Itacuruba, Belém do São Francisco, Petrolina, Afrânio, Ouricuri, Araripina and neighboring municipalities
6	Bahia	Sertão do São Francisco	Uauá, Macururé, Chorrochó, Abaré, Rodelas, Curaçá, Gloria, Jeremoabo, Juazeiro and neighboring municipalities

SOURCE: VASCONCELOS SOBRINHO, João. **Desertificação no Nordeste do Brasil**. Recife: Fadurpe / UFRPE. 2002.

As recognized by the Environment Ministry, the impact of desertification in these four nuclei is variable, for the geological nature and the types of soils also are distinct. The soils in

the nucleus of Gilbués belong to the class of the Lato- and Podzolic (Argisols) soils, while those of Irauçuba are of the Planosol class. In the Nucleus of the Seridó, the types Bruno non-Calcic, Litholic, Solonetz, Solodizado and alluvial soil predominate. In the nucleus of Cabrobó the soils are sandy, permeable and do not retain the rainwater in conditions to be utilized by the plants. The process of occupation of the areas where these nuclei are situated varies from one to another, even though the predominant activities are almost entirely connected to farming and cattle raising. The exceptions are represented by the nuclei of Gilbués and of the Seridó, where the mineral exploitation had a relevant economic role, but it also contributed strongly to increase the process of desertification.<sup>32</sup>

### 1.3.2 Semi-Arid Areas and Dry Sub-humid Areas

The United Nations Convention to Combat Desertification – CCD, which Brazil signed in 1997, considers as arid zones, semi-arid and dry sub-humid zones all the areas – with exception of the polar and of the subpolar regions – with an index of aridity between 0,05 and 0,65.<sup>33</sup> As zones affected one understands the arid zones, semi-arid or dry sub-humid zones affected or threatened by desertification.<sup>34</sup> This also is the criterion adopted by the National Action Program to Combat Desertification and Mitigate the Effects of Drought – PAN-Brazil.

The arid, semi-arid and dry sub-humid zones are denominated here in short expressions as areas affected or susceptible to processes of desertification. The effects of these processes have been strengthened by the inadequate management of the natural resources, associated or not with poverty. Farmers and small animal raisers, with few material possessions, can manage to contribute to the advance of desertification when they utilize to the very limit the scarce resources which they mobilize to produce their subsistence.

The spaces considered arid in the Northeast are territorially exiguous. Studies done in the 1960's demonstrated the existence of small arid parts in the interior of the region. The areas considered arid have a surface of 1,200 km<sup>2</sup>, and are inserted in the region of the Seridó of Rio Grande do Norte.<sup>35</sup> For this reason, one works here only with the categories of semi-arid areas and dry sub-humid areas, as making up the zones affected or susceptible to desertification, according to the concept of the CCD.

The Semi-Arid areas and the Dry Sub-humid Areas of Brazil include territorial portions of the State of Piauí, Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Alagoas, Sergipe, Bahia and Minas Gerais, as can be seen in Figure 1.5. These spaces include a surface of 1,130,790.53 km<sup>2</sup>, of which 710,437.30 km<sup>2</sup> (62.83% of the total) are characterized as semi-arid and 420,258.80 km<sup>2</sup> (37.17% of the total) as dry sub-humid, as shown in Table 1.3. In 2000, 22.5 million inhabitants lived there. Of this total, 14.2 million (63.31% of the total) inhabited semi-arid areas and 8.2 million dry sub-humid areas (36.69% of the total).

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<sup>32</sup> The process of desertification observed in these four nuclei was analyzed by SAMPAIO, Everardo V. S. B et alii. *Desertificação no Brasil: conceitos, núcleos e tecnologias de recuperação e convivência* (Desertification in Brazil: concepts, nuclei and technologies of recovery and living). Recife: Ed. Universitária da UFPE, 2003, p. 95-133.

<sup>33</sup> Calculated as corresponding to the relation between the Pluviometric precipitation and potential evapo-transpiration, according to the methodology established by C. W. Thornthwaite. See with respect to this: i) THORNTHWAITE, C. W. "The Climates of North American according to a new classification". *Geographical Review*, 21: 613-35, oct., 1931; ii) THORNTHWAITE, C. W. "An approach toward a rational classification of climate". *Geographical Review*, 38: 55-94, Jan. 1948; iii) THORNTHWAITE, C. W. & MATHER, J. R. "The water balance". *Publication in Climatology*, Centerton, New Jersey, 8(1): 1-104, 1955; and iv) "Instruction and tables for computing potential evapotranspiration and water balance". *Publication in Climatology*, Centerton, New Jersey, 10(3): 185-312, 1957.

<sup>34</sup> NAÇÕES UNIDAS. *Convenção das Nações Unidas de combate à desertificação nos países afetados por seca grave e/ou desertificação, particularmente na África* (United Nations Convention for combating desertification in the countries affected by grave drought and or desertification, especially in Africa). Brasília: MMA, 1997. (Document prepared in the scope of the Project BRA 93/036/MMA/PNUD/Fundação Grupo Esquel Brasil, with support of FAO.)

<sup>35</sup> CORNEJO T., Arturo (1970)-"Resources of Arid South America". In: DREGNE, Harold E. Editor. (1970) – *Arid lands in transition*. Washington, D. C., American Association for the Advancement of Science – AAAS, 1970: 345-380, p. 376.

The rates of total population growth of the semi-arid and dry sub-humid areas in the period from 1991-2000 are inferior to the rates observed both in relation to the Northeast and to Brazil. The same does not happen with the rate of growth of the population of the Northeast (2.59% per year). The growth rate of the rural population in the same period is negative, following the tendency observed in the Northeast. The rate of urbanization in the semi-arid and dry sub-humid areas is inferior to the rates observed in the Northeast of Brazil, but it is more elevated than in the dry sub-humid spaces (59.19% of the population lives in urban small farms in these areas.) The demographic density of the population of the semi-arid and dry sub-humid spaces (18.63 inhab./km<sup>2</sup>, in 1991, and 19.88 inhab./km<sup>2</sup>, in 2000) also is inferior to the demographic density of the Northeast, both in 1991 (27.35 inhab./km<sup>2</sup>) as well as in 2000 (30.72 inhab./km<sup>2</sup>). (Table 1.3)

In Figure 1.3 the spots are shown of the areas characterized as dry sub-humid and semi-arid areas in relation to the Northeast. The points of superimposition of these two areas with the area of the Drought Polygon are also shown. The Figure 1.4 complements the previous figures, comparing them with the Semi-Arid Region of the FNE.

The list of the municipalities of the Semi-Arid Areas and of the Dry Sub-humid Areas can be found on Annexes 2 and 3.

### **1.3.3 Areas Surrounding the Semi-Arid Areas and the Dry Sub-humid Areas**

The areas subject to the processes of desertification are specifically referred to according to the criteria of the CCD, as the semi-arid and dry sub-humid areas. In the Brazilian case, this definition about the scope of the jurisdiction limits the space of the action of PAN-Brazil practically to the Semi-Arid Region of the FNE, which includes areas of the states of Piauí, Ceará, Rio Grande do Norte, Paraíba, Pernambuco Alagoas, Sergipe, Bahia and north of Minas Gerais, according to the discussion done in item 1.2 of this chapter. By the criteria of this item they stopped being considered as Areas Surrounding the Semi-Arid and Dry Sub-humid Areas, for they are also susceptible to being affected by similar desertification processes.

However, the preliminary observations indicate that in the Areas Surrounding the Semi-Arid and Dry Sub-humid Areas, there are spaces being affected by processes of environmental degradation in everything just like those observed in the areas with an Aridity Index situated between the limits of 0.21 and 0,65. The drought occurrences in municipalities of these Surrounding Areas constitute evidence about the expansion of these processes.

The following criteria were adopted for the inclusion of the municipalities belonging to the Surrounding Areas of the Semi-Arid and the Dry Sub-humid Areas in the areas susceptible to desertification – ASD:

- i. Municipalities in the Surrounding Areas which have been affected by droughts, making up in these cases, lists of municipalities attended by emergency programs, administrated by Sudene;
- ii. Municipalities of the Surrounding Areas which also make up part of the area of activity of the Caatinga biome, according to studies done by the National Council for Preservation of the Biosphere of the Caatinga Biome, in 2003 and 2004,<sup>36</sup> and

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<sup>36</sup> This study was done by the National Council for the Preservation of the Caatinga Biosphere, by intermediation of the Science, Technology and Environment Secretariat – SECTMA, of the State of Pernambuco, under the general coordination of Dr. Alexandrina S. de Moura, executive secretary of the above-mentioned Secretariat. See with respect to this:

- iii. Municipalities added to the area of activity of Sudene, starting from the disciplining of Law nº 9,690, of July 15, 1998, as those included in the State of Espírito Santo.

In such a situation, more than another 281 municipalities began to make up the space of the ASD, in the category of Areas Surrounding the Semi-Arid Areas and Dry Sub-humid Areas. Their list is in Annex 4, thus specified by states: Maranhão (26), Piauí (71), Ceará (38), Rio Grande do Norte (3), Paraíba (11), Pernambuco (6), Alagoas (7), Sergipe (14), Bahia (23), Minas Gerais (59) and Espírito Santo (23).

The **Areas Surrounding the Semi-Arid and Dry Sub-humid Areas**, according to Figure 1.5, include a surface of 207,340 km<sup>2</sup>, distributed along 281 municipalities. The municipalities of Maranhão, Piauí, Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Alagoas, Sergipe, Bahia e Minas Gerais were included attending to the criterion of belonging to the Caatinga bioma, since they are in the **Surrounding Areas of the Semi-Arid and Dry Sub-humid areas**. They were delimited as such in the study “Scenarios of the Caatinga Bioma”, produced by the National Council for the Preservation of the Caatinga Biosphere, with the support of MMA. The municipalities of Espírito Santo were included attending to the criterion of Law nº 9,690/1998. In the spaces of this Surrounding Area 7,904,601 inhabitants lived in 1991, and 9,179,218 inhabitants in 2000. The information about the urban and rural population, rate of urbanization and geographic areas of these areas are specified in Table 1.3.

The environmental conditions of each one of the 281 municipalities integrated into the Surrounding Areas still need to be better characterized, in a short time, studying them through the use of basic indicator of inclination to desertification, such as those of vegetation covering and inclination to environmental degradation, suggested in a study done in 2000, by the Federal University of Pernambuco and by the previous Sudene, with the support of the Apollônio Salles Foundation for Educational Development – Faturpe and of the Financer of Studies and Projects – FINEP.<sup>37</sup>

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BEZERRA, Maria do Carmo de Lima. Technical Coordinator. **Cenários para o bioma Caatinga**. Recife: SECTMA, 2004. Bioma Caatinga. National Council for the Preservation of the Caatinga Biosphere.

<sup>37</sup> SAMPAIO, Everardo V. S. B. et alii. **Desertificação no Brasil: conceitos, núcleos e tecnologias de recuperação e convivência**. Recife: Ed. Universitária da UFPE, 2003, p. 62-67. In this text there is a well-structured proposal of construction of an **index of desertification**, including the following aspects: i) Principles for the Formulation of an Index; ii) Proposed Indices of Inclination and of Desertification; iii) Indicators of Inclination to Desertification; and iv) Indicators of Desertification (that is, environmental degradation, agricultural indicators, economic indicators and social indicators).

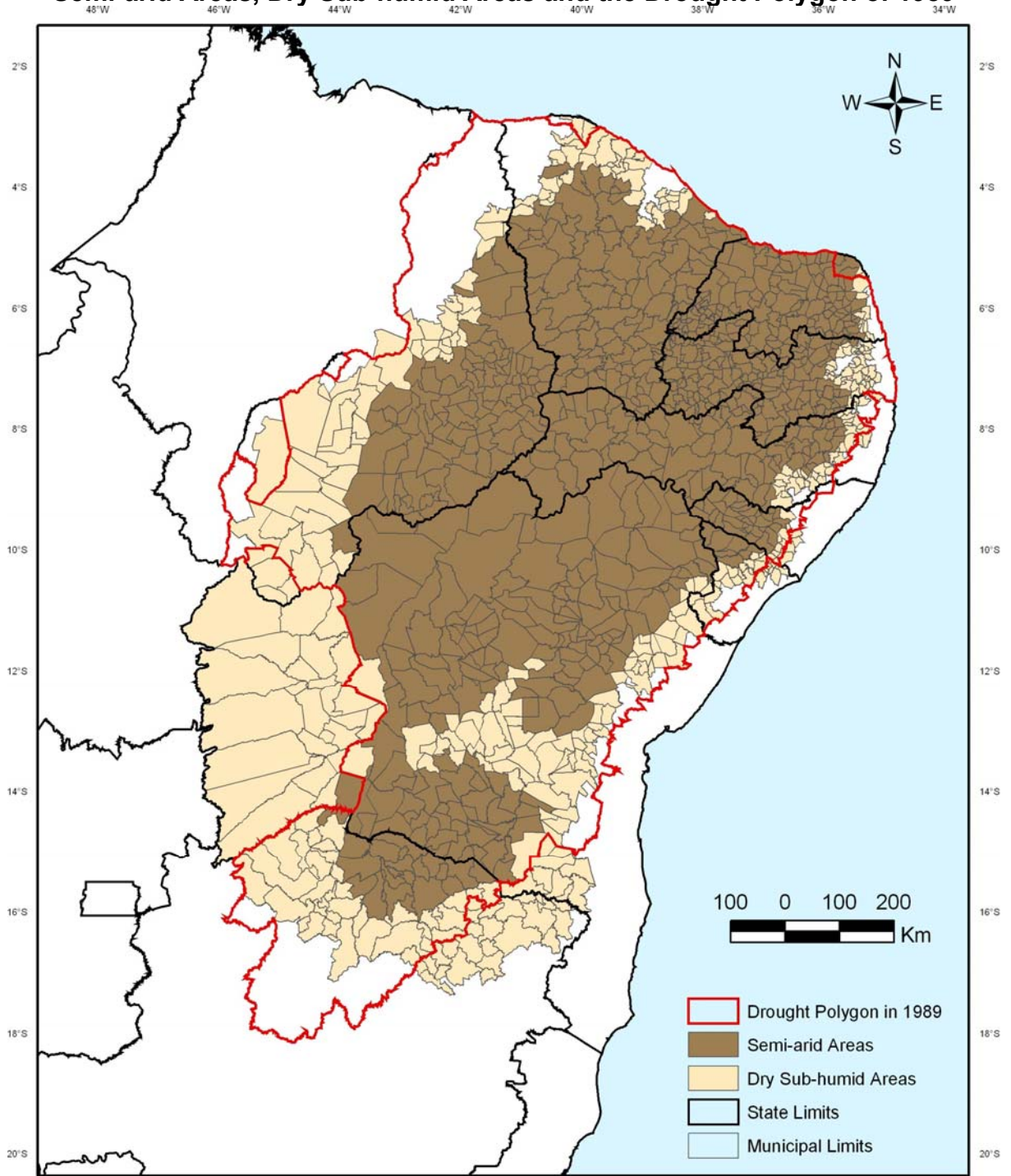
**TABLE 1.3**  
**DEMOGRAPHIC ASPECTS OF THE SEMI-ARID, DRY SUB-HUMID AREAS, OF THE SURROUNDING AREAS AND OF**  
**AREAS SUSCEPTIBLE TO DESERTIFICATION - ASD**

SPECIFICATION OF VARIABLES AND INDICATORS	YEAR	SEMI-ARID AREAS	DRY SUB-HUMID AREAS	SURROUNDING AREAS (*)	SEMI-ARID + DRY SUBHÚMID AREAS	AREAS SUSCEPTIBLE TO DESERTIFICATION- ASD	NORTHEAST	BRAZIL	ASD / NORTHEAST (%)	ASD / BRAZIL (%)
<b>Population (inhabitants)</b>										
Total	1991	13.237.542	7.493.355	7.904.601	20.730.897	28.635.498	42.497.540	146.825.475	67,38	19,50
	2000	14.235.815	8.248.638	9.179.218	22.484.453	31.663.671	47.741.711	169.799.170	66,32	18,65
Urban	1991	6.257.786	3.872.435	5.531.267	10.130.221	15.661.488	25.776.279	110.990.990	60,76	14,11
	2000	7.866.006	4.882.266	6.944.208	12.748.272	19.692.480	32.975.425	137.953.959	59,72	14,27
Rural	1991	6.979.756	3.620.920	2.373.334	10.600.676	12.974.010	16.721.261	35.834.485	77,59	36,21
	2000	6.369.809	3.366.372	2.235.010	9.736.181	11.971.191	14.766.286	31.845.211	81,07	37,59
<b>Rate of Population Growth (%)</b>										
Total	1991-2000	0,81	1,07	1,67	0,91	1,12	1,30	1,63	86,31	68,98
Urban	1991-2000	2,57	2,61	2,56	2,59	2,58	2,77	2,45	92,90	105,38
Rural	1991-2000	-1,01	-0,81	-0,67	-0,94	-0,89	-1,37	-1,30	64,86	68,30
<b>Rate of Urbanization [Urban Population / Total Population (%)]</b>										
Rate of Urbanization	1991	47,27	51,68	69,98	48,87	54,69	60,65	75,59	90,17	72,35
	2000	55,26	59,19	75,65	56,70	62,19	69,07	81,25	90,04	76,55
<b>Area (km<sup>2</sup>)</b>										
Area (km <sup>2</sup> )		710.437,30	420.258,80	207.379,90	1.130.696,10	1.338.076,00	1.553.917,00	8.514.204,90	86,11	15,72
<b>Demographic Density (inhab/km<sup>2</sup>)</b>										
Demographic Density	1991	18,63	17,83	38,12	18,33	21,40	27,35	17,24	78,25	124,10
	2000	20,04	19,63	44,26	19,89	23,66	30,72	19,94	77,02	118,66

SOURCES OF BASIC DATA: i) Foundation IBGE. Demographic Census of 1991 and of 2000; ii) National Integration Ministry-MI. Superintendence of Developing the Nordeste - Sudene (2003) – **Northeast Region of Brazil in Numbers**. Recife, Sudene, 2003; iii) Foundation Biodiversitas,. Available in: <<http://www.bdt.fat.org.br/workshop/caatinga/>>. Access in July15, 2003 and in December 04.2003.; and iv) Carvalho & Egler, 2003.

(\*) Surrounding Areas of the Semi-Arid Areas and of the Dry Sub-humid Areas.

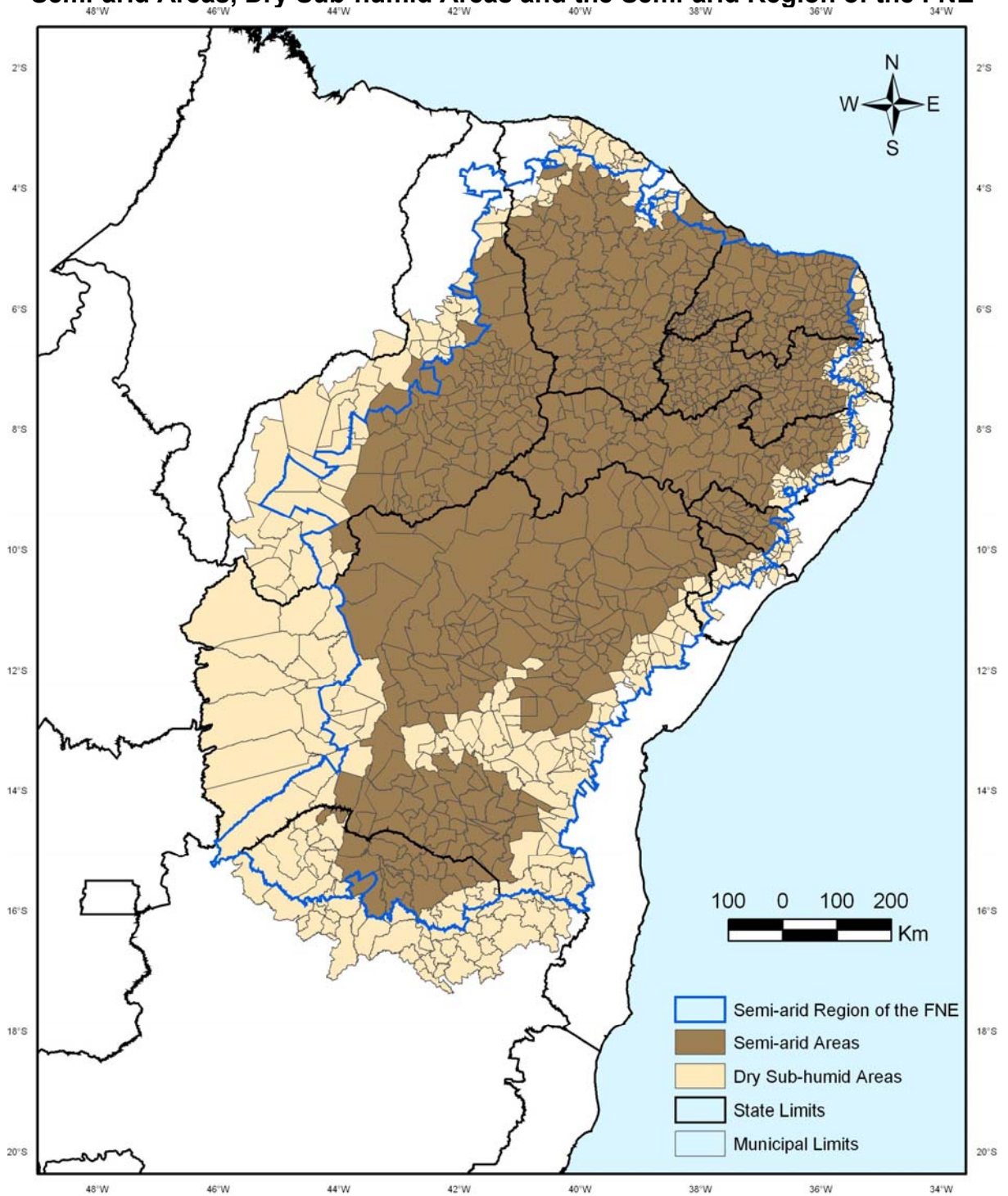
**FIGURE 1.3**  
**Semi-arid Areas, Dry Sub-humid Areas and the Drought Polygon of 1989**



SOURCES OF BASIC DATA: i) IBGE. **Demographic census of 1991**. Rio de Janeiro, 1993; ii) IBGE. **Demographic Census of 2000**. Rio de Janeiro, 2003; iii) Carvalho & Egler, 2003; and iv) BRITO, José Ivaldo Barbosa de. **Regional Regional Model of estimates of the water balance applied to the climate variability of the Northeast of Brazil**. Camping Grande: Federal University of Paraíba- UFPB, 2000. (Doctoral Dissertation in Natural Resources, 2000.)

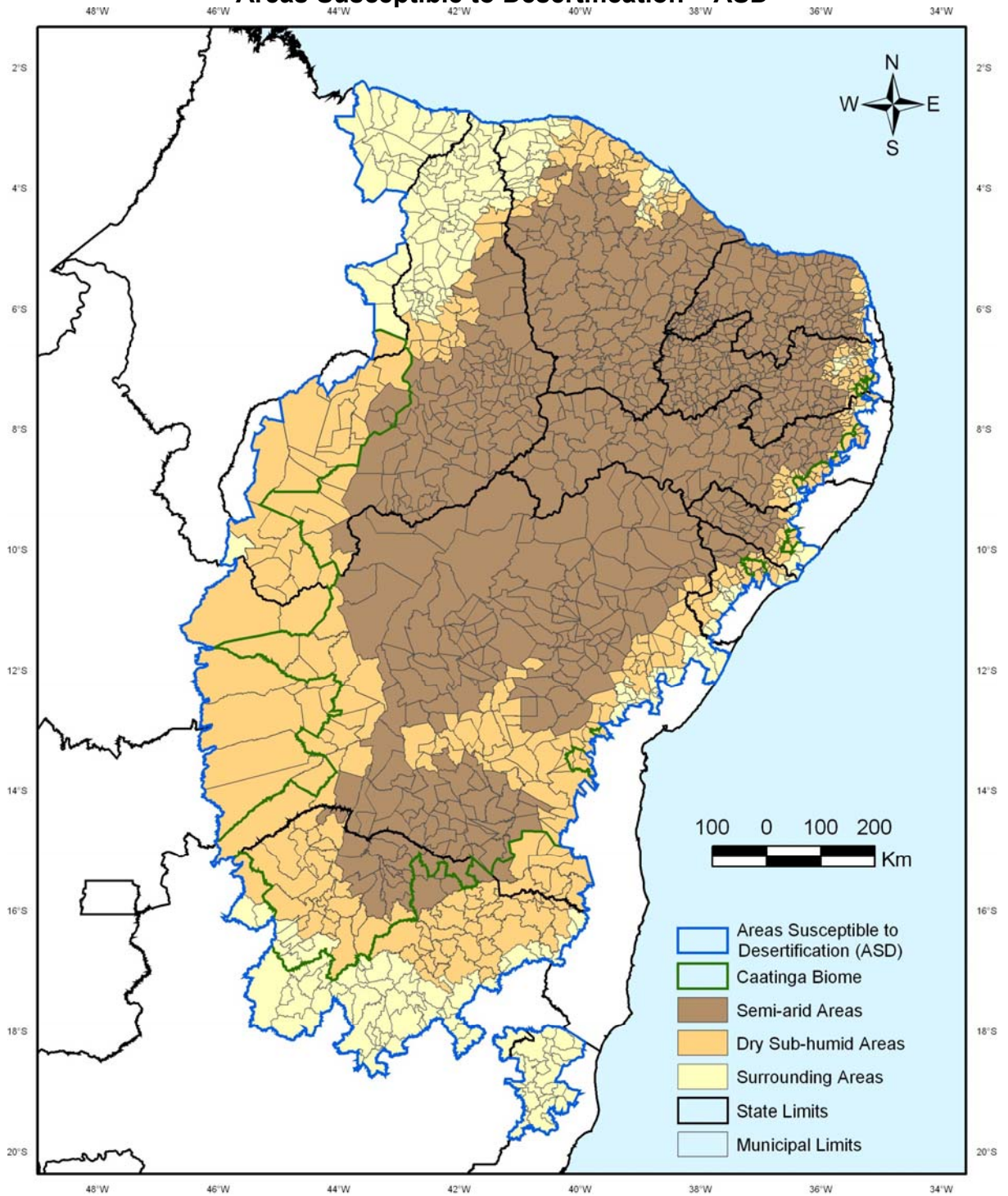


**FIGURE 1.4**  
**Semi-arid Areas, Dry Sub-humid Areas and the Semi-arid Region of the FNE**



SOURCES OF BASIC DATA: i) IBGE, 1993; ii) IBGE, 2003; iii) Carvalho & Egler, 2003; and iv) Brito, 2000.

**FIGURE 1.5**  
**Areas Susceptible to Desertification – ASD**



SOURCES OF BASIC DATA: i) IBGE, 1993; ii) IBGE, 2003; iii) Carvalho & Egler, 2003; iv) Brito, 2000; AND v) BEZERRA, Maria do Carmo de Lima. Technical Coord. **Cenários para o bioma Caatinga**. Recife: SECTMA, 2004. Caatinga. Biome C National Council for the Preservation of the Caatinga Biosphere.

The list of the municipalities of the Areas Surrounding the Semi-Arid Areas and the Dry Sub-humid Areas is specified in Annex 4.

### 1.3.4 New Areas in the Process of Desertification

There is much to do in relation to the areas submitted to known processes of desertification. The task assumes great importance for new areas affected by environmental degradation, on the way to desertification begin to be recognized. It is true that the indications about this are being produced on the basis of exploratory information, exactly because the State does not have technical, material and financial resources to reinforce and broaden its activities in these domains.

In studies done by the Project Arid Areas – Bahia, new additional information was added to the holdings of existing knowledge about this question. In Bahia, The desertification has corresponded to the progressive degradation of natural eco-systems in some areas of the State. The processes observed result equally from natural factors – as the climate and the soil – “as from the predatory human action, and generally from the conjugation of both, resulting in the reduction of the biological potential of the lands.” *desertificação.*” In the absence of the direct actions of man, the areas most susceptible to desertification, as occurs with the semi-arid areas, maintains a precarious balance between the fauna, the flora and the hostile environment. Thus one admits that it is the “human action which is the chief agent in setting off the processes of desertification”.<sup>38</sup> One understands as predatory human action the utilization of the lands to a degree of intensity superior to their capacity to support it. Utilized to the limit of their capacity, the wearing out of the lands sets off a series of processes which culminate with the desertification of the affected space.

From the point of view of the state, the semi-arid, dry sub-humid and surrounding spaces which make up the Bahia Semi-Arid correspond to the greater territorial part of the Brazilian Semi-Arid Region (36.64% of the total). Some of their areas are susceptible to desertification, although one has not identified any important Nucleus of Desertification as the four just mentioned. Among these areas stand out those of the areno-quartzian dystrophic soils. The studies done by the government of Bahia, in the scope of the Project ARID AREAS – Bahia, indicate that these areas are to be found:

- i. In the left bank of the Sobradinho Lake, constituting a dune field, at the area of the municipalities of Remanso, Casa Nova, Pilão Arcado and Barra, with semi-arid climate and caatinga vegetation;
- ii. In the northeast of Bahia, in the Raso da Catarina, in a semi-arid climate and with caatinga vegetation;
- iii. In west Bahia, along the drainage axes of the chief tributaries of the São Francisco river, in a sub-humid tropical climate and cerrado vegetation and/or of ciliar woods/buriti palm groves;
- iv. On the north Bahia coast, forming the dune chain, with humid climate and typical vegetation of sand bars. (Aouad, 1995:32-33).

The studies referred to also indicate that other areas of the Bahia Semi-arid Region show some degree of damage to the natural resources where the signs of desertification are evident. In these areas, both the vegetation covering as well as the surface horizontal layer of the soil have been removed, which already does not have the capacity to retain the water, either by the impermeability or by excessive permeability. Thus, once the rains have ceased,

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<sup>38</sup> AOUAD, Marilene dos Santos (1995) – **Desertificação (Desertificaton)**. Salvador, Projeto ÁRIDAS – Bahia, 1995, p. 31. (study done in the scope of the Group of ARID REGIONS – Bahia.).

the soils become dehydrated. The areas in the process of desertification mentioned are to be found in the quarternary paleo-dunes of the left bank of the Sobradinho Lake, where either there is no vegetation or what exists is very sparse. It is what also occurs in areas of the Northeast region of Bahia, in spaces where the soils already were substituted by layers of pebbles and boulders (rock fragments).(Aouad, 1995:33-34.)

In Paraíba also there are spaces which can be included in the category of new areas in the process of desertification. That is what the studies done by the Geography course of the University of João Pessoa – Unijpê found.<sup>39</sup>

These studies are concentrated in the Cariris region, in that portion oriented towards the southeast of the Paraíba Borborema. The area worked on has as its limits the south of the highway axis of BR-230 and the access highways which are situated between Queimadas and Boqueirão, to the east; Soledade, to the north; and the valley of the Farinha River to the northwest. To the south, the surface of the Cariris is enclosed by high mountain chains which border the frontier with the State of Pernambuco (Serra of the Cariris Velhos, Serra do Mulungu, Serra das Porteiras, Serra da Jararaca, etc.) from the west to the south; and the Serra da Quebrada and Serra da Cachoeira, among others to the southeast.

The soils of the area studied are shallow, compact and stony. In the neighborhood of Sumé and of Taperoá, there are soils developed starting from gronodiorites, situated on the hillsides of the elevated rises of the south of the region, which escape this rule. Their formation is varied.

In the line of studies done by Vasconcelos Sobrinho, the chief reasons were identified for the desertification in the regions of the Cariris of Paraíba: i) the geocological predisposition or the instable equilibrium resulting from the climatic, edaphic and topographical factors; and ii) the different modalities of the human actions, direct or indirect, which begin by the elimination or degradation of the vegetation covering, managing to set off the damage to the other components of the ecosystem and beginning the formation of the nuclei of desertification. (Melo, 2000:13.)

The author of the studies informs that “the processes of erosion became accentuated after each dry period. When the rainy season returns, characterized by the torrential rains, since the vegetation is without foliage and consequently not giving protection of the soil, the soil suffers, an enormous loss due to the action of the surface drainage; and the recuperation of the vegetation is not always total.”

To these actions are added the human actions, direct or indirect, upon the extremely fragile geofacies and geotopos. The areas studied permit one to identify various types of nuclei of desertification. The most serious areas are located in the regions of the hyperxerophilous Cariris (Cariri Oriental and Cariri Central) (Melo, 2000:14).

In the Figures 1.6 and 1.7 the areas in the process of desertification in the region of Paraíba Cariris are shown.

The situation of the areas around Bilbués, in Piauí, has become aggravated considerably from 1992/1994 to the present. Recent visits to those regions reinforce the evidence about the advance of desertification in the subregions of that state. Figure 1.8

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<sup>39</sup> MELO, Antonio Sérgio Tavares de. **Núcleos de desertificação na Paraíba: diagnóstico de reconhecimento dos núcleos de desertificação nos municípios de São João do Cariri e Caraúbas – PB (Nuclei of Desertification in Paraíba: diagnosis of recognition of the nuclei of desertification in the municipalities of São João do Cariri and Caraúbas – PB.** João Pessoa, PB: University of João Pessoa – Unijpê. University Center of João Pessoa. Geography course Oct., 2000.

shows the silting of the Boqueirão River in Gilbués, as a result of the agricultural exploitations badly done from the point of view of soil conservation.

The areas Surrounding the ASD, in the State of Espírito Santo, present a series of environmental problems. In the first place, the destruction of the natural vegetation stands out, which is substituted by the monoculture of eucaliptus to attend the demand of the paper and cellulose industry, especially in the municipalities of São Gabriel da Palha, São Domingos do Norte and Nova Colatina. Also there is the substitution by pastureland, as occurs in all the municipalities of the affected region. In the same sense, one observes the implantation of extensive areas with the monoculture of papaya and passion fruit, a situation more specifically observed in the municipality of Sooretama.

In second place one emphasized the occupation of extensive areas of woods by the cultivation of coffee trees. The soils occupied by this crop are very degraded, due to the low utilization of measures to protect the soils and control erosion. The coffee is being produced in areas where there no longer exists horizon "A", as occurs principally in the municipalities of Nova Venécia, São Gabriel da Palha, São Domingos do Norte, Vila Valério and Águia Branca.

Finally, one emphasizes the environmental degradation caused by the mineral exploitation (granite). The environmental impacts provoked by this type of activity are due to the lack of care in relation to the protection and the recuperation of the environment, particularly in the municipalities of Nova Venécia, Via Pavão, Colatina and São Domingos do Norte.

Maranhão is situated in a transition strip Caatinga/Cerrado/Pre-Amazonia, and has, for this reason, singular characteristics. In its interior there are strips of territory which are being characterized as susceptible to the process desertification, both for natural reasons as well as for intense and disorganized human activity. Because of this, the areas Surrounding the Semi-Arid and Sub-humid Areas of Maranhão have their environmental problems aggravated by the expansion of monocultures – as that of soybeans and that of eucalyptus- and the substitution by pasturelands, as has been happening in the southeast region of the State and more recently in the municipalities of Lower Paraíba.

The State of Maranhão reveals areas with water deficiencies of 300 mm to 700 mm with a length of droughts of up to nine months, although the average duration of the water deficiency is of six to eight months. Situated in the transition area between the humid climate of the Amazon region and the semi-arid of the Northeast, its chief climate is the sub-humid, which includes a great parcel of the territory, This is what effectively defines the climate transition between the humid areas and the dry areas. In this sense, the southeast of the state shows climatic typologies which range from the dry sub-humid to the semi-arid.<sup>40</sup>

These indications are reinforced by the empirical observations of the farmers about the difficulties of access to water, by the low natural fertility of the soils and by the loss of the crops due to prolonged droughts. Among other things, this was the reason for the including of a considerable number of Maranhão municipalities in the Emergency Program administered by Sudene, to attend the populations affected by the drought of 1993.

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<sup>40</sup> INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA – IBGE. **Atlas do Maranhão (Atlas of Maranhão)**. São Luís, MA, 1984, chapter II (Natural Chart).



**FIGURE 1.6**  
**Nucleus of Aureolar Desertification in Bruno non- Calcic and Litholic Soils, in Coxixola, Paraíba. (Photo: Antonio Sérgio Tavares de Melo, 1995.)**



**FIGURE 1.7**  
**Nucleus of Desertification, São João do Cariri, Cabaceiras, Paraíba. (Photo: Antonio Sérgio Tavares De Melo, 1995.)**



**FIGURE 1.8**  
**Boqueirão Bridge (80,0 m X 3,0 m X 3.724 m), over the Boqueirão River, in**  
**Gilbués, Piauí.**  
**(Photo: Luís Gonzaga, Ufpi, May, 2004.)**

In the State of Minas Gerais, the areas susceptible to desertification are situated in the Areas Surrounding the Semi-Arid and Dry Sub-humid Areas. These Surrounding Areas include 59 municipalities, which are located chiefly in the regions of the Jequitinhonha Valley and of the north of the state – in the so-called mining area of the Drought Polygon. All these municipalities are frequently affected by droughts.

Although it is composed of a mosaic of environmental, social, cultural and economic conditions, this region presents grave environmental problems. Besides being affected by accentuated climatic variability, all the 59 municipalities are affected by problems of intense exploitation and degradation of the natural vegetation.

An important part of the natural vegetation has been substituted by exotic pasturelands. The low fertility of the soils and the accidental topography of part of the region, allied to the overgrazing, reduce the capacity for supporting the pastures and favor the intense erosive processes on the soils. Part of the landscape consists of the presence of extensive areas of degraded pastures, known in the region as “stripped areas”, an important source of sediments which feed the process of silting of the watercourses.

There are present in part of the municipalities of the region dense extensions of planted forests, chiefly of eucalyptus, and areas used for the production of soybeans in the system of monoculture. The traditional mining activity of gold and the mineral exploitation of tourmaline, slate, quartz and diamonds – also constitutes a common practice in part of this

region. The mineral exploitation demonstrates important environmental impacts, such as contamination of water by mercury, destruction of the landscape, soil erosion and silting of the creeks, rivers and lakes.

### 1.3.5 Chief Characteristics of the Areas Susceptible to Desertification – ASD

The Areas Susceptible to Desertification in Brazil were delimited according to the presuppositions of the CCD, which took as a basis of climatic classification that of Thornthwaite (1941)<sup>41</sup> This classification is based on the Aridity Index, which corresponds to the ratio between annual measurements of precipitation and potential evapo-transpiration.

For the calculation of the pluviometric precipitation one utilized a historical series of 1,255 pluviometric stations. For the estimate of potential evapo-transpiration one used temperature data, relative humidity, wind velocity and sun of 91 meteorological stations. The estimate model of evapo-transpiration used was that of Penman-Montheith, modified by the FAO. The methods of interpolation applied were based on analyses of multiple regressions, considering the geographical coordinates: latitude, longitude and altitude. Also models of geostatistical interpolation were used (kriging linear and quadratic), which considered the space variability of the sample data.

According to the Agroecological Zoning of the Northeast, elaborated by Embrapa Soils, the territory of the Semi-Arid Northeast includes 110 Geoenvironmental Units,<sup>42</sup> grouped in 16 Large Landscape Units.<sup>43</sup> This region, the area of which is less than the territory of the Areas Susceptible to Desertification, consists of heterogeneous spaces, alternating with Humid Valleys, High Chapadas and Mountain Chains, characterized by microclimates where the Aridity Indices vary from 0,21 up to 0,65. thus the occurrence in its interior of semi-arid and dry sub-humid areas. The delimitation and the measuring of the Semi-arid Northeast were done on the basis of information of the previously mentioned Agroecological Zoning of the Northeast, on a scale of 1:2.000.000, besides other studies already mentioned in this chapter. Technicians of Embrapa Semi-Arid<sup>44</sup> consider that the Geoenvironmental Unit – upon the impossibility of obtaining more precise data for the pluviometric precipitation and potential evapotranspiration, covering all the Northeast-constitutes a secure reference for the identification of the semi-arid and sub-humid zones.

The vegetation of the areas Susceptible for Desertification is of the bush-tree type. With rare exceptions, the existing vegetation covering remains stripped of foliage which is the usual form of the Vegetation Drought Period. The dry leaves of the plants fall on the ground

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<sup>41</sup> The data about the Aridity Index, following the methodology of Thornthwaite, were worked on by BRITO, José Ivaldo Barbosa de. **Modelo regional de estimativa do balanço hídrico aplicado à variabilidade climática do Nordeste do Brasil (Regional Model of Estimating the water Balance applied to the climate variability of the Northeast of Brazil)**. Campina Grande: Universidade Federal da Paraíba – UFPB, 2000. (Doutoral Thesis in Natural Resources, 2000).

<sup>42</sup> According to the Agroecological Zoning of the Northeast, elaborated by Embrapa Semi-Arid, the “geoenvironmental unit is defined as a space unit, in which the substratum (material of the origin of the soil), the natural vegetation, the formation and the nature and distribution of the soils, as a function of the topography, constitute a set of homogeneous problems, the variability of which is minimum, according to the cartographic scale”. Cf. RICHÉ, G. R. & TONNEAU, J. P. “Stratification du milieu l'exemple de Ouricuri”. **Les Cahiers de la Recherche Développement**, n. 24, p. 57-76, 1989. APUD: SILVA, Fernando Barreto Rodrigues e; RICHÉ, G. R.; TONEAU, J. P.; SOUSA NETO, F. H. B. B. da; SILVA, A. B. da; ARAÚJO FILHO, J. C. de (1993) – **Zoneamento agroecológico do Nordeste; diagnóstico do quadro natural e agrossocioeconômico (Agroecological Zoning in the Northeast: diagnosis of the natural and agrossocioeconomic situation)**. Petrolina, PE: Embrapa – CPATSA/Recife: Embrapa – CNPS. Coordenadoria Regional Nordeste, 1993, 2 v, v. 1, p. 11.

<sup>43</sup> The Landscape Unit is made up of a set of environmental Units. Cf. SILVA, Fernando Barreto Rodrigues and; RICHÉ, G. R.; TONEAU, J. P.; SOUSA NETO, F. H. B. B. da; SILVA, A. B. da; ARAÚJO FILHO, J. C. op. cit., p. 11.

<sup>44</sup> Embrapa Semi-Arid is the denomination given today to the Center of Agricultural/cattle-raising Research of the Semi-Arid Tropics – CPATSA.



and there naturally become hay. This particular type of hay is consumed by the herds raised in the free-roaming system.

The period of slaughtering of the cattle and of goats is most intense in the Sertão in the months of June and July, when the leaves of vegetation and of native pasture are available in greater abundance. During about six to seven months of the year, the soil of the “typical forest” of the semi-arid area remains denuded and totally exposed to the sterilizing action of the sunlight, of the burning of organic material, of the dry and hot winds and of the torrential rains. Even at the beginning of the rainy season, one observes the predominance of the surface draining of the rainwater – to the detriment of its infiltration and retention in the soil. This provokes strong water erosion, impoverishment of the soil, silting of the watercourses and bodies of water, conditions favoring the occurrence of great floods. Besides this, one also observes the occurrence of wind erosion, during the dry season, when the fine part is removed clay and limo –, as happens during the occasional dust storms – “the dust whirlwinds” –, common in the Sertão of the São Francisco River, in Pernambuco and in Bahia, and at the top of the Araripe Chapada, in areas of the States of Pernambuco, Ceará and Piauí.<sup>45</sup>

The desertification is increased in its potential during the great droughts, when instead of months of drought in the course of the year, one totals up years of drought during a certain decade, as occurred in the case of the five-year drought of the period from 1979-1983. In this period, even some drought-resistant plant species died of thirst, such as the Jurema, the Marmeleiro, the Quipá and the Caruá, in areas of the Central Sertão of Pernambuco, of the Central Sertão and of Inhamuns, in Ceará, or of the Sertão of Canudos, in Bahia.

The annual burning of land areas still constitutes a generalized practice in the semi-arid hinterland of the Northeast, especially in the areas provided with scarcer soil resources, as those which were occupied for a long time with the cultivation of tree-type varieties of cotton. With the use of these procedures, only those tree and bush species survive which are burn-resistant, provided with adequate biological mechanisms, such as those having suberosa or cortical bark. These procedures however, have contributed to reduce the biodiversity of the Caatinga. In fact, with the burnings, the soils become denuded, dehydrated and stripped of organic material. They are submitted, beside this, to the sterilizing action of the rays of the sun and to the strong water erosion which manifests itself at the beginning of the rainy season, at the time of the germination of the first native pastures, which form the tender herbaceous covering. The abundance of the above-mentioned processes favors the impoverishment of the soil and of the forests covering, followed by silting of the watercourses. One has reached, finally, the beginning of processes of desertification already known.

As emphasized before, the areas susceptible to desertification are those which present an Aridity Index between 0,21 up to 0,65. The degree of susceptibility can vary from “very high” to “moderate”. Thus, the drier a given area, the more susceptible it is to desertification. This criterion is not sufficient to characterize the risk areas, for the risk involves other factors, beside the climate criterion. The risks are related to the type and the intensity of the use of natural resources. In this way, the areas subject to greater risk are represented by those which associate high susceptibility with human occupation factors, such as demographic density, forms of management, integration to markets, technological indices etc.<sup>46</sup>

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<sup>45</sup> CAMPELLO, Geraldo de Araújo Barreto & GODOY, Osani Godoy. **Desertificação do semi-árido nordestino: uma visão regionalista (Desertification of the northeast semi-arid: a regionalist view)**. Brasília, MMA, 2004.

<sup>46</sup> Cf. MATALLO JR., Heitor. “A desertificação no mundo e no Brasil (Desertification in the world and in Brazil)”. In: SCHENKEL, Celso Salatino & MATALLO JR., Heitor. **Desertificação (Desertification)**. Brasília: UNESCO, 1999, p. 11.

In the studies done in the scope of the programs of combating desertification in the Northeast, three categories of susceptibility to desertification were established as specified in Table 1.4.

**TABLE 1.4**  
**Classification of the Susceptibility to Desertification, Based on Aridity Index**

ARIDITY INDEX	SUSCEPTIBILITY TO DESERTIFICATION
0,05 a 0,20	Very High
0,21 a 0,50	High
0,51 a 0,65	Moderate

Source: MATALLO JR., Heitor. "A desertificação no mundo e no Brasil.". In: SCHENKEL, Celso Salatino & MATALLO JR., Heitor. *Desertificação*. Brasília: UNESCO, 1999, p. 11.

This susceptibility in the ASD is classified as "high" although there are indications that it can vary between "high" and "very high."

Besides the criterion of the Aridity Index, the areas in the process of desertification are characterized starting from the use of indicators related to the properties and use of the soil in areas with pluviometric precipitations, situated on the limit of 500 mm (driest areas of the semi-arid). This approach was utilized by researchers of CPATSA, of the Brazilian Agricultural Research Corporation – Embrapa. To this end, levels of environmental degradation were established (severe, accentuated, moderate and low), according to the types of associations of soils (Bruno Non- Calcic, Litholic etc.), the relief (softly wavy, wavy, etc.), the sensitivity to erosion (strong, very strong, moderate) and the length of time of occupation of the soil (long, medium, recent). Starting from these factors, the percentages of the levels of environmental degradation were calculated, as shown in Table 1.5.

The sum of the areas considered as submitted to levels of "severe" and "accentuated" degradation corresponds to 48.65%. It represents, thus, almost one and a half times the value of the areas considered as in "grave" and "very grave," shown on Table 1.6. It should be noted that the extreme classification (severe and very grave) presents a strong discrepancy; in the same way, the levels "moderate" and "low" present as strong divergence, not only due to the method or geographic focus, but also due to the indicators chosen, almost always centered on the problem of erosion. In any case, the data of Table 1.6 inform that 74.34% of the semi-arid region of FNE is submitted to varied environmental alterations, corresponding to the degrees "moderate" (40,80%), "grave" (27,68%) and "very grave" (5.86%).

**TABLE 1.5**  
**Northeast Tropic Semi-arid. Environmental Degradation Levels by Soil Class**

LEVELS OF ENVIRONMENT DEGRADATION	TYPES DE ASSOCIATIONS OF SOILS	RELIEF	SENSITIVITY TO EROSION	TIME OF OCCUPATION	PERCENTAGE IN RELATION TO DRYER AREAS OF THE TRÓPICAL SEMI-ARID REGION OF THE NORTHEAST (%)
Severe	Bruno Non- Calcic	Gently wavy and wavy	Strong	Long (Cotton)	38,42
Accentuated	Litholic	Wavy, Strongly wavy and Mountainous	Very Strong	Recent (Subsistence crops)	10,23
Moderate	Podzolic eutrophic, Structured red earth, Wavy and Strongly wavy Cambisol	Wavy and Strongly wavy	Moderate	Long (Commercial crops)	10,21
Low	Flat soils	Flat and Gently wavy	Moderate	Medium (Pasture and Subsistence crops)	7,07
<b>TOTAL</b>		<b>20.364.900 ha</b>			<b>65,93</b>

SOURCE: SÁ, Iêdo Bezerra. **Degradação ambiental e reabilitação natural no Trópico Semi-Árido Brasileiro (Environmental Degradation and Natural Recovery in the Brazilian Tropical Semi-Arid region)**. Fortaleza: Fundação Grupo Esquel Brasil, 1994. (Work presented to the National conference and Latin-American Seminar on Desertification, held in Fortaleza, Ceará, in the period from 7 to 11 of March, 1994.)

The areas susceptible to desertification – ASD in Brazil cover an area greater to that included by the Semi-arid Region of FNE or than the space of the old Drought Polygon. In their interior are included the municipalities characterized as Semi-arid and Dry Sub-humid areas – according to the criteria of the CCD -, to which were added in a preliminary character, those situated in the Areas Surrounding the Semi-arid and Dry Sub-humid Areas as explained before.

**TABLE 1.6**  
**Desertification in the Semi-arid Region; Area and Population Affected**

DEGREE OF DAMAGE	AREA (km <sup>2</sup> )	POPULATION IN 1991 (Inhab.)	% OF THE SEMI-ARID REGION	
			AREA	POPULATION
Very Serious	52.425,00	1.378.064	5,86	7,72
Serious	247.831,00	7.835.171	27,68	43,90
Moderate	365.287,00	6.535.534	40,80	36,62
<b>Total Semi-Arid Region Affected</b>	<b>665.543,00</b>	<b>15.748.769</b>	<b>74,34</b>	<b>88,24</b>
Semi-Arid Northeast Region (*)	895.254,40	17.847.287		

SOURCES OF THE BASIC DATA: i) RODRIGUES, Waldemar et alii. **Avaliação do quadro da desertificação no Nordeste do Brasil: diagnóstico e perspectivas**. Fortaleza: CE, Fundação Grupo Esquel Brasil, 1994, vol. VIII, p. 2389. (Impacts of Climatic Variations and Sustainable Development in Semi-arid Regions – ICID. International Conference, Fortaleza: Ceará, Brazil, January 27 – February 1992.); ii) FERREIRA, D. G. et alii. **Desertificação no Nordeste do Brasil: diagnóstico e perspectiva (Desertification in the Northeast of BrAZIL: Diagnosis and Perspective, UFPI, Nucleus Desert, 1994, p. 27; e iii) CARVALHO, Otamar de & EGLER, Claudio A. G. Alternativas de desenvolvimento para o Nordeste semi-árido (Alternatives of development for the semi-arid Northeast)**. Fortaleza: Banco do Nordeste do Brasil, 2003, p. 69 (Table 1.5). (\*) Corresponds to the Official Semi-Arid Region, referred to the area of resources application of the Constitutional Fund for Financing the Northeast – FNE, called the **Semi-Arid Region of the FNE**.

Altogether the ASD cover a surface of 1,338,076.0 km<sup>2</sup>, as is shown on Table 1.7, the territory of the ASD represents 74.46% of the surface of the Northeast of Sudene.<sup>47</sup> In 1991, 28,635,498 persons lived in these areas. Of this total, 54.69% resided in urban areas and 45.31% in the country. Already in 2000, the population resident in the ASD had reached the level of 31,663,671 inhabitants. Its distribution, according to the domicile structure, in 2000, was of 62.19% in urban areas and 37.81% in the country. The demographic density in the ASD was of 23.66 inhab./km<sup>2</sup>, in 2000, inferior to that of the Northeast as a whole, which was of 30.72 inhab/km<sup>2</sup>, in that same year.

The data (physical and demographic) of the ASD are detailed, by state and by sub-region (Semi-Arid areas, Dry Sub-humid Areas and Surrounding Areas), in the Annex 1. The relation of the municipalities of the ASD, for each one of these areas, is specified in the Annexes 2, 3 and 4. the number of municipalities of the ASD is of 1,482, as can be seen on Table 1.8.

The data (physical and demographic) of the ASD are detailed, by state and by sub-region (Semi-Arid Areas, Dry Sub-Humid Areas and Surrounding Areas), in Annex 1. The relation of the municipalities of the ASD, for each one of these areas, is specified in Annexes 2, 3 and 4. The number of municipalities of the ASD is 1,482, as can be seen in Table 1.8.

**TABLE 1.7**  
**Area, Population and Number of Municipalities in the Northeast of Sudene, in the Different Delimitations of the Semi-arid and in the Areas Susceptible to Desertification – ASD, in 2000**

SPECIFICATION	AREA (km <sup>2</sup> )	POPULATION TOTAL (inhab.)	Nº OF MUNICIPALITIES
1. Drought Polygon	958,819.60	27,863,392	1,264
2. Semi-Arid Region of the FNE	895,254.40	19,326,007	1,031
3. Caatinga Biome	1,037,517.80	28,098,321	1,280
4. Areas Susceptible to Desertification - ASD (*)	1,338,076.00	31,663,671	1,482
5. Northeast of Sudene (**)	1,797,065.00	53,434,693	2,029

Sources of Basic Data: i) IBGE Foundation. Demographic Census 2000; ii) National Integration Ministry – MI. Superintendency of Development of the Northeast – Sudene (2003) – **Região do Nordeste do Brasil em números**. (The Northeast Region of Brazil in numbers) Recife, Sudene, 2003; iii) Biodiversitas Foundation. Available in: <<http://www.bdt.fat.org.br/workshop/caatinga/>>. Access in: 7.15.2003; 12.04.2003; and iv) Carvalho & Egler, 2003.

Notes: (\*) Include the Semi-Arid Areas, the Dry Sub-humid Areas and the Areas Surrounding the Semi-arid and Dry Sub-humid Areas. The surface of these areas is specified in Annex 1.

(\*\*) Includes the territorial surfaces of the States of Maranhão, Piauí, Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Alagoas, Sergipe, Bahia, north of Minas Gerais (200,078.10 km<sup>2</sup>) and the north of Espírito Santo State (46,047.20 km<sup>2</sup>), which correspond to the **area of activity of Sudene**.

The processes of agricultural exploitation, either in the system of irrigated agriculture or in that of non-irrigated agriculture, have contributed to the production of environmental impacts capable of giving greater force to the processes of desertification.

<sup>47</sup> Corresponding to 1,797,065 km<sup>2</sup>, as can be seen on Table 1.3.

**TABLE 1.8**  
**Number of Municipalities of the Areas Susceptible to Desertification, by State**

STATE	NUMBER OF MUNICIPALITIES OF THE AREAS SUSCEPTIBLE TO DESERTIFICATION – ASD			
	SEMI-ARID AREAS	DRY SUB-HUMID AREAS	SURROUNDING AREAS	TOTAL ASD
Maranhão	-	01	26	27
Piauí	96	48	71	215
Ceará	105	41	38	184
Rio Grande do Norte	143	12	03	158
Paraíba	150	47	11	208
Pernambuco	90	39	06	135
Alagoas	33	13	07	53
Sergipe	06	28	14	48
Bahia	159	107	23	289
Minas Gerais	22	61	59	142
Espírito Santo	-	-	23	23
<b>TOTAL</b>	<b>804</b>	<b>397</b>	<b>281</b>	<b>1.482</b>

SOURCES: Annexes 2, 3 and 4.

Irrigation is a practice which has brought about great benefits to agriculture. There are evidences of this in various countries, including Brazil. The Northeast is one of the most benefited Brazilian regions in this sense.<sup>48</sup>

Performed in an inadequate way and without resorting to drainage, irrigation produces undesirable impacts in any semi-arid area. One affirms that a soil submitted to irrigation is salinized when the concentration of salts in this land is elevated to the point of harming the economic production of the crops. The salinization of the soil affects the germination and the density of the crops, as well as its vegetative development, reducing the productivity of the crops. In the cases at the limit point, the salinization can bring about the generalized death of the plants, making cultivation of the affected lands unviable.<sup>49</sup>

In a general way, the soils situated in arid and semi-arid regions, when submitted to the practice of irrigation, present great probabilities of becoming saline, if they do not possess adequate systems of drainage, and preventive or corrective measures are not adopted adequately and opportunely. Studies done by FAO<sup>50</sup> inform us that from 20% to

<sup>48</sup> The available information indicates that in 2001 the Northeast irrigated 663,672 hectares (21.0%) of the total areas irrigated in Brazil (3,149,217 hectares). Cf. CHRISTOFIDIS, Demetrios. "Irrigation, the water frontier in the production of foodstuffs". **Magazine ITEM – Irrigação & Tecnologia Moderna**. Brasília, Brazilian Irrigation and Drainage Association – ABID, nº 54: 46-55, 2º quarter, 2002, p. 51 (Chart 6).

<sup>49</sup> About this matter, consult: National Water Agency – ANA. Global Environment Facility – GEF (Global Environment Fund). United Nations Environment Program – PNUMA.- the Organization of American States – OEA. Project of Integrated Management of Activities Developed on Land in the São Francisco Basin. Sub-project 4.5c. **Ten-year Water Resources Plan of the Hydrographic Basin of the São Francisco River – PBHSF (2004- 2013)**; technical support study of PBHSF, nº 12: irrigated agriculture. Brasília: ANA/GEF/PNUMA/OEA, April, 2004, p. 44-45. The PBHSF was published, in a preliminary version for discussion, in April, 2004. All the documentation of the PBHSF is available on the Internet, on the ANA site, in four modules, thus detailed: i) Module 1 (Executive Summary); ii) Module 2 (Diagnosis of the Basin and of the Development Scenarios); iii) Module 3 (Allocation of Water, Classification of the Bodies of Water, Inspection and Charging for Use); and iv) Module 4 (Strategy for Vitalization, Recovery and Water Environment Conservation and Investment Programs). Besides the four modules, 17 Technical Support Studies for the PBHSF are also available. Available at: <<http://www.ana.gov.br/prhbsf/index.htm>>. Access in: 27.05.2004.

<sup>50</sup> Information collected in countries with great extensions of irrigated lands – such as India and the United States.

30% of the areas irrigated in arid and semi-arid regions need to reinforce drainage to avoid salinization. In this way, the irrigation and the drainage constitute related processes, which should be done together.<sup>51</sup> Although the available information is not completely precise, there are indications that at least 25% to 30% of the 274 million hectares irrigated in the world present problems of salinization and of saturation of the soil. Because of lack of drainage and being at the limit, by the occurrence of processes of salinization, several million hectares of lands with irrigation infrastructure cease to be cultivated annually.<sup>52</sup>

The basin of the São Francisco River is privileged in terms of adequate soils and water quality for irrigation, and for this reason there are still few existing perimeters of irrigation there with problems of salinization (ANA/GEF/PNUMA/OEA, 2004: 45.)

Part of the irrigation projects developed in this region is subject to deficient management conditions. Besides this, the existence of drainage systems is more common in the projects implanted by the government than in the projects installed directly by the private sector.

There already are indications about the occurrence of salinization processes in several areas of irrigated agriculture. Studies done by the Development Company of the São Francisco and the Parnaíba Valleys – Codevasf indicate that some irrigated areas in the Valley of the São Francisco, due to inadequate management, are being submitted to a process of salinization. In part of these areas, the agricultural production in the system of irrigation can reach – at the limit – inviability, because of the salinization of the soil.

The lack of drainage systems is probably greater in the irrigation projects implanted by the National Department of Works against the Droughts - DNOCS, due to the technical orientations adopted at the beginning in the Executive Projects. In these projects the management conditions of soil and water are less favorable to the installation of drainage systems. (ANA/GEF/PNUMA/OEA, 2004: 45.)

The problem of salinization also is present in the settlements of agrarian reform in the Northeast Region. Studies done indicate the presence, in various degrees, of salinization problems in approximately 2.5% of the useful areas of the settlements.<sup>53</sup>

The indications and the discrepancies in the information presented suggest that the knowledge about the desertification processes in course in the Brazilian semi-arid and dry sub-humid zones is still precarious and imprecise. One works with the possibility of eliminating these defects with the elaboration in the scope of Brazil, of Ecological-Economic Zoning – ZEE for the Northeast as a whole, and in particular, for the Areas susceptible to Desertification – ASD.

The lack of information also refers to the validity and the location of the occurrences of the processes of desertification, or about the recuperation (resilience) of the existing biomes in their susceptible areas. Fragmentary indications suggest that for some areas of the semi-arid, exceeding the “capacity to support” occurred from the decade of 1960 on, and, since then, the rate of degradation has accelerated. The sparse information available

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<sup>51</sup> In fact, “ **irrigation**, to the contrary of what is being done habitually, **can not be separated from drainage**, for it is the attending to the demands related to the latter which guarantees the productive continued use of the soils in irrigated areas. The complementary relationship between irrigation and drainage constitutes an essential basis to guarantee the sustainability of explorations in the Irrigation system. Irrigation and drainage should, for this reason, be worked on in strict connection, so that the irrigable soils can have their use maximized by water resources, which are relatively scarcer, particularly in arid and semi-arid territories.” Cf. CARVALHO, Otamar de & OLIVEIRA, Mauro Márcio. **Política nacional de irrigação e drenagem (National Irrigation and Drainage Policy)**. Brasília: MMA/SRH, Oct., 1997.

<sup>52</sup> For the data about the areas irrigated in the world, see: CHRISTOFIDIS, 2002, op. cit.

<sup>53</sup> SPAROVEK, Gerd. **A qualidade dos assentamentos da reforma agrária brasileira (The quality of the Brazilian agrarian reform settlements)**. São Paulo: Páginas & Letras Editora e Gráfica, 2003.

suggests that between the second half of the 19th century and the first half of the 20th century, this rate grew apparently at about 0.3% per year. Given the difficulty of obtaining information, due to the reduced amount of research about the subject, one verifies that the knowledge about this theme is still precarious in the complex of society and Brazilian institutions.

In the period from 1960 to 1970, the degradation rate increased, coming near to 2.5% per year, thus, similar to the growth rate of the population in the period from 1960 -1980. More recent data from the National Mineral Production Department – DNPM with respect to deep wells drilled in the State of Piauí (in the region of Picos), shows that in the 1990's there was a lowering of the aquifers, which signaled an annual rate of decrease in the amount of 3.6%.

Having exceeded the “ideal capacity to support’ of this biome, the resilience is broken and the processes of degradation accelerate at such a rate that one could foresee (in conditions *coeteris paribus*) the loss of half of its productive capacity, every twenty years.

One emphasizes that along with the process of degradation, significant changes occur – social and technological ones and the patterns of land use. These changes act as answering, adjusting or adapting factors of the populations to the conditions which are more and more adverse. Among them one can point out the intense processes of migration, the accelerated urbanization, the broadening of public investments in physical and social infrastructure and the intensification of the patterns of consumption of natural resources, chiefly of the vegetation and water. However, one of the most important seems to have been the diminution of the areas where cotton was cultivated, due to the occurrence of the plague of the cotton pest called the “bicudo”.<sup>54</sup>

Another movement which occurred on a significant scale was the transformation which happened in the scope of the exploitation of cattle raising, by the substitution in the breeds of the herds. The reduction of the areas where cotton plants were cultivated generated serious social problems, due to the destructuring of the model of traditional production and the loss of income for the farmers. However, this change contributed to the recomposition of the natural resources base (as an example, improvements in the vegetation and the soil). But the expansion of cattle raising, on a more modern basis, produced new pressures on the environment, with effects and impacts (agricultural, social and environmental) still not properly evaluated.

The problem of desertification is really serious in the semi-arid spaces of the Northeast. Despite the natural adjustments resulting from the changes in the set of activities of the group cattle-raising, cotton – food crops, there still has not been a visible reverting of the processes of desertification. It is possible, in fact, that such processes have been extended.

The studies done by the Institute of Economic and Applied Research – IPEA for the productions of the Map for the End of Hunger in Brazil, published by the Getúlio Vargas Foundation – FGV, indicate that in 2001 50 million persons in the Country, (29% of the population) lived below the poverty line, because they have a monthly income inferior to R\$80.00.

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<sup>54</sup> The scientific name of the “bicudo” is ***Anthonomus grandis*** Boheman. About the characteristics and the impact of this pest, vide: i) BARBOSA, Sebastião, LUKEFAHR, Maurice J. & BRAGA SOBRINHO, Raimundo/Editores. **O bicudo do algodoeiro (the “bicudo” of the cotton plant.** Brasília, Empresa Brasileira de Pesquisa Agropecuária – Embrapa. Technology Dissemination Department, Brasília, DF, 1996; e ii) MOREIRA, José de Alencar Nunes; BELTRÃO, Napoleão Esberard; FREIRE, Elêusio Curvelo; NOVAES Filho, Manoel de Barros; SANTOS, Robério Ferreira; & AMORIM Neto, Malaquias da Silva (1995) – **Decadência do algodeiro mocó e medidas para seu soergimento no nordeste brasileiro (Decadence of the cotton mocó and measures for its arising in the Brazilian Northeast).** Campina Grande – PB, National Center for Cotton Research – CNPA, Embrapa, 1995.

The states of the Northeast Region presented the highest indices of insufficiency, in relation to the other regions of the Country. With the exception of Rio Grande do Norte, the other states of the Northeast had more than half of their populations below the poverty line. Maranhão presented the worst situation, with approximately 63% of its population below this line. Afterwards, came the States of Piauí (61.7%), Ceará (55.7%), Alagoas (55.4%), Bahia (54.8%) Pernambuco (50.9%), Paraíba (50.2%) Sergipe (50,14%), and Rio Grande do Norte (46.93%).

In relation to the Municipal Human Development Index (IDH-M), there are only three municipalities inserted in the semi-arid (Montes Claros - MG, Natal – RN and Fortaleza- CE), within the 1,100 which presented the highest IDM-M; there was none among the 500 greatest. At the other extreme, among the 1.100 municipalities with the lowest IDH-M, 771 are inserted in the ASD, that is 70.1%. In short, in the Areas Susceptible to Desertification – ASD are to be found:

- i. 69% of the 500 municipalities with the worst IDH-M;
- ii. 58% of the 100 municipalities with the worst IDH-M; and
- iii. 5 of the 10 municipalities with the worst IDH-M of Brazil.

According to the information presented, the social situation of the great majority of the inhabitants of the ASD is much less favorable than that of the populations of those who, on the average, live in the Northeast or in the other regions of the Country. This means that if the poorest people with lower quality of life are in the Northeast, it is in the Semi-arid, in the Areas Susceptible to Desertification – ASD, that the poorest of the Northeast are to be found.

### **1.3.6 Relation of the ASD with the Caatinga Biome, The Drought Polygon and the Semi-Arid Region of the FNE**

The areas which make up the Areas Susceptible to Desertification – ASD, as well as the Semi-Arid Region of the FNE, correspond to almost the same surface area as the Caatinga Biome. The region of this biome is, for the greater part, characterized by semi-aridity which predominates in the so-called Northeastern Sertões. For the population of the Areas Susceptible to Desertification - ASD, the name of the Regions such as Biome Caatinga, Sertões of the Northeast, Semi-arid Northeast, and Drought Polygon have very similar meanings. The profile of the persons who live there are revealed in the habits and customs incorporated into the national imagination, starting from the language (accent), the cuisine, the literature (above all that of the “cordel”), of the figurative handicrafts, of the singers and their challenging each other in improvised singing competitions, of the sport of overturning cows, and many other manifestations which touch the Brazilian roots in such a marked way as perhaps no other region does.<sup>55</sup>

The information about variables such as geographic area, population and number of municipalities of the Drought Polygon, of the semi-arid regions of the FNE, of the Caatinga biome, of the Areas Susceptible to Desertification – ASD, and of the Northeast of Sudene are to be found on Table 1.7, where it is shown that the structured and delimited start of the formation of these regions from their relations with the droughts of the Northeast and their present dimensions are very close to each other. It should be noted that among them only one – the semi-arid of the FNE is officially recognized, considering its delimitation, done as a

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<sup>55</sup> Cf. GOMES FILHO, José Farias. **Relatório técnico final de análise da linha temática prioritária intitulada “valorização sociocultural” (Final Technical analysis report of the priority theme line entitled “sociocultural giving of value”);** Projeto “Cenários para o Bioma da Caatinga” (Scenarios for the Caatinga Biome). Recife: Fundação Apolônio Salles de Desenvolvimento Educacional – Faderpe, April, 2004, p. 3.



criterion for the application of the financial resources of the Constitutional Fund for the Financing of the Northeast – FNE.

The Caatinga biome is inserted in the category of the Ecosystems of the Region of Caatingas and Deciduous Forests of the Northeast. It includes the specific characteristics of the Morphoclimatic Domain of the Caatingas, be they of bushes or of trees. Since the beginning of the twentieth century, one already knows that this singular type of tropical xerophilous vegetation, only encountered in this part of the Northeast, refers to the capacity of the plants existing there to lose their leaves in the drought season (or rainless season).

This characteristic corresponds to a physiological defense mechanism of the plants against high transpiration. This peculiarity was pointed out, in a pioneering way in one of the most important studies about the Caatinga of the Northeast, done at the beginning of the Twentieth century by Philipp von Luetzelburg, a botanist of the old Inspection of Works against the Droughts – IOCS, transformed in 1919 into Federal Inspection of Works against the Droughts –IFOCS and afterwards in 1946 into the National Department of Works against the Droughts - DNOCS.<sup>56</sup>

This type of vegetation also was well studied by the Brazilian geographer and topographer Walter Alberto Egler.<sup>57</sup> The Northeast also was analyzed by Guimarães Duque, who managed to articulate between theory and practice, determining the possibilities, ecological and economic limitations of the areas, where the vegetation associations occur, which are the characteristics of the caatinga, and thus, of the Areas Susceptible to Desertification.<sup>58</sup>

New knowledge about the possibilities of the Caatinga were gathered between 2000 and 2001 by the Foundation Biodiversitas, by the International Conservation of Brazil, Embrapa Semi-Arid, Environment Ministry, World Bank, CnPq, Global Environment Facility – GEF, the Secretariat of Science, Technology and Environment of the Government of Pernambuco and the Superintendence of Development of the Northeast – Sudene, The Nature Conservancy of Brazil – TNC and the Plant Association of the Northeast –APNE. These studies represent an important contribution for the knowledge of the peculiarities of different types of caatingas. Using the ecoregion concept<sup>59</sup> a regionalization of the Caatinga Biome was produced.

According to the conclusions of the Seminar Biodiversity of the Caatinga and of the Seminar of Aldeia, the Caatinga Biome was divided into eight ecoregions, specified as follows:<sup>60</sup>

- Ecoregion of the Campo Maior Complex;

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<sup>56</sup> LUETZELBURG, Philipp von. **Estudo botânico do Nordeste (Botanical Study of the Northeast)**. Rio de Janeiro: IOCS, 1922-1923. 3 vol. (Publication nº 57, Series I, A.).

<sup>57</sup> EGLER, Walter. "Contribuição ao Estudo da Caatinga Pernambucana" (Contribution to the Study of the Pernambucan Caatinga). **Coletânea de Trabalhos de Walter Alberto Egler (Collection of Works of Walter Alberto Egler)**; organized by Pedro Luiz Braga Lisboa; Claudio Antônio G. Egler; William Leslie Overall. – Belém: Museu Paraense Emílio Goeldi/CNPq/MCT, 1992.

<sup>58</sup> Cf. i) DUQUE, J. Guimarães. **Solo e água no polígono das secas (Soil and Water in the Drought Polygon)**. 3ª ed. Fortaleza: DNOCS, 1953; e ii) DUQUE, J. Guimarães. **O Nordeste e as lavouras xerófilas (The Northeast and the xerophilous crops)**. 1. ed. Fortaleza: BNB, 1964.

<sup>59</sup> BAILEY, R. G. (1998) – **Ecoregions: the ecosystem geography of the oceans and continents**. Springer-Verlag: New York. 176 p.; DINERSTEIN, E., D. M. Olson, D. J. Graham, A. L. Webster, S. A. Primm, M. P. Bookbinder & G. Ledec (1995) – **A conservation assessment of the terrestrial ecoregions of Latin America and the Caribbean**. The World Bank: Washington, D. C. 129 p.

<sup>60</sup> This synthesis is based on a study made by Otamar de Carvalho, for the Secretariat of Science, Technology and Environment – SECTMA, of the State of Pernambuco: **Infra-estrutura e integração regional (Infrastructure and regional integration)**; Project of Scenarios for the Caatinga Biome. Recife: SECTMA, March, 2004.

- Ecoregion of the Ibiapaba-Araripe Complex;
- Ecoregion of the Northern Sertão Depression;
- Ecoregion of the Borborema High plain;
- Ecoregion Meridional Sertão Depression;
- Ecoregion of the Dunes of São Francisco;
- Ecoregion of the Chapada Diamantina Complex; and
- Ecoregion of the Raso da Catarina.

In Figure 1.9 the configuration of the eco-regions of the Caatinga biome is shown.

#### **1.4 PAN-Brazil, GLOBAL WARMING AND CLIMATE CHANGES**

There is no general and absolute consensus about the consequences of these phenomena. The subject is the object of worry for politicians, scientists and public and private executives. The majority of the researchers of governmental and non-governmental organisms tend to admit that in the next decades there will be an increase in the average temperature of the earth.

In May of 1990, climatologists of various parts of the world met and discussed the results of their work in the International Panel about Climate Change PIMC (Intergovernmental Panel on Climate Change – IPCC), held under the sponsorship of the General Assembly of the United Nations. This meeting was promoted with the purpose of alerting world leaders to the seriousness of these types of changes.<sup>61</sup>

In 2001, at the request of the American government (G. W. Bush's Administration), The National Science Academy of the United States published a report in which it confirms the former studies of Group I of IPCC, concluding that: "As a result of human activity, gases of the greenhouse effect are accumulating in the earth's atmosphere and producing an elevation of the temperature of the air and of the oceans"... "the level of the sea should continue rising in the 21st century".

With respect to this, the debate concerns the forecasting of such an increase which varies from 1 to 3 degrees Celsius. Once such an increase has occurred, utilizing the Aridity Index adopted by the CCD, the areas classified today as semi-arid can become arid. Dry sub-humid areas can become semi-arid and more humid regions will tend to be transformed into dry sub-humid areas.

The global warming would also provoke two other important changes: greater variability of the patterns of rains and greater frequency of extreme events (droughts and floods). Just as in the case of warming, there also exists a certain degree of uncertainty about these themes, accompanied by live debates, which does not hide the fact that such events are already occurring in various regions of the planet.

The aggregated effects of these changes are still not totally evaluated. However, by analogy, any person can project what could be a Northeast – in itself, already vulnerable if submitted to more elevated temperatures, to an even greater irregularity of rains and an eventual intensification of the droughts (and floods). In this perspective, the socioeconomic

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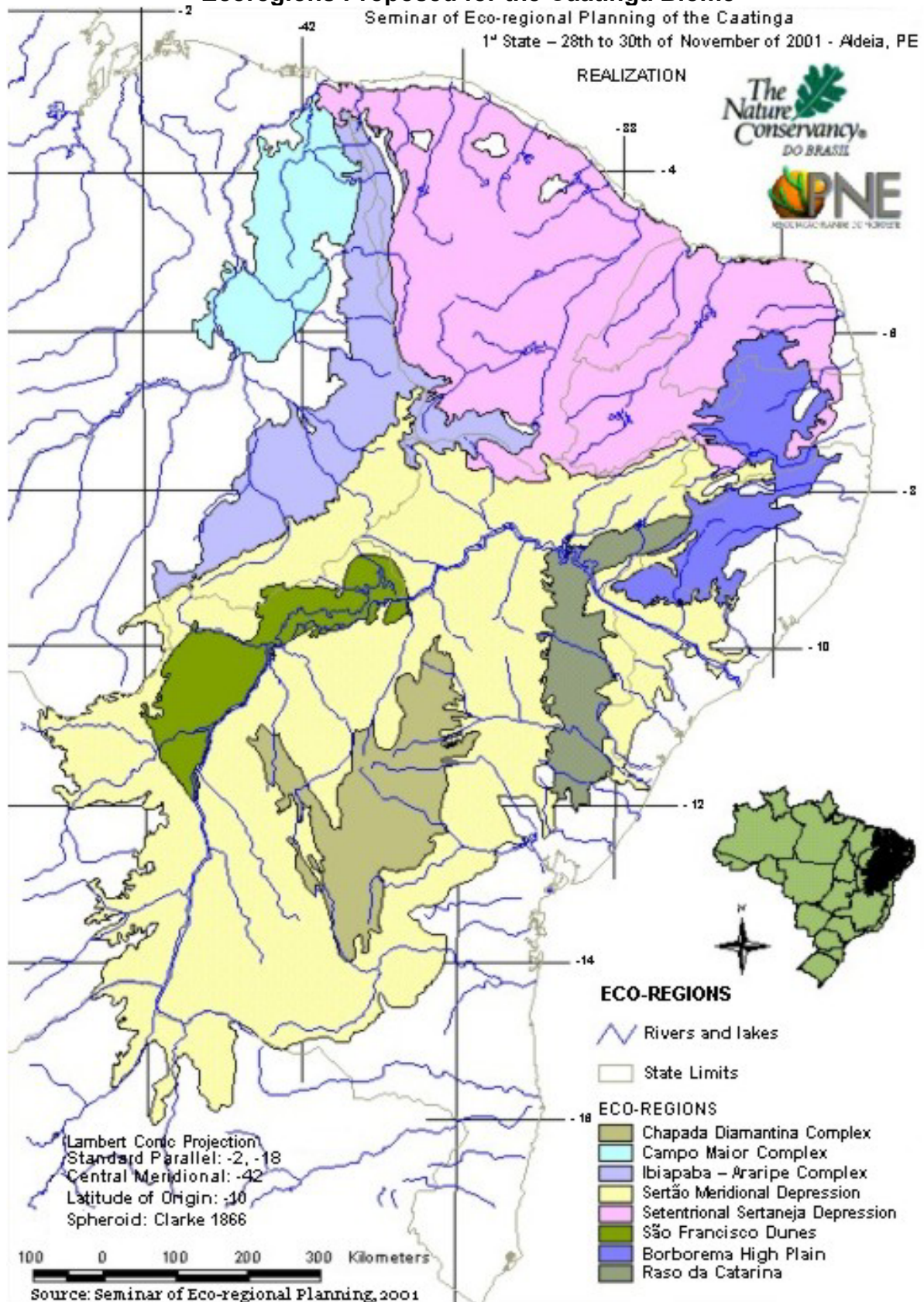
<sup>61</sup> LEGGETT, Jeremy. Ed. **Aquecimento global: o relatório Greenpeace (Global Warming: the Greenpeace Report)**. Rio de Janeiro: Getúlio Vargas Foundation Publishers, 1992.

losses would be broadened and inevitably the biodiversity (including the human being) also would be affected, deteriorating and or tending to adjust to the new conditions.

An important element to consider is that of the capacity of society to perceive and prepare itself to deal with these types of changes. With respect to this, society is very little prepared. Practically all the economic and social actors, opinion makers, decision makers, policy managers etc., continue to operate as if such possibilities did not exist. That is to say, they continue to work as if these eventualities could not occur, or as if such events were improbable, being able, at the most, to be pushed off to the remote future. Even if these possibilities are remote, one must think and reflect about their impacts. Recent studies suggest and warn that global warming is already occurring, in fact at a greater speed than one had foreseen at the end of the decades of the 1980's and the 1990's.

Given the conditions known today, it still is difficult to deal with events of uncommon consequences. It will be even more difficult to deal with problems which determine the occurrence of serious effects in unknown situations. To foresee is a part of the development of organized activities. Hence the importance of making studies and reflecting about problems such as those connected to the domains referred to here, among which it is proper to emphasize those related to the foreseeing of droughts and of flooding.

**FIGURE 1.9**  
**Ecoregions Proposed for the Caatinga Biome**



SOURCE: The Nature Conservancy of Brazil – TNC & Northeast Plants Association – APNE. Results of the Seminar for Ecoregional Planning of the Caatinga: ecoregions proposed for the Caatinga Biome. Aldeia, Pernambuco, TNC & APNE, 2001. Available in: <<http://www.bdt.fat.org.br/index>>. Access in 23.06.2004.

## *Chapter II*

# **COMBATING DESERTIFICATION**

The concerns with respect to desertification are recent ones. The drought and its effects, although their occurrence is considered certain, at specific intervals and at not always regular intervals, have been treated as an event of an extraordinary or emergency nature. It is quite true that some public policies were put into practice in the Northeast, taking as a basis the need to strengthen the regional economy in the face of this climate (a)normality. At any event, even today, with each new drought - partial or total – the different spheres of the government are forced to conceive and try to put into practice various sets of operations presumed to be capable of solving the drought's effects. However, once the period of duration of climate variability has been faced, the extraordinary measures follow in the direction of suspension.

The initiatives to combat desertification in Brazil, with emphasis on what was done in the Northeast are described here as corresponding to three moments, set forth after a general appreciation in order to present the previous situation concerning external factors determining the adoption of measures to combat desertification. In this way, this chapter treats the following aspects: i) The Previous Situation; ii) What was done in the Northeast up to 1994; iii) Initiatives of the Period 1994/1998 in Brazil; and iii) Actions Put into Practice in Brazil in the Period 1999/2003.

### **2.1 THE PREVIOUS SITUATION**

In the international scenario, the extent and severity of the droughts, particularly during the years of 1934 and 1936, affected an area of 380,000 km<sup>2</sup> in the United States, and represent a landmark for comparison for the occurrence of this phenomenon until today. Besides this the droughts and their association with the process of desertification awaken interest, principally in the academic and political areas, since then, consisting of studies and research (Matallo Jr., 1999: 9.)

Decades later, during the period from 1967 to 1976, a drought of great proportions hit the region of Sahel, below the Sahara Desert, where more than 200 million persons and millions of animals died of hunger.

These two phenomena definitively placed the concern about desertification on the list of themes to be treated in the international political agenda. The international community began to observe the dramatic situation of the populations of different African countries affected by the drought, famine and wars, where the images of the starving refugees caused commotion in the whole world. As a consequence of this, migratory movement and intense environmental devastation began to be detected in all Africa. The studies done about this began to point to the fact that the models of development utilized, based on the superexploitation of natural patrimony, had brought about the reduction of the agricultural production and productivity, causing the impoverishment of the populations, increasing the infantile mortality rates, epidemics etc.

From then on, international organisms, chiefly the United Nations, sought to establish agreements and partnerships with objective of creating international fora and institutionalizing the "combat against desertification" in the context of public policies of the

Member States. In Annex 5, one presents the historical sequence of the events which culminated in the international sphere with the creation of the United Nations Convention to Combat Desertification – CCD. In the national scope, the path already traversed is emphasized since the publishing of the book “The Great Brazilian Desert,” of Professor João de Vasconcelos Sobrinho, in 1974, up to the beginning of the process of formulating the PAN-Brazil.

Two aspects were shown by the series of events: i) the role of Brazil as a protagonist in different situations with relation to the significant advances made in terms of conception and negotiations of the CCD; ii) The participation of Brazilian civil society, which imprints a mark and a differential in the process of negotiation and implementation of the CCD in the national scope including international repercussions.

During the first United Nations Conference about Desertification, in 1977, the Brazilian situation was presented to the world by Professor João Vasconcelos Sobrinho. Up until then, desertification was only recognized as a grave problem on the African continent.

The International Conference about Climate Variations and Sustainable Development in the Semi-Arid Region – ICID held in Fortaleza, Ceará in 1992, was the only world event dedicated to the Arid and Semi-arid Zones of the earth, besides being a preparatory event for the United Nations Conference about Environment and Development CNUMAD (ECO02). The ICID had representatives from approximately 72 countries of the four continents. The international press reported that due to the conference the countries affected by desertification consolidated their political and technical bases to demand the celebration of a specific convention for the areas affected.

ECO 92 was held in the city of Rio de Janeiro in 1992. Its results were translated into a document that became known as Agenda 21 focusing on pressing current problems; this Agenda has as its objective to prepare the world for the challenges of the 21st Century. In this way it reflected a world consensus and a political commitment at the highest level concerning development and environmental cooperation.<sup>62</sup>

In the scope of ECO-92, Brazil participated actively in the discussions about desertification. The debates and the negotiations, then done, culminated with the recommendation that one realize a specific Convention to Combat Desertification, attending to what is contemplated in Chapter 12 of Agenda 21. The above-mentioned chapter establishes that the combat against desertification should confer priority to implementation of preventive measures for the lands hit by degradation or which were only slightly degraded. In the combat against desertification and the drought, it is essential that the local communities, rural organizations, national governments, non-governmental organizations and national and regional organizations participate (Agenda 21, 1996: 183).

The activities to combat desertification foreseen in Agenda 21 are being considered in the federal government budget. One foresees that these actions will be conducted with the participation of the international, Latin-American and Brazilian communities, bringing together those who govern, parliamentary representatives, prosecutors, Organized civil society, collaborators, partners, scientists and specialists, in order to promote the consciousness-raising about the problems of ecological and socioenvironmental imbalance. In this way, PAN-Brazil contemplates efforts to identify the factors which contribute to the occurrence of desertification, integrating strategies of eradication of poverty in areas hit by the drought and making viable practical measures to contain the advance of desertification.

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<sup>62</sup> United Nations Conference on Environment and Development. (1992: Rio de Janeiro). United Nations Conference on Environment and Development: **Agenda 21**. Brasília: Federal Senate, Subsecretariat of Technical Editions, 1996, p. 9.

In the scope of Agenda 21 **the Brazilian Agenda 21** was formulated. More than a document, this agenda constitutes a process of participatory strategic planning. This process is being conducted by the Commission of Sustainable Development Policies and of the National Agenda 21 –CPDS. The methodology utilized in the elaboration of the Brazilian Agenda 21 promotes a multisectorial approach of the national reality, focusing on the interdependence of the environmental, economic, social and institutional dimensions. Besides this, it determines that the process of elaboration and implementation should establish partnerships, understanding that Agenda 21 is not a government document, but a product of consensus between the diverse sectors of Brazilian society.<sup>63</sup>

The challenge of implementing a new model of development for the country recommends that it be treated by stages. The first, which was finished in June of 2002 treated of the process of elaboration of Agenda 21, according to a participatory methodology. For the second stage – that of implementation - it was defined among the members of the CPDS and the Planning, Budget and Management Ministry - MPOG that the strategy of internalization of the propositions of public policies which would come to integrate the Agenda constitutes the basis of elaboration of the Pluriannual Plans – PPAs of the Government. The elaboration of the PPA's constitutes a constitutional obligation according to which the National Congress approves, every four years, the programs in which the public resources of the Country are applied.

During the ECO-92, International Forum of Non-Governmental Organizations and Social Movements was held – Global Forum, in which 46 treaties were elaborated, emphasizing in them the commitment of world civil society to the socioenvironmental questions of the planet. Among the points negotiated, the theme of desertification in the Treaty about the Arid and Semi-Arid Zones stands out.

In the line of the recommendations of Agenda 21, in 1994 The International Conference and Latin-American Seminar on Desertification- CONSLAD, organized to discuss the test of the CCD, were also held in Fortaleza. The joint event involved the participation of government representatives and of civil society of the countries of Latin America, which formulated and negotiated the final text of the Regional Annex of Latin America. This was an important moment from the political point of view and of insertion of the block of Latin America in CCD, for there was a certain degree of difficulty in encompassing other areas of the planet, besides the areas of the African continent. This situation opened perspectives that other regions with a basis on the Annex of Latin America would formulate and include the own annexes, as was the case of the north of the Mediterranean and of Asia.

In November of 2003 the Environment Ministry held a National Conference of the Environment/Children's and Youth Conference which had as its objective to broaden popular debate and participation in the formulation of Proposals to Consolidate and Strengthen the National Environment System - Sisnama, by means of a definition of guidelines which should orient its organs in elaborating and implementing public environmental management policies oriented toward a sustainable Brazil. The Conference as conducted considering knowledge elaborated by the government and society: The Brazilian Agenda 21, the government program for the environment, the Pluriannual Plan 2004-2007 (PPA) and the strategic orientations of the Environment Ministry.<sup>64</sup>

The majority of the Brazilian states participated in the aforementioned events. From this participation, a positive contribution of various federal units resulted. In the case of the

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<sup>63</sup> Available in: <<http://www.mma.gov.br/port/se/agen21/index.cfm>>. Access in: 24.07.2004.

<sup>64</sup> See about the matter, documents available at the MMA site. Available in <[www.mma.gov.br/cnma/arquivos/pdf/deliberacoes\\_cnma.pdf](http://www.mma.gov.br/cnma/arquivos/pdf/deliberacoes_cnma.pdf)>. Access on: July 26, 2004.

Northeast, considerable advances were observed on the part of states such as Pernambuco, Bahia and Paraíba, which respect to the conception of state policies of desertification control.

In March of 2001, the State of Bahia began to have a **Policy to Combat Desertification**. The policy approved has as an objective “to bring it about that the natural environment and that environment modified by man, having guaranteed its preservation, be the object of social and economic development”.<sup>65</sup>

In October of 2003, the government of the state of Paraíba instituted the **State Policy of Combating and Preventing Desertification**. This policy has as an objective to assure adequate use of environmental resources, in Paraíba, in the promotion of development and welfare of the population.<sup>66</sup>

The State of Pernambuco published in December, 2003, the document detailing its **State Policy for Desertification Control**, the general objective of which is to reach sustainable development in the areas subject to drought and desertification in that state. Specifically, this policy has as objectives: i) to contribute to formulation of policies of sustainable use of natural resources in the Region, of the Agreste and of the semi-Arid; ii) contribute to the improvement of productivity and agricultural production in the areas susceptible to drought and desertification; iv) articulate sector actions of the government with a view to the synergy of the planning processes; and v) contribute to the improvement of the capacity to face the problems of desertification and of the drought on the part of local populations.<sup>67</sup>

The States of Ceará<sup>68</sup> and of Piauí<sup>69</sup> also are elaborating specific documents to make their orientation in the combating of desertification concrete. In this way, they have worked in close articulation with the Water Resources Secretariat of the Environment Ministry.

Years later, in 1999, with the holding of the 3<sup>rd</sup> Conference of the Parties to the United Nations Convention to Combat desertification – COP 3, in Recife, Pernambuco, one promoted an important advance in the comprehension and treatment of questions related to desertification in the country, having discussed, on that occasion, the causes and the measures necessary for combating it.

Another important event during the COP 3 was the Parallel Forum, organized by civil society, in which the document “Declaration of the Semi-Arid Region” was produced. This document consolidated the bases of the forum of civil society organizations - Articulation in the Brazilian Semi-Arid Region – ASA, which represents today one of the chief articulations of Brazilian civil society. Currently the ASA unites approximately 1,020 institutions located in eleven states (Maranhão, Piauí, Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Alagoas, Sergipe, Bahia, Minas Gerais and Espírito Santo) and in the Federal District. These organizations arose from different sectors, as NGO's; unions and federations of rural workers; Catholic and Evangelical Protestant churches; cooperatives; Community Base organizations - OCB's; environmental and development entities, among others.

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<sup>65</sup> This policy was approved by Resolution nº 2,772, of March 23, 2001, of the State Environment Council.

<sup>66</sup> The policy was approved by Law nº 7,414, of October 7, 2003.

<sup>67</sup> Cf. PERNAMBUCO. Science Technology and Environment Secretariat – SECTMA. **Política estadual de controle da desertificação State policy and control of Desertification**. Recife: SECTMA, 2003. (3<sup>a</sup> printing.)

<sup>68</sup> During the months of March and April of 2004, the government of Ceará discussed the guidelines which would orient the State Action Plan for Combating Desertification (PAE), meetings in which state and federal governmental entities and organized civil society would participate available in: <<http://www.ceara.gov.br>>. Access on: July 26, 2004.

<sup>69</sup> The government of the State of Piauí has been developing efforts, in articulation with the SRH – MMA, to formulate the State Plan for Combating Desertification. Available in em: <[http://www.pi.gov.br/materia\\_especial.php?id=7802](http://www.pi.gov.br/materia_especial.php?id=7802)>. Access on: July 26, 2004.



The articulations which followed these events also were fundamental for the changes of view of political articulation in the institutional scope, both by the governments (state and federal) as well as by the whole of society, chiefly in the areas affected by processes of drought in the country. In this sense the celebration of the convention in 1994 began a more systematic process of treatment of the themes of the CCD in Brazil, setting off a series of activities oriented towards systemizing available knowledge to obtain a more precise diagnosis of the process of desertification. Thus, in 1997 The Guidelines for the National Policy to Combat Desertification were elaborated with the involvement of the states and municipalities in the processes of dialogue and construction of PAN-Brazil.

In parallel to the movement of articulation between the institutions of civil society, a process of articulation was set off with the official institutions to internalize in public policies concepts as “living with the semi-arid” and development of effective actions having as their focus the population of the semi-arid with its strategies and empirical experiences of living with the environment in question.

In this context in 2001 a convenium was celebrated between the Environment Ministry and the Semi-Arid Region Articulation to implement the Formation and Social Mobilization Program for Living with the Semi-Arid Region: One Million Rural Cisterns – P1MC, with which it was possible to construct 12,400 cisterns in the States of Alagoas, Bahia, Ceará, Minas Gerais, Paraíba, Pernambuco, Piauí, Rio Grande do Norte e Sergipe.

With the election of a new government in 2003, the Water Resources Secretariat of the Environment Ministry, an institution of the National Focal Point of the CCD, began to set off a process of political articulation, involving civil society and the representatives of the state governments to guarantee the bases of political support, having in mind not only the participatory elaboration of PAN-Brazil as the guarantee of its implementation. The opening up of an effective and direct dialogue between the government and civil society, besides strengthening this latter, made possible a greater interface so that the government actions to combat desertification could reach the affected communities.

## 2.2 WHAT WAS DONE IN THE NORTHEAST UP TO 1994<sup>70</sup>

Desertification has never ceased to be part of the agenda of some pioneer historians, anthropologists and researchers, always concerned about the controlled management of natural resources of the Northeast. The survey of information and the production of the first perceptions about the matter were part of the efforts of our first ecologists - European naturalists, taken to Brazil by the Dutch, French and Portuguese colonizers such as Spix and Martius, moreover, traveled to the Northeast<sup>71</sup> having crossed Brazil from North to South and East to West.

The Brazilian scientists also made an important contribution. In 1859 the Scientific Exploration Committee, created by Dom Pedro II, and made up of scientists such as Francisco Freire Alemão (botanist), Guilherme Schüh Capanema (geologist), Manuel Ferreira Lagos (geologist), Giacomo Raja Gabaglia (geographer), and Antonio Gonçalves Dias (ethnologist)<sup>72</sup> traveled to the north of Brazil<sup>73</sup> to search for gold and precious stones. The theme of the droughts, however, wound up by leaving a mark on the reports and registries of the resources of the region.

To get to know the specific characteristics of the droughts, their consequences on the population and study the possibilities of taking advantage of the natural resources of the region around the 60's of the Twentieth Century important engineers, such as Charles Fredrick Hartt (American) Jules J. Revy (Frenchman) and P O'Meara (Englishman) were in the region known now as the Northeast.<sup>74</sup> Interested in the study of natural resources, the work of these engineers, as well as that of Rodolphe Theophile (a Bahian pharmacist living in Ceará)<sup>75</sup> contributed positively to broaden the knowledge of the Northeast in relation to its natural resources. His books and reports gave support in the beginning of the Twentieth Century to the studies done by technicians and scientists, Brazilian and foreign, who helped to create the Inspection Office of Works against the Droughts-IOCS, among which stand out Luetzelburg<sup>76</sup> and Albert Loefgren, who knew how to take advantage of the innovative

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<sup>70</sup> The synthesis presented here is based on CARVALHO, Otamar de. **Avaliação dos programas de desenvolvimento regional (Evaluation of the Programs of Regional Development)**. Brasília: SEPLAN – PR & IICA, 1993. (Work done in the scope of the Project Arid Regions).

<sup>71</sup> SPIX, Johan Baptist von & MARTIUS, Carl Friedrich Philipp von – **Viagem pelo Brasil (Journey through Brazil)**. Rio de Janeiro: Imprensa Nacional, 1938. 3 vol.

<sup>72</sup> BRAGA, Renato – **História da Comissão Científica de Exploração (History of the scientific exploration committee)**. Fortaleza: Imprensa Universitária do Ceará, 1962.

<sup>73</sup> Until 1910/1920, the expression "Northeast Region" was still to be invented. About the matter, see: ALBUQUERQUER JÚNIOR, Durval Muniz de. **A invenção do Nordeste e outras artes (The invention of the Northeast and other arts)**. Preface of Margareth Rago. 2. ed. Recife: FJN, Ed. Massangana: São Paulo: Cortez, 2001.

<sup>74</sup> ALVES, Joaquim – **História das secas (History of the droughts)**. Fortaleza: A. Batista Fontenele, 1953, pp. 120-42. (Coleção Instituto do Ceará. Monograph, 23.) XVI to XIX centuries.

<sup>75</sup> THEÓFILO, Rodolpho. **História da secca do Ceará – 1877 – 1880 (History of the drought of Ceará 1877-1880)**. Rio de Janeiro: Imprensa Inglesa, 1922, pp. 256 and 360.

<sup>76</sup> LUETZELBURG, Philipp von – **Estudo botânico do Nordeste (Botanical study of the Northeast)**. Rio de Janeiro: IOCS, 1922. 3 vol. (Publicação nº 57, Série I, A.)

orientation of the engineer Arrojado Lisboa.<sup>77</sup> Later, came Rodolpho von Ihering,<sup>78</sup> José Augusto Trindade,<sup>79</sup> Vinicius Berredo<sup>80</sup> and Guimarães Duque.

To the efforts of these scientists and technicians one should add those of important naturalists of the Northeast, contemporaries or not of these men, such as the Cearenses Guilherme Studart (the Baron of Studart),<sup>81</sup> Thomás Pompeu de Souza Brasil (Senator Pompeu),<sup>82</sup> Thomás Pompeu de Souza Brasil Filho<sup>83</sup> and Thomás Pompeu Sobrinho;<sup>84</sup> the Pernambucans, Carlos Bastos Tigre (residing in Ceará), Vasconcelos Sobrinho<sup>85</sup> and Dárdano de Andrade Lima; and the Paraibano Lauro Xavier.<sup>86</sup>

Constructing the works against the droughts, studying and reflecting about the natural resources of the Northeast, especially about its semi-arid parts, these authors managed to lay the basis of the ecology of the northeast. There is no way not to register especially the treatment given to the ecological question by one of the most important thinkers of Brazil: Gilberto Freire. In his monumental “Northeast,” the first edition of which is dated in 1937, Gilberto Freire already pointed out:

”This essay is an attempt at an ecological study of the Northeast of Brazil. From one of the Northeast, one stresses, because there are at least two, the agrarian and the pastoral; and here one only tries to see the agrarian closely. That of the sugar cane, which continues along by the lands of black clay soil through drainage areas, from the north of Bahia to Maranhão, without ever getting far from the coast.” He added that it was not sufficient to see simply. It is not about a sounding nor a minute analysis. The ecological analysis of such a complex region would be the task for more than one author, and not for just one; and also for more than one volume. Here one only tries to sketch the physiognomy of that agrarian Northeast, now decadent, which was for some time, the center of Brazilian

<sup>77</sup> LISBOA, Miguel Arrojado (1959) – “O Problema das secas” (“The Problem of the Droughts”). *Boletim do DNOCS*, nº 6, vol. 20, Rio de Janeiro: Nov., 1959. Miguel Arrojado Lisboa was the first Inspector of the Droughts. This text was produced for a conference given in Rio de Janeiro, in 1913, in the National Library.

<sup>78</sup> IHERING, Rodolpho von & BONANÇA, Dora von Ihering – *Ciência e belezas nos sertões do Nordeste (Science and beauties in the sertões of the Northeast)*. Fortaleza: DNOCS, 1983. Rodolpho von Ihering was the head of the Technical Commission of Pisciculture, created in 1932, responsible for the development of fish-farming in the waters dammed up in the semi-arid Northeast, principally those stored by IOCS. About the matter, see also: GUERRA, Paulo de Brito. *A civilização da seca (the civilization of the drought)*. Fortaleza: DNOCS, 1981, pp. 79-81.

<sup>79</sup> José Augusto Trindade was the first head of the Technical Commission of Reforesting and Agricultural Posts of the Northeast, created by President Getúlio Vargas, on November 12, 1932. He created and began functioning, in the municipality of Sousa, in Paraíba, the **Experimental Institute of the Dry Region**, subordinated to the Federal Inspection of Works against the Droughts – IFOCS. In 1941, after his death, the organ began to be called José Augusto Trindade Institute – IAJAT. To this Institute we owe a great part of the agronomic and ecological knowledge that we have currently, chiefly in relation to the northeast semi-arid area. See about the matter: GUERRA, Paulo de Brito. *O Instituto Agronômico José Augusto Trindade (The José Augusto Trindade Agronomic Institute)*. Fortaleza: DNOCS, 1984, p. 9-13.

<sup>80</sup> BERREDO, Vinicius. *Obras contra as secas (Works against the droughts)*. S. n. t.

<sup>81</sup> STUDART, Guilherme. *Diccionario bio-bibliographico cearense (Bio-bibliographic Ceara dictionary)*. Fortaleza: Typo-Lithographia a Vapor, 1910. 3 vol.

<sup>82</sup> SOUZA BRASIL, Thomas Pompeu de. *Memória sobre o clima e as secas do Ceará (Memory about the climate and the droughts of Ceará)*. 1877.

<sup>83</sup> SOUZA BRASIL Filho, Thomas Pompeu de. *O Ceará no começo do século XX (Ceará at the beginning of the twentieth century)*. Fortaleza: Typo-Lithografia a Vapor, 1909. 2v.

<sup>84</sup> SOUZA BRASIL Sobrinho, Thomas Pompeu. *História das secas (History of the droughts)*. Fortaleza: A. Batista Fontenele, 1958. (Instituto do Ceará. Monograph, 23.)

<sup>85</sup> VASCONCELOS Sobrinho, João. *As regiões naturais do Nordeste, o meio e a civilização (The natural regions of the northeast the environment and the civilization)*. Recife: Conselho de Desenvolvimento de Pernambuco – CONDEPE, 1971.

<sup>86</sup> Cf. MENEZES, José Rafael de. *Humanismo nordestino (Northeastern humanism)*. Recife: Centro de Estudos Técnicos de Pernambuco – CETEPE, 1982, especially Chapter XI.

civilization. The profile of the other Northeast will be traced by one of the deepest scholars of its social formation – Djacir Menezes”.<sup>87</sup>

The contribution which José Augusto Trindade made viable in the beginning of the 40's of the twentieth century with the creation of the institute which bears his name, and the innovations brought in by Guimarães Duque, Bastos Tigre and Vasconcelos Sobrinho, starting from the middle of that same decade, besides reinforcing the perception of Gilberto Freire, constitute most effective results of what it was possible to produce in the Northeast up to the middle of the last century in the matter of ecology and the environment. It was with the support of this production that Celso Furtado,<sup>88</sup> moreover, could conceive a strategy of sustained development for the Northeast. Celso Furtado knew how to read and interpret the contributions of Arrojado Lisboa and Guimarães Duque as few people have done.

It is fundamental to know that up to the end of the 50's, what one knew about the identification, exploitation and management of natural resources in the northeast had its production made viable by the Inspection of Works against the Droughts – IOCS, afterwards the Federal Inspection of Works against the Droughts – IFOCS and lastly, DNOCS. Additional contributions were rendered by the Agriculture Ministry, through the services of its Agricultural Posts and Experimental Farms, as well as from the Institutes of Research and Cattle-raising Experimentation – IPEANE, which was part of a network of regional institutes of research and cattle-raising experimentation. These were the institutions which formed the bases for the planting and replanting of several species destined for the establishing forests and reforestation of innumerable areas of the Caatinga of the Northeast. The former Commission of the São Francisco Valley – CVSF, currently substituted by the Development Company of the São Francisco and Parnaíba Valleys – Codevasf; the São Francisco Hydroelectric Company – CHESF and the Bank of the Northeast of Brazil also made valuable contributions in the production and broadening of knowledge about how to exploit better the natural resources of the region. The administrations of the different northeast states, some more, others less, also knew how to add value to the services done in the above-mentioned domains.

In the decades of the 1960's and 1970's Sudene was charged with the task of giving continuity to and doing more specific works in the areas of preservation, conservation and studies about the processes of desertification which were being identified in the Northeast. An important contribution was made by the Special Environment Secretariat – Sema, instituted by Decree no. 73,030 of October 30, 1973.

Sema was created as an institution linked to the Ministry of the Interior, to which was given the specific responsibilities of protection of the environment, notably those related to the urban and local development (Assistance to the municipalities, basic sanitation, habitation and benefiting areas, and construction of works for protection against droughts and floods). The creation of Sema was, to a great extent, the result of the responsibilities assumed by the Brazilian government at the United Nations Conference on the Human Environment, held in Stockholm in the year 1972. But it was the Ministry of the Interior which assumed the more specific responsibilities of a managing organ of the environmental

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<sup>87</sup> FREYRE, Gilberto – **Nordeste**; aspectos da influencia da canna sobre a vida e a paisagem do Nordeste do Brasil (**Northeast**; aspects of the influence of sugar cane on the life and landscape of the Northeast of Brazil). Rio de Janeiro: José Olympio, 1937, pp. 9-10. (Coleção Documentos Brasileiros, 4.) “O Outro Nordeste” (“The other Northeast”) was published in 1937. About Djacir Menezes, see: **O outro Nordeste**; formação social do Nordeste (**The other Northeast**; social formation of the Northeast). 1. ed. Rio de Janeiro: José Olympio, 1937. (Coleção Documentos Brasileiros, 5.)

<sup>88</sup> About Celso Furtado, consult: i) FURTADO, Celso. **A operação Nordeste (The northeast operation)**. Rio de Janeiro: Education and Culture Ministry. Superior Institute of Brazilian Studies – ISEB, 1959; ii) \_\_\_\_\_. **Formação econômica do Brasil (Economic formation of Brazil)**. Rio de Janeiro: Fundo de Cultura, 1964; iii) \_\_\_\_\_. **Uma política de desenvolvimento econômico para o Nordeste (An economic development policy for the Northeast)**. 2ª ed., Recife: Sudene, 1967; e iv) \_\_\_\_\_. **A Fantasia Desfeita (The phantasy undone)**. Rio de Janeiro: Paz e Terra, 1989.

question in Brazil. In fact, at that time, the activities of preservation of the soil resources, of the flora and of the fauna, were matters attributed to the Ministry of Agriculture.

The combating of desertification begins to be the object of new orientations after the United Nations Conference on Desertification, held in Nairobi, Kenya, in September 1977.

Brazil gave new emphases to the matter in 1992, with the United Nations Conference on Environment and Development (ECO-92), held in the city of Rio de Janeiro.

The success of ECO-92, with respect to the measures of combating desertification, was to a great extent the result of the conference "Impacts of Climate Variations and Sustainable Development in Semi-Arid Regions – ICID), held in Fortaleza, Ceará, in the period of January 27 to February 1, 1992.

In the line of works and agreements of ICID and of ECO-92, one held in February 1994, in Fortaleza, Ceará, the **International Conference and Latin-American Seminar on Desertification – CONSLAD**. In this conference both governmental representatives and civil society of Latin America participated. As a product of the works conducted there, the final text of the "Regional Annex of Latin America" was formulated and negotiated.

### **2.3 INICIATIVES IN THE PERIOD FROM 1994/1998 IN BRAZIL**

In the context of the Project BRA 93/036, implemented in the years from 1993/1998, one made studies oriented towards the "Elaboration of the National Policy of Controlling Desertification and Priority Actions". This effort was made starting from the Technical Cooperation Agreement between the Ministry of the Environment, Water Resources and of the Legal Amazon – MMA and the United Nations Program for Development – PNUD, having as its executing entity Fundação Grupo Esquel Brasil – FGEB.

In conducting these studies the MMA was benefited by the contributions made by ICID,<sup>89</sup> held in Fortaleza, in 1992, and by the International Conference and Latin American Seminar on Desertification – CONSLAD, creating a environment favorable for the conception and development of actions to combat desertification. These activities had a favorable course, at least, until 1998. Later on, the actions of an institutional nature, linked to the reduction of the Brazilian public administration, impeded the efforts destined to implement those measures from having the expected sequence. The actions delegated to the units of the federation in the Northeast could not, for this reason, follow the direction and the rhythm as foreseen.

Because of these interruptions, the more precise characterization of the areas in the process of desertification had a limited reach. Thus, the reduced tradition and familiarity of the governmental and technical-scientific community, reinforced by limitations of data bases and of other information also contributed to the theme. Not less important were the political and administrative aspects which contributed so that the institutionality demanded for the implementation of the Policy of Combating Desertification would reach its necessary success. One knows today, that different from the physical criteria, the possibilities and limitations of an institutional order fix limiting decisions, with respect to the realization of studies and research in the dominions of environmental preservation and conservation focused on the effective combat against processes of desertification in course in a region in study.

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<sup>89</sup> *Impacts of Climatic Variations and Sustainable Development in Semi-arid Regions*, conference held in the context of ECO-92 (United Nations Conference on Environment and Development).

The efforts of the government and non-governmental sectors undertaken in this period had as a central proposal to produce the **National Program to Combat Desertification – PNCD**. This program was a part of the commitments assumed by the government about combating desertification in the several forums in which it participated, since ICID and of ECO-92.

Desertification had already made up a part of the Brazilian imagination, showing the dramatic situation which the degradation of the natural resources of the Northeast had reached. Up to then, one knew that the areas threatened by the processes of desertification were contained in the semi-arid northeast. One concluded that the desertification was a result of the inadequate management of natural resources, bringing the degradation of the soil to the limit.

Brazil had already incorporated the concepts of the above-mentioned conferences in the subject of desertification. Thus, one understood that as the degradation of the soil represented the degradation of the reserves of the soil and water resources, the loss of vegetation and of biodiversity represented the consequent reduction of the quality of life and economic perspectives for the resident population. Since the pioneer studies of Vasoncelos Sobrinho, in the decade of the 1970's, one had come to know that the Semi-Arid Northeast has a surface on the order of 181,000 km<sup>2</sup> affected by processes of desertification,<sup>90</sup> resulting from the degradation of the natural resources. Various nuclei and areas submitted to processes of desertification had already been identified.

Although one could not count on a institutional system properly prepared and created to take care of the management of the programs and projects conceived in the period from 1994 -1998, the instruments formulated, even in a preliminary character, managed to be utilized in support of initiatives which were being put into practice. The executive actions referred to the qualification of human resources, little having been done in the matter of preservation, conservation and recovery of the degraded areas.

The greatest gains in this period corresponded to the studies which the MMA did, with emphasis on those destined to orient the formulation of the guidelines and policies of combating desertification. The improvement of the knowledge related to the processes of desertification was broadened, thanks to the studies promoted in the scope of the **Project Arid Areas**, put into practice by the initiative of six states in the Northeast (Piau , Cear , Rio Grande do Norte, Pernambuco, Para ba and Bahia), counting upon the sponsorship of the Secretariat of Planning, Budget and Coordination of the Presidency of the Republic (Seplan - PR), the technical support of the Interamerican Institution of Cooperation for Agriculture – IICA, and with the financial participation of the World Bank.

The Project Arid Areas was conducted according to the strategy that favored concern for the sustainability of development. For the first time, the process of planning incorporated the idea of sustainability, which had been recommended so strongly in the ICID, as well as in the conference of Rio de Janeiro in 1992. But the Project Arid Areas broadened the meaning of this concept, which stopped being merely environmental to be transformed into a global concept, for in it the economic, social, and political dimensions took on a fundamental role. Development would be sustainable when it presented conditions of durability in time. For this, it had to be economically sound, socially just, environmentally responsible and politically based on the participation of society.<sup>91</sup>

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<sup>90</sup> The information available today indicates that these areas cover 665,543 km<sup>2</sup>, with various degrees of affectedness (very serious, serious and moderate), as was shown in Table 1.4 before.

<sup>91</sup> PROJECT ARID REGIONS. **Nordeste: uma estrat gia de desenvolvimento sustent vel Norhteast: a strategy of sustainable development**). Bras lia, Minist rio do Planejamento e Or amento – MPO, 1995.

The concept worked on by the project incorporated also the long-term vision required for the identification of immediate and future priorities to be analyzed in the effort of planning for the definitive overcoming of the problems. It considered, at the same time, the guidelines of decentralization and participation of society, the practice of which would demand the recycling of the role of the government and of the definition of mechanisms of social participation in all the levels. Initially thought to be applied to the Northeast, the strategy of the Project Arid Areas was based on easily generalized methodological elements for the process of planning in other regions of the Country, including the possibilities of utilization in national scale planning. (Project Arid Areas, 1995.)

In the line of the studies done under the orientation of this project, 54 reports were prepared, thus specified by categories and by work groups:

- **Forty reports** about relevant themes (natural resources and environment, water resources, organization of regional space and agriculture, economy, science and technology, development policies and management models, human resources and integration with society) and special studies of interest to the states involved in the implementation of the project;
- **Seven reports** of work groups (relative to the themes mentioned in the previous item);
- **Six reports** consolidated by the states, meeting the verifications and proposals of work groups, pertaining to the state context;
- **One executive Report**, documenting the relevant aspects of the execution of the Project and the synthesis of the chief verifications and recommendations and products; and
- **Final report of the Project Arid Areas**, with an analysis of the conditions of current and future sustainability of the region, its vulnerability to the droughts and the efficacy of the policies of the government.<sup>92</sup>

In 1997, the Guidelines for the National policy for the Control of Desertification was done, within the National Policy for the Control of Desertification by means of Resolution nº 238, of December 22, 1997, of the National Environment Policy – Conama. Once integrated, These two documents represented the result of the efforts made by Brazilian Government to put into practice the dispositions agreed on with the United Nations Convention with the United Nations Covenant of Combating Desertification - CCD.<sup>93</sup>

The MMA produced moreover, several other contributions destined to elevate the level of knowledge about the desertification processes occurring in the Northeast, a production that was made systematic in a study elaborated by the ministry. These contributions became more visible after the analysis of the project Arid Areas, conceived to develop strategies destined to stop the processes of desertification in the Northeast by the introduction of appropriate practices of local management in the apparently most degraded areas and by means of the proposal of a new efficacious orientation for the development of threatened areas since the future development of these areas should be balanced with the

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<sup>92</sup> See about this: i) MAGALHÃES, Antônio Rocha et alii. Projeto Áridas; (**Project Arid Regions**); estudos sobre políticas e programas de desenvolvimento sustentável no Nordeste semi-árido (studies about policies and programs of sustainable development in the semi-arid Northeast). Brasília, IICA, Dec., 1993. and ii) Ministério do Planejamento e Orçamento – MPO & IICA (1995) – **Projeto Áridas, Nordeste: uma estratégia de desenvolvimento sustentável (Project Arid Regions, Northeast: a strategy of sustainable development)**. Brasília, MPO, 1995.

<sup>93</sup> Cf. UNITED NATIONS. **United Nations Convention for combating desertification in the countries affected by serious drought and/or desertification , particularly in Africa**. Brasília: MMA, 1997. (Document prepared in the scope of the Project BRA 93/036/MMA/PNUD/Fundação Grupo Esquel Brasil, with the support of FAO.)

above-described environmental vulnerabilities; the new orientation which the PNCD recommends is that of sustainable development.”<sup>94</sup>

The activities to combat desertification done by MMA, also were supported by the Fundação Grupo Esquel Brasil, which had already been active in this area since the holding of the ICID and the CONSLAD. The Foundation Esquel has collaborated, moreover, in the execution of initiatives of recovery of degraded areas, as it did in relation to the Group of Desertification Studies of the Seridó – GEDS. This group was created in 1997, having as its objective to study, propose and put into practice measures for the control of the desertification process which affects the region of the Seridó of Rio Grande do Norte. The GEDS was formed starting from considering the question of the drought and of the alternatives for the living with the effects provoked by this phenomenon. The agenda of discussions of the group includes subjects related to the economic viability studies of directly combating the processes that set off desertification.

## **2.4 ACTIONS PUT INTO PRACTICE IN BRAZIL IN THE PERIOD FROM 1999-2003**

The United Nations Convention to Combat Desertification – CCD began a systematic process of treatment of the themes of the struggle against desertification. On the one hand, it sought to obtain and systemize available knowledge, in such a way as to obtain a diagnosis of the situation. On the other hand, for the first time, the Guidelines for a National Policy of Combating Desertification were traced, seeking the involvement of states and municipalities in the processes - technical and political – of the construction of PAN-Brazil.

Administrative and operational restrictions in the federal scope did not permit one to design the program referred to until 2003. The relative instability observed in the federal sphere in some years of this period, in particular in that one referring to the commitments assumed by the Ratification of the convention did not impede some states and organizations of civil society from continuing to make oriented initiatives of a political-administrative nature, destined to combat desertification.. These efforts were always on a small scale, compared to the demand, but had the merit of showing, for the first time, the commitment of the states such as Bahia, Ceará, and chiefly, Pernambuco in the treatment of these questions.

There are important actions being done in a regional character, but with little articulation. One has discussed that the Economic Ecological Zoning – ZEE can be constituted as an instrument of this articulation – spatial – moreover, - following the example of the areas to preserve, conserve and develop. Included in this role are the actions in the domain of water resources, to be treated by the basin committees and/or other basin organizations. The forest policy constitutes an important element of this equation. A specific program of recovery of degraded areas is a priority matter. On a large scale, it would treat of taking care of water resources or of the recovery of a river like the São Francisco.

As emphasized in the previous section, it is certain that Brazil has managed to broaden gradually the degree of consciousness and the number of institutional actors involved in the theme of the processes of desertification and in the necessity to promote its combat.

The formulation of the PAN-Brazil thus comes to be the result of the initiative of the Water Resources Secretariat of the Environment Ministry, chiefly starting from April of 2003,

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<sup>94</sup> About the subject, consult: MCKAUGHAN, Sean E. **Guia metodológico para o desenvolvimento sustentável (Methodological guide for sustainable development)**. Brasília: MMA, 1997. (Document prepared in the scope of the Project BRA 93/036/MMA/PNUD/ Fundação Grupo Esquel Brasil, with the support of FAO.)



when the Water Resources Secretary himself assumed the role of National Focal Point of the United Nations Convention to Combat Desertification.

This initiative was backed up by the state governments and by non-governmental organizations, particularly those which make up the ASA, having as fundamental orienting instruments the environmental policy of President Lula's government and the guidelines of the Environment Ministry.

## *Chapter III*

# **PROCESS OF CONSTRUCTION OF PAN-BRAZIL**

The National Action Program to Combat Desertification (PAN-Brazil) was formulated as part of a process which was simultaneously political and technical. This process involved the different social actors which can bring it about that the actions combating desertification, besides being acts of consolidation and of preservation and conservation of natural resources of the Areas Susceptible to Desertification – ASD, can also be characterized as initiatives for strengthening citizenship of all who live in this region.

The participation of these actors was broad and transparent. All the important leaderships historically involved in the struggle for preservation and conservation of nature in a broad sense were mobilized. The work consolidated here corresponds to a significant participatory experience in the domains of planning of which one has information in Brazil. For this reason, one can admit that the passing to the implantation stage of the program will tend to take place in a way compatible with the search for the desired results.

One discusses in the present chapter, questions related to the following topics: i) Methodological Bases; ii) Institutional Engineering; and iii) the Process of Construction.

### **3.1 METHODOLOGICAL BASES**

The methodology adopted by the Brazilian government for the elaboration of PAN – Brazil tries to attend to the principles of the CCD – in the international scope – and to national conditioning factors such as the following: territorial dimensions, federative organization, level of organization of civil society and political priorities of the Brazilian government. In this perspective one tried to:

- i. Guarantee broad participation in the construction of the program;
- ii. Facilitate the construction of pacts and commitments between federal, state organs and organizations of civil society;
- iii. Create conditions to treat the combat of desertification in a transversal way, considering the relevant sector policies; and
- iv. Consolidate a program oriented to the promotion of sustainable development of the areas susceptible to desertification.

The partnership involving civil society was made easier by two important interconnected tendencies in the context of the democratization process in Brazil and, in particular, of the Northeast region. The first is with respect to the radical changes in public management, giving emphasis to social control the broad promotion of citizenship and

decentralization<sup>95</sup> A second refers to the strengthening of social organization in general and its growing capacity of interaction on equal terms with the public sector.

It is in this context which one tried to include in the process of participatory elaboration of the PAN-Brazil, the experiences already developed by organized civil society, chiefly that of articulation of the Semi-Arid (ASA), which has been, since 1999, maintaining inter-institutional and inter-sector articulations, aiming at the proposing and implementing of public policies directed towards the construction of instruments for living with the semi-arid area.

So that the theme of desertification would be present in political agendas, it was necessary to have a greater involvement of the states. Thus, the dynamics of debates and the making pacts in 11 states of the areas of activity were promoted (Maranhão, Piauí, Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Alagoas, Sergipe, Bahia, Minas Gerais and Espírito Santo), included in the processes of desertification. The involvement of the state governments made it possible to create synergies between the federal and state governments.

Finally the transversal treatment of the themes “combating poverty” and “preservation of the environment” was made easier, this being the approach conceived by the federal government and instituted by means of different mechanisms of interministerial coordination. In this same vision, organs such as the Codevasf, DNOCS and the Banco do Nordeste do Brasil began important institutional reforms, broadening their inventions beyond sector questions, structuring themselves to take on the role of promoters of regional development on sustainable bases.

In this context, and according to the above-mentioned central propositions, the methodological approach was designed as required for the elaboration of the PAN-Brazil. The process was set off in the middle of 2003, with the financial support of the World Mechanism, of IICA and of GTZ (German Technical Cooperation). One also could count on the participation of human resources of the Water Resources Secretariat – SRH, of the Environment Ministry – MMA and of several NGO’s involved in the construction of PAN-Brazil.

### **3.2 INSTITUTIONAL ENGINEERING**

The institutional structure created by the elaboration of PAN-Brazil was developed aiming at the construction of pacts – with emphasis on the concept of transversality – in a way that the theme “combating desertification” would be on the political and institutional agenda of the diverse public and social segments of the semi-arid and/or with activity in this geographic space.

The role of the **National Focal Point** of the CCD was transferred from the fourth to the second level of the government, aiming at facilitating the communication between spheres of greater decision-making capacity and facilitating the decision-making processes. Starting from April of 2003, the SR-MMA assumed this role, constituting there a Technical Coordination of Combating Desertification – CTC, destined to give technical support to the works of elaboration of the PAN-Brazil.

From then on, the agreement and institutionalization necessary for the success of the construction of the program were sought for. In this way, one gave value to the aspects

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<sup>95</sup> According to Mega-objective III of the Strategic Orientation of the Government.

connected to transversality of actions and the broad social participation, besides the integration of policy pacts with the real demands of the local populations. There were two institutional lines, one operational, made by State Focal Points; and the other more political – integrated by work groups.

### **3.2.1 Technical Cooperation to Combat Desertification – CTC**

The CTC is a part of the structure of the Water Resources Secretariat, of the Environment Ministry – National Focal Point – which has as its mission to coordinate the process of elaborating and implementing PAN-Brazil and conceiving the National Policy to Combat Desertification. It also has as its task to act as a political interlocutor between the Focal Points and other instances of the government and of civil society.

### **3.2.2 Work Groups**

With the objective of Strengthening the necessary institutionality for the elaboration and chiefly for the implementation of the Pan-Brazil, Directive no. 265, of June 23, 2003 created the Interministerial Work Group – GTIM. Due to the necessity of strengthening pacts with civil society and with the state governments, by means of dialogs based on common ideals, another two Work Groups were aggregated to the process of construction of Pan-Brazil: The Parliamentary and the Civil Society Work Groups. The interfacing of these groups is mediated by the Technical Coordination to Combat Desertification (CTC).

#### **3.2.2.1 Interministerial Work Group – GTIM**

The Interministerial Work group has as an objective to propose mechanisms for the elaboration and implementation of PAN-Brazil. Under the coordination of SRH/MMA this work group has as its specific mission to involve in an organic manner, the diverse governmental (federal and state) segments, as well as civil society, in the search for harmonizing public policies of combating desertification and living with the semi-arid region.

GTIM is made up of representatives from seven ministries, of six public federal institutions, of four state government institutions and of four civil society instances, all with direct activity in the ASD, thus specified:

- i. Environment Ministry – MMA (Coordination);
- ii. Ministry of National Integration – MI;
- iii. Ministry of Social Development and Combating Hunger – MDS;
- iv. Agriculture, Cattle-Raising and Supply Ministry – MAPA;
- v. Ministry of Agrarian Development – MDA;
- vi. Ministry of Science and Technology – MCT;
- vii. Planning, Budget and Management Ministry – MPOG;
- viii. The States of Bahia, Ceará, Paraíba and Pernambuco (as principal members) and of Sergipe, Rio Grande do Norte, Alagoas e Piauí (as their substitutes, respectively);
- ix. International Network of NGO's about Desertification – RIOD (a Brazilian representative);
- x. Articulation in the Brazilian Semi-Arid – ASA, represented by the Maranhão Association for the Conservation of Nature – AMAVIDA;

- xi. Fundação Grupo Esquel Brasil – FGEB;
- xii. Network of Education of the Brazilian Semi-Arid Region – RESAB, represented by The Regional Institute of Small Cattle-raising Owners – IRPAA;
- xiii. National Water Agency – ANA;
- xiv. Brazilian Institute of Environment and Renewable Natural Resources – Ibama;
- xv. Development Company of the Valleys of the São Francisco and of the Parnaíba Rivers – Codevasf;
- xvi. National Department of Works against the Droughts – DNOCS;
- xvii. Brazilian Institute of Geography and Statistic – IBGE;
- xviii. Brazilian Agricultural Research Corporation – EMBRAPA; and
- xix. Banco do Nordeste do Brasil S. A. – BNB.

Considering the amplitude of the themes and the problems to be faced for the elaboration of PAN-Brazil it was decided in one of the meetings of the GTIM, that the actions of the Program should be organized according to great theme areas, having as a parameter the Strategic Orientations of the Government. To this end, thematic commissions were formed, structured with the cooperation of federal and state organs, besides the research centers, with the proposal of systemizing and harmonizing the already existing proposals in the Pluriannual Plan of Investments (PPA 2004-2007) with those arising from the participatory process of elaboration of PAN-Brazil. The commissions which worked under the coordination of SRH/MMA, were organized by GTIM in four thematic areas, just as specified as follows:

- a) Reduction of Poverty and of Inequality, with the subthemes: Social Security, Family Agriculture/Food Security, Environmental Sanitation and Education;
- b) Sustainable Increase of Productive Capacity, with the sub themes: Economic Development, the Question of the Land, the Energy question, Irrigated Agriculture/ Salinization and Water Resources;
- c) Preservation, Conservation and Sustainable Management of Natural Resources, with the sub themes: Protected Areas, Forest Resources, Economic Ecological Zoning and Environmental policies; and
- d) Democratic Management and Institutional Strengthening.

### **3.2.2.2 Parliamentary Work Group**

This group was created in the scope of the Environment commission of the Federal Chamber and had as its basic objective to accompany and collaborate in the process of elaboration of proposals, as well as to support and negotiate initiatives, according to its constitutional attributions, destined for the elaboration of legal support for the implementation of the PAN-Brazil. The constitution of this group is of great importance, chiefly in relation to the continuity of the process of making pacts of policies for combating desertification. The Parliamentary work Group is characterized as the chief interlocutor and articulator of the PAN-Brazil before the state Parliamentary Focal Points, so that the question of combating desertification will be internalized in the state and municipal policies.

### **3.2.2.3 Work Group of ASA – GTCD**

The Work Group to Combat Desertification of ASA - GTCD was instituted in June of 2003, with the mission of articulating the network of social organizations in the ASD, oriented

towards integrating actions, disseminating information and negotiating with the public powers effective actions for the combating of desertification.

The actions of the GTCD have been important in respect to the broadening of the degree of participation of civil society, with the activity in the ASD, in the elaboration and implementation of PAN-Brazil. Its initiatives also have contributed positively for the strengthening of the relations with the state governments, so that the demands of society are reflected in the regional policies, and that the action of the local governments could be concatenated with those of civil society.

### **3.2.3 State Focal Points**

In analogy to the attributions of the CCD, the Secretariat of Water Resources of the Environment Ministry stimulated the creation of Focal Points in the 11 States covered by the Program. These Focal Points represent the state governments, the civil society and the legislative assemblies.

The **Governmental Focal Points** are represented by secretaries of the environment, of water resources or even, in some cases, by high directors of these secretariats.

In the same way, civil society, by means of the ASA, created a similar policy structure, represented by the Focal Points of Civil Society, the members of which are chosen by election in the state collegiate bodies.

The principal functions of the State Focal Points consist of sensitizing articulating and coordinating the activities and actions of state range around the elaboration process of Pan-Brazil, as well as to serve as qualified interlocutors before the National Focal Point, in respect to the intergovernmental and inter institutional relations More specifically, these Focal Points has as chief objectives:

- i. Facilitate the exchange of information;
- ii. Promote pacts and negotiations;
- iii. Promote cooperation and consultation;
- iv. Promote agreements and institutional links – in their spheres of competence – between civil society and the governmental organs related to combating desertification and to the application of the principles of the CCD; and
- v. Guarantee participatory management, by means of the presence of organizations of civil society, be it in the design, in the execution, in the evaluation or in the monitoring of the State Programs to Combat Desertification.

In November 2003, these Focal Points received training about the concepts and policies of combating desertification. The training was done to facilitate the integration of the actions between these representatives and those of the governments (federal and state) and of civil society. After this, in quarterly meetings, the strategies, chief difficulties and the needs implementation of the demands emanating from the GTIM were discussed.

The articulation of the government with civil society has as a proposal to integrate the actions in the sphere of these instances, so that both arrive effectively at the communities impacted by the processes of desertification in the Brazilian Semi-Arid Region. This relation gives to the federal government a closer interface/interlocution with the state governments, and of these with society.

The structuring of such instances has been of great importance for the mobilization of the state social actors in the process of elaborating of the PAN-Brazil and in the dissemination of the information which gave broad visibility to this process.

To strengthen this process the figure of the Parliamentary Focal Point was created, under the articulation of the Work Group of the Federal House of Representatives, closing definitely the functions of articulation of state strategies. In this sense: i) the Governmental Focal Points articulate with the official institutions of their level, ii) the Civil Society Focal Points promote the connection between the demands of the communities and the effectiveness of the public policies; and iii) the Parliamentary Focal points are responsible for the dissemination of the political discussions in the scope of the Legislative Assemblies and for the negotiations together with the remaining governmental instances. The articulation between these spheres is done by the Water Resources Secretariat of the Environment – which acts as a **National Focal Point**.

Figure 3.1 shows the relation between the above-mentioned instances created and the National Focal Point.

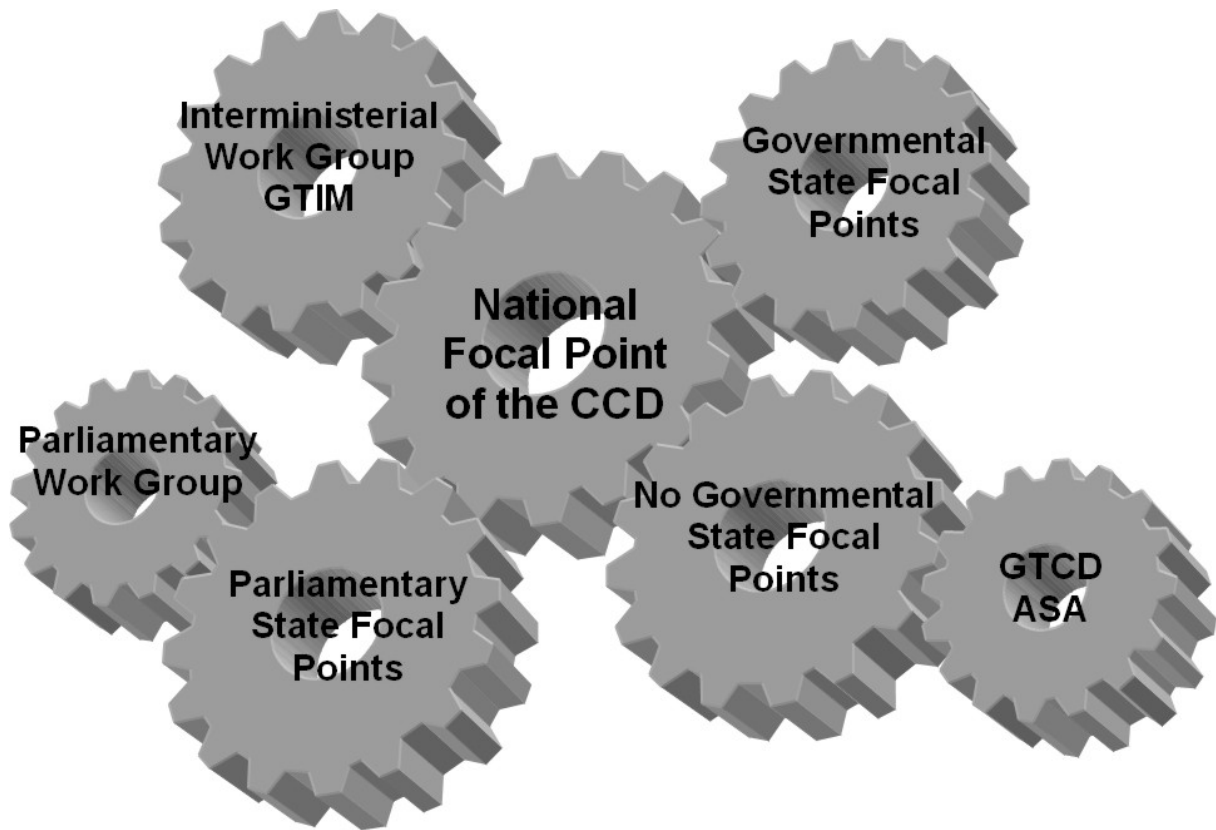
### **3.3 THE PROCESS OF CONSTRUCTION**

The elaboration of the PAN-Brazil was characterized by a participatory process marked by two aspects: i) the technical aspect, centered on studies and review of the existing policies; and ii) the political aspect, related to the involvement of the various institutional actors, both governmental and non-governmental.

From the interface between these two aspects, one sought to integrate the proposals coming from civil society with those public policies of the government, implemented and/or in the nature of a proposal. The convocation, coordination and moving of this process was set off starting with the coordinating of the National Focal Point, by means of the CTC/SRH.

The technical aspects of the process were developed under the coordination of the CTC/SRH, by means of the Interministerial Work Group and of the Thematic Commissions. The task of the commissions consisted of the systemizing of the proposals coming from the state dynamics done in their states included in the program, in light of the existing policies and programs, for their analysis and (later) making adequate for the principles foreseen by the CCD. A good part of the members of these commissions participated in one or more stages of the participatory construction of the states, collaborating in the debates and guaranteeing a direct flux of information.

**FIGURE 3.1**  
**Institutional, Policy and Operational Articulation**  
**for the Elaboration of PAN-Brazil**



The policy aspects of the process were in course during the State Dynamics coordinated and organized by the State Focal points and were successful in mobilizing a considerable range of regional actors around the construction of the PAN-Brazil.

Two official State Workshops were held, in the months of March/April and May/June of 2004 in the 11 states included in the Program. From these, more than 1,200 representatives of about 4,000 governmental and non-governmental institutions participated (Table 3.1). The first State Workshops had as their chief objective to raise proposals of actions for PAN-Brazil; and the second Workshops, that of systemizing these actions. These proposals are systemized according to thematic axis and can be found listed in annex 6.

During the work process several changes in the methodology adopted were made, with the result of formal and informal interactions. In the Third National Meeting of the Focal Points, held in Olinda, Pernambuco, on April 22 and 23 of 2004, one could count on the participation of the majority of actors involved in the process: State Focal Points, members of the GTIM, Members of the Thematic and Parliamentary Commissions. In that event the actions demanded in the first State Workshops were discussed and the first texts produced by the Thematic Commissions were analyzed.



**TABLE 3.1**  
**Schedule of the State Workshops Held in 2004**

STATE	1 <sup>st</sup> STATE WORKSHOPS			2 <sup>nd</sup> STATE WORKSHOPS		
	DATE	PLACE	PRESENT	DATE	PLACE	PRESENT
Alagoas	25-26 of March	Piranhas	53	27-28 of May	Palmeira dos Índios	30
Bahia	---	---	---	25-26 of May	Feira de Santana	51
Ceará	04-05 of March	Fortaleza	66	27-28 of May	Fortaleza	67
Espírito Santo	18-19 of March	Colatina	47	08-09 of June	Colatina	35
Maranhão	25-26 of March	São Luis	63	28-29 of May	Chapadinha	58
Minas Gerais	05-06 of April	Salinas	56	01-02 of June	Minas Novas	50
Paraíba	24-25 of May	Campina Grande	92	08-09 of June	Patos	36
Pernambuco	12-13 of April	Recife	34	-	-	-
Piauí	1 <sup>o</sup> - 02 of April	Teresina	155	27-28 of May	Gilbués	90
Rio Grande do Norte	29-30 of May	Caicó	81	01-02 of June	Mossoró	140
Sergipe	12 of April	Aracaju	47	-	-	-
<b>N<sup>o</sup> of participants:</b>			<b>694</b>			<b>557</b>
<b>Total:</b>						<b>1251</b>

After systemizing the documents produced by the Thematic Commissions – including the programs and policies of the federal government – the first version of the program was elaborated integrating the actions demanded in the workshops and the suggestions presented by the Interministerial Work Group.

This first version of the PAN-Brazil was discussed during the month of July, by means of a videoconference, open to the public, which involved the Legislative Assemblies of the 11 states. In this videoconference the 3 State Focal Points had their first formal meeting. After the suggestions of the members of the GTIM, during its fifth meeting were presented, the document was made available in the portal of desertification: <http://desertification.cnrh-srh.gov.br> so that the participants in the process of construction of PAN-Brazil could give suggestions or simply consult the document.

On Table 3.2 there is a synthesis of the first stages of the methodology of construction of PAN-Brazil which was presented and debated in February of 2003, during the Second National Meeting of the Focal Points in Maceió, already held as a part of this strategy. The only aspects of this chart which were altered were the dates. This occurrence was already expected, due to the great decentralization of the stages of formulating the Program, subject to nuances of the participatory work process.

During the first evaluation of the process of participatory elaboration of PAN-Brazil, it was possible to identify positive elements, limitations and challenges still existing. In this way, one could extract lessons to orient the future process of review and complementing of PAN-Brazil.

The institutional structure, created and broadened along the process, permitted one to administer this process in a satisfactory way, involving innumerable actors, in an area corresponding to the size of two Frances, with states and municipalities enjoying great political and administrative autonomy.

The creation of Governmental and Non-Governmental Focal Points in the states concluded in the Program, should be considered as one of the great successes of the process up to the present. With this procedure, it was possible to begin in all the states a new dynamic of dialogue between the government and civil society, including in states where there were and still are 'open conflicts of interests' about the questions of use of natural patrimony. This new constellation permitted one to advance in a constructive way in the search for negotiated solutions, where the existence of an external facilitation, since one treats of a process of national scope, helped in the dialogue and in bringing the actors together.

The creation of the Interministerial Group – GTIM should also be emphasized, for the institution of this group made possible the construction of agreements between the chief actors about mechanisms of concerted efforts and about distinct stages of elaboration of the PAN-Brazil.

With respect to the methodology, the experience also was satisfactory, chiefly in relation to the discussion and the analysis of the policies of the government by the Thematic Commissions during the State Workshops. Besides the new mechanisms of dialogue already mentioned, they advanced in a significant way in the analysis of problems in their geographic and thematic dimensions and in the dissemination of the conventions as a policy instrument for organizing and orienting the combat of desertification.

The great challenge for the future, in relation to their process of formulation of the Program will be the consolidation of pacts between the most diverse actors. Up to the present, in the majority of cases, these pacts still are in the initial phase of construction and strengthening. The fact of the elaboration of PAN-Brazil having been conducted as a process to have a continuation after the publishing of the document can also be considered an important methodological gain.

The partnerships established are considered strategic for the success of the implementation of the Program. In the National scope, organs such as Codevasf, DNOCS, the Agency for the Development of the Northeast and the Banco do Nordeste are integrated in the process and support it with their own resources. In the same way, cooperations were done with bilateral and international agencies, as the World Mechanism, IICA and GTZ, which will continue to contribute so that the program will be implemented with success in Brazil.

**TABLE 3.2  
METHODOLOGY FOR THE ELABORATION OF PAN-Brazil**

PERIOD	DYNAMICS AND EVENTS	OBJECTIVES
Mar/2003	The Water Resources Secretariat of the Environment Ministry assumes the function of National Focal Point of CCD	(a) Transfer to the 1 <sup>st</sup> level of the government the responsibility for implementing the CCD in Brazil; (b) Elaborate the National Action Program to Combat Desertification (PAN-Brazil).
Mai/2003	Meeting of the Countries of South America – Mendoza – Argentina	Discuss indicators of desertification.
Jun/2003	IX Regional Meeting in Bogotá – Colombia	(a) Discuss the effects of the drought in Latin America and the Caribbean; (b) Choose the Regional Coordinator of the CCD for the Countries of the South cone.
	Institution of the Interministerial Work Group – GTIM	(a) Propose mechanisms for elaborating and implementing the National Action Program to Combat Desertification (PAN-Brazil).
Jul/2003	Seminar on Planning the Support Project for Elaboration and Implementation of the PAN-Brazil, Olinda – PE	(a) Discuss the proposal of the project with the actors involved; (b) Present the results of the evaluation mission; (c) Agree upon the objectives and the functioning of the project; (c) Identify the cooperations in the scope of the project.
Aug/2003	National Workshop of Specialists in Desertification Indicators	(a) Define the physical environmental and socioeconomic indicators of desertification in Brazil, in the scope of the Program to Combat Desertification and Mitigate the Effects of drought in South America –IICA/BID
Oct/2003	Workshop with the Interlocutors of PAN-Brazil: strategy of Elaborating PAN-Brazil, Recife – PE	(a) Proposal of a strategy to elaborate the PAN-Brazil to provide subsidies for the 1 <sup>st</sup> Meeting of the GTIM.
Nov/2003	I National Meeting of the Focal Points	(a) To make the principles alike of the CCD for the construction of PAN-Brazil; (b) Promote the interaction of the governmental actors and of civil society.
	1 <sup>st</sup> meeting of the GTIM	(a) Taking office of the members of the GTIM; (b) equalize the knowledge about the CCD and the PAN-Brazil; (c) Discuss and approve the Summary of the PAN-Brazil; (d) Discuss and approve the agenda for elaborating the PAN-Brazil; (e) Define the Reference Document with the profiles of the consultants to be contracted for the elaboration of PAN-Brazil; (f) Discuss the desertification portal.
Dec/2003	2 <sup>nd</sup> Meeting of the GTIM	(a) Discuss the Minutes of the Internal Rules of the GTIM; (b) Discuss the Minutes of the Reference Document of the Consultants for the PAN-Brazil; (c) Present and discuss the Summary in context of the PAN-Brazil; (d) Present and approve the strategy proposal for mobilizing the MMA–SRH/ASA/GTZ; (e) Present the Project of the National Environment Fund–FNMA.

Continued

continuation

PERÍOD	DYNÂMICS AND EVENTS	OBJECTIVES
Jan/2004	3rd Meeting of GTIM	(a) Present and approve the final version of the Internal rules of the GTIM; (b) Discuss the General Reference document for the Elaboration of PAN-Brazil; (c) Present the final version of the Reference document and definition of the consultants for contracting; (d) Discuss the constitution and functioning of the Thematic Commissions of PAN-Brazil; (e) Present and discuss the proposal of the project FNMA; (f) Revise the schedule of elaboration of the PAN-Brazil.
Feb/2004	II National Meeting of Focal Points	(a) Elaborate a participatory agenda for the construction of PAN-Brazil; (b) Discuss the question of mobilization and preparation of the 1 <sup>st</sup> State Workshops.
Mar- Abr/2004	1 <sup>st</sup> State Workshops	(a) Analyze with the community the chief problems related with the process of desertification; (b) strengthen the relationship between the Governmental and Non-Governmental Focal Points.
Mar/2004	1 <sup>st</sup> Workshop of the Thematic Commissions	(a) Equalize the knowledge about CCD and the PAN-Brazil; (b) Constitute the Thematic Commissions; (c) Propose sending along for the subthemes of PAN-Brazil.
	Participation in the <i>Taller</i> "Segment and Evolution of the PAN's-CCD", in São Domingo, Dominican Republic.	(a) Discuss the indicators and the Management of the National Action Programs.
Apr/2004	III National Meeting of the Focal Points	(a) Systemize the proposals coming from the 1 <sup>st</sup> State Workshops; (b) Analyze the policies and programs of existing governments; (c) Strengthen the interaction between the diverse actors involved in the process.
May/2004	4 <sup>th</sup> Meeting of the GTIM	(a) Present the documents produced by the thematic commissions and consolidated in the State Workshops; (b) Select consultants for giving a better basis for the central themes and the general writing of the Program.
	1 <sup>st</sup> Meeting of the Parliamentary GT	(a) Begin the policy articulations in the scope of the Federal Chamber of Deputies; (b) Constitute the Parliamentary Work Group in the federal and state scopes; (c) equalize the knowledge about the CCD and the PAN-Brazil; (d) Propose sending along proposals..
	Starting off of the desertification portal <a href="http://desertificacao.cnrh-srh.gov.br">http://desertificacao.cnrh-srh.gov.br</a> .	(a) Disseminate the process of construction of PAN-Brazil; (b) Facilitate the contact between society and the government.
	Holding of the 1 <sup>st</sup> Meeting of the Technical-Scientific Committee of PAN-Brazil.	(a) Present research works directed towards the semi-arid and dry sub-humid areas; (b) Discuss the process of constituting the CTC and propose sending the works along.

Continued

PERIOD	DYNAMICS AND EVENTS	OBJECTIVES
May-Jun/2004	2 <sup>nd</sup> State Workshops	(a) Consolidate the general actions of the Program, synthesized no III National Meeting of Focal points; (b) Analyze the texts elaborated by the thematic commissions.
Jun/2004	Start-up of the Summit conference of the Governors of the Semi-Arid Region by Children and Adolescents – UNICEF	(a) Celebrate the World Day to Combat Desertification; (b) Mobilize the governors of the states inserted in the semi-arid and dry sub-humid areas for the problematical situation of the children and adolescents of the region.
Jul/2004	1 <sup>st</sup> Version of PAN-Brazil	(a) Analyze the 1 <sup>st</sup> version of the PAN-Brazil, which was the task of the technicians of SRH/MMA and of the consultants contracted.
	Video conference	(a) Present and discuss the document in the scope of the Legislative Chambers of the 11 states involved in the process; (b) strengthen the pacts already signed.
	5 <sup>th</sup> Meeting of the GTIM	(a) Discuss the preliminary version of PAN-Brazil; (b) Discuss the map of the semi-arid and dry sub-humid areas; c) Discuss the next steps for implementing the program.
	Making the document available on the portal <a href="http://desertificacao.cnrh-srh.gov.br">http://desertificacao.cnrh-srh.gov.br</a>	(a) Begin again the process of discussion with the participants of the State Workshops; (b) Make the document available for a greater number of persons.
	Presentation of the proposal of policy articulation for the management of PAN-Brazil to Minister Marina Silva.	(a) Strengthen the institutionality of the Program; (b) Guarantee the support of the government for implementing the actions of PAN-Brazil.
Aug/2004	IV National Meeting of Focal Points	(a) Presentation of the Management Proposal for PAN-Brazil; (b) Analysis of the Project for Implementing the Chief Actions of the Program; (c) Discuss the remaining actions of the Project of the FNMA.
	6 <sup>th</sup> Meeting of the GTIM	(a) Presentation of the Management Proposal for PAN-Brazil; (b) Analysis of the Project for Implementing the Chief Actions of the Program.
	South-American Conference about Combating Desertification – CCD+10	(a) Celebrate the 10 years of the CCD; (b) start up PAN-Brazil; (c) Broaden the interchange of experiences and knowledge about the theme “Desertification” with the representatives of the other countries and (d) advance the participatory process between Brazil and the countries of Latin America.

## *Chapter IV*

# **STRATEGY OF THE NATIONAL ACTION PROGRAM TO COMBAT DESERTIFICATION**

The strategy of PAN-Brazil includes a set of orientations formulated with the purpose of assuring adequate paths for the achieving of the objectives of the Program, which were postulated in a way to explain the initiatives which structure the political will, organized by different agents involved, for the formulation of the program. One can in this way, define the strategy as a path or manner utilized to overcome challenges and attain objectives, of a governmental institution, of a non-governmental organization or of a given set of these types of agents.<sup>96</sup>

In this chapter the following aspects are treated: i) Strategic Landmarks of PAN-Brazil; ii) Thematic axes of the Program; iii) Focus of PAN-Brazil; iv) Objectives of the Program; and v) Conditioning Factors and General Restrictions.

### **4.1 STRATEGIC LANDMARKS OF PAN-Brazil**

For the formulation of the general strategy of PAN-Brazil, three referential landmarks were observed: the mega-objectives of the Strategic Orientation of the Government, with a basis on which the Pluriannual Plan of Investments was elaborated (2004-2007);<sup>97</sup> Article 10 and the Annex of Latin America and the Caribbean of the Convention to Combat Desertification; and the Declaration of the Semi-Arid Region. Thus, they are based on the same elements which structured the methodological bases for elaborating the Program. Following, the elements related to the following topics are described: i) Orientations of the United Nations Convention to Combat Desertification; ii) Orientations for the Pluriannual Plan of Investments (PPA) of the Federal Government; iii) The Declaration of the Semi-Arid – ASA; iv) Other Orientations.

#### **4.1.1 Orientations of the United Nations Convention to Combat Desertification**

The first landmark adopted as a referential for the elaboration of PAN-Brazil is that furnished by the Convention itself. In its article 10, the CCD establishes that the chief objective of the programs of national actions is to identify the factors which contribute for desertification and the measures of a practical nature necessary for its combat and the mitigation of the effects of the drought.

This article makes a series of recommendations for the National Action Program, emphasizing among them to:

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<sup>96</sup> See about this: OLIVEIRA, Djalma de Pinho Rebouças de (1992) – **Planejamento estratégico: conceitos, metodologia e práticas (Strategic Planning: concepts, methodology and practices)**. São Paulo, Atlas, 1992.

<sup>97</sup> The PPA 2004-2007 was approved by the National Congress on July 13, 2004.

- i. Include long term strategies of combating desertification (...) and integrate them in the national policies of sustainable development;
- ii. To have in mind the possibility of changes being introduced, in response to alterations in the presuppositions on which one based its elaboration, which should be sufficiently flexible, at the local level, to accommodate different socioeconomic biological and geophysical conditions;
- iii. Give special attention to the application of preventive measures in the lands not yet degraded or which are only slightly degraded;
- iv. Reinforce the capacity of each country in the area of climatology, meteorology and hydrology and the means to construct an early warning system in case of drought.
- v. Assure the effective participation at the local, national and regional level of the non-governmental organizations and of the local populations both masculine and feminine, and (...) the respective representative organizations having in mind its involvement in the planning of policies in the process of decision, implementation and review of the programs of national action.

Article 4 of the CCD, in the Regional Annex of Latin America, also advances in the definition of contents for the PAN Brazil centering it on:

- i. Consciousness-raising and education, as well as scientific and technical development;
- ii. the eradication of poverty;
- iii. The reaching of food security;
- iv. The sustainable management of the natural resources in the diverse hydrographic basins;
- v. The sustainable management of soil and water resources;
- vi. The need to formulate a plan of contingencies for the mitigation of the effects of the droughts;
- vii. The strengthening or establishment of information systems for early warning;
- viii. The sustainable management of various sources of energy – use of alternative energies;
- ix. The conservation and the sustainable use of the biodiversity, according to what was established in the Convention about Biological Diversity;
- x. The consideration of demographic aspects related to desertification; and
- xi. The establishment or strengthening of the legal and institutional landmarks which facilitate the implementing the principles of the Convention, considering the aspects of decentralization and of participation of the communities involved and of the society in general.

#### **4.1.2 Strategic Orientation of the Federal Government**

The second great strategic reference of the PAN-Brazil is related to the axes of its construction which are harmonized with the national macro-policies, made concrete in the Pluriannual Plan of Investments – PPA 2004-2007. The PPA in turn, adopts the **Strategic**

**Orientation of the Government**, which is the instrument which rules the formulation and the selection of the programs which make up the PPA.

The dimensions of the Strategic Orientation of the Government are the social, economic, the environmental, the regional, and the democratic dimensions. Its mega-objectives are thus synthesized: social inclusion and reduction of inequalities; growth with the generation of environmentally sustainable employment and income, and reducing regional inequalities; and promotion and expansion of citizenship and strengthening of democracy. The dimensions and the mega-objectives reflect long-term strategies, having as objectives:

- i. Social inclusion and the deconcentration of income;
- ii. Vigorous growth of the product and of employment;
- iii. Environmentally sustainable growth;
- iv. Reduction of regional disparities;
- v. The making dynamic of the mass consumer market, by investments and by elevation of productivity;
- vi. The reduction of external vulnerability, by means of the expansion of the competitive activities which make this growth sustained, and
- vii. The strengthening of the citizenship and of democracy.<sup>98</sup>

#### **4.1.3 Declaration of the Semi-Arid Region – DSA**

The Declaration of the Semi-Arid Region – DSA is the document of civil society, elaborated by organizations of Articulation in the Semi-Arid Region – ASA, a forum which currently includes more than 1,020 entities of organized civil society, acting in the Brazilian Semi-arid Region. The Declaration of the Semi-Arid Region was formulated at the time when the Third Conference of the Parties to the United Nations Convention to Combat Desertification was held in Recife, Pernambuco, in the year 1999 – COP3. Resuming the experience of a long walk of the social movement, in this document ideas and propositions are affirmed which orient the action of non-governmental organizations and community-based organizations.

In DSA the importance and the values of the Brazilian Semi-arid Region are recognized, affirming the confidence in the potential viability of implementing a process of sustainable development based on the following key ideas:

- i. Breaking of the monopoly of land, water and means of production;
- ii. Sustainable management of the eco-systems;
- iii. Activity of civil society;
- iv. Education and e rescue of the cultural identity of the ASD; and
- v. Information.

The DSA recommends, also a series of practical measures, and of public policies which should be adopted for the attainment of these objectives, to be made concrete in a Program of Living with the Semi-arid. This program is set up on two basic pillars, where stand out: i) the conservation, the sustainable use and the environmental recovery of the natural resources; and ii) the breaking of the monopoly of access to land, to water and to the other means of production.

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<sup>98</sup> Planning, Budget and Management Ministry – MPOG. Planning and Strategic Investments Secretariat. **Plurianual Plan 2004-2007**; a bill. Brasília, 2003. Volume I.



Suggests, moreover, a list of six chief components:

- i. Living with the droughts;
- ii. Orientation of the investments in the sense of sustainability;
- iii. Strengthening of civil society;
- iv. Inclusion of women and youth in the process of development;
- v. Preservation, rehabilitation and controlled management of natural resources; and
- vi. Financing the Program of Living with the Semi-Arid Region.

It is important to emphasize the degree of adherence of these proposals to the text of the Convention, chiefly in what refers to the fact of such proposals starting out from organizations of civil society of a country, where until quite recently, the theme of “desertification” was totally marginal or relegated to some few academic sectors.

Later, on the following occasions, these proposals were reaffirmed, or better, specified by the entities in the successive National Meetings of ASA, by means of elaboration of “Policy Letters.” These last reflect the gradual advance of the entities which, acting on a variety of themes, seek a systemizing which would permit them to act in a way of proposals on the public policies and realities of the region.

The Articulation of the Semi-Arid Region, which today holds together more than 1,020 organizations, in 11 Brazilian states understands that an ample agrarian reform, an aggressive policy of food security, of formal education and the struggle against desertification constitute inseparable elements for making viable the process of sustainable development of the Brazilian Semi-Arid Region.

#### **4.1.4 Other Orientations**

The formulation of the general strategy of the PAN-Brazil is benefited also by the orientation established by Conama (Resolution Conama n<sup>o</sup>. 238/1997), by the Agenda 21 and the National Environment Conference.

#### **4.2 THEMATIC AXES OF PAN-Brazil**

The orientations to combat desertification were defined by the United Nations Conference to Combat Desertification – CCD, which was articulated to a broad set of national policies, in particular those which seek to make viable the implementing of sustainable models of development. In this line the strategy of implementation of the National Action Program to Combat Desertification and Mitigate the Effects of Drought – PAN-Brazil is based on the development of articulated actions and programs, around four thematic axes, referring to the strategic mega-objectives of the Government. These four thematic axes are thus specified:

- i. **Thematic Axis 1 (Reduction of Poverty and of Inequality)**, referring to Mega-objective I: Social Inclusion and Reduction of Social Inequality, unfolded in sub themes such as Agrarian Reform, Education and e Food Security;
- ii. **Thematic Axis 2 (Sustainable Increase of Productive Capacity)**, including the following sub themes: Economic Development, Energy Question, Water Resources and Environmental Sanitation, and Irrigation/Salinization;

- iii. **Thematic Axis 3 (Conservation, Preservation and Sustainable Management of Natural Resources)** which includes the sub themes: improvement of Environmental Management Instruments, Ecological-Economic Zoning, Protected Areas, Sustainable Management of Forest Resources and revitalization of the Hydrographic Basin of the São Francisco; and
- iv. **Thematic Axis 4 (Democratic Management and Institutional Strengthening)**, which is referenced to Mega-objective III: Promotion and Expansion of Citizenship and strengthening of Democracy. Includes sub themes such as those referring to Human resources qualification and to the creation of new institutionalities to take care of the management of initiatives of combating desertification.

The thematic axes 2 and 3 are related to Mega-objective II: Growth with Generation of Environmentally Sustainable Employment and Income and Reducing of Regional Inequalities.

## **4.2.1 Expression of the Thematic Axes**

Following, one explains the content of the four above-mentioned thematic axes. What one discusses in relation to each one of them corresponds to a brief appreciation about the nature of the problems which one hopes to solve with the implementation of the initiatives which make up PAN-Brazil.

### **4.2.1.1 Reduction of Poverty and Inequality**

The relation between poverty and the processes of desertification constitute a widely debated theme. There is consensus in identifying poverty as a factor resulting from the processes of desertification and simultaneously as a self-perpetuating factor. This perception is corroborated by the Brazilian case, in which one verifies that the gradual loss of productive capacity of the natural resources, including of the natural fertility of the soils, reduces inexorably the possibility of producing wealth, causing, among other consequences, the reduction of the income of people. The persons (or communities) submitted to such conditions tend – in the search for their survival or of overcoming their fragile condition – to put pressure on the base of resources, in the majority of cases already impoverished, thus increasing the negative impacts in the environmental, economic and social spheres.

Still considering the Brazilian case, it is possible to affirm that the aforementioned problem tends to be aggravated due to the extreme inequality in the distribution and use of the natural resources (for example land and water). According to Spavorek (2003), 50% of the smallest farmers occupy in the northeast, about 2,1% of the total area of the rural real estate and the largest 5% occupy 67.7% of the same area. The Gini Index – which measures the inequality of income, according to the same study, despite small variations, increased consistently in the last decades, for the real estate property and/or for individual income.

The combination of these elements (poverty and inequality) promotes an evident acceleration of the processes of degradation in the Areas Susceptible to Desertification - ASD.<sup>99</sup> An immense mass of small decapitalized farmers confined in the small parcels of land in such areas (as a rule, of medium or low natural fertility), dependent on their work for the production of foodstuffs for their own consumption, of forage for their animals, but needing to produce a marketable surplus, will naturally tend to overuse the natural resources contributing in this way to aggravate the processes of degradation.

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<sup>99</sup> The increase in the desertified areas is also due to other aspects, some of them treated before. One should not however, underestimate the contribution of the factors linked to poverty and to the social inequality for the advance of the processes of desertification.

In the ASD this vicious circle is aggravated by the occurrence of periodic droughts, which bring about significant and recurrent losses in production and income. In this way, the droughts intensify the degree of degradation, leading environmental vulnerability to even higher levels. The effects of the droughts on health and food and nutritional insecurity also are known and considerable.

In this sense, it is vital for PAN-Brazil to treat these themes as central elements for overcoming the problems identified. Expressed in another way, prevention and combat of desertification will only be possible with the simultaneous combat against poverty and inequality.

Despite the existence of divergent opinions with respect to poverty and inequality, currently there seems to be a consensus that they have distinct origins, and so they need distinct differentiated policies and instruments. One can reduce poverty with compensatory policies – focused or universal - with macro-economic policies, with programs of the Family Scholarship type, or even with social security programs. However, to reduce inequality, one has to implement strategies oriented to transferring assets.<sup>100</sup>

The policy of transferring assets can contribute to reduce inequality, making for example, the agrarian reform. One also reduces inequality by guaranteeing quality education. It is now universally accepted that education and associated knowledge are assets - really patrimony. The inequality can be reduced by the offering of water and food security for the population, the same thing happening with the offering of resources for investments, in a way to support the individuals and agents who are entrepreneurs in the acquisition of capital goods for the constitution of productive micro- businesses.

It is in this perspective that one will treat of implementing the actions foreseen in item 5.2 for the ASD.

#### **4.2.1.2 Sustainable Increase of Productive Capacity**

Historically the Areas Susceptible to Desertification – ASD's have constituted a challenge to the development of the country. Despite these periodic spurts and interruptions of progress, the restrictions of the natural environment, economic social and political relations established in them tended to create a picture of low indices of economic growth. In the previous chapters and sections, various elements were characterized which make up the picture of immense social and human deficits.

Despite the rates of growth of the Northeast Region's economy having almost always been greater than the average rate of the country, at least until the 1980's, this growth was concentrated in the coastal regions, outside the ASD, despite the region's object of PAN-Brazil having also contributed to this performance. However, in the ASD the patterns of growth were, over time, much more irregular and less significant. Altogether, these processes result in the maintenance of social inequalities and poverty in these areas.

One also underscores that this general picture has generated strong migratory processes, intense urbanization and an enormous social pressure for services and goods in the urban areas of the ASD's, as well as in the metropolitan areas. The poor population of the ASD's shifts more and more to the capital and to middle or large-size cities, of this and other regions. But some of its privileged locations continue to be the outskirts of the small villages and interior cities, exactly because of the lack of work options. The origin of the

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<sup>100</sup> One considers an "asset" as patrimony (material or not), goods for production (machines, technology, equipment), and not simply the transfer of income or consumer goods.

population expelled from the rural area of the semi-arid hinterland remains linked in this way to the spaces most affected by the droughts.<sup>101</sup>

Thus, to the restrictions of the use of soil, water, vegetation (and its degradation) and of climate variation are added equally the index of human and social development comparatively the lowest in the country. Restrictive macro-economic factors act on this picture, such as the high cost of capital and the fiscal crisis of the Brazilian state, which powerfully limits the capacity of the State to act as a promoter of long-lasting processes of generation of wealth in the region. Deficiencies of energy infrastructure of communication and transportation act as restrictive factors to an eventual accelerated expansion of productive capacity.

Projections based on linear tendencies (maintaining the current standard and the structures of production and distribution) point to the need for several decades for the ASD to be able to reach standards of human development comparable to those of other more developed regions in the country.

Such a set of restrictions could suggest the unviability of the possibilities of sustainable increase of its productive capacity. It is probable that this affirmation can be true, if the usual patterns and models of growth and of economic activity remain immutable, founded upon the almost mechanical transposition of models and technologies of temperate regions which are subject to fewer restrictions.

Brazil took centuries to realize that one cannot “combat the drought”, and so began to affirm the possibilities of living with the Semi-Arid Region.” This means not only the possibilities of living with dignity in the ASD, but also the opportunity for – once known, respected, made dynamic and perfected the environmental and socioeconomic conditions existing there, - progress to exist and sustainable generation of wealth for its inhabitants and for the Country.

The viability of sustainable increase of productive capacity of the ASD requires, for this, that government and society, supported by their assets, act upon the set of identified conditions; about the processes of investment of physical capital; about the necessary adjustments of distributive processes, with the object of maximizing, on durable and harmonic bases the use of natural resources (such as native vegetation), the human resources (such as those available and linked to family agriculture), the energy and the existing social creativity in the region and consolidated in their social capital.

Two elements should be considered as inducing this process: the production for mass consumption (popular products) and the improvement and expansion of the sector of governmental and private services, chiefly those associated directly with strengthening the productive capacities and of social capital. Moreover, initiatives which lead along the production chain to processes of substitution of importation (from abroad and from other regions) should be stimulated and exploited and contribute with exportable products (to other regions and abroad).

#### **4.2.1.3 Preservation, Conservation and Sustainable Management of the Natural Resources**

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<sup>101</sup> CARVALHO, Otamar de. “Environment and Population in the Semi-Arid Northeast”, in: **Population and environment in Brazil: Rio + 10** / HOGAN, Daniel Joseph, Elza Berquó and Heloísa S. M. Costa (eds.) – Campinas: CNPD, ABEP, NEPO, 2002.)

The Brazilian region affected by the process of desertification has as native vegetation covering a mosaic of rather diversified vegetation with trunks and twisty branches, thick sobers, presenting very open field forms to relatively dense forest forms, called savanna (cerrado) and savanna steppes (Caatinga). Of the six biomes existing in Brazil (Amazon, Cerrado, Atlantic Woods, Caatinga, Pantanal and Pampa) the Cerrado and the Caatinga constitute respectively, the second and the fourth greatest Brazilian biomes in area.

The Cerrado biome is characterized by a formation of the tropical Savannah type, which occupies 23.9% of the surface of Brazil. With an extension of about two million km<sup>2</sup>, it is the second greatest biome of South America. One estimates that in this biome there exist more than 10,000 species of plants, with 4,400 being endemic. The Cerrado extends through the central region of the country, including the States of Goiás, Tocantins, Mato Grosso, Mato Grosso do Sul, west of Minas Gerais and of Bahia, south of Maranhão and part of Piauí, reaching Rondonia and to Pará. This biome suffered a strong alteration in the decades of the 1970's and 1980's, due to the accelerated growth of the agricultural frontier, resulting today in an alteration of 67% of its area. Currently, a mere 20% of the area of the biome is well conserved and about 2.49% are protected by Federal Conservation Units.<sup>102</sup>

In the region of the Caatinga Biome, a vegetation predominates which is typical of the Brazilian northeast, including parts of Maranhão and of Minas Gerais. This biome is considered the only one that is exclusively Brazilian, and is composed of at least one hundred unique landscapes, with a predominance of the steppe-like Savannah; Recent studies demonstrate the existence of diverse landscapes, it being thus a biome of great heterogeneity, where 932 vegetation species are registered. Of these 380 are endemic and have already been cataloged.

The original area of the Caatinga biome is 1,037,517.80 km<sup>2</sup>.<sup>103</sup> Currently the Caatinga constitutes one of the Brazilian biomes most altered by human activities. Its modified areas according to the studies mentioned, correspond to 56% of the total area, included there the areas altered in function of the occupation with permanent crops, temporary crops, and the occupation called "highway effect." According to the report "Scenarios for the Caatinga biome", each year, at least, 6,530 km<sup>2</sup> of the vegetation of this biome are destroyed. Should the pressure persist or be aggravated, the scenarios for the year 2010 demonstrate that only 32% of the vegetation will be left, since 665 mil km<sup>2</sup> are threatened, of which 182 thousand are very susceptible to desertification.

As an aggravating factor of these aspects, the Caatinga and the Pantanal are the biomes least protected by conservation units of restricted use (about 1%). Moreover, the non- altered areas in the Caatinga biome correspond to 44%, but are distributed in a fragmented way in small dispersed "islands."<sup>104</sup>

Associated to these factors, brusque changes of the hydrological cycle (droughts and floods) produce an excessive pressure on the natural resources implying in the adoption of strategies of survival which exhaust the resources by the use of land, the immediate causes of which are the inappropriate utilization and degradation of natural resources (water, soil, vegetation). In this way, the adoption of techniques of cutting to the ground of the vegetation and use of fire, weighs excessively, as well as the great demand for nature wood for

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<sup>102</sup> Available in <<http://www2.ibama.gov.br/unidades/geralucs/estat/brasil/ucuso.pdf>>. Access in: August 28, 2003.

<sup>103</sup> CONSELHO Nacional da Reserva da Biosfera da Caatinga (National Council for Preservation of the Caatinga Biosphere). **Cenários para o bioma Caatinga (Scenarios for the Caatinga biome)**. Recife: SECTMA, 2004. 283 p.

<sup>104</sup> Cf. studies of CASTELETI, Carlos Henrique Madeiros, SILVA, José Maria Cardoso da, TABARELLI, Marcelo & SANTOS, André Maurício Melo. **Quanto ainda resta da Caatinga? Uma estimativa preliminar (How much is left of the Caatinga A preliminary estimate)**. Petrolina-PE, Universidade Federal de Pernambuco, Centro de Ciências Biológicas, Núcleo de Biodiversidade. 2000. (Document for discussion in the GT. Petrolina, 2000).

industrial supply (ceramic centers, areas of charcoal burners, plaster centers, and limekilns) and for internal consumption (firewood for energy).

The rural population of the ASD, despite its being strongly dependent on the native vegetation for its survival, rarely identifies itself as a producer of forest products, and extraction activities is a common practice. The plans of Forest management do not take into consideration the variability of the production, chiefly in the region of the Caatinga biome, a fact which contributes to its super exploitation. This reflects the lack of a consistent forest policy, as well as the lack of knowledge about the potential of the products that can be made into wood and products not to be made into wood of the vegetation.

To modify this situation, PAN-Brazil is giving priority to the execution of an Economic Ecological Zone in the areas affected by desertification to be reinforced by the execution of programs of qualification and improvement of environmental management.

#### **4.2.1.4 Democratic management and Institutional Strengthening**

To adhere to and ratify the CCD, Brazil reaffirmed its democratic commitment and committed itself to create, expand and strengthen instruments which guarantee the full exercise of rights and duties of the actors involved in combating desertification and in mitigation of the effects of the drought.

From the point of view of the federal government, the combat of economic and social inequalities to be realized in the line of the orientation established in the 1<sup>st</sup> Thematic axis is understood as a necessary condition for the guaranteeing to all Brazilians of the status of citizens, men and women really equal before the State, the governments and society.

In this perspective, one sought to establish a new social contract which favors the birth of a political culture of defense of civil liberties, of human rights the construction of an economically and socially more just country and above all, of a State adapted to the demands of development founded on environmental, social and economic sustainability.

The strengthening of democracy requires in this way, combating inequality, authoritarianism, and the client system; this is very common in the areas subject to processes of desertification. In the national plan, a great effort of deprivatizing of the State will be promoted, putting it at the service of the group of citizens, especially in the sectors which are socially more vulnerable and marginalized.

The radicalization of the democratic process by the government and present in this program, right since its identification and preparation, as well as in that which refers to its implementation, should be understood as part of a great cultural movement, which will go beyond the adoption of measures of economic and social democracy and even the realization of political reforms.

The strategy of PAN-Brazil assuming wholly the proposal of the PPA, is set up on the strengthening of democracy in all its dimensions. This strengthening foresees the development of plural and democratic relations, based on equity, without the preconceived notions of generation, sex, race and ethnic group with equal opportunities in all the aspects of social life.

Consistent with the governmental objectives and with the commitments assumed in the CCD, the democratic orientation of PAN-Brazil has as objectives:

- i. The strengthening of citizenship and the guarantee of Human Rights – political, social and civil;
- ii. The transparency of the public sector with control by society;
- iii. Decentralization, participatory planning and public management oriented to the citizen; and
- iv. Public security and citizenship, with priority for the prevention and combat of organized crime, drug traffic and money laundering.

The participatory character is understood as a permanent formula for the enriching of planning and management of the actions foreseen in PAN-Brazil, having in mind conferring transparency and greater social efficacy to the actions proposed. Control by society is also consecrated as the best arm against waste and corruption and as an instrument of consolidation of an efficient and agile State.

Special attention will be given to the formation and qualification of community leaders in the areas affected by desertification, so that they can perform such roles with quality. One foresees also the need for perfecting the normative, institutional and political mechanisms to guarantee the protection of citizenship and of its entities of eventual arbitrary acts, for the hypothesis of these irregularities being committed by agents of public authorities, still not familiar with the new orientations here formulated. The guarantee of unrestricted liberty of expression, as well as the access and democratization of the means of communication also constitute instruments essential for this movement.

Within the PAN-Brazil, these objectives and procedures will be pursued with the implementation of the actions foreseen here. In this process, the installation of democratic management mechanisms will take place, by means of specific actions of institutional strengthening which will include institutions and diverse actors, of the public, private spheres and civil society.

The country is passing through important socio-economic and legal transformations which affect the set of its institutions and organizations governmental or not. The private sector, for example, has been realizing a broad adjustment to face the commercial opening to the financial mechanisms or for the improvement of quality in the face of the increase of competition between sectors.

In the same way, organizations of civil society are more and more involved in actions and even in the implementation of public policies. For these institutions, the changes have been significant. The adoption by the Federal Constitution (1988) of principles and practices of participatory democracy broadened in an extraordinary manner, the field of action of citizenship and of control by society. This broadening represents an event in the process of complete construction presenting unheard of and important challenges for the organizations, both internally as well as in relation to the government and to society in general, chiefly when one considers the institutional vulnerability and instability of governmental organizations.

Governmental institutions present a greater degree of rigidity and difficulty for adapt and adjust themselves to new requirements. Many governmental institutions were made extinct or are being substituted and complemented by new organizations (as happens with the Agencies, Councils of Public Policies etc.). At the same time, various organizations seek with difficulty to rethink their missions, objectives, roles, competencies etc.

In this manner, upon recognizing the need to develop actions of institutional strengthening, Pan-Brazil proposes to act upon an environment in change, subject to instability. Even more, the proposal of PAN-Brazil, anchored in the determinations of the PPA

2004-2007, seek to modify processes and situations the origin of which, in many cases is a derivative of the institutionalities and actions or omissions of existing government, private and non-government organisms.

The institutional strengthening, without prejudice to the traditional actions, implies in creative effort to support and give value to new institutionalities, which are capable of contributing effectively for the solution of problems of combating desertification and to the search for the sustainability of development. This means, in the line which the CCD establishes, to strengthen the “relevant actors”, creating conditions to amplify institutional capacities in the areas of technical knowledge, execution and management of initiatives oriented for the effective combating of desertification and mitigation of the effects of the droughts.

#### **4.2.2 Significance of the Conception of the Thematic Axes in Combating Desertification**

The four thematic axes selected are oriented to social demands expressed by the majority of the population which lives in the ASD. Its coming together can result in the possibility of promoting the effective combating of desertification, by combining the creation of new economic activities with the basic social necessities of the population.

The coming together of initiatives around the four axes also expresses demands of the social classes holding the means of production and better level of income. These segments also demand the suppression of the levels of violence. To this end, they should be called to reflect and contribute for the solution of the social questions which are the most acute. This understanding may possibly not solve all the contradictions of Brazilian development, but certainly will contribute positively for its balancing.

The choice of the thematic axes constitutes a form of simultaneously visualizing and synthesizing the comprehension of options chosen about how to solve the general and specific problems of the ASD. From its choice, a much better integration can result of the actions structured by this Program.

The implementation of the initiatives specified in Chapter V constitutes, in this sense, the support basis for sustainable development of the ASD, focused on preservation, conservation and controlled management of natural resources, vis-à-vis the need to attend the socioeconomic and cultural demands here identified with the promotion of an including and sustainable development, that is, at the same time, inducing social inclusion, economic efficiency, environmental conservation and preservation and giving value to cultural patrimony.<sup>105</sup>

### **4.3 FOCUS OF THE PROGRAM**

PAN-Brazil aims at supporting the sustainable development of the Areas Susceptible to Desertification – ASD, by means of stimulus and of promoting changes in the models currently in effect in these areas. The combating of poverty and the combating of inequality are the orienting elements of this change, allied to the recovery, preservation and conservation of natural resources.

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<sup>105</sup> See about this: BRASIL, Ministério da Integração Nacional, Secretaria de Políticas de Desenvolvimento Regional, GTI – Interministerial Work Group for the Re-creation of Sudene (2003) – Bases for the Re-creation of Sudene. For a Policy of Sustainable development for the Northeast. Final Version. Available in: <<http://www.integracao.gov.br>>. Access in: August 15, 2003.



As referred to in Agenda 21, combating desertification should give priority to the implementation of preventive measures for the lands affected by degradation or which are in the process of degradation. It also emphasized the seriously degraded areas should have priority status for recovery.

#### **4.4 OBJECTIVES OF PAN-Brazil**

The PAN-Brazil has as a **general objective** to establish guidelines and legal and institutional instruments which permit one to make the best possible formulation and execution of public policies and private investments in the Areas Susceptible to Desertification – ASD, in the context of the policy of combating desertification and mitigation of the effects of the drought and of promoting sustainable development.

In this perspective, it has as **specific objectives**:

- i. To create the institutional mechanisms of coordination, participation and action between the public sector, civil society and the private sector;
- ii. To perfect the knowledge of the situation of the processes of desertification and of the occurrence of droughts in Brazil, to be updated systematically;
- iii. Formulate guidelines for the conception, formulation and revision of policies and actions supporting the sustainable development of the areas susceptible to desertification;
- iv. Collaborate with the states and municipalities in the formulation and implementation of strategies combating desertification;
- v. Create institutionalities and strengthen the activity of the institutions responsible to combat desertification;
- vi. Implement actions integrated and having pacts which lead to sustainable development of the areas affected and subject to desertification processes, according to the principles and orientations of the CCD;
- vii. Institute participatory planning processes and making of pacts between the different actors; and
- viii. Create instruments supporting the development of productive activities, compatible with the preservation, conservation and sustainable management of natural resources.

#### **4.5 CHALLENGES**

The employment of measures oriented to combating desertification in the ASD is recent, besides still being subject to varied administrative interruptions. The program here structured takes into account the efforts which need to be made to administer well the problems resulting from the advance of desertification in the susceptible areas. In this sense, it will be necessary to deal with the following challenges:

- i. Tax and financial Adjustment practiced by Brazil;
- ii. Planning capacity;
- iii. Capacity of operating of the administrative structures at the three levels of government;
- iv. Level of knowledge about the problems and possibilities of the ASD; and

- v. Specific institutionalities to take care of the management of the problems of desertification.

**Tax and Financial Adjustment Practiced by Brazil.** The implementation of programs of protection, recovery and conservation of natural resources in the regions of the ASD, with emphasis on combating desertification, has not been made into regional priorities. The possibilities of obtaining non-governmental resources for financing projects in these same areas have also been limited. Thus, this limitation contributes to the difficulty of access to external credits, in part, determined by the reduced availability of good projects. These are increased by restrictions to public spending.

**Planning Capacity.** As an instrument of sustainable development, Pan-Brazil needs the existence of a more robust system of planning since the desertification processes going on in the Northeast are only known in a general way. It is necessary to deepen knowledge about the peculiarities. The planning of action to be implanted on the regional, state, subregional and local scales for combating desertification still have little chance of prospering, despite the international commitments assumed by the Brazilian government. In this context, the middle and long-term plans formulated by the initiative of a specific entity or ministry have less possibility of success with respect to the coordination of intragovernmental and intergovernmental actions. Beside this, it is important to improve the articulation between the plans and programs and the different budgets.

**Capacity of Operation of the Administrative Structures in Three Levels of Government.** The challenges referred to in the previous topics are extended to other spheres. Their effects become particularly visible in the states of the Northeast, in their majority, submitted to not very effective processes of reform of the State. The results of the reforms made in these states helped to make articulation difficult between the federal organs and state institutions. For this reason, the reflections of this process in the municipal spheres are also noted.

**Knowledge about the Challenges.** References made about the Northeast as being one of the most studied Brazilian regions are usual. One recognizes the advances made in various fields of knowledge. However, the amount of information in the areas of climatology, meteorology, supply and demand of natural resources among other things is still restricted.

**Institutionalities for the Management of the Problems of Desertification.** The institutions whose job it is to combat desertification in the country are still organized in an insufficient manner. The management and the implementation of PAN-Brazil are being conducted by the Water Resources Secretariat, of MMA, by means of the Technical Coordination to Combat Desertification – CTC. In the states, the actions are conducted by the Environment, Water Resources and/or Agriculture Secretariats. The management of the actions combating desertification needs to be institutionalized and strengthened.

## *Chapter V*

# **PAN-BRAZIL ACTIONS**

The Programmatic actions which make up the PAN-Brazil were selected starting from the suggestions discussed and presented in the State Workshops. The programs which directly or indirectly can contribute to the combat of desertification are also integrated in the Pan-Brazil. In this sense, such actions make up a list of initiatives integrating the PPA 2004-2007, which was the object of the Bill no. 30/2003, approved by the National Congress in July of 2004.

Thus, the programming of PAN-Brazil is made up of initiatives the implementing of which is given to the public institutions (federal, state and municipal), and private and non-government organizations. It also contemplates new activities, derived chiefly from proposals recommended during the State Workshops, which were held during the elaboration period of the Program.

The initiatives specified and detailed from here on, with a varying level of scope, express as much as possible the aspirations of the population of the Areas Susceptible to Desertification – ASD, considering the possibilities offered by the system of participation to which they were submitted in the course of the process of formulation of the PAN-Brazil. In reality, the various instances representative of the interests of the society of the ASD were heard, in several moments, as described in Chapter III, referring to the Process of Construction of the Program. The programming here detailed following the logic of the four thematic axes chosen, tries to adjust itself adequately to those desires, joining in a decided and rational manner, the forces and factors responsible for their different dynamics - social, economic, environmental and institutional. One knows however, that the positive results of the Program will depend on the collective effort, involving the different “relevant actors” acting in the ASD.

This chapter deals with the questions related to the following topics: i) Synthesis of the Principal Problems of the ASD and Criteria for the Selection of Programs and Project. ii) Actions for the Reduction of Poverty and of Inequality; iii) Actions for the Sustainable Increase of Productive Capacity; iv) Actions of Preservation, Conservation, and Sustainable Management of the Natural Resources; and v) Actions for the Democratic Management and Institutional Strengthening.

### **5.1 SYNTHESIS OF THE PRINCIPAL PROBLEMS OF THE BRAZILIAN SEMI-ARID AREA AND CRITERIA FOR THE SELECTION OF PROGRAMS**

The natural resources of the Areas Susceptible to Desertification have been utilized without due care in relation to the norms and standards of sustainability, environmental conservation and economic rationality. In this sense, one can consider as the chief environmental problems of the region in study: the construction of structures for water storage not adequate to the nature of the problems; the growing practice of land-clearing of the areas of native vegetation; the damaging and reduction of the drainage of the rivers and streams; the erosion, silting of rivers, streams and storage ponds in various subregions of the semi-arid area; the scarce destination of resources to agriculturally viable soils; inadequacy

of disciplinary instruments for the use of natural resources; the expansion of areas in the process of desertification; and the increased production of waste in urban areas.

With respect to the economic and social dynamics, the pressures on the supply of employment and the insufficiency of equipment and social services stand out as a result of the migration of people with insufficient qualification to meet the demands of the market.

With respect to the availability of information to support the technical conducting of the initiatives to combat desertification, there is a considerable lack of precise information about the “state of the art” in relation to the advance of desertification and of the processes of environmental degradation.

The lack of technical information has been increasing the potential of effects due to the insufficiency (quantitative and qualitative) of the institutional apparatus dedicated to the realization of studies, formulation of programs and projects and implementation of the initiatives for combating desertification. In the absence of the actions put into practice by the non-governmental organizations, this type of difficulty would be much graver. But it has not been possible to overcome the lack of qualified human resources in the area of studies, research and planning about subjects connected to the environmental and social sciences.

It is necessary to broaden the availability of information about opportunities of investment in the ecologically more fragile areas of the ASD. This fragility has contributed to the fact that the poor population, and even the established businessmen, have dedicated themselves to activities which use natural resources in an environmentally inadequate manner, such as occurs in the production of ceramics in various sub regions of the ASD.

In the domains of science and technology, one notes a scarcity of development projects, formulated in consonance with the demands of protection, preservation and conservation of natural resources. Perhaps for this reason the difficulties of access to sources of financing are more accentuated.

In the face of these conditions, it is necessary to establish precise criteria for the choice of programs and projects to combat desertification and mitigate the effects of the droughts. In this perspective, one considered as priorities those programs and projects capable of:

- i. Attending the criteria of the CCD;
- ii. Attending to the demands expressed in the Declaration of the Semi-Arid Region – DAS and in the proposal of the state workshops;
- iii. Finding backup in the orientations established in the document Strategic
- iv. Orientations of the Government;
- v. Making themselves adequate to the principles and concepts of Agenda 21 (Global and Brazilian); and
- vi. Attending to the orientations of the National Environment Conference.

These macro-criteria in the demands imposed by the difficulties synthesized previously recommended the choice of initiatives compatible with the following characteristics and/or options:

- Programs and/or Projects which are already being implemented by entities of the government (as happens with various of those which are detailed in this chapter);

- Programs and/or Projects already commuted with studies, previous documentation and financial resources defined in public budgets;
- Programs and/or Projects for the execution of which there are specific credit lines in financial institutions;
- Programs and/or Projects which contribute to minimizing environmental problems in general and desertification in particular;
- Programs and/or Projects which constitute basic requisites for endogenous development (local development); and
- Programs and/or Projects which contribute to create and make dynamic economic activities linked to production chains and local production arrangements, based on primary materials and processes which do not degrade the environment.

## **5.2 REDUCTION OF POVERTY AND INEQUALITY**

As described in subsection 4.2.1.1 there is an intrinsic relationship between poverty, inequality and the advance of new processes of desertification. This circumstance brings about the necessity of promoting effective actions which seek chiefly to transfer assets and implement policies of social security.

Having recognized the complexity of the theme and of the measures necessary for its overcoming, one understands that the essential policies and actions should treat qualitatively and quantitatively the broadening of the agrarian reform. In this sense, the strengthening of family agriculture (destined among other aspects to promote the achievement of food security) and the quantitative and qualitative expansion of formal education chiefly of basic instruction, in the picture of redistributive impacts of education produce immediate and lasting effects, universally recognized as beneficial.

In relation to agrarian reform the central challenges turn on the increase of availability of arable lands (principally those near to water courses and/or the works of water reserves) for the landless people and those with little land. This increase should be associated to a continuous quality technical assistance, which considers the socioeconomic and cultural characteristics of the family farm workers, as well as those related to the edaphoclimatic conditions of the region. Questions related to the offer of specific compatible credits also should orient the processes of agrarian reform in the ASD.

The strengthening of family agriculture is characterized as a central element to guarantee food security, and should be strictly related to the process of agrarian reform. This relationship is justified among other reasons, by the great social deficit in relation to the land redistribution and the crucial need to increase the production of food for attending the population (especially those lacking financial resources to maintain their food and nutritional needs).

With respect to education, one knows that it is necessary to make dense transformations which consider structural and programmatic aspects, so that one can reach the goal of implementing a quality education for all those who inhabit the region, focus of PAN-Brazil, which historically has been characterized by presenting the greatest educational deficits.

Starting from the implementation of the actions correlated to the themes described, one intends with time to act together with an important contingent of the population with the notion that the most durable results will be obtained on a middle to long-term basis.

Parallel and simultaneously to the implementation of policies and actions of transfer of assets, one should seek the implanting of policies of social security, as a specific form of combating poverty. However, for greater effectiveness and increased power of such policies, one has to exercise/ adapt, in a relatively short span of time, new forms and measures of governmental action to alter the current picture of poverty in the ASD.

### **5.2.1 Chief Challenges for Land Restructuring in the ASD**

Brazil presents a very well known situation in relation to land concentration, showing a Gini Index higher than 0.8. Specifically, in the region focus of PAN-Brazil, this characteristic is even graver. Hundreds of millions of farm workers, campers, squatters, tenant farmers, and family farmers live there without land or with land, but with an insufficient size of land for its social and economic reproduction.

In relation to the establishment of an effect and process of agrarian reform, the following aspects should be considered: criteria for appropriation; period for appropriation, settling and dividing of lands social and productive infrastructure; technical assistance, among others. Nevertheless, as will be detailed later, the picture visualized in the ASD is very delicate and peculiar, which reinforces the need to promote discussions, as neutral as possible, and practical and integrated actions to manage to effect a quality agrarian reform.

With respect to the indices of productivity (established by law), used to define if a property is or not subject to appropriation, one observes that they are relatively low. This brings it about that the majority of the lands destined for agrarian reform are to be found in areas considered marginal, with low natural fertility of the soils, besides being at great distances from the markets.

In general, the time necessary for the appropriation of unproductive areas, settling and division of the lands makes it necessary for the farmers to submit themselves to a long period of camping there. The arrival at the land does not always occur at the right time of the year for planting. Besides this, the absence (or extreme delay) of the division impedes the farm workers from having access to credits and consequently, from investing in dwellings, in more lucrative systems of production and in the cultivation of perennial crops, among other aspects.

With respect to technical assistance, one confirms the existence of isolated experiences, promoted by non-governmental organizations and state governments; however, in general, there is a great insufficiency<sup>106</sup> if not total absence, of this service in the agrarian reform settlements.

An important part of the settlements in the ASD present profound problems related to the lack of investment in social infrastructure (schools, health posts etc.) and productive infrastructure (roads, energy, access to water for consumption and production etc.), necessary to guarantee decent living conditions for the families settled and conditions of economic, social and environmental sustainability.

Considering the demand for urgent actions on the part of the State, in relation to the settlements installed and to the need to create new settlements in the ASD, there is another plea, also urgent. This is the demand which involves part of the farm families with access to land (small land owners, partners, share croppers, squatters), but who do not have areas

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<sup>106</sup> Data of the National Institute for Colonization and Agrarian Reform – Incra, of the International Fund for Agricultural Development – FIDA and of the United Nations Organization for Agriculture and Food – FAO reveals that only 16.7% of the Brazilian farmers receive some type of technical assistance. In the Northeast Region of the country (which includes a great part of the areas susceptible to desertification), this index is much smaller – only 2.7% of the establishments are assisted.

sufficient for their survival and, much less, for the accumulation of capital, as data reveals from the Agrarian Development Ministry (MDA).<sup>107</sup>

The edaphoclimatic characteristics of the ASD have contributed to the fact that the majority of the rural properties are to be found in strips perpendicular to the trough of the water courses<sup>108</sup> (even the intermittent water courses). They also have an important role with respect to the forms of occupation of the soils, which occurs starting from the margins of those watercourses, where the conditions of fertility and humidity are more favorable. This process of occupation is well visualized around the work of water reserves.

This peculiar situation of the ASD demands the structuring of compatible forms of land reordering. The greater part of the family farmers have areas near to water courses (possessing alluvial soils), but insufficient to attend their needs (production of food for their own consumption and sale; production of forage for the animals; among others). This fact collaborates for the unsustainable exploitation of the natural resources accelerating the processes of desertification.

Around the works for accumulating water one observes the concentration of great properties, marginalizing innumerable families of small farmers. This situation demands the promotion of a broad process of agrarian reform, in the properties considered unproductive based on land re-ordering, contemplating as a priority the areas surrounding the watercourses and the medium and large water works, already installed or being installed. In this way, one can combat the inequality starting from the democratization of access to the chief determinants of production expansion and of productivity in the ASD: land and water.

### **5.2.1.1 Policies and Existing Strategies**

The reality, previously described was discussed during the dynamics for the construction of PAN-Brazil. Several of the proposals presented in those events come from the meeting of the orientations of the National Agrarian Reform Plan (PNRA). These orientations aim at promoting the generation of employment and income; the sovereign and balanced occupation of territory; the guarantee of food security; the preservation of the cultural traditions and of the environment; the strengthening of the local economy; and the sustainable regional development.

Among these proposals we can point out:

- i. A review of the concept of reformable property, with the inserting of coefficients of environmental and labor use;
- ii. The updating of the indexes of defining improductivity of lands subject to appropriation;
- iii. A revision of the internal norms of MDA/INCRA, to speed up the process of obtaining land and the settling of rural farm workers;
- iv. The recognition, the demarcation and the giving title to areas of communities quilombolas;
- v. A guarantee of resettling of the non-Indian occupants of reserve areas;

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<sup>107</sup> This data indicates that in the Northeast Region, 80% of the total rural establishments do not possess land sufficient for the development of a sustainable agriculture, from the economic, social and environmental point of view.

<sup>108</sup> It should be emphasized that the subdividing of the lands of the families follows the same logic, that is, is done starting from the riverbeds. In the course of generations, such a fact brought about the constitution of millions of small parcels of land. The tracts of land with these dimensions are not sufficient for the establishment of a productive dynamic process which guarantees the maintenance of the basic needs of the families, causing in some cases the exhaustion of the natural resources, to the increase of the rural abandonment, to famine and misery.

- vi. A promotion of sex equality in the agrarian reform;
- vii. A guarantee of technical assistance and rural extension programs, of qualification, of credit and of commercialization policies for all the families of the areas reformed; and
- viii. The universalization of the right to education, to culture and social security in the areas reformed.

The PNRA has the following goals for the period 2004-2007:

- Settle 400,000 new families of rural workers;
- Regularize the squatters rights of 500,000 families;
- Recover the productive capacity and the economic viabilization of the current settlements;
- Benefit 130,000 families with land credit;
- Create 2,075,000 new permanent work posts in the reformed sector; and
- Register, by means of geo-referencing, the national territory and regularize 2.2 million rural properties.

The PNRA can count on resources in the amount of R\$ 6,722.0 million for the period when the PPA is in effect from 2004-2007.

### **5.2.1.2 Chief Actions Proposed**

With respect to the aspects related to the agrarian reform, the representative which participated in the construction of PAN-Brazil presented various aspects not fully treated in the governmental policies, the following for example:

- To broaden the participation of civil society in the processes of land reorganization/reordering in the places of greater concentration of family agriculture, where the conflicts and the social inequalities are more evident;
- To consider as priority the appropriation the areas where one verifies the existence of slave labor, those use for planting marijuana, those pertaining to quilombola communities and the native Indians;
- For this it is necessary that the legal aspects be reviewed to redefine the indices used for the selection of improductive lands, taking into consideration the principles of agro-environmental analysis which consider the logic of the family agriculture and the edaphoclimatic conditions of the ASD, that is the need to use the areas near to the water courses.;
- Utilize the hydrographic basin as the planning unit;
- Regularize the debt situation of the settlements in relation to environmental licensing;
- Reformulate the technical assistance system and rural extension, qualifying the technicians to act in agricultural systems focused on family agriculture and on the principles of agro-ecology; in management and conservation of soils, to recuperate those which show problems of salinization and environmental preservation; and in the actions necessary for combating desertification;



- Open ample discussion to seek alternatives for recovery of public lands in the system of being loaned to reforestation companies or others, destining them for the settling of family farm workers or for their collective utilization by surrounding communities;
- Formulate and implement Plans for Agro-Extracting Activity Territorial Development, oriented towards sustainable economic exploitation of the Caatinga and Cerrado, offering economic alternatives to the population settled there, in a way to reduce the pressure on the natural environments and combat desertification; and
- Broaden the discussions referring to the effective implementation of agrarian reform in the ASD.

### **5.2.2 Education**

The Federal Constitution of 1988 brought significant advances to the activities of teaching. It established that “education, a right of all people and an obligation of the State and of the family will be promoted and given incentive with the collaboration of society, aiming at full development of the person, his preparation for the exercise of citizenship and his qualification for work.”

Despite the advances in the political field and the pragmatic actions in relation to education (as the increase in the number of matriculation in basic education, impelled by the creation at the federal level of the fund for Maintenance and development of Fundamental Education and the Giving Value to the Teaching Profession – Fundef), the region focus of PAN-Brazil continues experiencing problems in relation to the quality of education practiced there in two main directions. The first is related to the quality of the teaching in a general way (work conditions and the operating of the schools, quality of the staff of teachers, allied to the question of early work and low educational level of the parents), the second is with respect to the quality of the contents taught (curricula disarticulated from the local reality).

These obstacles materialize in the educational indicators in the Brazilian Semi-arid Region (a region which includes a great part of the municipalities included in the ASD), chiefly in the rate of illiteracy, which present a tendency to increase with age. Among the children of 7 to 14 years of age, resident for the greater part in the Brazilian semi-arid region, 36.3% are illiterate. This rate is two times greater than the Brazilian average. In the range from 12 to 17 years of age the indicators show that the index of illiteracy reaches 43%. This rate of illiteracy reaches the level of 60% when one considers the elderly people.

With respect to the quality of the teaching given, the evaluation in Mathematics done by the National system of Evaluation of Basic Education – SAEB, in 1995, pointed out that only 51% of the children who finished the 4<sup>th</sup> grade in the Northeast were capable of resolving concrete problems, such as to sum fractions with the same denominator and identify the graphic representation of simple fractions. Similar results were found in Portuguese language. In this sense compared with the average of 68% in Brazil, only 58% of the pupils in the 4<sup>th</sup> grade were capable of reading simple texts, making a literal interpretation of the text, and identifying the chief idea.

In relation to what one teaches the perspective is universalistic, sustained chiefly by didactic materials which promote the circulation of knowledge and images which does not relate at all to the circumstances of life in the ASD. This aspect tends to bring it about that the population inserted in that region do not have in the school a support for the production of answers pertaining to the various challenges which they face daily. In this sense, they wind

up incorporating information which are not appropriate to their environment, creating a differentiated and hostile look in relation to their condition of life, strengthening the tendencies to abandon the school, to go away and to emigrate.

In the last years, a series of entities and institutions with direct activity in the ASD have been developing and accumulating political-pedagogical experiences which today are presented as a reference for the public policies related to living with the eco-systems of this area. This political-pedagogic experience, based on the reality and on practices of the local populations, generated a proposal of a model of living with the territory referred to, in such a way that the experiences of living with the region are understood and implemented as public policies (Braga, 2003:25).<sup>109</sup>

One arrived then, at the proposal of a “contextualized education”, which seeks to overcome the traditional viewpoint of education restricted to the transmission of content and information, to that of a sociocultural formative process. The contextualized education is proposal which presents “contents, methodologies, curricula, educators, didactics and structures” appropriate to the areas susceptible to desertification processes, taking into account their sociocultural, economic and environmental potentialities.

The contextualized educational process implies in a methodology of social intervention which supposes a way of conceiving, learning and giving new meaning to reality, to act in it, aiming at transformation. The challenge presented is that of struggling for the pedagogical to transform the political and vice-versa, for this it being necessary to think education on new theoretical-political, theoretical-pedagogical an institutional bases, that is, in the perspective of living there. Thus according to Mattos 2003<sup>110</sup>, contextualized education has a fundamental role, for its practice seeks to transform the vision of the world and the social representation about the areas susceptible to desertification, transforming the idea of “a place of misery, cracked earth, and drought” in another reality, that of a field of possibilities.

### 5.2.2.1 Policies and Existing Strategies

The bill nº 030/2003 – CN, which contains the proposal of the PPA 2004-2007, presents a series of programs and actions in the educational area, of interest for implementing PAN-Brazil, such as the following: i) Brazil made literate; ii) Brazil Schooled; iii) Democratization of Management in the Systems of Teaching; iv) Democratizing the Access to Professional, Technological and University Education; v) Education in Early Childhood; vi) The Ideal Basic school; vii) The Modern School; viii) Management of Education Policy; ix) the University of the Twenty-first Century; and x) Giving Value to and Education of Teachers and Workers in Education.

Theses programs<sup>111</sup> destine resources for investment and management of education, in the Northeast Region, on the order of R\$ 10,518,188,823.00.

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<sup>109</sup> BRAGA, Osmar Rufino. “Educação e convivência com o semi-árido: introdução aos fundamentos do trabalho político-educativo no semi-árido brasileiro.(Education and living with the semi-arid region: introduction to the basics of political educational work in the Brazilian semi-arid region).” In: KÜSTER, Ângela & MATTOS, Beatriz H. O. de. Orgs. **Educação no contexto do semi-árido brasileiro (Education in the context of the Brazilian semi-arid region)**. Fortaleza: Fundação Konrad Adenauer, 2004. p. 25-44.

<sup>110</sup> KÜSTER, Ângela & MATTOS, Beatriz H. O. de. Orgs. **Educação no contexto do semi-árido brasileiro(Education in the Brazilian semi-arid)**. Fortaleza: Fundação Konrad Adenauer, 2004.

<sup>111</sup> One emphasizes that besides the resources for application specifically in the regions of the Country, those programs in the area of education included in the PPA 2004-2007 also contemplate values to be applied nationally, the sum off which amounts to a quantity of R\$ 21,542,347,984.00. Part of this value can be aggregated to the amount available specifically for the Northeast region.

### **5.2.2.2 Chief Actions Proposed**

During the dynamics established in the process of construction of PAN-Brazil, it was possible to broaden the discussions with diverse social actors (representatives of the government and of civil society) in relation to the theme. Proposals were constructed starting from local reality. For greater efficacy in the application of the resources in the educational area, one considers it to be of fundamental importance to establish processes which seek the involvement and the social participation in order to “polish” such proposals (considering, moreover the application of the resources).

Thus, the desires and the necessities diagnosed and the public policies established for the sector will tend to meet at the same object. In this sense, one emphasizes the broadening and strengthening of quality education, especially fundamental education, for the transformation of reality in the ASD's.

The central axis for education, proposed by the social actors coincides with the presuppositions of contextualized education. To reach this it is necessary to put into practice a series of actions as adaptation, principally in fundamental education, do the curriculum, of the methodology of teaching and of teaching materials used, as well as the school calendar, specifically in relation to the socio-productive peculiarities of the rural environment.

Moreover, some complementary actions should be put into practice for greater effectiveness of the educational processes in the ASD, involving the qualification of teachers in the context of education oriented towards living together, the increasing of the number of rural schools, the improvement of infrastructure of the already existing schools and the guarantee of a quality school lunch program.

In relation to the broadening of the offering, in the context of quality and quantity of education in the rural area, was emphasized during the workshops of construction of Pan-Brazil, the necessity of broadening and strengthening the Family Agriculture School (EFA's), the Rural Family Houses and the Pole Schools, which confer priority to all-day school. As emphasized, the importance of the Pedagogy of Alternation<sup>112</sup> has been amply utilized by the EFA's.

With respect to Fundef, an important instrument for the destination of funds for education in the country, the need to distinguish (increase) the quota (cost/pupil) of the above-mentioned fund for the ASD's was raised, due to the alarming picture in relation to the educational indicators of the region.

One also verified the need for a greater interaction and integration of the university system with fundamental and high school system, to give greater power to the transformations necessary with respect to the formation of teachers, for the implementation of socioeducational and cultural programs for the children/youth public and the identification of successful experiences of education for living together with the semi-arid region.

Finally, the proposed strategy to respond to the challenges which are presented to education in the ASD depends on the involvement of all the actors of the educational process (teachers, pupils communities, directors, representatives of organs of public power and civil society, social movements etc.) For the edification of this new educational process it is important to consider:

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<sup>112</sup> In the pedagogy of alternation, the educational action starts out from the reality that the youth has cultures and human and spiritual values. During this practice of alternating, the youth remain for a specific continuous time (about 15 days of the month) in the EFA and the rest of the time in their community, where together with the monitors, they seek to exchange experiences and put into practice the teaching transmitted.

- The integrity of the actors in the educational process;
- The equity of access to cultural, scientific, moral, ethical and technological knowledge in all the levels of education;
- The intersector quality in the definition of educational policies;
- The interdisciplinary and transdisciplinary quality in the construction of knowledge;
- The environmental, social, economic, and cultural sustainability, as elements sustaining the educational processes projects;
- The respect for plurality and for diversity of cultures, credos, races, ideas and of methodological options in the process of teaching/learning;
- The decentralization, transparency and shared management;
- The financial and pedagogical autonomy of the educational systems and school units;
- The giving of value to the teaching profession and favoring the conditions of perfecting it and providing continued and permanent education for the educators;
- The respect for the constitutional principles and rights, for human rights and for the environment;
- The applicability of the legal instruments which aim at the construction of a quality public education;
- The unconditional defense of the free quality public school; and
- The respect and the promotion of children's, adolescents, youth, adults and elderly persons rights.

### **5.2.3 Strengthening of Family Agriculture and of Food Security**

There is an intrinsic relation between the guarantee of food and nutritional security and the strengthening of family agriculture. Despite the various problems of family agriculture in Brazil, its activities continue exercising a fundamental role in the production of basic foodstuffs. Of all the foodstuffs consumed in the country, family agriculture produces about 70% of the beans, 84% of the manioc, 58% of the swine, 54% of the dairy cows, 49% of the corn, and 40% of the poultry and eggs.

In the past one measured the food security by the quantity of calories and proteins ingested each day correlated with the type of physical activity, age and sex of the person. Currently, one evaluates also the ingestion of vitamins and mineral salts, the healthiness of the foodstuffs, and the water consumed,<sup>113</sup> according to the cultural traditions of the populations. Thus, the current concept of food security incorporates quality and diversity, besides the quantity of food ingested. This concept includes, moreover, the diversity of food consumption and the respect for the culturally accepted diets, for the traditional diet had a strong connection to the possibilities of regional production of foodstuffs. One should consider the great potentiality of family agriculture for the production of such foodstuffs with the objective of guaranteeing food and nutritional security, especially for the part of the population which demonstrates low income.

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<sup>113</sup> Diseases originating from the bad quality of drinking water and for cooking impede the organism from absorbing the available nutrients in the foodstuffs.\*

The strengthening of family agriculture has in mind to minimize the structural crisis related to the lack of employment and income of a great part of the population inserted in the semi-arid region. In this sense, the implementation of the development model centered on family agriculture constitutes a *sine qua non* for food security and the sustainable development in the ASD's;

In this approach, it become apparent that the production model considered most appropriate to the reality in question should be based on agro-ecology.<sup>114</sup> Agro-ecological systems are characterized by demonstrating a lesser demand in relation to the use of external input for property (in this way reducing the costs of production), besides permitting the increase of production (via increased productivity), concomitantly with the preservation of the natural resources (of fundamental importance for the prevention and combat of desertification) and fewer risks, in the face of the climatic fluctuations (greater resistance and resilience to the droughts) and of the markets.

The implantation of the agro-ecological model should be concatenated with the various strategies of impounding, storing and rational management of water (especially that of rainwater). The experiences in the ASD which adopted the practices of agro-ecology along with the small works of water infrastructure (decentralized in the scope of the properties or communities) show high efficiency in facing the problem of the droughts. These experiences demonstrate excellence in seeking the solutions most adapted to the water stress, from the choice of crops, and the most appropriate varieties to the adoption of systems of management which promotes greater retention of water and its conservation in the soil. In the face of environmental risks, the strategy of guaranteeing safety stocks (of water, of forage resources, of seeds, of foodstuffs etc.) is certainly the most adequate course.

The public policies should facilitate the access of the farmer to financing, considering the installation of basic infrastructures and of equipment necessary for the establishment of productive diversified systems (passing along of assets) both for auto-consumption as well as for the commercialization of the products in the local/regional markets.

### 5.2.3.1 Policies and Existing Strategies

With the objective of assuring food security and strengthening family agriculture in the ASD, the Brazilian Government presents a series of programs and actions in the scope of the PPA 2004-2007, with emphasis for the following: i) Program of Agro-alimentary Supply;<sup>115</sup> ii) Program Interdependent Network of Popular Restaurants;<sup>116</sup> and iii) Program Access to Food.<sup>117</sup>

In the line of the chief premise of the CCD, the struggle against hunger constitutes an absolute priority of the current government. To coordinate this effort, the Extraordinary Ministry of Food Security and Combat of Hunger – MESA, which later was substituted by the Ministry of Social Development – MDS. In this sense, the most important part of this question in the governmental scope is the Zero Hunger Program, which aims to eradicate hunger and social exclusion in the Country.

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<sup>114</sup> Agro-ecology is defined as a science of management of the natural resources, in a way to get the best possible production with a minimum of use of resources external to the property. Cf. Von der WEID, Jean Mark. **Agricultura familiar, segurança alimentar e processos de desertificação no semi-árido nordestino. (Family agriculture, food security and desertification processes in the northeastern semi-arid region)** Brasília, MMA. 2004.

<sup>115</sup> Chief actions: i) Acquisition of de Foodstuffs coming from Family Agriculture (R\$ 1,072,296,848.00); and ii) Operation of Strategic Food Security Stocks (R\$ 73,656,580.00).

<sup>116</sup> Chief action: Support for the Installation of Public Popular Restaurants and of Small Units of Production and Commercialization of Meals (R\$ 18,532,900.00).

<sup>117</sup> Chief action: Formation of Consortia of Food Security and of Local development (R\$ 25,013,750.00).

The **Zero Hunger Program** constitutes the mobilizing environment and the guiding axis of the programs and actions in five great areas: food and nutritional security, income of citizenship, complementary structuring programs, emergency actions and citizenship education. Along 2003, this program had the merit of placing the theme of hunger on the political agenda, besides improving the social indicators in the 1,227 municipalities where its actions were implanted.

The **Program Harvest Guarantee** begun in the year 2003, guarantees an insurance for the farm families which had their harvests damaged by the drought, starting from a tax of R\$6.00 charged to each farmer. In the year 2003, 278 thousand farmers of 334 municipalities adhered to the program. Of this total, 61 thousand farmers lost more than 50% of their harvest and could receive benefits on the order of R\$29 million. In the Bill No. 030/2003, the resources of the Program Harvest Guarantee are equivalent to R\$3.39 billion.

This set of governmental actions follows the orientation of item 2 of article 2 of the CCD, which provides for the adoption of long-term strategies in the affected zones, based simultaneously on the increase of productivity of the land and on the recovery, conservation, and sustained management of water resources, aiming at improvement of living conditions, particularly of the population of the ASD.

### **5.2.3.2 Chief Actions Proposed**

The contributions coming from the process of construction of PAN-Brazil combine with the proposal defined in the Second National Conference of Food and Nutritional Security, held in March of 2004 in Olinda - PE, thus specified:

- i. Broaden the actions, involving the a impounding and use of rainwater in cisterns, successive dams and underground dams, among other technologies, for the family domestic supply, as in the example of the **One Million Cisterns Program** oriented for watering of animals and for the local production of foodstuffs;
- ii. Implement programs of financial granting of resources to non-governmental Organizations which develop actions together with the family farmers Organizations, as a form of recognizing the importance and broadening the activity of these Organizations in the process of construction of proposals which aim at sustainable development of the semi-arid and dry sub-humid Regions of the country;
- iii. Stimulate the creation, on a large scale, of community seed banks of traditional varieties and other reserve stocks at various levels (from that of the family to that of a community, municipality and micro-region), supplied by the regional producers themselves, as a way to guarantee the access to the genetic resources essential for production, maintaining the diversity of the varieties of species adapted to the multiple conditions of the agro-ecosystems and the climatic instability, facilitating the overcoming of the acute crisis situations related to the prolonged droughts which frequently occur in the Brazilian Semi-arid Region;
- iv. Implement a program of agricultural research and rural extension oriented exclusively for family agriculture and for agro-ecology, which would have as a basis the exchange of knowledge between technicians and farmers, the generation and participatory dissemination of technologies and living with the semi-arid region;
- v. Broaden the offering of subsidized credit for the implantation and improvement of the productive infrastructure and of equipment (individual and collective), which facilitate the processing of the production, both for the Conservation – aiming at auto-consumption as well as for placement in the market, as a form of raising the income and quality of life of the family farmers of the region;

- vi. Stimulate the constitution of handicraft and family agro-industries, including of fishing by means of credit, permitting a greater added value, generation of income and employment in the rural environment;
- vii. Implement programs oriented for education and continuing education for the qualification of people camped waiting for land, settled persons, Indians, communities of descendents of former slaves and family farmers, aiming at developing an environmentally sustainable agricultural practice in a context of interdependent economy, with stimulus for associations, cooperatives, organic agriculture and management of collective projects;
- viii. Strengthen family agriculture and effectuate agrarian reform, by the intermediation of a public policy with an agro-ecological approach, favoring the conservation of local biodiversity, the diversification of production – truck gardens, nurseries, orchards and agro-forest systems, medicinal plants, raising of small animals, production of milk, aquiculture, bee-keeping and meliponiculture (raising of earth bees or those without a stinger), sustainable extraction activity etc. –, the improvement of transportation conditions, to facilitate the distribution of production and reduce costs, considering the question of sexual equality and generation with ethnic and cultural diversity, giving value to adequate treatment of populations of Indians and descendents of former slaves;
- ix. Motivate the municipalities to identify the areas and support the implantation of Municipal Programs of Urban Agriculture, creating community vegetable gardens in neighborhood/ community lands or urban backyards, by means of neighborhood and/or community associations;
- x. Stimulate the municipalities to implement school vegetable gardens and reorient the nutritional basis of the school lunch program, adapting it to the culture of the semi-arid region;
- xi. Stimulate the implantation of popular restaurants which utilize organic products derived from family agriculture;
- xii. Support the process of development of agro-industrial products, based on foods culturally adapted to the semi-arid region, with a specific legislation which facilitates commercialization; and
- xiii. Broaden the programs governmental purchasing and stimulating the implantation of fairs of agro-ecological products of family agriculture.

According to the specified lines, one considers it important to incorporate these proposals into the public policies, oriented to the food security and the strengthening of family agriculture in the ASD.

#### **5.2.4 Social Security**

According to the Brazilian Federal Constitution (1998), Social Security includes “an integrated set of actions of initiatives of the Public Powers and of society destined to assure the rights relative to health, social welfare and social assistance.” In this way in Brazil one seeks to articulate these actions, considered to be of great importance for the combat of poverty and the promotion of the welfare of the population.

Moreover, according to the Constitution it is a duty of the Public Power to organize the social security with a basis on the following objectives: a) universal coverage and attending of the people; b) uniformity and equivalence of the benefits and services for the urban and rural populations;) selectivity and distributivity in the rendering of the benefits and services; d) non-reducibility of the value of the benefits; e) equity in the form of participation

of the cost-sharing; f) diversity on the basis of financing; and g) democratic character and decentralization of the administration, of the retirees and of the government in the collegiate organs.

In the context of the region which is the focus of PAN-Brazil, social security represents an element of the highest importance for the maintenance of the basic needs of the population, as the guarantee of distribution of income for the under-privileged population, historically located in several sub-regions of the ASD's. Thus, the chief objective of treating the theme of social security in PAN-Brazil is due, fundamentally, to the importance of access of this population to the universal social rights required for the establishment of citizenship.

#### **5.2.4.1 Health**

The constitution of 1988 instituted the Single Health System – SUS. It was established as a goal for this system to become an important mechanism for promoting equity in the attending the health needs of the population, offering services with quality and adequate to their needs, independent of the buying power of the citizen. The SUS proposes to promote health, giving priority to preventive actions and democratizing the relevant information so that the population can know its rights and the risks to its health.

One of the chief programs of the government for the health area is the Program Family Health – PSF. Created in 1994, the PPSF possesses as a proposal to reorganize the practice of attention to health on new bases and substitute the traditional model, bringing health closer to the family. The strategy of this program consists in conferring priority to the preventive actions, promoting and recovering the health of the people, in an integral and continuous way.

In parallel to the governmental activity, one visualizes in the ASD's a strong action of civil society, developed by the Child's Pastoral Work (an organization of social action of the National Conference of the Bishops of Brazil – CNBB. This organization has been developing actions (known throughout the world) with themes related to the combat of infant mortality and lack of nutrition, showing satisfactory advances in the places of its activity starting from simple and efficacious measures, such as nutritional orientation for the families, use of multimixtures and accompaniment of the nutritional state of children up to six years of age, stimulus for nursing babies at the breast, medical accompaniment of pregnant women, and oral rehydration among other things. It is to be emphasized, by the way, that PAN-Brazil considers it of the highest importance to strengthen and broaden these actions for their universalization in the ASD.

These actions are fundamental, since the picture in the regions affected by desertification in relation to health is alarming, especially with regard to infant mortality. According to a study by UNICEF (2003), infant mortality presents extremely high indices, due among other things, to the reduced conditions of social infrastructure which guarantee the mothers pre-natal care, qualified attention for birth, and the minimum conditions to give healthy development to the children. The data revealed that 95% of the municipalities of the semi-arid region (which holds the largest part of the areas susceptible to desertification) has an infant mortality rate (65 per thousand live births) higher than the national average (29.7 per thousand). In 31% of these cases, this rate reaches a level higher than the double presented by the country.



### 5.2.4.2 Social Assistance

Social Assistance has as principles the giving of the service free of cost and the protection for the family, maternity, for childhood, adolescence, and for old age, as well as for persons with deficiencies, and their reintegration into the work market of those who need this.

Among the various governmental programs situated in this sphere, the following merit special emphasis: Family Scholarship Program<sup>118</sup> (transfer of income destined to families in the condition of poverty); ii) Program of Eradicating Child Labor; iii) Benefit of Continuous Rendering of Service (attending the elderly, persons with deficiencies, incapable of independent living and for work); iv) Programs of Attention for Children from 0 to 6 years of age; and v) Program of Total Attention to the Family.

These actions figure as central for the population inserted in the ASD, considering that historically this region includes the greatest contingent of disadvantaged persons.

### 5.2.4.3 Social Welfare

The Social Welfare System fulfills a role of fundamental importance in the ASD. Starting from the constitutional changes which occurred in 1988, regulated in 1991,<sup>119</sup> the full rights to the Social Welfare Benefits were guaranteed to a great part of the population of the affected region, especially to the elderly of the rural environment.

In 2001 according to studies developed by Ricardo D. Sândi e Luiz P. Heringer<sup>120</sup> 13,4% (about 2.61 million persons at that time) of the population of the Brazilian semi-arid region (which includes a great part of the ASD) was attended by social welfare. If one considers only the rural zone, this percentage rises to 22,4% (approximately 1.9 million persons).

In relation to the urban zone, approximately 717 thousand persons were attended.<sup>121</sup> According to IBGE, for each person attended by welfare another 2.5 (who live in his "social surroundings") are indirectly benefited. One verifies, in this way, the elevated social impact promoted by the actions of the social welfare system.

Besides guaranteeing the distribution of income to the population, the payment of the social security benefits gives dynamism to the economies of the semi-arid areas, especially to commerce, with advantageous effects for fixing the population in the country, and consequently for the diminution of rural abandonment, besides reducing the swelling of the exaggerated growth of the medium and large cities.

Despite the benefits which the social security system furnishes in all the areas of Brazil, the semi-arid includes a great contingent of persons who are not covered by the social security system. (Sândi e Heringer, 2001.)

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<sup>118</sup> The Family scholarship, according to the PPA 2004-2007, foresees resources on the order of R\$ 31,9 billion.

<sup>119</sup> Law nº 8.213/1991 – Plans and benefits of Social Security

<sup>120</sup> Social Security in the Municipalities of the Brazilian Semi-arid Region. See about this matter: i) HERINGER, Luiz. **O papel da previdência social no semi-árido brasileiro e no combate à pobreza (The role of social security in the Brazilian semi-arid region and in combating poverty)**. Brasília: [Ministry of Social Welfare], 2004. and ii) SANDI, Ricardo & HERINGER, Luiz. "A previdência social nos municípios do semi-árido brasileiro (Social Welfare in the municipalities of the Brazilian semi-arid region)". In: **Informe da Previdência Social**, nº 8, v. 13. Brasília: [Ministry of Social Welfare], 2001.

<sup>121</sup> According to the authors, on considering the relation beneficiary/population, the percentage of the semi-arid region in 2001 was equivalent to 6.6%, less than the national average of 9.7%.

This fact indicates the extreme necessity of establishing public policies which favor the creation of mechanisms of stimulus for the normalization of labor relationships for the social protection of the workers, besides this, the inserting into the system of the free-lance low-income urban workers, who have never contributed to the social security system, is one of the strategies needed to combat poverty.

It is necessary to produce studies which demonstrate the impacts (positive and negative) on the differentiation of the social security contribution rates (both on the employers' part and on the workers' part) for the ASD, so that one can stimulate the formalization of the labor relations and broadening the insertion of the low income workers into the social welfare system.

In the face of the importance of the Social Security System for the Combating of poverty and the social exclusion in the ASD, one should give priority to the elaboration of more detailed actions about this subject, to be added to later to this Program.

### **5.3 SUSTAINABLE INCREASE OF PRODUCTIVE CAPACITY**

As mentioned in the previous chapter, the ASD are submitted to a set of restrictions and productive processes which should merit special attention, in the sense of broadening the capacity of response to the challenges set by the process of desertification.

The conflicts for the use of water in the ASD are an example of the need to strengthen the management of water resources, having in mind to guarantee the destination of these resources with greater efficiency, in the face of its different uses.

One emphasizes that the energy matrix in the ASD is highly dependent on the utilization of the forest covering of the region. This dependence refers both to the domestic consumption as well as to the commercial and industrial use, reaching, according to official estimates, about 25% of the energy offering. Given the edaphoclimatic conditions and those of the management of vegetation, the land clearing anticipates the erosive processes and those of desertification. The substitution between sources would be restricted by the limited offering of the hydroelectric system, raising the cost of this production element. The most accelerated growth of the economic activity will find thus, in principle, a considerable restriction to its advance.

In the same way the transport infrastructure, although quite significant in the semi-arid areas, (and less dense in the dry sub-humid areas) will need great investments for its broadening, maintenance, and improvement, in the face of demands of the economy. At present, the infrastructure of transports constitutes a heavy burden to the competitiveness and the efficiency of the whole regional economic system.

#### **5.3.1 Chief problems and challenges**

One examines, from here on, some problems and specific challenges of the various sectors and economic segments in the ASD.

##### **5.3.1.1 Farming activities**

The making dynamic of the farm and cattle-raising activities in the ASD depends on the solution of problems related to the domain of the agrarian structure, of technology, of the availability of water resources – in reality, the scarcest -, to generate wealth with economic,

environmental and social sustainability. This set of factors has its possibilities limited due to the occurrence of periodic droughts and environmental degradation.

In the last years, one has been observing the expansion of the agro-business in some sub regions of the ASD, with emphasis for those commanded by the advance of the cultivation of soy beans (chiefly in the dry sub-humid areas) and the expansion of irrigated agriculture, centered on the cultivation of fruits (especially in some portions of the semi-arid areas). Significant changes also have been observed in family cattle raising, in areas exploited in the system of non-irrigated agriculture

The crops of soybeans and cultivation of fruit are generating considerable wealth in the region, but these benefits have provoked strong environmental and social impacts, chiefly in reference to destruction of employment. Significant sectors of social movement condemn this type of option, as it was possible to observe in the discussions held during the process of the formulating of PAN-Brazil. There are other perspectives with the advance of irrigated agriculture and concerning this, the problems of inadequate management of the soil - water - plant complex stand out, due to the risks of salinization and resulting loss of productive capacity. Given the volume of investments, which demand to be put into practice, these activities area not contributing as would be desirable and hoped for to reduce poverty and inequality. They have been conducted, moreover, according to income concentrating models.

Despite the investments made in the last decades, the grazing activities (herds of cattle, goats, and sheep) face strong reduction in their effective size to a large extent because of the occurrence of various droughts, in the decade of the 90's. Despite this one perceived a relative stability of the levels of productivity, resulting from the modernization observed in some sub regions of the semi-arid area. These activities also develop at the cost of process of concentration of capital, (lands and other assets) and of income. They produce, moreover, considerable pressures on the natural resources, which in many regions are already debilitated by overgrazing.

Despite the resistance and capacity of adjusting to adverse conditions, family agriculture, historically submitted to restriction of resources of every type (lands, access to water, fixed capital and working capital, technical assistance etc.) has managed to survive, although many times, those who lived on it have been at the limit of the poverty line or almost indigent. Even in the Agrarian Reform settlements, family agriculture has not managed to provide the farmer with economic, social or environmental sustainability. First, because the models of production adopted are, in general, incompatible with the prevalent conditions in the ASD. Second, because the processes adopted for its effectiveness lack greater support in the area of credit, technical assistance, infrastructure (social and productive) and diverse investments.

### **5.3.1.2 Industrial activities**

Until the middle of the Twentieth century; industry in the semi-arid was represented by activities as the following: the industrialization of fishing, production of carnaúba wax and oiticica oil, processing of cotton, small industry for the production of metallurgical articles (as screws, springs and bronze pieces); and industrialization of sugar cane in the areas of high Caatinga of the Humid Mountainous Area (for the manufacturing of hard brown sugar, honey and derivatives).<sup>122</sup> The profile of the sector changed considerably in the last quarter of the Twentieth century Integrating their own resources to those resources of fiscal incentives of

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<sup>122</sup> In the middle of the twentieth Century one did not know of the existence of petroleum in areas of the semi-arid or of the coast, which only recently, in about the 1990's were identified and studied by Petrobrás.

Sudene and of the Constitutional Fund for Financing of the Northeast – FNE, administrated by the Banco do Nordeste, northeastern businessmen from other regions installed new industrial undertakings in several cities of the semi-arid region, especially those connected to the industry of transformation. (Carvalho & Egler, 2003.)

The industrial production of the Semi-arid Region includes today branches of the mining industry, of the transformation industry, of civil construction, and of industrial services of public utility. The weight of the mineral extracting industry is still small, when compared to the industrial production of the Northeast, especially of the existing industry in the coastal zones. The industry of mineral extraction presents greater weight specifically in the semi-arid areas of States as Bahia, Pernambuco, Rio Grande do Norte, Ceará and Piauí.

In general, the spaces with the most significant industrial activity in the semi-arid area are concentrated around the cities such as Feira de Santana, Juazeiro and Jequié in Bahia, Araripina, Petrolina, Serra Talhada, Arcoverde, Belo Jardim and São Bento do Una, in Pernambuco; Patos and Campina Grande, in Paraíba, Mossoró, Caicó and Angicos, in Rio Grande do Norte; Maracanaú, Pacatuba, Guaiúba, Sobral and Juazeiro, in Ceará; and Floriano, Parnaíba and Picos, in Piauí.

In the context of the areas susceptible to desertification – ASD industrial activities dependent on the exploitation of mineral and forest resources stand out. One notes however, that these activities exercise intense pressure on such resources, when exploited according to technological standards of low productivity. The rational use of mineral resources, in the face of modern technologies available today and of the legal norms to which such activities are submitted, can constitute important economic and social alternatives for the development of this region.

A diversified range of mineral goods, involving metallic and non-metallic substances represents mining in the ASD. There one finds a great variety of geological environments with diverse ages and lithological constituents, which reveal a high mineral potential. For example, all the potential of magnesite of the Country – which constitutes the basic element for the refractory industry, on which depends all the siderurgical park and national cement industry – is concentrated in this region. The occurrences known are concentrated in the States of Bahia and of Ceará. The reserves of vanadium, uranium and lithium, however, are concentrated almost totally in the semi-arid spaces of Bahia and of Minas Gerais.

The ASD possess other mineral raw materials such as graphite, diatomite, barite, chromite, potassium, and various gems, representing the greatest Brazilian reserves. Besides these, there are also present in those areas minerals such as bentonite, rock salt, gypsite, cyanite, vermiculite and minerals of pegmatites (feldspar, micas, beryllium, quartz etc.) representing the second greatest reserves of Brazil.

In quantitative terms the Brazilian mineral extraction industry – including the fossil fuels, petroleum and natural gas – produced in 2003 a value corresponding to R\$73,904 billion. Of this amount, mineral production in the ASD (including the universe of more than fifty mineral substances of the metallic, non-metallic and energetic group) contributed with R\$ 10.459 billion, representing a percentage superior to 14% of the global value of Brazilian mineral production.<sup>123</sup>

The mining activities have been contributing to the expansion of the job offers, direct and indirect, in the region. Thus the possibilities of development are promising in the mineral

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<sup>123</sup> Cf. i) Mines and Energy Ministry-MME. Nacional Mineral Production Department - DNPM. **Anuário mineral brasileiro (Brazilian mineral yearbook)**. Brasília, DNPM, 2001; and ii) Mines and Energy Ministry-MME. Nacional Mineral Production Department - DNPM. **Informe mineral (Mineral Information letter)**. Brasília, DNPM, 2004. Available in: <<http://www.dnpm.gov.br>>. Access in September 30, 2004.

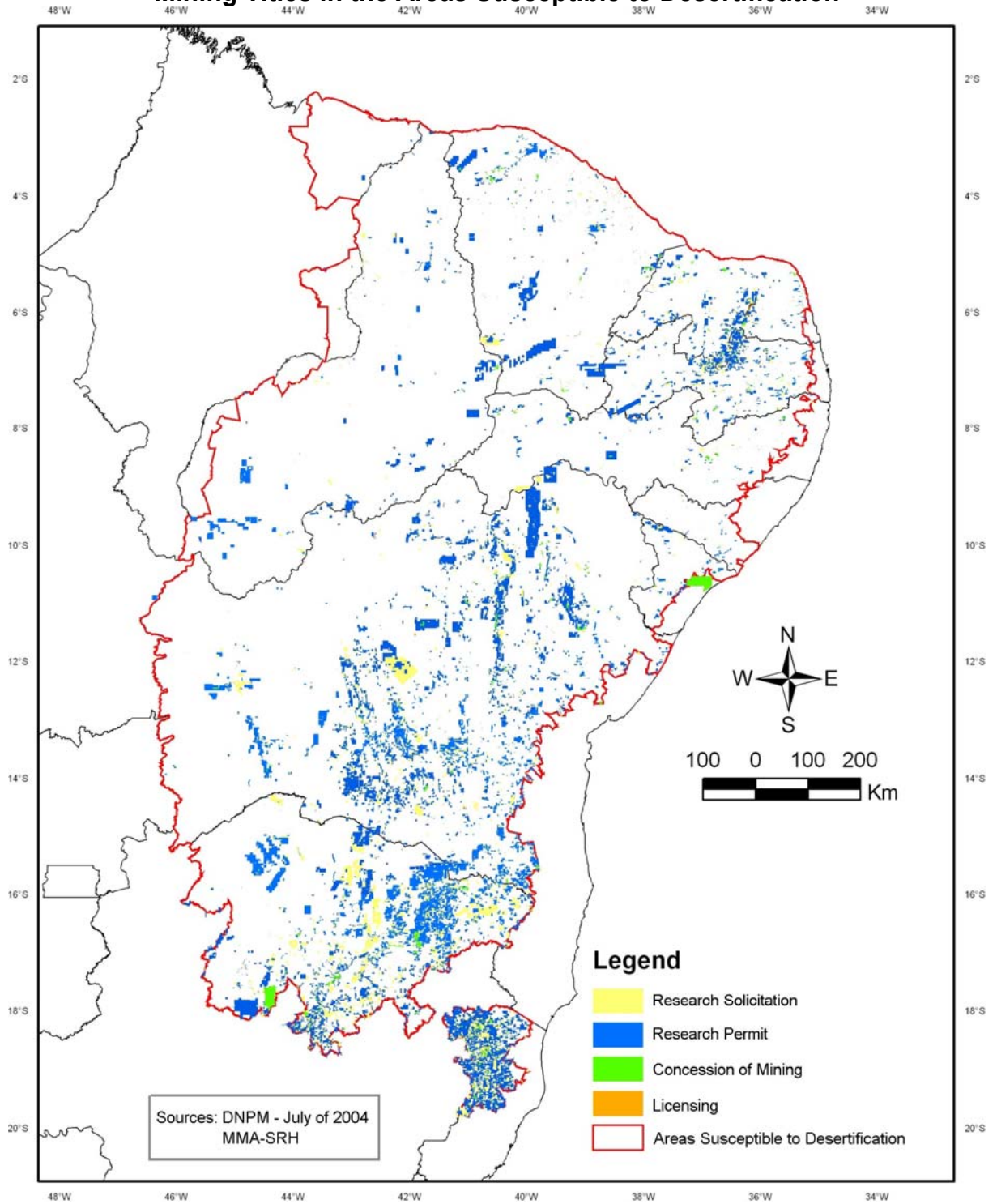
sector of the ASD, having in mind the condition of geological and metalognetic environment of the crystalline, pré-cambrian lands and the Mesozoic sedimentary coverings for the discovery of new deposits. The demand is great, at the DNPM by the mineral extracting industry for new authorizations of research for mineral exploration in the ASD. Up to the present, the DNPM authorized the concession of more than 13,000 research titles in those areas. This means a significant number of projects of mineral exploration involving national and multinational mining companies, besides individuals. In 5.1 the space distribution of these titles in the areas susceptible to desertification is shown.

Managed in a sustainable way, in balance with the environment, mining can represent a viable alternative for socioeconomic development to benefit significant contingents of people who survive with very great difficulty in the ASD.

### **5.3.1.3 Services**

The positive variation and the expansion of the service sector have been permanent. Since the decade of the 1990's, the investments in public services, as education, health, sanitation, electricity and communications (in the majority of cases associated with urban areas) have increased in a continuous and significant way in the ASD. This same movement can be observed in private activities and personal services, tending to broaden in the next coming years.

**FIGURE 5.1**  
**Mining Titles in the Areas Susceptible to Desertification**



The improvements observed are still small. First of all by the existence of a chronic deficit of basic services which only recently is being covered. In second place, the possibilities of expansion also suffer restrictions common to the other sectors (water, energy, transport infrastructure, cost of capital) and, additionally, suffer from the low buying power of the majority of the population.

Whatever significant addition to the productive capacity of the agricultural or industrial sector will immediately demand the existence of complements and sustaining of services connected to the production, distribution and consumption, which are quite limited and decapitalized, except for the exceptions which confirm the rule.

### **5.3.2 Existing Policies**

For the promotion of sustainable development of productive capacity of the ASD, one still cannot count on a unified, integrated and articulated federal policy. This verification has been explained, repeatedly, during all the process of formulation of PAN-Brazil by the various actors involved.

It is true that there exist legal determinations relative to the need for combating the regional inequalities. But the initiatives characterized by more visible results have depended on sector policies for promotion or fiscal incentives, much more than on efforts derived from the establishment of objectives and goals, which lead to the overcoming of the problems identified. Traditionally, one has reached the recognition of certain problems, but the solutions proposed are demonstrated to be over the short, medium and long range inadequate or insufficient to change its determining reasons.

The sector policies implemented with a low degree of intensity, integration and articulation constitute the tonic note in the last decades. Even the policies of fiscal incentives or even the mechanisms of subsidized credit present only temporarily positive effects for making the economy dynamic. But tend to be, due to economic and financial insustainability, interrupted and presenting negative social impacts, broadening the inequalities and the concentration of income.

The autonomous state policies, complementary or not to the federal policies, have not been sufficient to alter the conflicting results. Isolatedly or as a group, these policies tend spontaneously to reproduce or stimulate, in the ASD, standards of production development which do not always take into consideration the special conditions, the existing restrictions or the processes of desertification present there. For this reason, the government and society have been developing a new concept of sustainable development, affirming the idea of Living with the Semi-arid Region.

To keep official credit and tax benefits from being utilized in activities prejudicial to the environment, institutions of the Federal Government, coordinated by the Environment Ministry, have created the Green Protocol by means of which one agrees to the set of guidelines and procedures, so that the specific aspects – restrictions and potentialities- of each biome will be respected by means of the inclusion of an environmental variable in the management and concession of the referred to credits or benefits.

The chief concern with the promoting of sustainable development of the ASD contributes in the formulation of proposals to create conditions for competitive insertion of the

Micro, Small and medium sized businesses – MPME's in Productive Chains<sup>124</sup> of a specific sector, as well as for the adopting of a model of local productive arrangements – APL's.<sup>125</sup>

In this way, the organization of work in productive chains has the merit of promoting the interaction between businesses and public institutions and civil society, by using the purchasing power of these institutions as an inducer of activity. For the APL's it is necessary to consider the dynamics of the territory in which the businesses are inserted, having in mind the number of work places, turn-over, market, growth potential, diversification etc.

The idea of territory is fundamental for the activity in APL's, their not being summed up merely in their material or concrete dimensions. Territory is a field of forces, a web or network of social relations, which are projected in a determined space. As a result, the Local Productive Arrangement also is a territory where the constitutive dimension is economic by definition. Despite not being restricted to it, it includes a section of geographic space (part of a municipality, set of municipalities, hydrographic basins, valleys, mountain chains etc.) which possess signs of collective identity (social, cultural, economic, political, environmental, or historical).

As any innovative proposal, these are the objects of discussion and tests. The sectors of social movement perceive it with potentiality, but argue that the necessary links with more developed and competitive markets can make unviable the very effort made by local communities, the most fragile links of the productive chain.

Now one will specify the actions, procedures and processes which will be adopted to reach the objective of stimulating the sustainable increase of productive capacity, considering that the government and civil society should operate within the set of restrictions and blocks identified, as well as in the stimulation of new options and productive initiatives.

### **5.3.3 Chief Actions**

The process of construction and the commitments of PAN-Brazil signify a governmental effort in the direction of sustainable increase of productive capacity. The actions to be implanted include topics as the following: i) Improvement of Infrastructure; ii) Strengthening of Productive Activities; and iii) perfection of the Flux of Investments.

#### **5.3.3.1 Improvement of the Infrastructure**

The activities of infrastructure are referred to initiatives in the areas of energy and of water resources and environmental sanitation.

##### **a) Energy**

In the context of this Program, energy is being considered as a vector of local development and as a factor of integration of the multisector development, also competitive on a global basis.

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<sup>124</sup> The productive chains refer to the set of stages through which pass and are being transformed and transferred the diverse inputs, in cycles of production, distribution and commercialization of goods and services. It implies in the division of work, in which each agent or set of agents realizes distinct stages of the productive process.

<sup>125</sup> Local Productive Arrangements – APL's are agglomerations of businesses located in the same territory, which present productive specialization and maintain some link of articulation, interaction, cooperation and learning among themselves and with other local actors, such as the government, business associations and credit teaching and research institutions.



The renewable sources of energy will participate more and more relevantly in the global energetic matrix in the next decades. The growing concern with the environmental questions and world consensus about the promotion of development on sustainable bases has been stimulating the realization of research and technological development which foresees the incorporation of the effects of learning and the consequent reduction of the costs of generating these technologies.

The tactics considered as opportune for the energetic development of the ASD's should correspond to the utilization of hybrid systems, structured starting from the taking advantage of local sources of renewable energy, privileging the figure of the independent, autonomous producer of energy, organized in community associations and/or cooperatives. An other point of view corresponds to the repotentializing of the energetic system of production, transmission and distribution of energy existent in the semi-arid area, to aggregate the technological innovations, confer efficiency gains, reduce losses of distribution and consumption, and consequently the final cost of energy.

Some alternatives of the use of renewable sources present quite favorable characteristics for the implementing of systems of generation, production and furnishing of energy on a decentralized basis, capable of providing in an economically viable form, and at competitive costs, the energy service essential for the population of areas far from urban centers.

The energetic forests can constitute a form of taking the best possible advantage of some of the natural vocations of the ASD. Sustainable forest management of the Caatinga and of the Cerrado, associated with native reforestation, can aim at the production of energetic biomass. It would be a solution to reverse the process of desertification of the Sertão.<sup>126</sup>

However, one is not speaking of traditional silviculture, with the substitution of the original biome with a homogeneous forest of an exotic species, with rigid spacing and traditional culture treatment, but of a copy of the original biome, with the arboreal, bush, and herbaceous strata, obtained by means of the planting of diversified natural slips – in the beginning of the rainy season, in the deep Caatinga, without rigid spacing, taking advantage of the openings in the native vegetation, which will serve as a protection. With the development of the slips planted, a thinning of the protecting vegetation would be practiced, eliminating those undesirable species, and making new planting of slips, until the formation of the forest, which would rationally exploited for firewood and charcoal, guaranteeing the sustainability of the biome.

The sources of renewable autonomous and decentralized energies and local networks of distribution and equipment of high efficiency for furnishing and consumption for domestic and industrial applications are capable of supplying the energy services at costs comparable to those in the areas covered by the national integrated network, with elevated levels of services and access.

Technological developments in the use of the biomass, wind energy and photovoltaic energy have created new opportunities for rural development in addition to the use of small hydro-energetic central energy stations. This taking advantage constitutes a basis for recommendation about the use of energy in the remote areas, including: i) the decentralized generation and distribution of electricity, creating more employment in the rural areas than centralized generation; ii) the energy of the biomass which offers significant possibilities for

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<sup>126</sup> CAMPHELLO, Geraldo de Araújo Barreto & GODOY, Osani Godoy. **Desertificação do semi-árido nordestino: uma visão regionalista (Desertification of the northeastern semi-arid region: a regionalist vision)**. Brasília, MMA, 2004.

the creation of jobs; and iii) the utilization of new technologies of generation of energy starting from the biomass, given its potential for obtaining of electricity at low cost which rural industry is lacking.

Besides this the production of biomass can become a source of jobs and generation of income for the rural population. Both the crops dedicated for the production of energy as well as the utilization of residues and agricultural leavings (crushed cane and straw of sugar cane, peels and stems of cereals, grains etc.) can be utilized as combustible and prime materials for the production of energy,

New technologies of small units of energy generation of the biomass can also make economically viable the extension of transmissions lines up to the rural areas, giving the flux of energy of the rural area to the cities, contributing for the generation of income and added value in activities realized in the country.

Decentralized sustainable energy can also contribute significantly to improve the living conditions of the population in rural areas, providing energy services which the inhabitants of far away areas cannot have available in some other way. The alternative sources of energy are capable of assuring, in the short term, the access of the rural population to essential services (health, education etc.).

### **a.1) Policies and Existing Strategies**

For the implementation of PAN-Brazil, it is important to articulate actions and formulate proposals of projects the economic viability of which will be assured by the utilization of instruments and resources already contemplated in government programs, in the context of the National Energetic Policy of the Sector Funds of Support for Scientific and Technological Development and of the Lines of Financing directed especially to the sectors of the economy, to which was conferred priority for industrial development.

Among the diverse existing instruments and mechanisms it is proper to emphasize, especially because of the profile of attending the demands of PAN-Brazil, the programs detailed following:

- i. Light for All. The federal government with the challenge of eliminating electrical exclusion in the country started this. Budgeted at R\$7 billion, it will be executed in partnership with the energy distributors and state governments with the objective of taking the electrical energy to more than 12 million persons by 2008;
- ii. The Program of Energetic Development of the States and Municipalities –PRODEEM. Has as an objective to attend the isolated locations not supplied with electric energy by the conventional network, obtaining this energy by local renewable sources, in a way to promote the social and economic development of these localities and having as partners diverse national and international organisms, including partnerships of co-financing; and
- iii. Program of Incentives for Alternative sources of Electric Energy – PROINFA. This has an objective to stimulate the utilization of alternative sources of energy, particularly wind energy, biomass and small hydroelectric central power plants.

The actions foreseen in these programs are complemented by the instrument of the sector Funds of the Science and Technology Ministry – MCT. It is about a form of impelling the technological development of priority sectors, as that of energy, through the concession of financial resources in support for implementation of project of technological development.

## **a.2) Actions Proposed**

Based on the demand identified, starting from the recommendations and proposals consolidated in the State Workshops, one presents herewith some of the options of projects to be implemented, aiming at taking advantage of alternatives for the use of renewable sources for generating, producing and furnishing of energy on a decentralized basis, providing, this essential service in an economically viable form and at competitive costs, to the population of distant areas. Moreover, projects arise which plan to take advantage of the biomass with potential for the production of low-cost electricity in the rural communities.

One presents here with a list of projects that can be detailed and implemented later:

Elaboration of a Guideline Plan for the Energetic sector of the ASD, considering among other aspects the characterization of the demand, the alternatives of utilization of renewable sources, the potential of the offer of energy, the socio-environmental impact of the solutions which can be adopted;

Elaboration of a Program of qualification and Training of State scope (in the municipalities and regions of the ASD), destined for the formation of competencies both of the users as well as of the community and municipality agents in the installation, operation and maintenance of the equipment and systems of local production of energy, be it electricity or production of biofuels;

- Implementation of an Industrial Program for the production of equipment & Systems of Generation and Taking Advantage of Renewable Energies;
- Expansion of the Program of Rural Electrification and making adequate for national programs;
- Survey and/or complementing of Data for the Elaboration of an Wind Atlas of the ASD's;
- Implementation of Projects of Solar Energy Utilization in low income Housing;
- Installation of a Demonstrative Unit of Solar Heating of Water in the Hospital Sector;
- Implementation of projects of Alternatives and Energetic Efficiency, with a focus on the utilization of biogas, and firewood in domestic use, native oleaginous products and natural gas;
- Continuation of the Viability Studies for the Extension of Gas ducts in the SAB, starting from already identified deposits;
- Development of Projects of Energy Alternatives for the Substitution of Firewood in producing steel;
- Establishment of Programs of Utilization of Renewable Energy Systems in Schools and Municipal Organs; and
- Amplifying of Energy Capacity by the Repotencializing of Plants and of the Transmission and Distribution System in the ASD's.

## **b) Water Resources and Environmental Sanitation**

Here follows a description of the chief characteristics of water resources – with emphasis on its management aspects- and of environmental sanitation of the ASD:

## b.1) Water Resources

The ASD are characterized by a hot and dry climate with concentrated rains in few months of the year and high potential evapo-transpiration. These areas are constituted basically of two types of geological structures: the sedimentary basins and the crystalline foundation. This last covers approximately 70% of all the semi-arid space (which covers a great part of the ASD).

Due to the low capacity of infiltration/retention of water, of the crystalline foundation, allied to the high potential evapo-transpiration and to the existence of long periods of droughts, an important part of the watercourses of the Brazilian semi-arid are intermittent watercourses. Allied to these characteristics, the soils derived from these rocks are, for the most part, shallow with a depth of 60 centimeters or less; with a low capacity of infiltration, high superficial run-off and low natural drainage.

In these areas the storage of water occurs in splits/fractures of the rocks or in small reservoirs in the regions of alluvial soils. The waters present in the splits of the rocks are normally of low quality (the wells drilled in this region present drainage averages of less than 1,000 liters/hour) and the quality leaves something to be desired, due to the high concentration of chlorates. Such characteristics, in general, make these waters improper for human consumption. A significant fraction of these waters, moreover, can present serious restrictions with respect to use for watering animals and for irrigation.

But in the sedimentary basins the soils are deep (generally with more than two meters of depth), which makes superficial run-off possible, high capacity of infiltration, good drainage, and reasonable availability of underground water of good quality.

Due to the characteristics cited, the public policies historically implemented in this regions gave priority to the accumulation of the waters coming from the rain in reservoirs, of large, medium and small size, as a form of guaranteeing human and animal supply, agriculture, fishing industrial use and recreation. Given the importance of offering water and in promoting development, the governmental interventions tend to be concentrated in point water works (construction of dams, aqueducts, perforation of wells and implantation of irrigation projects), not connected to an effective process of integrated and sustainable development for the region. These works did not always occur in an articulated way between the diverse regional social actors or were not based on technical, economic, social, environmental and cultural premises compatible with the local reality.

Currently the Brazilian semi-arid Region has more than 70 million dams, reservoirs, and storage ponds. These reservoirs have a water storage capacity of 85.1 billion cubic meters.<sup>127</sup> Approximately 80% of the existing storage ponds are small and medium-sized, with a volume including between 10,000 and 20,000 cubic meters of storage capacity. Due to the elevated potential evapo-transpiration, dams with little depth and a large surface area of water tend to lose a significant volume of water by evaporation, functioning more as an evaporator than really as a storage space of water. Add to this the fact that these works are necessarily constructed in alluvial lands, inundating the best soils of the region, which makes the use of these lands by farmers unviable.

The attempt to implement a model of development based on intensification of the use of the soils and on irrigation has as a direct consequence the increase of the demand for

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<sup>127</sup> Within that total of dams, two (Sobradinho and Itaparica) are responsible for a storage capacity of 50 billion cubic meters, that is, for 58,8% of the total dam capacity (or of storage). About the matter see: GONDIM FILHO, Joaquim Guedes Corrêa. **Sustentabilidade do desenvolvimento do semi-árido sob o ponto de vista dos recursos hídricos. (Sustainability of development of the semi-arid region from the point of view of water resources)** Fortaleza, SEPLAN-PR/IICA, 1994. (A study realized in the scope of the Water Resources Group of the Project ÁRIDAS – Nordeste).

water) one of the most limiting factors in the region), the broadening of the processes of erosion and salinization of the soils, the degradation of the natural vegetation and the reduction of the biological diversity among others. At the same time, the destining of great sums of public resources in works of water infrastructure without the necessary agrarian reform, as an instrument of transformation of the traditional forms of ownership and use of the soils and of democratization of access to the land, privileged certain sectors with better economic conditions, and from this resulted the privatization of many of these public works and the broadening of the process of exclusion and of impoverishment of a significant parcel of the population.

Factors such as the low water availability, the high potential evapo-transpiration, the instability of the rains, and the social, economic, environmental, and cultural characteristics of a great part of the areas susceptible to the phenomenon of desertification in Brazil impose a differentiated manner of working with the question of water resources. These new perceptions should be based on respect for the natural processes related to water resources and in the best use of the existing availabilities. This region demands the implementation of strategies of living with the semi-arid area and decentralized and participatory management of the water resources, especially at the local level.

The Federal Constitution of 1988 defined that it is in the competence of the Union to institute the National Water Resources Management System (article 21, section XIX). It established also that the waters are public property, in the domain of the Union and of the States (articles 20 and 26).

Starting out from these constitutional determinations, from the recommendations resulting from the International Conference of Mar del Plata and of Dublin and from the principles of Agenda 21, the National Water Resources Policy – PNRH, was conceived and instituted by Law no. 9,433 of January 8, 1997.

In this law, fully discussed among the various democratic currents which represent Brazilian society, presents fundamental presuppositions for the democratization of water resources management, such as the decentralization and the active participation of society in the decision-making process, having as a planning and management unit the hydrographic basin. Its objectives (article 2) consist of:

- iv. Assuring the current and future generations the necessary availability of water in standards of quality adequate for their respective uses;
- v. Utilizing in a rational and integrated way the water resources, including among its uses waterway transportation, with a view to sustainable development; and
- vi. Establishing mechanisms of prevention and defense against critical hydrological events, of a natural origin or resulting from the inadequate use of natural resources.

The Waters Law, in its article 3, describes the general guidelines of action for the implementation of the National Water Resources Policy, emphasizing that the management of water resources should be adequate to the physical, biotic, demographic, economic social and cultural diversities of the several regions of the Country, beside integrating the environmental management and articulating it to the management of soil use.

Various instruments (article 5) were established for the promotion of the National Water Resources Policy, with emphasis on the following:

- Elaboration of water resources plans, which should have as an objective to give a basis and orient the implementation of the National Water Resources Policy and the management of these resources;

- Establishing a classification of the bodies of water, according to the preponderant uses of the water, to guarantee the quality compatible with the most demanding uses to which they are destined and to diminish the costs of combating pollution through permanent preventative actions;
- Concession of the right to use water resources to assure the quantitative and qualitative control of the uses of water and the effective exercise of the rights of access to water;
- Charging for the use of water resources, which figures as an educational mechanism, which recognizes water as a economic good and indicates to the consumer its real value;
- Establishing a system about water resources, including the collection, treatment, storing, and recovery of information about water resources and intervening factors in its management.

The current situation of the process of implementing the instruments of the Water Resources Policy for the ASD is shown in Table 5.1.

Law no. 9,433/1997, besides instituting the National Policy, created the National System of Water Resources Management – Singreh, which, in synthesis, is made up of a set of legal-administrative mechanisms (be they laws, institutions or management instruments) with the purpose of putting into practice the national policy, to offer the proper technical and institutional support for managing water resources of the Country. The institutions which form Singreh, are thus defined:

- i. The National Water Resources Council;
- ii. The National Water Agency;
- iii. Water Resources Councils of the States and of the Federal District;
- iv. Hydrographic Basin Committees;
- v. Organs of federal and state public powers and of the Federal District and of the municipalities, the competencies of which are related to water resources management; and
- vi. Water Agencies.

Despite Brazil's having instituted its National Water Resources Policy in 1997, some states inserted in the region which is the focus of PAN-Brazil had already established their state policies, such as Ceará, Bahia, Minas Gerais, Paraíba and Rio Grande do Norte. Currently all the states included in the region of PAN-Brazil have policies and state systems of water resources management, however, in a quite differentiated degree in relation to the effective implantation of its presuppositions.

All the 11 states of the area of PAN-Brazil constituted State Water Resources Councils and have systems of inspection and control of the utilization of water resources. Eight of them constituted state funds for the support to the system of management. In relation to the existence of committees for rivers in the state domain, five states installed such decision-making instances (Ceará, Minas Gerais, Pernambuco, Piauí, and Sergipe), totaling 24 committees of rivers in the state domain in the area of the Program's activity.

It should be pointed out that the National Water Resources Policy is recent. Thus, its implementation should be observed as a dynamic process, supported by effective social participation, by institutional strengthening and the formation of specialized situations.

Therefore, despite the differentiation in relation to the implementation of water resources management in the states affected by the phenomenon of desertification, in a short span of time, significant advances were observed, as well as the incorporation by society and political entities of the vital necessity of implementing water resources management for supporting sustainable development and the reduction of regional inequalities.

Among the several successful experiences in the scope of the project, one emphasizes the so-called negotiated allocation of water, in which the representative of the water consumers, together with the technicians of water organs of the state, share the decision as well as the realization of monitoring and evaluation in relation to the use of the water stored in reservoirs. This decentralized model should be motivated on a large scale in the area focused by PAN-Brazil and adapted to the most diverse realities experienced in the region.

**TABLE 5.1**  
**Current Situation of the Process of Implementation of the Instruments of the Water Resources Policy in the States Inserted in the Region of PAN-Brazil**

INSTRUMENT	PRESENCE	ABSENCE
Classification of the bodies of water		BA, SE, PE, PB, RN, CE, ES, MG, * AL, PI, MA.
Concession	BA, PE, PB, RN, CE, SE, MG, AL, PI, MA	ES
Charging for the Use of Water Resources	CE	BA, SE, PE, PB, RN, ES, MG, AL, PI, MA
State Water Resources Plan	BA, SE, PE, PB, RN, CE	ES, MG, AL, PI, MA
Basin Plans	MG, BA, SE	PE, PB, RN, CE, ES, AL, PI, MA
Information System about Water Resources	BA, SE, PE, PB, RN, CE	ES, MG, AL, PI, MA

Source: Siapreh (SRH/MMA), 2003.

(\*) Minas Gerais possesses classification in six hydrographic basins of the rivers in the state domain; however, they are not a part of the area susceptible to the phenomenon of desertification.

The underground water constitutes an important source for public supply, for irrigation, for industry and for cattle raising in the region subject to processes of desertification in Brazil. An important part of these waters, however, is subject to processes of contamination and of super exploitation, demanding urgent related actions, chiefly to control the uses and maintenance of their quality.

The Federal Constitution of 1988 established the state domain for the underground waters and the Federal domain for the underground resources, including there the mineral waters, drinking waters, and thermal and recreational waters. Despite this, Brazil still does not have an adequate treatment for these resources. The basic knowledge about the underground waters is reduced and dispersed. Various governmental organisms (at the federal and state levels) divide the responsibility of underground water management, but the control of the uses and quality of these waters still is insufficient, for the existing legislation

presents serious breaches. Moreover, there is no critical mass sufficient for their management.

In this way besides the perfecting of the legislation and the broadening of the articulation between the federal and state organisms responsible for the management of underground waters, it is necessary to develop actions of research on the chief aquifers. These actions should permit the deepening of the level of knowledge of the existing reserves, of quality, of the foci of potential contamination and of the exploitable resources of the chief hydrogeological provinces of the ASD. Such actions should be implemented with the objective of broadening the availability of water, and at the same time, establish mechanisms of management and control which make it possible to use these resources sustainably, starting from the identification of the point of balance between demand, offering and preservation of the reservatories of underground water.

To attend the above-described demands the SRH-MMA began the **Program of Underground Water**. Its implementation is being conducted in articulation with other organs of the federal government and with states of the ASD. Still with respect to the underground waters, it is important to add that in the area having a crystalline foundation, the content of salt found present in these waters makes them improper for human consumption. Since in some areas of the ASD the underground waters are the only source for attending the demand of the local population, the federal government started, in partnership with the state governments of the region, the Program Fresh Water, which aims at the installation, recovery and maintenance of equipment of water desalinization for human supply. Moreover, this program seeks to take advantage of rejected material for fish-farming and irrigation of halophyte plants with a high protein count, destined for human consumption and that of animals (especially goats), avoiding negative environmental impacts as salinization of the soils.<sup>128</sup>

## b.2) Environmental Sanitation

The implementation of actions related to environmental sanitation has as its chief purpose to control the factors of the physical environment, which are capable of provoking effects deleterious to human health. This concept adopted by the World Health Organization, demonstrates the breadth of the theme, involving diverse areas, such as: water supply, sanitary sewage, collection and adequate disposal of solid wastes, urban drainage, control of vectors and quality of the air, among other things.

However, considering the peculiarities of the ASD and the contributions coming from the dynamics established during the construction of the PAN-Brazil, one will treat here the questions related to sanitary sewage, water supply and collection and adequate disposal of solid wastes.

The indices of water supply and sanitary waste are far from the necessary universalization. Despite the advances verified in the offering of these services, the lack of attending to these needs is notorious, especially in the social levels of lower income, in the peripheral areas of large cities, in the smaller municipalities, in the small locations and chiefly in the rural area.

The data of the Demographic Census of 2000 show that in relation to the sanitary waste, only 21,13% (that is, 1.5i8 million of the permanent private residences inserted in the region included by PAN-Brazil are linked to the collecting networks (exclusively or of

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<sup>128</sup> A majority of the communities that have desalinators throws the waste material of the process (water with a high concentration of salts) on the ground, being thus able to provoke negative impacts of a great size.



rainwater drainage), while the Country presents an index of 47.24 % (including at that time, 22,16 million homes). In relation to the rural environment, the situation is more critical, for only 0.84% of the domiciles are linked to the network. To consider the use of septic tanks for the final destination of the sewage, this value reached 4,70% (125,017 domiciles).

In the rural environment of the region focused, the most common destination for excretion is the rudimentary sinkhole (31,36% of the homes). However, the most alarming data with respect to the rural area is in the total absence of sanitary sewage treatment in 60.23% of the permanent private homes (that is 1.60 million) while this index on Brazil, according to the same source is 35.29%.

In the urban area, the situation is less critical, but not less alarming, if one considers the national indices. Of a total of urban domiciles which are inserted in the region focused by PAN-Brazil, (4.84) million), only 32.28% are linked to a general network; 39,90% use the elementary sinkhole, and 9.05% do not have any type of sanitary sewage (an index superior by more than 300%, in comparison to the national average).

With respect to the supply of water, 81.39% of the rural domiciles do not have a general network of supply and 40.83% are served by well water, or a spring located outside the property or, still, by water coming from reservoirs (or boxes), supplied by rainwater, water-truck and by a well or spring also located outside the property. When one includes in this last case the existence of running water (in at least one room or on the property) the index reaches only 3.5% of the homes. In relation to those attended by well or spring existing on the property, (with or without hydraulic installations to the houses or for the property) the index is 36.99%.

The lack of water near the property implies in many cases in the spending of many hours of hiking per month in search of this fundamental life element. Although there are not sufficient data to describe the quality of these waters and their results in relation to health, it is common knowledge that many families residing in the rural zone of the ASD use water for human consumption which is also utilized by animals and other domestic uses. This fact tends to compromise the quality of water and causes damage to human health.

The coverage in relation to supply of water in the urban zone corresponds to 86.15%, a little below that identified for the Country (89,76%). However, the percentage of domiciles which use water coming from sources located outside of their land area or by water trucks reached 8.77%, a value much higher to the national index of 3.11%.

In relation to the collection and destination of garbage, once again the data observed in the rural zone are extremely critical. Only 4.9% of the domiciles are attended by garbage collection systems (done by garbage collection services or collected in dump trucks) That is, 95.09% of the homes burn, bury or throw the garbage in empty lots, bodies of water, among other things. In the urban zone, the collection<sup>129</sup> reaches 82,08% of the homes, an index lower than the national percentage (92,14%).

The set of factors pointed out above favors the occurrence of diseases, the prevalence of high indices of infantile mortality and the environmental contamination of the region, among other aspects especially considering the rural zone. According to Abicalil (2003),<sup>130</sup> research done about the matter in several localities in the world indicates that the

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<sup>129</sup> Although collected one observes that the final destination of the garbage, in the great majority of the municipalities inserted in the ASD, is done in an inadequate way (principally in large garbage dumps), without the necessary conditions to avoid contamination.

<sup>130</sup> ABICALIL, Marcos Thadeu. "Atual situação dos serviços de água e esgotos no Brasil" ("Current situation of the water and sewage services in Brazil.") In: **O Estado das Águas no Brasil, 2001-2002**. Marcos Aurélio Vasconcelos de Freitas. Organizer. Brasília: Agência Nacional de Águas, 2003, p. 139.

implementation of water supply and sanitary sewage systems brings large-scale benefits for human health, such as: prevention of at least 89% of the cases of typhoid fever; reduction of 60% to 70% of the cases of trachoma and esquistosomosis; prevention of 40% to 50% of the cases of bacili-caused dysentery, amebic dysentery, gastroenteritis and skin infections.

So that this reality can be reversed, especially in the rural areas, it is necessary to intensify the process of implementing actions, with a view to promoting the adequate sanitary conditions, properly accompanied by actions of social mobilization, sanitary and environmental education, which maximize the acceptance and efficiency of the measures implanted and disseminate hygienic and environmental practices among the population in question.

Moreover, one should broaden the actions destined to assure quality water in a satisfactory quantity for the maintenance of basic necessities of the inhabitants of this region, encouraging the participation, the social involvement and the use of technologies adequate to the socio-economic and cultural conditions of the local population. One example to be pointed out related to the broadening of the offer of water for human consumption of the families resident in the rural semi-arid region (the majority in a dispersed way), by means of the establishment of partnership between the public authorities and civil society, is the **Program of Education and Social Mobilization for the living with the Semi-Arid Region; One Million Rural Cisterns - Program P1MC**. Begun in 2000, this program seeks to contribute with the educational process and of social transformation aiming at the preservation, the access and the giving of value to water as an essential right of life and of citizenship broadening the comprehension and the practice of sustainable and cooperative living with the ecosystem of the semi-arid region. In the first phase of the P1MC (2000 to 2003), about 40,000 cisterns were constructed benefiting directly 65,555 persons

It should be emphasized that the search for universalizing sanitation services in the region subject to the processes of desertification, despite demanding heavy government investments, represents the paying off of a historical debt of Brazilian society towards that parcel of the population of the lowest income in the country.

### **b.3) Policies and Existing Strategies**

The programs and actions specified herewith are in the PPA 2004-2007. The values specified refer to the national actions and the specifically regional actions. In this sense, it is possible to verify that there are regional programs the budget allotments of which can in a specific moment be superior to the values attributed to the same title nationally. This procedure has to do with the management processes of the programs developed nationally and regionally. It means that the national budget allotments can in certain circumstances, be allocated to a region which already can count on a parcel of resources superior to that attributed to the national title.

The following programs related to water resources and environmental sanitation were included: i) Management of the National water Resources Policy; ii) Conservation and the Rational Use of Waters; iii) Pro-basins; iv) Solid and Urban Wastes; v) Integrated and Sustainable Development in the Semi-arid Region – Conviver; vi) Proágua Infrastructure; vii) Rural Sanitation; viii) Urban Environmental Sanitation; and ix) Proágua Management.

- i. **Management of the National Water Resources Policy.** This program has as an objective to coordinate the planning and the formulation of sector policies and evaluate and control the programs in the area of water resources. The resources foreseen nationally correspond to the amount of R\$ 39.6 million.

- ii. **Conservation and Rational Use of Waters.** This program aims at improving the efficiency of the use of water resources, conservation and the quality of waters. It receives resources foreseen nationally of R\$ 40.8 million.
- iii. **Pro-basins.** This program has as an objective to implement the Integrated System of Hydrographic Basin Management of Brazil. It has resources foreseen nationally on the order of R\$ 68.7 million.
- iv. **Urban Solid Residues.** This aims at stimulating the reduction, reuse and the recycling of solid urban residues, broadening the coverage and increasing the efficiency and efficaciousness of the services of cleaning, collection, treatment and final disposition, besides promoting the social insertion of pickers, by means of the elimination of garbage dumps and of child labor in the trash. It mobilizes resources foreseen nationally on the order of R\$ 70,9 million. For the Northeast Region R\$ 66.0 million are foreseen.
- v. **Integrated and Sustainable Development in the Semi-arid Region – Conviver.** This program aims at reducing the socioeconomic vulnerabilities of the population of areas of the semi-arid region in the face of the occurrences of drought. The program contemplates actions related to various themes, including those which present purposes compatible with water resources management (including those of a structuring nature) and environmental sanitation. Nationally, resources are foreseen in the amount of R\$146.5 million. For the specific actions in the Northeast, R\$292,1 million are foreseen.
- vi. **Proágua Infrastructure.** This is destined to increase the offering of good quality water for human consumption and for the production by means of execution of structuring work, as dams, drainage basins, and aquaducts. Several of its actions also are a part of the list of initiatives of the Conviver Program. Proágua counts on resources on the order of R\$9.5 million nationally. For the Northeast region R\$315.5 million are foreseen.
- vii. **Rural Sanitation.** This has as its objective to broaden the coverage and improve the quality of services of environmental sanitation in rural areas. It can count on resources, foreseen nationally, of R\$ 362.2 million. For the Northeast Region R\$27.8 million are foreseen.
- viii. **Urban Environmental Sanitation.** This project seeks to broaden the coverage and improve the quality of urban environmental sanitation services. It has resources foreseen nationally on the order of R\$697.0 million. For the Northeast the resources foreseen are of R\$1.510.0 million.
- ix. **Proágua Management.** A part of the Conviver Program, the Proágua Management has as an objective to broaden the offering of good quality water for the semi-arid region, avoiding with rational use, that the scarcity impedes the sustainable development of the region. This program is structured in two components: **Management of Water Resources**, and **Studies and Projects**. The resources foreseen nationally correspond to the sum of R\$29.0 million. For the Northeast R\$17.8 million are provided.

#### **b.4) Chief Actions Proposed**

The diverse actors who participated in the process of construction of PAN-Brazil presented a series of proposal involving water resources and environmental sanitation, as a form of democratizing the access to water, improve the conditions of life and work of the population and combat the desertification of the ASD. With respect to this, the following proposal stands out:

Broadening of the actions of environmental sanitation (system of distribution of water, collection and treatment of sewage, installation of sanitary land fills, and systems of recycling of solid wastes) in the municipalities of small and medium size, giving priority to the rural zone of those municipalities in the most critical situation in relation to the economic and social indicators;

- Support, strengthening and stimulus for the cooperatives and associations of pickers of recyclable material;
- Concession of priority for the construction of water ducts which make viable the utilization of water of the medium-sized and large dams for human and animal consumption, and for agricultural use.
- Democratization of the access to water of the large and middle-sized dams, giving priority to those affected by their construction and to the surrounding rural communities;
- Stimulus for the increased efficiency of use, for the combating of wasting and for the broadening of the offering of water, by means of the implantation on an adequate scale, of technologies of reuse of water at the urban and rural level;
- Making studies and making information available in relation to the viability of the systems of water reuse (cost x benefit), as a form of making private initiative sensitive to this issue and the governmental organisms of the small, medium-sized and large municipalities, about their potential in broadening the offering of unprocessed water in the ASD;
- Broadening the actions for disciplining the use of water resources in the irrigation projects and in the industries;
- Broadening the inspection and control in relation to the pollution in the storage ponds and bodies of water caused by the discharge of effluents;
- Priority attending to the demands for water supply of the diffuse rural populations;
- Stimulus, implementation and broadening of the actions related to the construction of cisterns, underground dams, successive dams, simplified system of impounding and storing water, tubular wells, and storage ponds in partnership with the states, social movements, and civil society, respecting the local particularities;
- Promoting environmental education, formal and non-formal, oriented towards the giving of value to water and for the dissemination of strategies of living with the semi-arid region;
- Implementation /expansion of the processes of social mobilization, with the intention of broadening the participation and social control in waters management;
- Stimulus for the creation of water resources consumer associations and for the initiatives of negotiated allocation of water (creation of local commissions), involving the public authorities, consumers and local communities;
- Support for the civil organizations and of consumers which participate in collegiate bodies in the exercise of water management, for the broadening of the participation and social control of the governmental actions;
- Broadening of the actions related to the creation and strengthening of the hydrographic basin committees;
- Dissemination of information about the National Water Resources Management System;

- Implantation of a Databank about hydrological potential (surface and underground) of the ASD;
- Technical assistance for the state water resources councils and for the organs responsible for the water resources management at the state level for the making the National Water Resources Management System adequate to social, economic, environmental and cultural reality of the ASD;
- Making compatible the legislation and the instruments of environmental and water resources policy, aiming at making them adequate to the Reality of the ASD;
- Stimulus for the implanting of systems of impounding, storing and utilization of rainwater at the rural and urban level, as a priority in public buildings, schools, industries and other establishments which present large covered areas as a form of broadening the offering of water in the municipalities of the ASD;
- Recovery of wells and water supply systems that are deactivated or with operating and maintenance problems;
- Stimulus for the use of alternative sources of energy for irrigation, pumping of water and desalinization, among others;
- Implementing of the Project Fresh Water (desalinization of water and sustainable taking advantage of rejected material);
- Making a zoning of the recharging areas and mapping of springs in the ASD, and making this available as a planning and management instrument for the use of soils;
- Promoting research networks, scientific and technological development in relation to water resources management;
- Broadening of the credit lines specifically for research, development and implementation of low-cost alternative technologies related to the recovery and preservation of degraded waters and recharging areas; to the taking advantage of water in underground dams to the rational use of water in irrigation; and the implementation and operation of environmental sanitation services in small and middle-sized municipalities.

### **5.3.3.2 Strengthening of Productive Activities**

In this item the topics related to i) Irrigated Agriculture; ii) strengthening of Family Agriculture and iii) local Productive Arrangements are emphasized.

#### **a) Irrigated Agriculture**

Irrigated agriculture has been seen as a fundamental tool for the promotion of development, attracting from the reduction of the risks of frustration of the harvests, the increase of production, the broadening of the productivity, and the generation of employment, the improvement of the living conditions and the increased income for the rural producers.

As a function of the water resources available, of the quality of water and of the soil conditions and topography, the irrigable area is estimated at about 3% of the total area of the Brazilian Semi-arid Region. Less optimistic estimates, which take as a reference only the Northeast, indicate that there exists a potential of soils apt for irrigation of 1,014,00 hectares.

Of these, 670,921 hectares (66%) of the total are being utilized for irrigation,<sup>131</sup> that is, a significant part of the soils apt for irrigation have already been incorporated into the production process. Table 5.2 presents an estimate of the areas irrigated by different irrigation methods in the Brazilian Northeast.

In the context of the discussion about irrigated agriculture in the process of sustainable development of the ASD's, it is proper to analyze which farmers have access to this technology. There is no reliable data about the irrigatable areas among the small, medium-sized and large producers. Empirical observations, allied to the verification of the already well known land ownership concentration existing in the Semi-arid Region, chiefly in the areas near to water sources permit one to suppose that an important part of these irrigable areas is not occupied by family farmers.

**TABLE 5.2**  
**Area Irrigated by Different Irrigation Methods in the Brazilian Northeast (1999/2000)**

<b>IRRIGATION METHOD</b>	<b>ÁREA IRRIGATED (hectares)</b>
Superficial	134.799
Conventional Aspersion	244.631
Central Pivot	121.938
Localized Irrigation	145.497
<b>Total</b>	<b>670.921</b>

SOURCE: Christofidis, 2003. Op. cit.

For the family farmers, who represent the majority of the farmers of the semi-arid area, the opportunity to irrigate a small area, allied to the rainfed agriculture can represent the guarantee of a minimum income, sustainability and food security for the family.

The search for sustainability in the semi-arid region involves, necessarily, the facing of this great challenge of Brazilian society, that of how to incorporate into the process of development millions of family farmers who do not have access to sufficient land for their survival. In this sense, it is necessary to identify forms and implement policies of democratization for the access to irrigation in the ASD's, chiefly in the semi-arid part. There is an urgent need to include an important part of the population of the semi-arid region in the process of sustainable development of the country. Thus, the promotion of family small irrigation, chiefly in the areas surrounding the sources of water, should be defined as one of the priority goals of the federal government. One understands as family small irrigation that which involves small irrigated surfaces, on the order of 0.5 to 2.0 hectares.

Irrigated agriculture however, does not constitute a factor to combat desertification, it only makes the semi-arid and dry sub-humid lands more productive. However, if it is not technically planned and well managed, it can become a factor of desertification, by the salinization of the lands cultivated in the system of irrigation.

<sup>131</sup> CHRISTOFIDIS, Demetrios. "Água, ética, segurança alimentar e sustentabilidade ambiental"("Water, ethics, food security and environmental sustainability"). *Bahia Análise & Dados*, Salvador, v. 13, nº ESPECIAL: 371-382, 2003.

Salinization is the process of accumulation of soluble salts and of exchangeable sodium in the soils, which can be responsible for the reduction of productivity and in graver situations for the impediment of productive activity in these areas. The methods of irrigation utilized and the existence or not of efficient systems of drainage have a great influence on the processes of salinization. The irrigation by furrows, of the lowest efficiency, is a factor which contributes to the evolution of the process of salinization. Badly drained soils, where systems of artificial drainage have not been implanted, can become saline in a few years. In this sense it is important to point out that in only 27.95 of the area utilized for irrigation in the Northeast do there exist agricultural drainage control systems. (Christofidis, 2003.)

Little information is available about the real situation of the salinization of the soils in the semi-arid and dry sub-humid areas. Data of 2003, still in the process of updating, related to the perimeters irrigated implanted by the National Department of Works against the Droughts – DNOCS point to the fact that of a total of 47,336 hectares given to irrigators, 2,887 hectares (approximately 6.1%) are made saline or present a tendency to salinization. Estimates done by Codevasf indicate that in the regions of the Valley of the São Francisco, there is a minimum of 50,000 hectares (about 15% of the irrigated area) with medium levels and high levels of salinization, and of this total, 15,000 hectares are localized in the Sub-middle São Francisco.

The perimeters which utilize the water of the São Francisco River (which possess low concentration of salts), in a general way present good resistance to processes of salinization. However, since a part of the irrigated perimeters were implanted about 20 to 30 years ago, it is possible to admit that the problems related to salinization and to sodification will tend to be aggravated, as a function of the absence of efficient systems of drainage, and can become critical in the near future.

The data about salinization is practically inexistent in relation to the other irrigated areas dispersed all over the semi-arid region of the ASD. A study done by Inbra, along with the Luiz de Queiroz Superior School of Agriculture – ESALQ, in 2002, despite being not very precise with respect to the degree of salinization, points to the existence of this problem in agrarian reform settlements in all the states which compose the ASD's. Specifically for the Brazilian Northeast, the study demonstrates that of a total area of 4.4 million hectares, destined for settlements done between 1995 and 2001, there was 119,492 hectares (2.7% of the total) with diverse degrees of damage of production from problems related to salinization of soils. It is a normal practice to destine the best soils, from the point of view of topography and fertility, for irrigation when the owner of the land has water available for irrigation. This implies that it is perhaps the best soils that are being damaged, which puts at risk a good part of the production sustainability of the farmers who work in rural settlements

The problems related to salinization of soils in the settlements in the semi-arid (relatively recently occupied) can constitute and indicator of the fact that this question also is occurring in other areas irrigated by private persons, whether they are parts of large projects or small irrigated areas.

The implantation of irrigated perimeters represents significant investments of resources of the Brazilian State and of the farmers. Public irrigation projects in Brazil present a cost per hectare implanted, besides that area of the parcel of land (cost of common infrastructure) which varies from R\$ 13,500.00 to R\$ 21,000.00 (Christofidis, 2003.). The investments in the interior of the parcels also can vary according to the methods and equipment utilized, between values such as R\$1,900.00 to R\$4,800.00 per hectare irrigated. An important part of these investments can be being compromised, in case the salinization and sodification processes are not avoided and reversed. Additionally, there will have to be added the annual losses with agricultural cultivation, which according to estimates of the

State University of So Paulo – Unesp reach, on a world average, about US\$250.00/hectare/year.

Another question, still related to the processes of salinization, involves the consumption of water in the irrigated areas. A study done by ANA and by the Federal University of Viçosa – UFV, in 2002, shows the existence of a great waste of water in an important part of the irrigation systems situated on the banks of the São Francisco River. In some situations a consumption of water 40% higher than necessary was identified. Besides representing a great waste of a scarce resource, and an excessive consumption of energy, the volume of water utilized can change the level of the aquifers in the irrigated areas, aggravating or speeding up the processes of salinization and sodification.

Here it is important to call attention to the fact that one knows very little about the processes of salinization and sodification going on the ASD's. Thus it is necessary to adopt measures oriented for the introduction of efficient systems of drainage, chiefly in the semi-arid areas.

At the same time it is necessary to recovery the soils in the process of salinization and sodification. The process of recovery of salinized soils involves the construction of drains and the application of water in a quantity sufficient to realize the washing of the area. In sodium-bearing soils, the recovery involves the construction of drains, the application of water in a quantity sufficient for the removal of salts, conjugated with the utilization of chemical products, aiming at substituting the sodium existing in the complex of the soil. The average cost for the implantation of drainage systems is approximately R\$ 9,000.00 per hectare drained. For the specific case of sodificated soils, the cost tends to be greater, due to the necessity of utilizing chemical products and of plowing, for the incorporation of these products in the profile of the soil.

The points raised up to the present demonstrate the magnitude of the social, economic and environmental problems related to irrigation which has been badly conducted in the semi-arid areas. The governmental problems, oriented for the implantation of irrigated perimeters, have not been sufficient to prevent or deter the advance of the processes of salinization of soils and democratize the access to irrigation in the ASD's.

On the other hand, important progress does exist in reference to water resources management, as explained before. Such processes should be encouraged in a way to facilitate the maintenance and broadening of the productive capacity of the ASD. Thus it is necessary:

- To review and perfect the governmental irrigation programs in the semi-arid areas aiming at adapting them to the needs of efficient use of water, of democratization of access to irrigation and of the control of the processes of salinization;
- Review and perfect the processes of granting use and environmental licensing of the official irrigated perimeters and of the large private projects of irrigation, with the objective of:
  - Making a technical evaluation, dimensioning, and obligatory implantation of efficient systems of drainage in irrigated areas susceptible to the process of salinization;
  - Make an analysis of the irrigation processes, equipment utilized, water shifts and volume of water applied, with the objective of promoting the rational use of water, in away t obtain at middle term, greater volumes of production with lesser water consumption;



- Constitute a Work Group (with a defined time span) make a survey of the real situation of the irrigated soils of the semi-arid and dry sub-humid areas, in respect to the processes of salinization, creating a databank which will be made available for all the interested organs;
- Elaborate and implement actions for the prevention and combating of salinization processes in irrigated soils of the semi-arid and dry sub-humid areas, contemplating as a priority actions to:
  - Implant climatological stations near to the areas of greater concentration of irrigation, aiming to orient the irrigators with respect to the need of irrigation and volumes of water to be applied;
  - Motivate the recovery of soils in the process of salinization;
  - Motivate the development of management plans for water use;
  - Furnish technical assistance oriented for the efficient use of water, the rational use of irrigated soils and the combat of salinization processes.
- Conceive and implement a special credit program for irrigation in the semi-arid and dry sub-humid areas, oriented specifically for attending the demand of family farmers and small irrigators, both private as well as the perimeters irrigated implanted by the federal and state governments, with a view to making the best use of water in the irrigation processes, including, as a priority, actions destined to:
  - Create a special line of subsidized credit, oriented for the implantation of drainage systems and recovery of soils in the process of salinization; and
  - Create a special line of credit for the acquisition of equipment and for the substitution of inefficient equipment in relation to the supply of water or not adequate for the reality of the semi-arid region.
- Make studies and research related to the salinization processes with actions destined for:
  - Subsidizing the zoning of the areas with potential for the installation of projects of small irrigation, taking into account the climate factors, the condition of the soils and above all, the quantity and quality of the water;
  - Make precise surveys of irrigable potential of all the ASD, including the alluvial areas and those localized in sedimentary regions;
  - Develop and disseminate technologies which save water in irrigation;
  - Improve the dynamic of the springs for irrigation, taking into consideration the quantitative and qualitative aspects of water, with the objective of minimizing the risks of salinization;
  - Develop and disseminate recovery techniques of saline soils which are economically viable; and
  - Disseminate low-cost drainage technologies, with the objective of making drainage accessible for the greatest possible number of farmers of the semi-arid.

## **b) Strengthening of Family Agriculture**

A substantial part of the addition of productive capacity of the ASD should be realized by family agriculture – rainfed or irrigated. In the chapter “Combating Poverty and Inequality,”

the actions and propositions were debated that refer to incisive support for family agriculture, which is being furnished in the scope of the governmental policy and of this PAN-Brazil, both in what refers to the distributive aspects as well as with respect to food security. In this section one tries to emphasize the effect of such policies in the increases of production and of economic activity.

One hopes that the implementation and improvement of the Agrarian Reform Program and of the Program of Support for Family Agriculture produce significant gains of production, productivity, employment and income. Moreover, such measures tend to assure higher standards of food and nutritional security for the group of the population of the ASD.

Even with the current deficiencies and limitations for conception and implementation of such programs, the gains obtained have generated immediate impacts and transformer in the local economies, according to what has been observed in evaluations conducted by national and foreign institutions, as the MDA, the Nucleus of Agrarian Studies and of Development – NEAD and FAO.

When one reaches a greater level of activity, one broadens the job market, the market of mass consumption products (food and industrial good), as well as the services associated with it (of agricultural and industrial inputs, of support for production and financial intermediation) with beneficial effects for the whole of society in the ASD.

Attain the permanence and expansion of such benefits will be an important task of PAN-Brazil. It has already been observed that in the ASD's, the farmers strongly pressured by restriction of resources with land and water of the family farmers, or projects of settlements done in inadequate areas, can bring them to adopt practices of inadequate management can cause them to adopt inadequate management and therefore unsustainable on the middle or long run.

In this sense, the federal government is implementing, in the agrarian reform settlements measures of the so-called "agreement of conduct", where the environmental dimension and the questions of natural resources preservation and sustainability are the key elements.

### **c) Local Productive Arrangements**

Particularly in the case of the ASD, various factors contributed either as a set or isolatedly to make the implementing of actions and the adopting of inducing mechanisms of the sustainable development process difficult, among them the deficiency of infrastructure (energy and transportation), the network of communications and the low attractiveness for productive investments, aiming at the taking advantage of resources renewable in the region.

In a complementary way, in the face of the inherent costs for competitive and innovative technologies and of efficient productive processes, one should confer priority to the acting as a consortium of the businesses and of the small producers of a determined segment or sector, according to the adoption of a shared production model made into cooperatives, which permits the socialization of technology and of new production techniques which can guarantee quality and competitive cost for the final product.

The proposal of a series of sustainable development projects is seen as a means of accelerating the modernization, not only creating new businesses, of technology or not, but also of getting past rapidly the current conservative structures which have made difficult the application of new models, systematizing all the process of stimulus for the arising of facilities and installations capable of furnishing technological, industrial and commercial development

of products and services for the ASD's, besides promoting the interchange of experiences of assimilation and incorporation of technologies and innovations in the agroindustrial productive chain, with the increase of quality and of productivity, by means of the modernization of management, marketing and process procedures.

During the discussions held in the State Workshops the convenience was suggested of supporting the constitution of family APL's, on a local basis, as those which can be structured starting from handicraft activities (of leather, cotton, wood, clay, food etc.) Examples about this are given by the communities in regions as the Seridó of Rio Grande do Norte, Vale do Jequitinhonha, north of Minas Gerais, Sertão of Pernambuco, northeast of Bahia, among others.

One identifies in the scope of the several governmental institutions and organs, at the federal, state, and municipal levels (among which stand out the CDIC, the BNDES, the CEF, the BNB, the Sebrae) a set of programs oriented for the promotion and stimulus for implementing projects, with the objective of:

- i. Strengthening the development of businesses, of micro, small and medium size, seeking the insertion of the businessmen in the formal sector of the economy, as well as the arising of new business;
- ii. Financing the farm/agriculture activities and non agricultural activities exploited by direct employment of the work force of the rural producer and his family;
- iii. Development of actions oriented for the creation of employment and generation of income with the small businessmen, by means of stimulus for the production, qualification and the creation of infrastructure, providing the communities benefited with instruments which permit their development on sustainable bases;
- iv. Financing agricultural machines and implements;
- v. Stimulating the implantation, broadening, modernization and relocating of agro-industrial units in the ASD's to elevate the competitiveness, increase the opportunities of employment, promote a better distribution of income and induce the bringing of development to the interior;
- vi. Promote the conservation and control of the environment;
- vii. Support the development of irrigated agriculture, sustainable economically and environmentally, in way to minimize the risk in the production and to increase the offering of foodstuffs for the internal and external markets; and broaden the capacity of storage of the rural properties.
- viii. Motivate the correction of soils, the recovery of the degraded cultivated pasture areas and the systematizing of drainage areas with a view to increasing the production of grains;
- ix. Increment the competitiveness of the agroindustrial complex of Brazilian cooperatives, by means of the modernization of the production and commercialization systems; and
- x. Favor the conditions for the socio-economic development and the effective fixing of the communities object of settlement projects, created in areas destined for agrarian reform, through the implantation of infrastructure and services.

Although these programs have this range, it is absolutely necessary in the course of the implementation of PAN-Brazil that these programs be made adequate for the socioeconomic, technical and environmental characteristics of the ASD's.

#### **d) Chief Actions**

The existence of a potential contingent of national production starting from the natural resources and from the climate and environmental conditions of the ASD's can provide the mobilization of the community for i) the increase of economic activity; and ii) the diversification of the list of products, goods and services which confirm greater autonomy and sustainability, with a view to social inclusion.

It is therefore fundamental that one establish actions of the government articulated with state and regional entities and with civil society, which provide better formulation of the strategies for the development of the productive sector, through:

- i. The establishing of partnerships and strategic alliances at the most diverse levels and in the detecting of opportunities of incorporation, of transfer and of appropriation of technologies;
- ii. The pre-diagnosis and the evaluation of the potentiality of the poles of regional modernization giving priority to actions and investments for getting resources;
- iii. Giving priority to actions and investments for obtaining resources;
- iv. A elaboration of business plans and market strategy; and
- v. The utilization of instruments and mechanisms of promoting facilities for the MPME – Micro, Small and Medium-sized businesses – in each regional pole.

In this sense, a list of actions to be developed in the context of the implementation of the PAN-Brazil is being sent along to furnish the broadening of the productive capacity with sustainable development of the ASD's, including:

- The joint evaluation of the potentialities in the SAB, for sectors and regional poles of interest, aiming at the giving of priority of possibilities and more significant opportunities of sustainable development in socio-economic, cultural, touristy, energy, and environmental terms.
- The oriented definition of the sector of interest of the State Focal Points with a basis on the conditions of competitiveness and on the criteria of added value, productive capacity, demand potential, attractivity factors for investments and obtaining resources, diversification of markets, potential for generating employment and income, and other factors to be considered;
- The survey of the existing technological infrastructure in the sectors defined and the perspectives of complementation by means of partnerships with other technological institutions already established;
- The study of how to take advantage of alternative sources of renewable energy in a decentralized way, in a complementary form, to supply the demand of the productive activities of the sectors defined and isolated communities;
- The elaboration of the proposals of projects and the definition of the Poles of Regional development;
- The identification of partnerships and strategic alliances, having in mind the making compatible of projects with programs of other government organs and technological entities to make viable the necessary resources for implementing the projects;
- The definition and the institution of the Managing Committee for Implementing Projects and the indication of potential partners and Sponsors;

- The identification of Financers and Executors of the Projects;
- The consolidation of a Portfolio of Projects and the formulation of the Business Plan;
- The results in each State, in the scope of PAN-Brasil, of the strategies constructed for the production chains and APL's selected; and
- The implementation of the Horizontal Network model of Cooperativized Production.

Based on the demand identified, starting from the recommendation and proposals consolidated in the State Workshops, a Portfolio of Projects was established in the beginning with potential for promoting the economic activities of the region.

Special emphasis should be given to the conditions and restrictions which orient the process of selection and implementation of industrial projects in the ASD's, in the sense of preserving the balance and sustainable management of the region and of absolutely avoiding the incidence of any practice which could provoke environmental degradation.

Their implementation should be preceded by studies, surveys, complementary analyses and detailing of the pre-project, resulting in Proposals of Economic Development and Industrial Implementation of Projects for the ASD's.

Following one presents some suggestions of projects:

- i. Implementation of Poles of Regional Undertaking for the Agrobusiness in Selected Sectors in the ASD's, with priority for increasing the competitiveness of the agroindustrial complex of cooperatives of small and medium agro-industries, by means of modernization of the productive systems and of commercialization (potential sectors: sheep and goat-raising, cultivating fruits, poultry-raising, bee-keeping, hog-raising, frog-raising, sericulture, flower-raising etc.
- ii. Institution of Regional Centers of Business Modernization, Business Management, Foreign Commerce, and Managerial Support in the cases of agroindustrial projects with isolated activity or in the form of cooperative networks for the assistance of undertakings, rendering of services of quality control, industrial processes, of marketing, of acquisition of inputs, of distribution and of the commercialization of production, prospecting of new markets and exportation
- iii. Strengthening of the handicraft production in the ASD and support for its commercialization;
- iv. Implementation of agroindustrial projects on family bases, economically and environmentally sustainable, with support of technologies appropriate for the production in which the conservation of the quality of the soil and water prevails and which saves external chemical inputs, in a way to minimize the risk in the production and increase the offering of foods for the internal and external markets, and broaden the capacity of storage of the rural properties;
- v. Implementation of the model unit of water culture and the Nucleus of Organic Agriculture in Low Income Communities in the ASD;
- vi. Establishing of projects of technological cooperation for furnishing raw materials and foodstuffs which promote health, an improvement of the nutritional level and the quality of life of the populations in isolated communities;

- vii. Development of the Market and Technology of taking advantage of Residues – Residues Market.
- viii. Installation of the Demonstration Plant with new Technologies pumping and De-salinization;
- ix. Implementation of Model Projects of Reusing Waters and Installation of Cisterns;
- x. Applications of Better Urban Practices for Utilizing Materials of the Region and Residues in Civil Construction;
- xi. Implementation of Pilot Project(s) of extracting Oil, Production of biocombustibles and Generation of Energy starting from the taking advantage of Biomass obtained by Selective cultivation of Oleaginous and grains in the Region – Agro-industrial complex in the ASD;
- xii. Implementation of alternative activities and projects of the mining sector; and
- xiii. Implementation of alternative projects of generation of employment and income according to local activities, as a way to attenuate the pressure on natural resources in the process of exhaustion.

#### **e) Expansion of the service sector**

The set of governmental policies and measures proposed here will bring about an expansion of the service sector of the economy and of the ASD's broadening the investments, the generation of income and the offering of employment.

As a result of the recent policies, the governmental or private services in the areas of health, education, communications and sanitation tend to grow at a greater rate of speed than in the past. In the same way, the broadening of the productive capacity will induce the flowering of support activities for the development of agriculture, of industry, of mining and of APL's. As a group this expansion should be translated into a dynamic element of the regional economy.

These various sector themes were treated or specified in chapters and sections before as elements or dimensions of the set of actions proposed in PAN-Brazil. Several of these activities compose the set of real possibilities of sustainable increase of productive capacity in the ASD's. This picture should not necessarily be focused for the expansion of activities of the primary and secondary sectors of the economy, for, as was mentioned before, they present important negative impacts from the environmental point of view.

Special attention should be given to that which refers to the government sector (included in it its various spheres). Important gains in productivity can be obtained with the improvement in the utilization of public resources. These improvements does not refer only to the aspects of management technologies, but also to the elimination of the practices of corruption and rerouting of resources to other ends, still present in the ASD.

The educational processes of formation and broadening of social capital, foreseen in the set of operations mentioned in the PAN-Brazil should contribute in a significant way to reach this objective, to the extent that one broadens the opportunities and other mechanisms of popular participation in the councils and instances of formulation or deliberation of public policies, as well as in the instances and processes of social inspection affirmed in the PPA and in this Program.

Such activities, despite generating pressures on the use of natural resources in the ASD's, chiefly on the water resources, present relatively less environmental impact from the point of view of the processes of desertification.

It is considered desirable not to neglect the aspects that incorporate the expansion of the service sector as a relevant productive option for the conditions of the ASD's. With respect to this, during the process of constructing PAN-Brazil, various recommendations and sector alternatives were formulated, including, for example, the stimulus for tourist activity in its several modes.

### **5.3.3.3 Improvement of the Flow of Investments**

One has observed during all the effort of constructing the PAN-Brazil that during their history, the ASD's frequently were the object of policies and investments without due respect for their condition, restrictions and potentialities. One saw, too, how the result of this indifference brought about processes of non-sustainability and of degradation of the natural and human resource base of the ASD's. Far from being able to be characterized as being in a critical state, from now on, the region requires special attention on the part of the government and regional and national society.

It does not help to make great governmental investments in the recovery of the degraded areas if, at the same time, forces and economic and social dynamics continue to promote spontaneously, production processes that lead to desertification.

In this way, as important as the actions and proposals listed in this program will be the priority effort of bringing it about that the public and private investments be analyzed, in their consequences, about the processes presented here. It is not a question of creating more formal and bureaucratic barriers for productive expansion. One should take care that any type of investment answers substantively to the conditions and necessities of sustainable management of the productive capacity of the ASD's.

In the governmental plan, important steps have been taken, emphasizing the need of effective implementation of the already mentioned **Green Protocol**, which seeks to orient public investments in this direction. On the same level of importance, one can mention the adoption by public banks and some private ones, of environmental criteria and parameters for allocating credit operations.

For an efficient management and allocation of resources, it is fundamental to realize Economic-Ecological Zoning on a scale compatible with the demands of the productive and governmental sector.

In the same way, municipal plans of territorial ordering, plans of hydrographic basins and the National Plan of water Resources are being prepared with ample participation of the economically and socially interested agents. These plans should transform themselves into powerful instruments to make this type of management viable, orienting the investments required to guarantee the sustainable increase of the productive capacity and the reach of the objectives of social equity and environmental balance in the ASD's.

## **5.4 PRESERVATION, CONSERVATION AND SUSTAINABLE MANAGEMENT OF NATURAL RESOURCES**

The program actions foreseen here are structured starting from the description of the following topics of the third Thematic Axis, which orients the initiatives of PAN-Brazil: i) Chief Problems and Challenges; ii) Policies and Existing Strategies; and iii) Chief Actions.

### **5.4.1 Chief Problems and Challenges**

The treatment of the environmental questions in Brazil has advanced since ECO-92, with steps in the legal field and the increased adhering to and participation of Brazilian society. However, many problems and challenges still need to be overcome to reverse the tendencies of degradation of the different Brazilian biomes, emphasis given to the Cerrado and the Caatinga.

The problems are varied which the Brazilian states face with relation to the environmental questions, but in the states of the Northeast, and, specifically in the ASD's, these problems were aggravated due to the conditions of poverty of their population and of extreme climate conditions, expressed by the occurrence of periodic droughts and occasional floods.

The lack of alternatives in the matter of public policies proper to the regional specific qualities, added to the potential lack of knowledge of the natural resources, contributed to the gradual alteration and fragmentation of the Caatinga and Cerrado Biomes. Today, more than 67% of the original area of the Cerrado and 56% of the Caatinga are altered.

These factors aggravate the environmental and socio-economic conditions of these biomes. In the ASD's, the population presents a high dependence on natural resources principally on extraction activities; The cutting of vegetation for the production of firewood and charcoal, both for domestic as well as industrial consumption, without an adequate forest management plan contributes to the qualitative and quantitative reduction of the forest covering, exposing the soil to erosion and loss of its most fertile layer.

In this way, strategic planning instrument of use and occupation of the territory, such as the Economic-Ecological Zoning and other economic instruments for the management of the natural resources, are indispensable for this region, not only for making the utilization of the natural resources adequate, but for orienting the policies of development in the region. However, it is necessary that the methodologies and the scales of work be compatible with the surveys already done in the other Brazilian states, to facilitate the integration of the operations.

From the experiences developed in other states, one knows that these instruments only will have the desired effects if there is a strengthening of the state organs of the environment, in terms of infrastructure, qualification of personnel and production and systemization of information.

### **5.4.2 Policies and Existing Strategies**

The chief legal support for the Brazilian environmental policy is in the Constitution of 1988, which dedicated a whole chapter to the environment (Title VII, Chapter VI), considered as one of the most important and advanced of the Constitution. The quality of the environment is a good, a patrimony, of which the preservation recuperation and revitalization constitute imperatives for the public authorities, to assure health, welfare of man and give conditions for his development.

The Brazilian legislation incorporates a National Environment Policy (Law no. 6.938/1981), a National Environment System – Sisma, a National Environment Council – Konami, a National Water Resources Policy (Law no. 9.433/ 1997), a Statute of the Earth, a Forest Code (Law no. 4,771/1965), a Law of Protection for the Fauna, A Decree-Law of Protection and Stimulus for Fishing, a Biosecurity Law, a Law of Protection for Cultivated Crops, a Law of Industrial Property and a Law of Environmental Crimes (Law no.



9.605/1998) and recently the Green Protocol, which has guidelines, strategies, and operational mechanisms for incorporating the environmental variable in the activities of production, management and concession of official credit and tax benefits

Starting from the decade of the 90's, due to the increasing environmental consciousness which occurred in Brazil and to the fact of the Country's having been host to ECO-92, the environmental policy and the mechanisms of management were strengthened and perfected, both with respect to the normative and the legislative area as well as in relation to social participation.

The realization of ECO-92, besides sensitizing national public opinion about the environmental themes, gave the country and to the government a rare opportunity to examine extensively and profoundly the various aspects of the problem of sustainable development by means of the matters confirmed relative to the chief environmental impacts to be considered in the semi-arid region, contained in the documents elaborated by the ARIDAS Project, and in various events, as the ICID and the Conslad (oriented for the elaboration of the Regional Chapter of the CCD for Latin America).

In this context the ratification of the Kioto Protocol for the United Nations Convention - Situation about Climate Change, in 1994, of the Convention on Biological Diversity - CDB, in 1994; and of the CCD, in 1997, served also for the reinforcement of new mobilizations of organized civil society and of the authorities, at the various levels of government.

With the objective of promoting the partnership between the public authorities and civil society in the conservation of biological diversity, sustainable utilization of its components and just and equitable sharing of the benefits resulting from this utilization, the National Biological Diversity Program - Pronabio, was created in December 1994. This is the chief instrument for the implementation of the Convention about Biological Diversity in the country. In a similar manner, the elaboration of PAN-Brazil is the chief instrument for the implementation of the CCD in the Country.

The advances in environmental management are realized in terms of social participation, particularly in urban areas, by means of committees, cooperatives and community councils. The following themes have kept them united: water resources, solid wastes, environmental protection areas and desertification.

In this sense The National Water Resources Policy became a landmark for the construction of a new code of ethics on the traditional relations between the State, civil society and the national territory. The same can be expected of Law no. 9.985/2000, which established the National Conservation Units System and the Law of Environmental Crimes (Law no. 9.605/1998).

The Law of Environmental Crimes introduced important innovations in whatever refers to protection of the environment in Brazil. The importance of these alterations reveals itself in the evolution of the relations of society, which understood that environmental damage should have the status of crime. New concepts were introduced and started out polemical, such as those which refer to themes as criminal responsibility of juridical persons, the criminalization of behaviors previously not criminally defined and the relation of man to animals and with nature in general.

The constant modification which the forest Code has been suffering after 1996, by means of Provisions Measures, culminated recently with the last version of the Provisional Measure n 2.166-67, of August 21, 2001, in which it was established that the areas of Legal preservation can be extended by up to 50%, in the whole national territory, if so indicated by the Economic-Ecological Zoning.

With relation to the use and conservation of soil, the Green Protocol is one of the most significant initiatives of the government in terms of self-sustaining development of public policies. Recently in May of 2004, a work group was instituted for the incorporation of the environmental variable in the management and concession of official credit and tax benefits, since the current government is concerned with seeking mechanisms which avoid the utilization of official credits and tax benefits in activities which are prejudicial for the environment.

In this sense, new tools are being introduced into the country, to the detriment of the existing mechanisms of control and command, as is the case of the environmental licenses, which are not focused on environmental quality. To the contrary, frequently they denote merely a procedural need. As examples of other economic instruments, one cites the Compensatory measures (ICMS Ecological, Mechanisms of Clean Development - MDL/ Exchange of carbon emission etc.) and the giving value to impacts, foreseen both in Law no. 6.938/1981 as in the SNUC itself (Law no. 9.985/2000 and Decree no. 4.430/2002) which aim to make compatible the socioeconomic development with the preservation of environmental quality and of ecological balance, imposing on the polluter and the predator the obligation of recovering and or indemnifying for the damage caused to the legally protected areas.

There is in the phase of implementation, the National Environment Program - PNMA II, oriented to give support to the states in the perfecting of their environmental management and strengthening Sisnama. The implementation of this program will be done by successive stages, and its first stage will be ended in June of 2005. The financial resources are from the agreement celebrated in 2000 between the Brazilian government and the World Bank, and for this phases US\$25 million were invested.

The National Environment Program – PNMA II, starting from its two components (Institutional Development and Integrated Management of Environmental Assets), has as its chief objective the strengthening of the organizational infrastructure and the regulating of the public power for the exercise of environmental management of the Country, improving effectively the environmental quality and generating socio-economic benefits.

The Institutional Development component is oriented for the strengthening of the three important instruments of environmental management in the Country:

- The environmental licensing aims at perfecting the systems of environmental licensing in the states and strengthening the technical and operational capacity of the environmental organs;
- The monitoring of water quality aims at implementing state systems of monitoring and disseminating them for use in decision-making and planning; and
- Coastal management aims at improving the capacity of state environmental management on the coastal zone of the Country, principally by means of coastal zoning and by the making of strategic studies

The component of Institutional Development is oriented for the strengthening of three important instruments of environmental management of the country: environmental licensing, monitoring water quality and coastal management.

Starting from the Component Integrated Management of Environmental Assets, state projects of integrated management are financed, in which the environmental area is articulated with other sector policies to internalize the environmental question in these policies. The projects should promote measurable improvements of environmental assets considered priority by the states, serving as sustainable development models.

In the first stage of PNMA II 17 Brazilian states participated, which taken altogether executed 43 projects centered on two component of the program: Institutional development and Integrated Management of Environmental Assets.

Specifically, with respect to the projects developed in the ASD, the State of Pernambuco is developing two projects within the component Integrated Management of Environmental Assets, which are: Protection and Environmental Conservation of the Ipojuca River Basin in the Central Agreste of the State of Pernambuco and Protection and Environmental Conservation of the Region of Araripe in the State of Pernambuco. It should also be noted that three projects are being elaborated in the states of Ceará Alagoas, and Paraíba, which treat the theme of combating desertification and living with the semi-arid region.

In the State of Ceará, the project **Protection of Water Resources and Integrated Management of Solid Wastes in the Cariri and Maciço do Baturité Regions** has as its goal to improve the quality and the availability of water resources destined for human supply, with actions such as elimination of sources of contamination of the water resources; recovery of the springs; combating predatory vegetation extraction activity; promoting of adequate agricultural techniques; incentive to storage of water and adequate management of solid wastes, among other things.

In the state of Alagoas, the project **Recovery and Protection of the Caatinga of the Lower Traipu as a Strategy of Sustainable Development in the Alagoan Semi-Arid Region** is oriented for the protection and recovery of the Caatinga biome in the Lower Traipu, including the municipalities of Traipu and Batalha. Among the proposed actions are: to preserve, restore and rehabilitate the ciliate woods of the Lower Traipu; promote the sustainable management of the Caatinga through agro-ecological practices, and restore and stimulate the implantation of structure for the impounding, reserving and making available of rainwater.

In the state of Paraíba, the project Integrated Management of the Hydrographic Basin of the Upper Paraíba do Norte River – Region of Western Cariri of Paraíba includes 17 municipalities of the semi-arid region, and aims at combating the process of desertification by the reduction of land clearing by the adequate use of forest resources, with the object of increasing the water availability of the Hydrographic Basin of the Upper and Middle Paraíba do Norte River. Among the chief actions proposed are: the environmentally adequate use of forest resources, the incentive for agro-ecological practices and actions oriented for the rational use of water resources in the region.

It is important to cite, also, that in a study conducted by the PNMA II in 2000, for identifying the principal priorities of the state for the Program, the combating of the processes of degradation of the soil by desertification and erosion appeared as one of the six priority themes in the Country, having appeared in first place in the Northeast Region (72% of the indications), which reinforces the need to recognize the problem of desertification as a grave environmental vulnerability to be dealt with in the scope of the public policies.

### **5.4.3 Chief Actions**

In an effort to contemplate the recommendations and suggestions coming in the proposals of the 1st State Workshops, systemized in the Third National Encounter of the Focal Points, in Olinda – PE, and of the review made in the 2nd State Workshops, one can summarize the desires of the population of the eleven states which are part of the program, with respect to the theme Preservation, Conservation and Management of the Natural Resources, in the following points:

- Improvement of the tools for environmental management;
- Necessity of a planning instrument for the use and occupation of the territory (ZEE);
- Broadening of the Conservation Units to 10%;
- Sustainable Management of Forest Resources;
- Articulation with the Dom Helder Câmara Project; and
- Revitalization of the São Francisco River Basin.

#### **5.4.3.1 Improvement of the Instruments of Environmental Management**

In the scope of PAN-Brazil, and contributing to the national effort and of the states effected. One intends to act in the sense of assuring the existence of a fundamental instrument for management, The Economic Ecological zoning – Zee, starting from which the governmental entities (in the diverse spheres of the federation) will be able to balance their options and initiatives, serving at the same time as an orienting element for the actions of the private sector and of the partnerships between the social and economic agents (public and private).

From there on, the federal government will have the capacity of organizing and of furnishing the economic instruments to facilitate and make viable the management, with the use of instruments such as the Green Protocol, Certification Seals for Ecologically Correct Products, Ecological ICMS, creation of environmental criteria for the allocation of the Participation funds of States and Municipalities, as well as to encourage the private sector in its own activities or in partnership with the public sector to perform its activities in such a way as to combat desertification and make viable real processes of sustainable development.

The system of management of PAN-Brazil, presented in chapter VI, intends also to contribute in this direction, creating mechanisms in instances which permit the realization of a democratic and efficient management in the prevention and combat of desertification.

#### **5.4.3.2 Ecological-Economic Zoning (ZEE)**

The ZEE is indispensable for giving a sound foundation to the governmental decisions with respect to the orientation of the development processes, territorial ordering, conservation of the biodiversity and management and monitoring of the areas susceptible or affected by desertification processes.

Despite the fact that human occupation of the susceptible regions is a long- standing situation and its high human population density, there is paradoxically, a high degree of lack of knowledge of various important aspects characterizing the affected ecosystems, chiefly taking into consideration the scale of the information available.

On the other hand, on an appropriate scale there is a relatively large and dispersed volume of information about the socio-economic and environmental characteristics of the semi-arid and dry sub-humid regions, which can contribute to identify the characteristics and regional potentialities.

Specifically for the Caatinga, biome, the Environment Ministry recently began the Geographic Databank - Scenarios for the Caatinga Biome -, which integrated the National Economic-Ecological Zoning, and published the book “Priority Actions for Conservation of the Biodiversity of the Caatinga Biome,” realized by means of the Project of Conservation and

Sustainable Utilization of the Brazilian Biological Diversity – ProBio. Besides this, there is much information in the scope of the states, on a lesser scale.

To the contrary of what occurs in the process of construction of a ZEE of regions occupied recently or of low human population density, the peculiarities of the regions affected place a great challenge to policy formulators, planners, and managers.

Centuries-old occupations, cultures, behaviors and models and patterns of development which even if considered inappropriate, from the scientific point of view, nevertheless present a strong resistance to an type of ordering which is imposed. Thus, for the ASD one intends that the ZEE be the result of an effective interaction of political and technical processes and which have an imperative character only for the various levels of government and indicative or inducing for the remaining social and economic actors.

The process of territorial ordering and the definition of priorities should be constructed starting from a methodology which combines the realization of brad processes of consultation and negotiation with the economic and social agents already present in the area, with the technical and scientific studies which can offer subsidies to these processes and orient governmental decision which surely will go beyond the agreements celebrated between sector sub-regional or private actors.

As with every participatory process, it will be necessary to design methodologies and systems to facilitate the process of discussion and of a “methodology of negotiation and arbitration” to be implemented by key representatives of the federal and state governments, of the NGO’s, of the businessmen, of the farmers.

One can utilize as a geographic basis for the shaping of the nuclei of discussion the Geo-environmental Units established by Embrapa, as well as the different eco-systems existing in the Caatinga and Cerrado biomes.

The technical processes are better known and have norms; thus, they do not present any great difficulties for their realization.

It will be crucial for the implementation of this methodology, that the federal government be involved and that a significant number of specialists in conflict mediation be trained. Once the conflicts are overcome, the government will formalize the pacts, since one aims at long term planning.

This instrument will have limited effectiveness if the institutionalization of environmental management and its decentralization is not restructured and strengthened, including the qualification of personnel and improvement of the information network.

One estimates for the realization of this process, that one will need a time span of two to three years and financial resources on the order of 20 to 25 million dollars, including actions of institutional strengthening and of qualification, both on the part of the federal government as well as on that of the affected states.

#### **5.4.3.3 Protected Areas**

The chief proposal of action for the sub-theme Protected Areas is that of protecting at the least, 10% of the semi-arid and dry sub-humid areas by means of the Conservation Units of indirect use (integral protection) and of sustainable use (Environmental Protection Areas, Private Preserves of Natural Patrimony, and Extraction Activities Preserves), in the period of

ten years, in both cases considering the areas already identified as priority for the conservation of biodiversity (Figure 5.2).

The broadening of the areas of Conservation Units is not only a demand of the states or of the federal government, but an international commitment, including the time span of 10 years established.

However this is not an easy task, not only due to the great alteration of the biomes, Cerrado and Caatinga, or the problems of institutional management of the already established units (irregular land situation, deficient inspection), but chiefly due to the network of roads already instituted, which fragmented the non-altered parts into small islands.

In the face of the institutional problems, the federal government has been determining new systems of administration for the management of these Conservation Units, establishing conveniums of co-management with NGO's. However, this is a matter of point cases and it does not resolve the problem of a lack of personnel trained in the field to manage the system.

Allied to this the greater part of the states affected by the process of desertification does not practice full management of at least 3% of the Conservation Units already created and is lacking better economic instruments of environmental management (ecological tax - ICMS, for example); despite having environmental licensing in operation, do not do follow-up after licensing, nor do they have a Plan of Environmental Inspection.

The discussion and the ordering of priorities for the solution or minimizing of these problems according to what was suggested in the previous section, can be treated through the nuclei of discussion with respect to the introduction of economic instruments and of environmental credits in Participation Funds as well as partnership for the management of the Conservation Units.

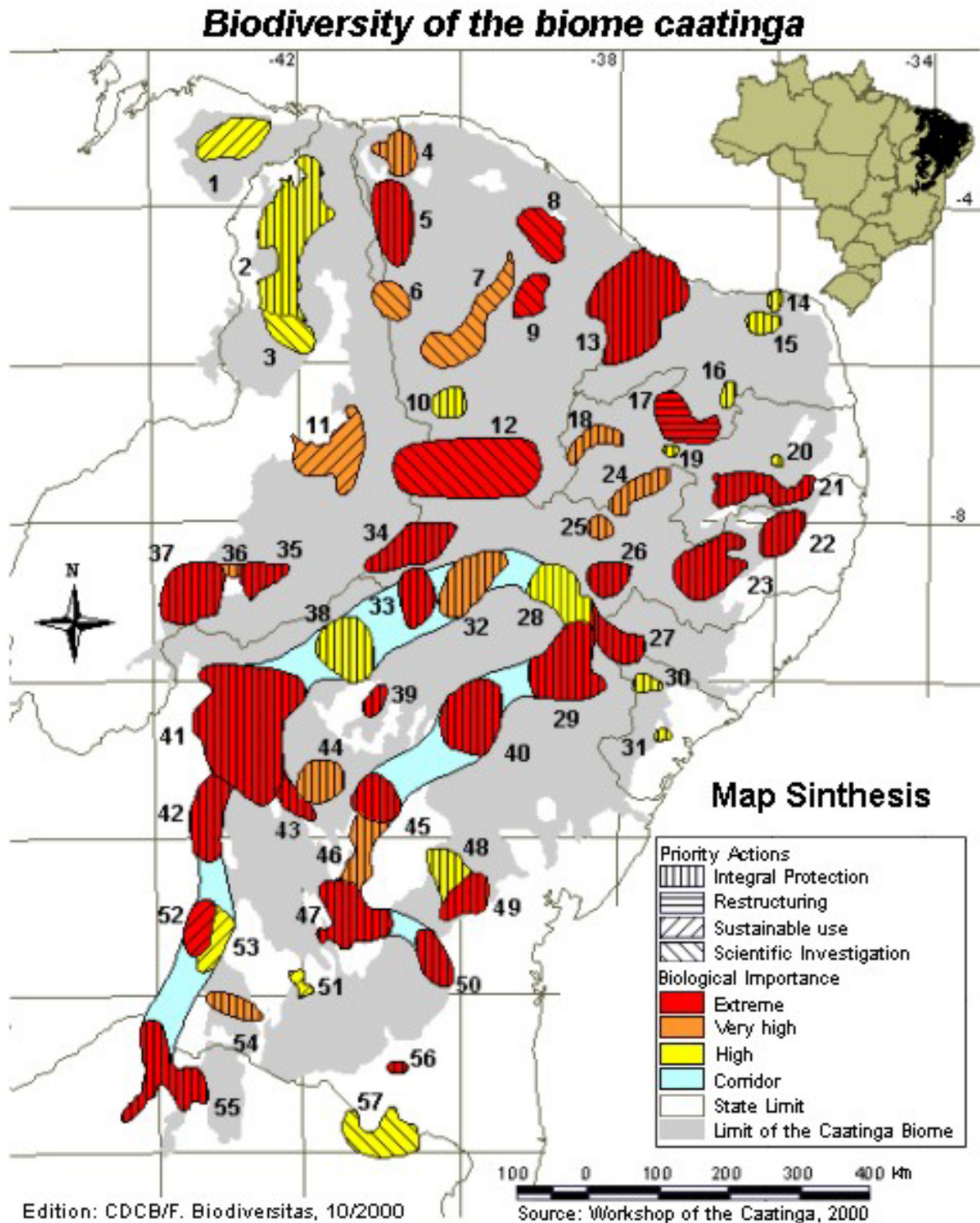
With respect to the broadening, management and inspection of the Conservation Units, the Brazilian government has as pillars the National Protected Areas Program- PNAP and the National Biological Diversity Program - Pronabio.

The PNAP has as an objective to consolidate by 2010, a system of protected areas effectively managed and representative of the biodiversity and the guarantee of its maintenance over the long term, contributing to the world network of protected areas. Recently a Protocol of Intentions was signed between the Brazilian government and civil society in which one established a mutual commitment for the construction of a common agenda, to incorporate objective and goals of the Work Program for Protected Areas and the creation of the National Forum of Protected Areas, of a consultative nature, composed of representatives of the government and of civil society, with a mandate to discuss and propose actions and with the objective of implementing the PNAP. The PPA 2004-2007 destined resources in the amount of R\$134,0 million for this program.

Pronabio – which has resources in the amount of R\$90,0 million for the period of PPA 2004-2007 being in effect has as a basis the Project of Conservation and Sustainable Utilization of Brazilian Biological Diversity – ProBio, which aims at the defining methodologies, instruments and processes; to stimulate international cooperation; to promote research and studies; to produce and disseminate information; to qualify human resources for institutional perfecting; and to develop demonstrative actions for the conservation of biological diversity. In relation to SAB two recent actions can be pointed out:

- The conclusion of the sub-project “Evaluation and Priority Actions for the Caatinga Biome, with the publication of the book “Biodiversity of the Caatinga: priority areas and actions for conservation”; and
- The publishing of the Public announcement ProBio 02/2004 – “Survey of the remains of vegetation covering of the Brazilian biomes”, aiming at the selection, among others, of projects for the survey of the vegetation covering of the remains of the biomes Caatinga and Cerrado, on a scale of 1:250.000, generating subsidies for the formulation of public policies for the conservation and sustainable utilization of the biological diversity in the region and in the Country.

**FIGURE 5.2**  
**Biodiversity of the biome caatinga**<sup>132</sup>



<sup>132</sup> This map was produced by the Nature Conservancy do Brasil-TNC & Associação Plantas do Nordeste – APNE. **Resultados do Seminário de Planejamento Ecorregional da Caatinga: ecorregiões propostas para o Bioma Caatinga (Results of the Seminar on Eco-regional Planning of the Caatinga: proposed eco-regions for the Biome Caatinga)**. Aldeia, Pernambuco, TNC & APNE, 2001, p. 4. Available in: <<http://www.plantasdonordeste.org/Livro/Index.htm>>. Access on: November 4, 2003. (Cf. <http://www.bdt.fat.org.br/index>. Access on: June 23, 2004.) The Tropical Database – BDT is a department of the André Tosello Foundation. This Foundation has as its chief objective the dissemination of environmental information of interest to the national and international scientific community.



#### 5.4.3.4 Sustainable Management of Forest Resources

The principal aspect with respect to sustainable management of forest resources is the lack of knowledge about the productivity of the different ecosystems, chiefly of the Caatinga biome, which leads to the elaboration of generalized management plans, based on shallow cuts, contributing to the diminution of forest covering, as well as the illegal and indiscriminate cutting of the vegetation.

With relation to the guarantee of sustainability of the management plans, some questions are already where one intends to broaden and deepen the necessary studies, with the follows as examples:

- i. Greater legal rigor and better efficiency in the inspection, long with the inspection of the product by means of certification mechanisms and added values;
- ii. The elaboration of management plans need to overcome the condition of being a mere bureaucratic requirement and contribute effectively for the characterization of the forest population and for the making of technical decisions;
- iii. The cutting cycles established in the Forest Management plans should take into consideration the type of predominating soil and give preference to selective cutting;
- iv. Utilize applied research for the monitoring and evaluation of the sustainability of forest management, incorporating the necessary innovations in small reforestation projects;
- v. Take up again forest extension, which is practically non-existent in the Northeast states; and
- vi. Perfect the qualification of the technicians involved;

The aspects cited constitute challenges which need to be faced, not only in the areas affected, but also in the whole country, since many of them are of a structural nature and of qualification. This goes through efficient inspection, new economic instruments for management; ethics, professional qualification and applied and articulated research; active forest extension; control by society and a transdisciplinary perspective, capable of integrating the forest activity to the traditional agriculture/cattle-raising practices.

The solution for these problems should be treated and stimulated by the policies and programs at all hierarchical levels of the government.

In this sense, one of the chief Programs of the Federal government that approaches this demand is the National Forests Program - PNF.

The National Forests Program – PNF is of extreme importance since it has as its chief objective to promote the balanced use and the conservation of Brazilian Forests, by means of articulation of public policies related to questions such as land regularization, credit and financing, environmental legislation, research and technology, training and qualification. One of its chief projects “demonstration of Integrated Management of the Eco-system and of the Hydrographic Basins of the Caatinga Biome – GEF”, foresees action in eight priority areas<sup>133</sup> in which there is a great pressure on the native vegetation, defined in seminars held in the Northeast, between 2000<sup>134</sup> and 2001.<sup>135</sup> The project has a duration of ten years,

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<sup>133</sup> Vale do Jaíba/Peruaçu, in the north of Minas Gerais; all of the southeast of Bahia; Region of the Xingó (state line of Bahia, Alagoas and Sergipe); Seridó (frontier of Rio Grande do Norte with Paraíba); Paraíba Cariri; Regions of Araripe and Petrolina; Region of Poti/Inhamuns/Ibiapaba (Ceará); and Areas of influence of the National Parks of Serra das Capivaras and of the Confusões (Piauí).

<sup>134</sup> Workshop of Biodiversity of Caatinga. May of 2000, Petrolina/PE.

<sup>135</sup> Seminar Protected Areas of the Caatinga. April of 2001, PNF. Fortaleza/CE.

divided in three stages: the first, of four years, already approved in the scope of the GEF, has a budget of US\$26.0 million US\$ 4.0 million from the Global Environment Fund – GEF and US\$10.0 million in matching funds from SBF – MMA, besides the institutional matching funds of diverse co-participants in the amount of Us\$12.0 million.

There also exist financial resources on the order of 30 million reais, available up to June of 2005, which can be utilized to finance investments in silviculture, forest, agro-forest, or agro-silva-pasture systems, coming from the Forest FRONAF. To give technical support to this action, the National Environment Fund – FNMA specifically published a public notice for the Formation of multidisciplinary agents and technical Assistance and Forest Extension for Family Farmers of the Caatinga Biome, making available R\$4.6 million by mediation of financial support for projects.

Besides what was explained one knows that it is not only with management plans that one will manage to get sustainability and the recover of the forest patrimony in the areas affected by desertification. The utilization of techniques adequate for soil management, chiefly in areas used for agriculture and pasture, is crucial for the contention of the advance of the erosion process and environmental degradation. In this sense, the Agriculture Ministry and Embrapa are the chief partners for the transmission of these techniques, as well as for the implementation of Programs relative to the theme.

As was opportunely remembered by the participants of the State Workshops, there is a need to assure the genetic inheritance of the species of the Cerrado and Caatinga biomes, where the research institutions with Embrapa have a fundamental role. Another demand also raised is the broadening of the network of seeds and stimulus for installation of plant nurseries. In this sense, the Articulation of the Semi-Arid Region – ASA has constituted since 1995 a network of Community Network of Seed Banks - BSC, which today is formed by more than 200 banks having around 8,000 families as members have. These farmers are conserving and broadening the local agricultural biodiversity, for they collect the native seeds and organize stocks/reserves of seed and foods, promotion the improvement of the food security for families, as well as planting their properties or settlements again with trees.

However, phenological studies, techniques of breaking dormancy, storage and the time of harvest, selection of seed-bearing species and the techniques of planting among other things must be aggregated to these demands and initiatives

One understands that the synergy of the actions of the programs of government and of the research done by governmental institutions (as Embrapa and the universities) with the initiatives of civil society is important so that the management and dissemination of technologies adapted to the conditions of the semi-arid and sub-humid climates reach the greatest number of farmers, considering that the recuperation of the biomes demands a growing consciousness of the population as well as the economic alternatives for their sustainable use.

#### **5.4.3.5 Sustainable Management of the Lands in the Sertão**

The Project Sustainable Management of the Lands in the Sertão complements the actions going on of the Dom Helder Câmara Project – PDHC of the Agrarian Development Ministry – MDA. Besides the MDA and the PCHC, the International fund for the Development of Agriculture – FIDA and the Global Environment Fund – GEF participate ass co-financiers of the project.

The actions of the Project Sustainable Management of the Lands in the Sertão are inserted in the Operational Program of GEF OP- 15 (Sustainable Management of Lands) and

intends to generate local, national and global benefits. These actions are directly related to the recovery of areas degraded by farming/cattle-raising, to the conservation of biodiversity and to the catching of carbon (climate change), contributing not only to sustainable development of the farmers communities and family farmers, but also to the fulfillment of commitments assumed by Brazil before the Convention to Combat Desertification, the Convention about Biodiversity, the Convention about Climate Changes.

The **global benefits** of the project are thus expressed:

- a) Sustainable use of biodiversity by means of adoption of agricultural practices, management of pastures and recovery/protection of ciliary woods (or other areas of permanent preservation) which contribute to the preservation or restoration of the functions and of the services provided by the eco-systems of the Caatinga, and promote better quality of life for the local rural population; and
- b) Increased fixation of the greenhouse effect gases in productive systems and in ciliate woods (or in other areas of permanent preservation) by the sustainable adoption of management of pastures and recovery/protection of ciliate woods.

The **objective of development** of the Project Sertão is to contribute to the improvement of the sustainable development and the quality of life of the populations affected by the process of degradation of lands in the Semi-arid Region of the Northeast of Brazil, by means of an inspector approach in the public activities of support for sustainable production and reduction of poverty.

The **global object** of the project is to minimize the causes and the negative impacts of the degradation of lands on the integrity of the ecosystems of the Caatinga Biome, in the semi-Arid Region.

The Project has as specific objectives:

- a) Utilize the actions for combating rural poverty, the processes of territorial devilment and the existing institutional arrangements in the scope of the Dom Helder Câmara Project to implant actions to struggle against the degradation of lands: prevention and recuperation of areas degraded;
- b) Broaden, in society, the perception of the processes of degradation of lands and the capacity of facing the problem;
- c) Promote systems of sustainable agricultural production (socio-economic and environmental), relevant for the conservation of biodiversity, broadening of vegetation covering and increase of the fixing of carbon;
- d) Try out mechanisms of incentives considering the policies of struggle against poverty and of inclusion social, with the objective of implementing referential systems of agricultural production; and
- e) Follow up, systemize and produce references with a view to elaborating public policies and the dissemination of knowledge.

The area of scope of the Project Sustainable Management of Lands in the Sertão comprehends the territories of the PDHC, localized in the Semi-Arid Region of the States of Sergipe, Ceará, Paraíba, Pernambuco, Piauí and Rio Grande do Norte, benefiting in a broad way 7,000 families and in a pilot way 1,000 families of communities of family farmers.

The actions of the Project are structured in the following components:

- Qualification and Experimentation for the Planning and Implementation of Sustainable Productive Systems.
- Environmental Incentives;
- Monitoring and Evaluation; and
- Management Institutional Articulation and Communication.

The resources of the Project are estimated at US\$ 15.0 million, US\$6.0 of which originates from the donation of GET, US\$ 4.7 million from the FIDA, and US\$ 4.3 million from MDA.

#### **5.4.3.6 Revitalization of the Hydrographic Basin of the São Francisco River**

The basin of the São Francisco River is the third greatest hydrographic basin in Brazil, and the only totally Brazilian one. With an area of 640.00 km<sup>2</sup>, it is responsible for the drainage of approximately 7.5% of the national territory. The basin is divided in four physiographic regions: Upper São Francisco, from the springs up to Pirapora-MG; Middle São Francisco, between Pirapora and Remanso – BA; Sub-middle São Francisco from Remanso to Cachoeira de Paulo Afonso, and Lower São Francisco, from Paulo Afonso to the mouth in the Atlantic ocean.

Since the springs and along its rivers, the basin of the São Francisco has been suffering degradations with serious impacts on the water and consequently, on the fish. About 18 million tons of soil per year are carried to its riverbed and those of its tributaries, which besides contributing to the silting of the river also compromise its quality since along with the particles of soil in suspension chemical fertilizers, organic material and pesticides, arising frequently from the excess of water applied in irrigation, which is not evapotranspired by the crops, returning to the river or its tributaries or to underground deposits.

At the chief headwater of the São Francisco river, the greatest problem is the land-clearing for the production of charcoal used by the steel industry of Belo Horizonte, which has reduced the ciliate woods to 4% of their original area, contributing to falling of the riverbanks into the river, silting up, and death of several springs. Besides this, the mining activities, the irrigation and the hydroelectric dams are responsible for the rerouting of the bed of the rivers, reduction of drainage, alteration of the intensity and period of the floods, transformation of rivers into lakes etc. with direct impacts on fishing resources.

Another grave problem is the lack of environmental sanitation, since the majority of the villages do not possess any treatment of domestic and industrial sewage, discharging them directly into the rivers. The residues of mines, mining operations, and industries increase the load of heavy metals, including mercury, to levels beyond the permitted.

Knowing the importance of this basin and of the environmental problems installed there, the Brazilian government created the program of Revitalizing the Hydrographic Basins of the São Francisco River, conceived starting from the Work Group of the Revitalization of the São Francisco River, created in September of 2003 by Directive no. 384. The structure of the Program presents five lines of actions that put together 19 specific components, which are directly related to various sub-components of recovery, and hydro-environmental conservation of the Basin Plan.

The actions of the Program present dimensions related to the environmental management of the basin, oriented to sustainable development and are linked both to the

general guidelines of the National Water Resources Policy – PNRH, expressed in Law no. 9,433/97, as with the guidelines of the National Environment Policy.

The components and lines of actions which integrate the Program of Revitalization of the Hydrographic Basin of the São Francisco River, were identified starting from the definitions of Federal Decree of June 5, 2001, which created the Project of Revitalization and by the propositions of the diverse technicians and actors involved in the process of elaboration of the Basin Plan and of the Program of Revitalization for the PPA 2004-2007, by means of diverse demands identified.

Such components also had as a basis the diagnosis of the existing situation in the Basin developed between the years 2002 and 2003, which were gradually perfected, on occasion of the interministerial workshop realized jointly by the MMA and MI, and in the rounds of public discussion in the Regional Consultative Chambers during the elaboration of the Program, and still in the Forum of Discussion of the Plan in Brasília-DF, passing through successive refinements in each of these stages, aiming at perfecting them and integrating them to the Basin Plan.

The very concept of revitalization described in this Program was conceived during such activities and defined as being “the process of environmental recuperation, conservation and preservation by means of the implementation of integrated actions which promote the sustainable use of natural resources, the improvement of socio-environmental conditions of the basin and the increase of quantity and improvement of the quality of water for multiple uses.”

The Program of Revitalization of the Hydrographic Basin of the São Francisco River is a priority of the Government, and R\$ 100 million is foreseen for the year 2005.

## **5.5 DEMOCRATIC MANAGEMENT AND INSTITUTIONAL STRENGTHENING**

The implementation of PAN-Brazil will be the object of processes of monitoring and evaluation. The realization of these processes will be done in two planes, one internal and one external. Internally, the program will have its actions monitored and evaluated by the structure charged with its implementation. It is this which chapter VI will treat. Externally, the Program will be monitored and evaluated by the structure of CCD.

The actions for the democratic management and for the institutional strengthening of PAN-Brazil comprehend activities: i) of Monitoring and Evaluation; ii) of Improvement of Knowledge; iii) of Education and Qualification; iv) of Broadening the Capacity of Participation of Civil Society; v) of Strengthening the State Dynamics.

### **5.5.1 Monitoring and Evaluation Activities**

The monitoring and the evaluation of PAN-Brazil integrate a process similar in the scope of the CCD. The annual report submitted to the Executive Secretary of the CCD by all the countries that signed it constitutes the most important instrument of monitoring and evaluation. The system of monitoring and evaluation is a necessary requisite for the management on a national scale, involving social actors at all the levels of the federation. For this complex task, the managing instances of Pan-Brazil need precise information about three central questions:

- The degree of advancement of desertification in the Country;

- The process of implementation of PAN-Brazil and its quality; and
- The impact generated by the actions of the Program.

These actions are interconnected. Because they are operational questions and to be oriented of the secretary's office of the CCD, the following will be treated according to distinct subsystems of monitoring and evaluation: of Monitoring and Evaluation of Desertification; ii) of Monitoring and Evaluation of the Process of Implementation of the Program; and iii) Monitoring and Evaluation of the Impacts.

The principle which orients the consolidation and the application of the system of monitoring and evaluation is given by the qualified participation of all the actors involved in the combat of desertification. This is valid from the elaboration of the indicators, passes through a collection of data and goes up to the evaluation of advances and impacts, making the access to information and to the democratization of decision-making easier.

### **5.5.1.1 Subsystem of Monitoring and Evaluation of Desertification**

The monitoring of desertification takes care of observing the changes in the processes of degradation of the complex soil-water-fauna-flora, as well as the socio-economic conditions that give origin to them or are affected by them in the susceptible regions.

Experience recommends that this subsystem accompany, simultaneously the pressures (human or not) exercised on the eco-systems. The state of desertification and the results provoked by the phenomenon.

For this it will be necessary to specify the Reference Situations (or points of starting out) and indicators and parameters of accompaniment and evaluation. In the scope of the CCD, the Committee of Science and Technology, since 1999, has worked for attending to this demand. However, there still is no general consensus about these themes.

In Latin America, since 1994, one has been realizing a coordinated effort of various countries of South America (including Brazil) in the sense of defining a minimum set of common indicators to be utilized by various countries. Starting from September of 2002, with the agreement celebrated between the Inter-American Institute of Cooperation for Agriculture (IICA) and the Inter-American Development Bank (IDB) the "Program to Combat Desertification and Mitigate the Effects of Drought in South America" began to be implemented with the objective of harmonizing these efforts and designing a computerized system which starting from key indicators, would facilitate the monitoring of the problems in the six participating countries – Brazil, Argentina, Bolivia, Chile, Equator and Peru. This program is financed with resources coming from the Special Fund of the Japanese Government and has the technical support of the Esquel Brazil Group Foundation (FGEB).

In the same year, the Economic Commission for Latin America and the Caribbean - CEPAL, with the financial support of the German Technical Cooperation – GTZ and in partnership with the National Focal Points of the CCD, developed the Project "Indicators of socio-economic Impact of Desertification and Degradation of Lands in Brazil, Argentina and Chile", by which one defined socio-economic indicators with the objective of measuring the levels of evolution of the desertification in these three countries and orient the policies of government in a way to make best use of this process and contain the expansion of desertification.

The indicators of the project of CEPAL/GTZ were agreed on by the Focal Points of Brazil, Argentina and Chile, in a meeting held in Buenos Aires, in December of 2002, and constitute a common trunk for the three countries. These indicators are specified in table 5.3.

With the indicators selected and validated,<sup>136</sup> CEPAL constructed a database utilizing, among other things, the microdata of the census of population and agricultural-cattle-raising and of the National Research by Samples of Homes (PNAD's), and developed a software, the "REDATAM," for obtaining and managing the information. Also there is in the process of elaboration for CEPAL and SRH/MMA a CD containing the software REDATAM, an interactive database and a base of socio-economic indicators of desertification in Brazil.

**TABLE 5.3**  
**INDICATORS AGREED ON BY THE THREE COUNTRIES**

<b>SOCIAL INDICATORS</b>
1. Net Rate of Migration
2. % of Women who are Head of Household
3. Number of Inhabitants (rural and urban area)
4. Average Annual Growth Rate of the Population
5. Age Structure
6. Incidence of Poverty
7. Greatest incidence of disease (water-borne)
<b>ECONOMIC INDICATORS</b>
8. Destination of Resources for Recovery of Lands
9. Agricultural Income of the Families/ Total Income by Family
10. Production for Subsistence/ Total Production
11. Expansion of the Cattle-raising Frontier
12. Rate of Animal Load by Species/Rate of Support
13. Size of Rural Establishments
14. Percentage of Firewood used as Fuel

Source: Minutes of the Meeting of the National Focal Points of the CCD held in 2002.

In the scope of the Program to Combat Desertification and Mitigate the Effects of Drought - IICA/BID in Brazil, the Meeting of the Specialists in Indicators of Desertification held in Brasilia, in August of 2003, identified and agreed on a preliminary set of physical, biological, socio-economic and institutional indicators which explain the phenomenon of desertification. These indicators are cited in Annex 7. The socio-economic indicators utilized in the Program IICA/BID are the same defined by the Program of CEPAL, however in the

<sup>136</sup> In the scope of the application of the CCD, the process of definition of a system of indicators should be constructed and conducted by means of a participatory process. In this way the population which inhabits the regions affected by desertification is the concrete source of qualitative and quantitative information about the processes of desertification and its specific characteristics. In this line, and with the aim of evaluating the utility of the socio-economic indicators proposed by the Project CEPAL/GTZ, the Coordinating Board of the Combating Desertification of the Water Resources Secretariat of the Environment Ministry defined the areas representative for the process of validation. The location selected for the case study was the municipality of Caicó, located in the region of the Seridó, in the State of Rio Grande do Norte, where activities were developed as field research with the rural communities and workshops for the exchange of experiences and collection of information with representatives of the local population and policy deciders.

above-mentioned meeting, these were broadened, and additional indicators, specific for sanitation (sanitary service), infantile mortality, educational level and land distribution structure.

The proposal of the Program IICA/BID is to consolidate the indicators defined in the national scope and establish a baseline which will be used as a reference in the six countries contained in the Program IICA/BID. For the management system of the indicators a software is being developed by the University of Chile (AGRIMED), the MONITOR”, an instrument which will permit one to monitor the processes of desertification and thus support the countries in the formulation of public policies with structuring actions for combating desertification.

As mentioned in the previous chapters, the degree of effective knowledge of the Country about the phenomena of desertification is still incipient and only will have conditions to be definitively perfected when the Economic-Ecological Zoning, proposed in this program, is done. The ZEE will permit – on an appropriate scale define the initial position of the indicators starting from which one can make an effective monitoring of the processes of desertification.

While one realizes the works of the ZEE, the coordination of PAN-Brazil, along with the remaining countries of Latin America, and in the scope of the Project IICA/BID, previously mentioned, should continue to develop and test the software (free) which after being made available, will facilitate the permanent monitoring of desertification.

From the institutional point of view, in the spirit of SISNAMA, one foresees that the subsystem of monitoring (databases and software) will be made operational in a decentralized way, making available such elements for each state, sub-region or even municipalities of the ASD. Each one of these points duly qualified, is committed to make available its information, being able to realize specific monitoring in its region without harming the realization of a national work.

This subsystem only will be fully effective if it is appropriate for the affected communities. The chief local actors – affected by the processes of desertification – should be the first informants of such processes, the same happening with the consumers and beneficiaries of monitoring, which should orient the decisions related to combating desertification

One emphasizes that the full implementation of the subsystem of monitoring of desertification depends on the realization of ZEE and at the same time, of the institutional strengthening (of governmental entities and of civil society).

### **5.5.1.2 Subsystem of Monitoring and Evaluation of the Implementation Process**

This subsystem permits the management instances and principally the National Focal Point to evaluate the advances relative to the general objective itself and to the specific objectives of the PAN-Brazil. The indicators of this subsystem area are oriented to check the quality of the processes initiated in the different areas of action including the level of participation and commitment of the various actors involved in the formulation and implementation of actions.

The evaluation of the process of implementation constitutes an exercise that is also qualitative, because it involves distinct opinions and perceptions. As a dynamic principal, workshops of self-evaluation will be realized in the whole region focused by the Program,



confronting subjective observations with indicators for which there is available information. The participation of all the categories of actors of PAN-Brazil is important also to create a common comprehension about the objectives of the Program and of the results that one expects from it.

The specification of the list of indicators, parameters, and systems of collection and processing of the respective data will be done in the first year of Pan-Brazil's being in effect. The coordination of this task is for the Executive Secretariat of PAN-Brazil to do.

### **5.5.1.3 Subsystem of Monitoring and Evaluation of Impacts**

The monitoring of impacts includes the collection, processing and dissemination of information about biophysical, socio-economic, institutional and behavioral changes provoked by the actions combating desertification, defined in the thematic axes. Since these actions will be executed by different organs and ministries, this subsystem will have a decentralized character, it being the task of the Science, Technology and innovation Committee to assist those responsible in the choice of indicators appropriate and the other instruments of monitoring. Activities of training in monitoring and evaluation should be promoted by the Technical Coordination of Combating Desertification.

### **5.5.2 Activities of Knowledge Improvement**

On various occasions one mentioned here the limits and fragility of the existing knowledge in the country about the processes of desertification and even, of the activities of mitigation of the effects of the droughts. Diverse circumstances, as those already discussed, are responsible for the limited knowledge about many of the phenomena treated in the CCD.

Such a condition can be clearly perceived by the fact of its taking more than 550 years for the government and society to realize that one cannot "combat desertification", but rather "live with the environment where this phenomenon occurs." This perspective is recent and profoundly alters the models and approaches necessary to meet the challenges of sustainability in the areas susceptible to desertification.

The improvement of knowledge is a process already initiated, but still requires important investments. The PAN-Brazil proposes to act on the following links in this chain: i) Elaboration of Economic Ecological Zoning ii) Installation of the Early Warning Systems; and iii) Realization of Studies and Basic Research and Development.

#### **5.5.2.1 Ecological-Economic Zoning (ZEE)**

The ZEE is a fundamental instrument for knowledge and environmental management. Its characteristics already were treated in the subsection 5.4.3.2 previously. Its availability permits, on the one hand, to identify and monitor the processes of desertification, pressures, states and answers of the actions of combating desertification and mitigation of the effects of the drought. It offers, on the other hand, the entire base necessary for an efficient environmental management in the ASD.

A basis for these indicators is to be found in Annex 7.

### **5.5.2.2 Early Warning Systems**

These systems have deserved the attention of the international community, by permitting one to broaden the capacity of response to extreme events, both on the part of the governments as well as on the part of society. They are also useful to strengthen and/or improve the resistance of society to such events.

In fact, significant progress has been obtained in the last ten years in what refers to the models of forecasting (of climate and weather), in monitoring of “El Nino” or of “ENOS” (El Nino-South Oscillation). Scholars of the Country have been making important advances in this field, but the degree of uncertainty and the capacity of such models still leave something to be desired.

Pan-Brazil should collaborate for Brazil to participate more intensely in the efforts of the international community in the scope of the already established cooperation programs and projects and in others which come to be identified or recommended by the Technological Science and Innovation Committee (CCTI).

Society can broaden its capacity of resistance to the climatic events mentioned, organizing itself better to face them.

### **5.5.3 Studies and Basic and Applied Research**

Brazil has systematically participated in the international efforts of SCT-CCD, which has focused its action on three fundamental themes: “Benchmark & Indicators,” “Early Warning Systems” and the theme of “Traditional Knowledge.” In chapters and previous sections one has already affirmed the relevance of this type of knowledge for the Brazilian Case.

Various governmental and non-governmental institutions, with the support of international cooperation institutions have participated in the development of monitoring systems by means of specific indicators. This effort should be continued and broadened.

With respect to the “Traditional Knowledge,” despite its importance, the most part of the efforts have been conducted in a non-systematic and interrupted manner by civil society organizations and by some few government research organizations.

The CCTI, created in the scope of the management of PAN-Brazil, should take care of these and other themes that come to be considered relevant for the scientific community in interactions with the civil society entities.

Financial resources for the realization of research can be obtained from budget sources already established, from the special Funds at the disposition of the scientific community, as well as by means of resources (financial and human) coming from International Cooperation.

### **5.5.4 Improvement of the Environmental Management System.**

Due to the origin, the nature, the causes and the evolution of the phenomena of desertification, it becomes evident that its mitigation, prevention or even its combat should be executed not so much by a specific policy, but by the interaction of various instruments of

this policy, where the environmental themes should be seen as one of the components for the solution of the problems identified and not as blocks to development.

This characteristic implicit in PAN-Brazil signifies that one of the strategies adopted - including by recommendation of the CCD itself – is that of working in the sense of bringing it about that the theme of desertification begin to be incorporated, in all the scopes (social and political institutional) as a integral part of the various initiatives and policies, be they sector or structural.

One understands that this intention will become concrete by means of a permanent and structured action of environmental managers and conflict mediators, so that, in a relatively short time, Brazilian society (and its economic, political, institutional and social agents) will have incorporated the theme of desertification as their own relevant agenda. It is a matter of bringing it about that a theme, until today little known, should begin to constitute an element of attention on the part of the formulators and managers of public policies and of the economic and social agents of the region and of the Country.

One understands as relevant and necessary the role which the environmental managers and conflict mediators should perform in the sense of developing and planning actions to facilitate, sustain, stimulate and in this way make viable the stages of implantation the Program.

The federal government and the MMA, aware of the challenges which they still have to face, already have initiated, with the support of the World Bank, the preparation of a proposal of structural adjustment for the environmental sector, where various of these themes will be present. The instruments for its overcoming or improvement can also be conceived and utilized in the next ten years. Among the instruments, the Institutional Strengthening assumes a great priority.

Within the scope of PAN-Brazil, one intends to act in the sense of assuring the existence of a fundamental instrument for its management, expressed by ZEE. Starting from this instrument the governmental entities (in their diverse spheres of the federation) can support their options and initiatives, serving at the same time as orienting elements for the actions of the private sector and the partnerships between the social and economic agents (public and private).

Possessed of these possibilities, federal government will begin to have the capacity available to organize and stimulate economic instruments to make management easier and more viable with the use of instruments as the Green Protocol, Seals for Certification of Ecologically Correct Products, Ecological ICMS, and creation of environmental criteria for the allocation of Participation Funds of the States and Municipalities. It will also stimulate the private sector in its own initiatives or in partnerships with the public sector, to perform its activities, in a way to combat the desertification and make viable real processes of sustainable development.

### **5.5.5 Extending the Education and Qualification Activities**

For decades only a small number of researchers and public managers were familiarized and involved with the questions of desertification, its prevention and combat.

In the first years of its implementation The PAN-Brazil has incorporated initiatives oriented towards the qualification of the persons directly involved in the process, in whatever refers to the actions for which the federal government is responsible, without detriment to the supports which can be given to the states and other partners. By the way, one intends to

implement an emergency plan of qualification. The Technical Cooperation (IICA and GTZ) has already shown its disposition to begin operations in this direction.

### **5.5.6 Extending the Participatory Capacity of Civil Society**

It will be necessary to conceive a specific project to broaden the participation of civil society in the implementation of Pan-Brazil. It is important to count on other important social and economic actors. A program of this type should assure resources for:

- i. The mobilization of rural and urban communities;
- ii. The institutional support for the monitoring and evaluation processes of PAN-Brazil;
- iii. The qualification of leaders of the organizations of civil society (in general themes of public policy, management of their entities, design and preparation of development projects, etc.; and
- iv. Revision of the legal and regulatory landmark in the relation between the government and civil society.

### **5.5.7 Strengthening of the State Dynamics**

As described on the chapter about the Process of Construction of PAN-Brazil the State Dynamics, encouraged and articulated by the State Focal Points (Governmental and of civil society) occupy the most important participation spaces to analyze the local problems caused by desertification and to discuss and make pacts of possible solutions between the actors. In this way, these spaces will continue to be of supreme importance for the continuity of the Program, as well as for its implementation and monitoring. So that this movement can continue and increase in quality and scope, involving new actors including municipal mayor's offices, the federal government, along with its partners from the states, from civil society and International Cooperation should furnish their focal points and other state facilitators with an instance qualification which continues to foster the strengthening of their institutions.

In relation to the necessary institutional support, the MMA is already making resources available through the mediation of FNMA. These resources will be passed on, as a set, to the Focal Points (Governmental and of Civil Society), reinforcing in this manner the co-management and the cooperation between these two sectors. Also it is important to support the Focal Points in obtaining additional resources, for the consolidation of vital structures to guarantee the effective and decentralized implementation of PAN-Brazil.

## **5.6 RESOURCES REQUIRED FOR THE IMPLEMENTATION OF PAN-Brazil**

Due to the gravity and extension of the problems treated in this Document and of the social demands historically not attended, one can consider it practically impossible for a single government, in a relatively short time, to respond fully to all the demands previously cited. Moreover, the volume of resources necessary would be incompatible with the current conditions of public finances. Beside this, the institutional and operative capacity of the public and private institutions needs to be strengthened, with the purpose of guaranteeing the necessary effectiveness and integration of efforts.

The financial resources for the implementation of this program of action were estimated in the light of the Bill 030/2003-CN, relative to PPA (2004-2007) and of the

information contained in various official documents. The estimates made for each one of the initiatives already detailed have, for this reason, a strict relation with the budget reality. The financial participation of the state and municipal governments was not included, even though they exist and can have important significance.

One estimates that the resources for the execution of the Programs and actions foreseen in the PAN-Brazil in the period from 2004 - 2007, will reach an amount of R\$23.5 billion equivalent to US\$7.7 billion, at an exchange rate of US\$ 1.00 / R\$3.05, in effect in the month of July, 2004. Of this value, following the priority established by the federal government: practically 90% will be being applied in the actions foreseen to combat poverty and inequality, including there those oriented toward guaranteeing food and nutritional security and for the strengthening of family agriculture.

Other possibilities for additional resources can be utilized, as those represented by credit lines administrated by international financial institutions, the mobilization of which depends on the elaboration, analysis and evaluation beforehand of projects. In these cases, one considers it possible to obtain the support of institutions such as the World Bank, BID, and FIDA, among others.

The possibilities offered by the lines of credit of the official banks, (Banco do Brasil, Banco do Nordeste do Brasil, BNDES and the Caixa Economica Federal), referring to the mobilization of resources coming from the private sector, and finally the bringing in of resources coming from the contribution of society in a general way, producers of various categories.

In the first year of formal implementation of PAN-Brazil, its managers will take care of elaborating the aforementioned initiatives in the most detailed way. For this, they should be able to count on the participation of various institutions of the federal Government, of the state governments, including those of the ASD, of the private sector, of the municipalities and of other partners. This will be the moment to qualify, to quantify and to need to improve the demands and the effective possibilities of allocation of the resources necessary to the realization of the programs and projects which integrate the PAN-Brazil.

One is not unaware of the difficulties through which the Brazilian economy is passing. One admits that one is doing all that is possible to overcome the most important problems. In this way, the resources foreseen for this Action Program, in relation to the amount and to the sources, will have guaranteed allocation, to the exact extent of the forces which come to be made for mobilizing the social forces of Brazil - Governmental, non-governmental, and of society in general. The results achieved up to now and those that one hopes to attain, can be a good exchange for guaranteeing the adequate implementation of PAN-Brazil.

## *Chapter VI*

# **MANAGEMENT SYSTEM OF PAN-Brazil**

The implementation of the program actions of PAN-Brazil demands the attending to two order of commitments: Those assumed by the Country before the United Nations and those agreed upon with Brazilian society, during the process of elaboration of this program. There are two commitments and a significant list of tasks to perform.

In this chapter the ideas are presented which orient the efforts which should be made for the materializing of the actions to combat desertification in the country. One describes them as follows: i) the Bases for establishing the Management Model of PAN-Brazil; and ii) the Management Structure of Pan Brazil.

### **6.1 BASES FOR ESTABLISHMENT OF THE MANAGEMENT MODEL OF PAN-Brazil**

The United Nations Convention to Combat Desertification – CCD presents as one of its chief presuppositions, the need to implement effective processes of participation and social involvement for the combat of desertification. This need is pressing in the face of the enormous challenge of articulating actions to combat desertification, including the political, social, economic, environmental and cultural dimensions.

The breath and density of the problems related to these dimensions indicate the need for promoting broad integration aiming at facing the underlying problems of desertification. In this way, one should seek the participation of diverse social actors (governmental or not) with activity in the ASD, having in mind the extent of the goal to combat efficaciously the desertification and all its causes and consequences.

The participation in PAN-Brazil is understood as a dynamic process in constant growth, with a view to constituting an authentic democracy. In this way, the public consciousness established by various means can, also, be characterized as a central element of the strategies of combating desertification, as the CCD clearly establishes.

Taking as a basis the aspects described above and aiming at making best use of the existing governmental structures, one establish a management model for PAN-Brazil which involves instances at strategic, tactical and operational levels, giving value to an effective process of social inspection.

It is to be emphasized that the nature of PAN-Brazil recommends that such an instrument be understood in the context of a continuous process of construction, implementing and collective evaluation. It needs, for this reason, formulation, reformulation, and establishing of pacts for its greater effectiveness. This quality demonstrates its difference in relation to “conventional” plan or project, meaning that the Document PAN-Brazil represents at every moment, the result of agreements obtained between governmental agents and civil society with activities in the ASD.

In this sense, the management process defines instances that seek to articulate the relevant social actors that operate in various spheres of government and of society. Moreover, one seeks to give value to spaces for the discussion, having in mind the perfecting

of the instrument and actions agreed on, in the condition of its permanent review and innovation.

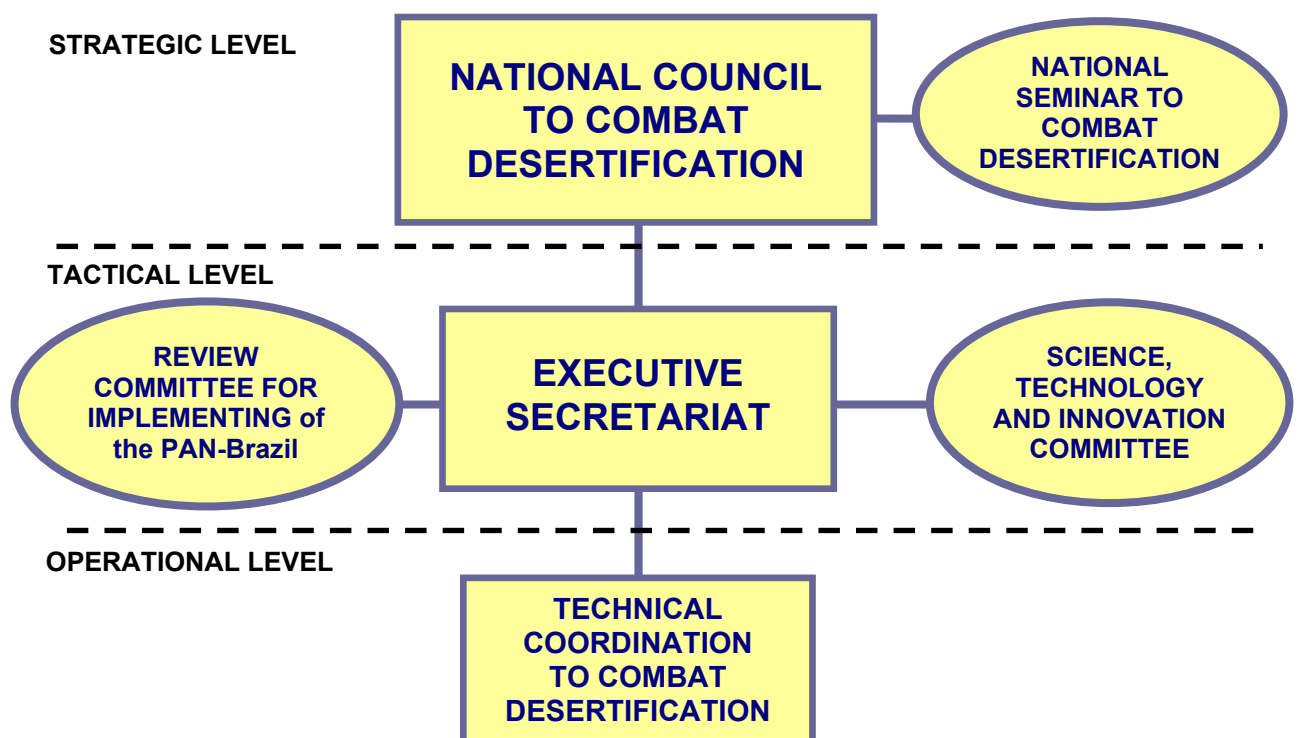
Besides the effort for successful management of this Program, the model herewith delineated point to the importance of the broadening of the debates about the revision of the National Policy to Combat Desertification.

## 6.2 MANAGEMENT STRUCTURE OF PAN-Brazil

Following one describes the management structure of PAN-Brazil, presenting succinctly the composition, function, attribution and the operationalization of the various defined instances. The instances at the strategic, tactical, and operational levels are shown in Figure 6.1.

It is worth mentioning that such a structure seeks to integrate deliberative and consultative instances, giving value to effective participation and social inspection, with the objective of promoting continuous advances in the combat of desertification in the Country.

**FIGURE 6.1  
MANAGEMENT STRUCTURE OF PAN-Brazil**



## **6.2.1 National Council to Combat Desertification – CNCD**

### **COMPOSITION**

- I. Ministry of the Environment;
- II. Representatives of the Ministries related to PAN-Brazil;
- III. Organs of the Federal Public Administration;
- IV. Representatives of the State Governments;
- V. Representatives of Civil Society.

### **FUNCTION**

The National Council to Combat Desertification – CNCD is the highest decision-making instance of PAN-Brazil, having as its primordial function the construction of pacts to combat desertification and mitigate the effects of drought. Moreover, the CNCD should deliberate about the proposals coming from the National Seminar on Combating Desertification and the Review Committee for Implementing PAN-Brazil, and finally to establish/give priority to the action strategies of the government in the region focused by the Program with a view to its sustainable development.

### **ATTRIBUTIONS**

- i. Guarantee the attainment of the objectives proposed by PAN-Brazil;
- ii. Construct and strengthen the pacts for the implementation of PAN-Brazil;
- iii. Evaluate and approve the strategies and procedures implemented by the Executive Secretariat of PAN-Brazil;
- iv. Deliberate about the proposals coming from the National Seminar on Combating Desertification;
- v. Establish and give priority to strategic actions for the combating of desertification and mitigation of the effects of the drought.

### **OPERATIONALIZATION**

The National Council to Combat Desertification will hold annual ordinary meetings presided over by the Environment Minister and the Water Resources Secretariat of the Environment Ministry (National Focal Point of the United Nations Convention to Combat Desertification – CCD) will act as secretary. They will count on the participation of representatives of the Ministries related to PAN-Brazil, of the state governments inserted in the area focused by the Program and of representatives of civil society with activity in the areas susceptible to desertification in the Country.

## **6.2.2 Executive Secretariat**

### **COMPOSITION**

- The Water Resources Secretariat of the Environment Ministry (National Focal Point of the CCD).



## **FUNCTION**

The Executive Secretariat is situated on the tactical level and is the link in which one sends along decisions of the National Council to Combat Desertification to the remaining related instances, and of these to the Council. This instance is charged with materializing the decisions established by the National Council to Combat Desertification in practical actions, promote broad synergy between the various ministries in order to guarantee the cohesion necessary for the development of actions defined in PAN-Brazil.

The Executive Secretariat is also responsible for the coordination of the National Seminar on Combating Desertification and for the passing along of information about the implementation of Pan-Brazil, to the National Council to Combat Desertification and to the Review Committee for implementation of PAN-Brazil, besides making the agenda of the Science, Technology and Information Committee as well as monitoring its actions. Besides the Executive Secretariat of PAN-Brazil should coordinate actions for the establishment of projects aiming at asking for resources before the national and international institutions for fomenting as well as managing them.

## **ATTRIBUTIONS**

- Develop actions according to the resolutions of the National Council to Combat Desertification;
- Articulate the interministerial actions for the implementation of PAN-Brazil;
- Establish and advance actions in the states to combat desertification and mitigate the effects of drought;
- Act as Secretary to the National Council to Combat Desertification;
- Coordinate the process of holding the National Seminar on Combating Desertification;
- Make the agenda and monitor the actions of the Science, Technology and Innovation of PAN-Brazil.

## **OPERATIONALIZATION**

The Executive Secretariat will be administered by the Water Resources Secretariat of the Environment Ministry (an institution of the National Focal Point).

### **6.2.3 Technical Coordination to Combat Desertification – CTCD**

#### **COMPOSITION**

- Technical team for Combating Desertification (SRH/MMA).

#### **FUNCTION**

The chief function of the CTCD, in the operational scope, is to seek broad articulation between the programs of diverse ministries related to PAN-Brazil and the governmental institutions and non-governmental institutions of the States involved, with the objective of establishing central actions for the Reduction of Poverty and Inequality; Sustainable Increase

of Productive Capacity, Preservation, Conservation and Sustainable Management of the Natural Resources. This coordinating body should also help the States in the formulation and review of the State Action Programs to Combat Desertification (PAE's), interact with the members of the Review Council for \Implementing PAN-Brazil and promote actions with a view to realizing of the National Seminar to Combat Desertification. Moreover, this instance should develop programs and projects aiming at establishing pleas for resources before National and international fomenting organisms for developing actions to combat desertification and mitigate the effects of drought.

## **ATTRIBUTIONS**

- Promote articulation between the programs of the diverse ministries which have actions related to PAN-Brazil;
- Help the States to establish and review the PAE's;
- Form commissions involving representatives of civil society, of the legislatures and of public organs (federal, state and municipal) with the objective of broadening the capillary of their actions and broadening institutional synergy necessary for greater efficaciousness of the strategies adopted;
- Establish actions for realizing the National Seminar to Combat Desertification.
- Establish programs and projects to ask for resources before national and international organizations for promotion;
- Manage the programs and funds correlated for combating Desertification, coming from the establishing of petitions before the organisms of promotion;
- articulate the conveniums and contracts with public or private organizations of civil society for the establishing of actions to combat desertification and mitigation of the effects of the drought;
- Promote the follow up and the evaluation of the conveniums signed;
- Monitor and evaluate the actions supported in the scope of the States;
- Produce technical evaluation and proposal reports for the Executive Secretariat and for the Review Committee for Implementing PAN-Brazil.

## **OPERACIONALIZATION**

The CTCD will be subordinated to the National Focal Point of the CCD.

### **6.2.4 National Seminar to Combat Desertification – SNCD**

#### **COMPOSITION**

- Delegates representing civil society;
- Delegates representing the municipal governments;
- Delegates representing the state governments;
- Delegates representing the parliamentary (federal, state and municipal);
- State Focal Points

- Representatives of the National Council to Combat Desertification;
- Representatives of the Executive Secretariat;
- Representatives of the Review Committee for Implementing PAN-Brazil;
- Representatives of the Science, Technology and Innovation Council.

## **FUNCTION**

The National Seminar to Combat Desertification of a consultative nature possess as an orienting element for participation and social involvement for the establishment of public policies for combating desertification and mitigation of the effects of the drought. With this Seminar one intends to broaden the social mobilization and the passing on of information about the theme before the social actors who act in the region focused by PAN-Brazil. Besides this, through this event one will seek to analyze the actions going on and propose alternatives for the greater effectiveness of the Program.

## **ATTRIBUTIONS**

- To broaden the participation for the establishing and analysis of public policies for combating desertification and mitigation of the effects of the drought;
- Pass along the information about the theme to the society inserted in the area of PAN-Brazil;
- Analyze the actions developed and give subsidies for the CNCD to make decisions about the Pan-Brazil;
- Analyze and propose alterations for the National Policy to Combat Desertification.

## **OPERATIONALIZATION**

The National Seminar will be held every four years, simultaneously with the National Environment Conference, and the responsibility for managing and holding it will be the duty of the Executive Secretariat. The Seminar can count on the participation of key actors to combat desertification in the Country, including representatives of the States, Parliaments, of the Scientific Community and of Civil Society.

### **6.2.5 Review Committee for Implementing PAN-Brazil – CRIPAN**

#### **COMPOSITION**

- Representatives of the related Ministries;
- Representatives of the States (state focal points);
- Parliamentary Representatives (federal, state and municipal);
- Representatives of Civil Society (state focal points and social movements);
- Representatives of the Executive Secretariat;
- Representatives of the Science, Technology and Innovation Committee.

## **FUNCTION**

The chief function of CRIPAN is to guarantee social inspection in the implementation of the PAN-Brazil, founded on an effective system of representation, through the periodic follow-up of the actions developed for improving the implementation procedures of the Program, recommending the implementation of research to be developed by the Science, Technology and Information Committee. The CRIPAN should also help the Executive Secretariat in the preparation and holding of the National Seminar to Combat Desertification.

One should emphasize that the Interministerial Work Group (GTIM), instituted by means of Ministerial Directive no. 265 of June, 2003, should develop the functions of CRIPAN up to its institution.

## **ATTRIBUTIONS**

- Monitor and evaluate the performance of the actions developed for implementing PAN-Brazil;
- Send along to the Executive Secretariat the proposals for the redirectioning of the actions pertaining to the Program;
- To propose the creation of specific technical chambers or put together already existing instances with the purpose of generating information and present solutions for themes correlated to combat desertification and mitigate the effects of drought.
- Propose themes for research to be developed by the Science, Technology and Innovation Committee;
- Propose alterations for the National Policy to Combat Desertification;
- To help to prepare and follow up the National Seminar to Combat Desertification.

## **OPERATIONALIZATION**

The CRIPAN will meet in ordinary session every six months, and the meetings will be presided over by the Water Resources Secretary of the Environment Ministry (National Focal Point of the CCD). The members of the CRIPAN will receive periodic reports about the progress of actions established for implementation by PAN-Brazil.

### **6.2.6 Science, Technology and Innovation Committee – CCTI**

#### **COMPOSIÇÃO**

- Representative of the Ministries related to PAN-Brazil;
- Representative of the Executive Secretariat;
- Representative of EMBRAPA;
- Representative of Universities;
- Representative of Civil Society.

## **FUNCTION**

The CCTI should respond to the national demands in relation to C&T, proposed by the CRIPAN and deliberated by the Executive Secretariat, to combat desertification and mitigate the effects of drought, as well as those defined in the international scope by the Science and Technology Committee of the CCD. For the realization of the research, the focal points of the CCTI (Science and Technology Ministry and representatives of civil society) will have as attributions to compose and coordinate work groups involving different public research organizations (in the federal and state scope) and of civil society.

## **ATTRIBUTIONS**

- Respond to the demands in relation to Science and Technology deliberated by the Executive Secretariat and by the Science and Technology Committee of the CCD;
- Transfer the products established by the research to society;
- Present reports about the progress of the research to the Executive Secretariat;
- Present to CRIPAN the actions developed and debate about the proposals coming from this instance.

## **OPERATIONALIZATION**

The representative of CCTI have the duty to make operational and coordinate the creation of work groups for the development of research correlated to the demands of the PAN-Brazil, as well as to promote the monitoring of such studies and the passing on of the information to the Executive Secretariat and to CRIPAN.

## *Chapter VII*

# **STEPS FOR IMPLEMENTING PAN-Brazil**

The formulation of this action program was the fruit of an extraordinary effort of all those who work for combating the desertification and mitigation of the effects of the droughts in the ASD. This was a great effort. Greater, however, will be that which now is beginning, with the setting off of the measures necessary for its implementation.

### **7.1 SYNERGY WITH THE CONVENTIONS ABOUT CLIMATE CHANGES AND BIOLOGICAL DIVERSITY**

The discussion and the treatment of the environmental questions in Brazil have presented a continuous movement, chiefly after the holding of ECO-92. This movement can be considered irreversible. The social participation and the integration of the environmental questions with social and economic policies are already being articulated and integrated according to their chief characteristics. In a general perspective, one already recognizes that the impacts coming from inadequate management of natural resources (water, vegetation, air and soil) are reflected directly in the socioeconomic level of the population and in the economic activities of the Country.

In this context the ratification of the Kioto Protocol to the United Nations Convention Situation about Climate Change (CCC), the Convention on Biological Diversity (CDB), and the United Nations Convention to Combat Desertification (CCD) serve to reinforce new mobilizations of organized civil society and of the authorities at various levels of government, chiefly in respect to the interactions between the Focal Points of the three above-mentioned conventions.

The secretariats of the three conventions are organizing workshops aiming at synergism in the implementation of these conventions the Workshop held in Viterbo Italy, in April of 2004, contributed to the Focal Points being able to treat the forest sector in terms of degradation of lands, biodiversity and climate change. In the workshop interest was shown for managing the forests as ecosystems through sustainable management including the maintenance of environmental services furnished by the forest - hydrological service, stabilization of the soil, recreation, biodiversity, fixing of carbon -, and the promotion of political tools and with a basis on the market, for obtaining the value of these services, nationally and, where applicable, internationally.

During the Workshop the fact was discussed that for reaching synergistic effects in foresting/reforesting, projects can be formed according to the basic principles for the three conventions, giving appropriate attention to the environmental goals of conservation and sustainable use of the biodiversity, combating desertification, fixing of carbon, and other goals and socioeconomic aspects, including the eradication of poverty.

The chief recommendations of the Viterbo Workshop for the synergy of the three conventions were for the following thematic areas:

- Biomass for energy: joint forest management;
- Foresting/reforesting/conversion of forests: implications of monoculture;

- System of collecting water for reforestation in dry lands: programs of development of integrated hydrographic basins;
- Technology to cultivate the earth: stocking of Carbon in the soils;
- Monitoring and evaluation: satellite images, terrestrial systems, database;
- Agriculture and pasture: impacts of grazing on the adoption of other practices and technologies.

For Brazil, the participation in this Workshop was quite important, and since then, the National Focal Points have been seeking to establish projects aiming at synergy in such conventions, including of their indicators. This synergy and integration harmonizes with one of the chief guidelines of the Environment Ministry, that is, the transversality of their actions.

## **7.2 IMMEDIATE STEPS**

The problems of desertification observed today in the ASD will not have a guaranteed solution because this Program of National Action to Combat desertification was elaborated. In this sense, PAN-Brazil does not constitute an end in itself. But its formulation opens hopeful perspectives for the preservation, conservation and controlled management of the natural resources in this region. In this sense, PAN-Brazil can be characterized as a work instrument, resulting from a process of collective construction, during which different social actors interacted, representing public, private and non-governmental agents. During the paths taken, it was possible to combine diverse perceptions and interests – of the political and technical spheres -, in an attempt to identify problems and seek solutions, oriented for combating desertification and mitigating the effects of the droughts that occur in the ASD.

More than a document or a traditional program, PAN-Brazil constitutes a set of general and specific orientations about how to confront desertification in Brazil. In this sense, PAN-Brazil will have a fundamental role, serving as a landmark of reference and instrument for harmonizing interventions and seeking greater cooperation between all the actors involved with the theme.

Upon concluding the task of formulating PAN-Brazil, a new task will have to be started. This new task will be related to the implementation of what was planned and approved. The implementation of the program will demand for this reason, a series of immediate steps and activities which can be ordered as follows: i) juridical-legal; ii) of popular mobilization; iii) political; and iv) administrative and operational.

### **7.2.1 Juridical-Legal Steps**

These steps are with respect to the preparation of a set of normative instruments destined to furnish the necessary legal support for PAN-Brazil and for its System of Management. They also will include the reformulation of existing structures and the design of new structures, with the definitions of their composition attributions and *modi operandi* of the units that should integrate them.

### **7.2.2 Steps linked to Popular Mobilization**

In this sense, it will be necessary to continue the activities to be exercised jointly with the representative segments of society, in the line of coherence of the process of formulation of PAN-Brazil.

### **7.2.3 Political Steps**

On the list of steps of this nature required for the successful implementation of PAN-Brazil, the following stand out as the most immediate:

- Negotiation with institutions of the different spheres of government, for support for PAN-Brazil, with emphasis on the creation of the necessary institutional entities for the exercise of the functions of planning, execution, evaluation and monitoring of the Program.

### **7.2.4 Administrative and Operational Steps**

It will be necessary that the MMA improve its technical operational capacity so that the Executive Secretariat can have the conditions of functionality, necessary for the full execution of the Program. The Ministry also will have to consolidate the policy-operational instances presented in Chapter VI. In the same way, the State should set up their operational instances to maintain the institutional relationship with PAN-Brazil and construct and/or revise their respective State Action Plans to Combat Desertification.

In the same category will be included the selection of the Programs and Projects with priority for immediate execution.



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# *Annexes*



**ANNEX 1**  
**AREA AND POPULATION OF THE AREAS SUSCEPTIBLE TO DESERTIFICATION-ASD**  
**(SEMI-ARID, DRY SUB-HUMID AREAS AND SURROUNDING AREAS), IN THE YEARS OF 1991 AND 2000**

SEMI-ARID AND DRY SUB-HUMID AREAS AND SURROUNDING AREAS OF THOSE AREAS, BY STATE	POPULATION (INHABITANTS)						TERRITORIAL AREA	DEMOGRAPHIC DENSITY		RATE OF URBANIZATION (%)	
	TOTAL		URBAN		RURAL		(km <sup>2</sup> )	(Inhab/km <sup>2</sup> )			
	1991	2000	1991	2000	1991	2000	2000	1991	2000	1991	2000
Alagoas	490.401	541.950	174.382	212.635	316.019	329.315	11.297,1	43,41	47,97	35,56	39,23
Bahia	3.623.476	3.763.184	1.412.679	1.803.175	2.210.797	1.960.009	280.652,2	12,91	13,41	38,99	47,92
Ceará	2.693.365	2.957.693	1.301.049	1.662.415	1.392.316	1.295.278	108.334,8	24,86	27,30	48,31	56,21
Minas Gerais	279.976	334.460	123.460	174.784	156.516	159.676	27.933,8	10,02	11,97	44,10	52,26
Paraíba	1.620.994	1.691.115	920.648	1.092.770	700.346	598.345	46.004,0	35,24	36,76	56,79	64,62
Pernambuco	2.284.935	2.522.519	1.192.266	1.509.872	1.092.669	1.012.647	78.866,7	28,97	31,98	52,18	59,86
Piauí	705.640	742.116	216.284	317.903	489.356	424.213	103.595,2	6,81	7,17	30,65	42,84
Rio Grande do Norte	1.440.119	1.563.478	878.852	1.041.484	561.267	521.994	48.945,5	29,42	31,94	61,03	66,61
Sergipe	98.636	119.300	38.166	50.968	60.470	68.332	4.808,0	20,51	24,81	38,69	42,72
<b>1. SEMI-ARID AREAS</b>	<b>13.237.542</b>	<b>14.235.815</b>	<b>6.257.786</b>	<b>7.866.006</b>	<b>6.979.756</b>	<b>6.369.809</b>	<b>710.437,3</b>	<b>18,63</b>	<b>20,04</b>	<b>47,27</b>	<b>55,25</b>
Alagoas	411.413	445.334	218.596	252.938	192.817	192.396	3.123,9	131,70	142,55	53,13	56,80
Bahia	2.518.850	2.813.225	1.338.902	1.702.021	1.179.948	1.111.204	199.821,9	12,61	14,08	53,15	60,50
Ceará	865.461	1.045.273	403.649	586.347	461.812	458.926	20.732,0	41,75	50,412	46,64	56,09
Maranhão	13.500	15.349	5.666	7.887	7.834	7.462	2179,9	6,19	7,04	41,97	51,38
Minas Gerais	1.136.004	1.174.058	618.221	772.343	517.783	401.715	79.936,8	14,21	14,69	54,42	65,78
Paraíba	607.022	620.329	306.669	350.972	300.353	269.357	6.010,6	100,99	103,21	50,52	56,58
Pernambuco	1.020.445	1.094.582	561.188	668.752	459.257	425.830	9.219,4	110,68	118,73	54,99	61,10
Piauí	388.691	420.397	175.742	238.986	212.949	181.411	88.903,4	4,37	4,72	45,22	56,85
Rio Grande do Norte	206.672	260.290	82.163	104.704	124.509	155.586	2.395,3	86,28	108,66	39,76	40,22
Sergipe	325.297	359.801	161.639	197.316	163.658	162.485	7.935,6	40,99	45,34	49,69	54,84
<b>2. DRY SUB-HUMID AREAS</b>	<b>7.493.355</b>	<b>8.248.638</b>	<b>3.872.435</b>	<b>4.882.266</b>	<b>3.620.920</b>	<b>3.366.372</b>	<b>420.258,8</b>	<b>17,83</b>	<b>19,63</b>	<b>51,68</b>	<b>59,19</b>
Alagoas	183.391	195.928	98.137	118.917	85.254	77.011	2.789,5	65,74	70,24	53,51	60,69
Bahia	561.854	618.414	303.688	369.106	258.166	249.308	9.811,5	57,26	63,03	54,05	59,69
Ceará	2.807.821	3.427.695	2.457.309	3.066.556	350.512	361.139	16.645,5	168,68	205,92	87,52	89,46
Espírito Santo	445.962	494.281	246.518	311.329	199.444	182.952	16.887,1	26,41	29,27	55,28	62,99
Maranhão	574.479	645.793	223.307	310.676	351.172	335.117	39.062,5	14,71	16,53	38,87	48,11
Minas Gerais	677.224	738.780	345.073	433.924	332.151	304.856	69.827,8	9,70	10,58	50,95	58,74
Paraíba	154.623	143.222	79.289	86.121	75.334	57.101	1.215,3	127,23	117,85	51,28	60,13
Pernambuco	110.794	112.772	42.333	49.676	68.461	63.096	1.223,4	90,56	92,18	38,21	44,05
Piauí	1.451.344	1.649.153	957.611	1.210.423	493.733	438.730	46.004,8	31,55	35,85	65,98	73,40
Rio Grande do Norte	685.140	856.579	663.649	834.874	21.491	21.705	429,9	1.593,72	1.992,51	96,86	97,47
Sergipe	251.969	296.601	114.353	152.606	137.616	143.995	3.482,6	72,35	85,17	45,38	51,45
<b>3. SURROUNDING AREAS</b>	<b>7.904.601</b>	<b>9.179.218</b>	<b>5.531.267</b>	<b>6.944.208</b>	<b>2.373.334</b>	<b>2.235.010</b>	<b>207.380</b>	<b>38,12</b>	<b>44,26</b>	<b>69,98</b>	<b>75,65</b>
Alagoas	1.085.205	1.183.212	491.115	584.490	594.090	598.722	17.210,5	63,05	68,75	45,26	49,40
Bahia	6.704.180	7.194.823	3.055.269	3.874.302	3.648.911	3.320.521	490.285,6	13,67	14,67	45,57	53,85
Ceará	6.366.647	7.430.661	4.162.007	5.315.318	2.204.640	2.115.343	145.712,3	43,69	51,00	65,37	71,53
Espírito Santo	678.887	743.391	406.004	503.268	272.883	240.123	24.375,2	27,85	30,50	59,80	67,70
Maranhão	587.979	661.142	228.973	318.563	359.006	342.579	41.242,4	14,26	16,03	38,94	48,18
Minas Gerais	2.093.204	2.247.298	1.086.754	1.381.051	1.006.450	866.247	177.698,4	11,78	12,65	51,92	61,45
Paraíba	2.382.639	2.454.666	1.306.606	1.529.863	1.076.033	924.803	53.229,9	44,76	46,11	54,84	62,32
Pernambuco	3.416.174	3.729.873	1.795.787	2.228.300	1.620.387	1.501.573	89.309,5	38,25	41,76	52,57	59,74
Piauí	2.545.675	2.811.666	1.349.637	1.767.312	1.196.038	1.044.354	238.503,4	10,67	11,79	53,02	62,86
Rio Grande do Norte	2.331.931	2.680.347	1.624.664	1.981.062	707.267	699.285	51.770,7	45,04	51,77	69,67	73,91
Sergipe	675.902	775.702	314.158	400.890	361.744	374.812	16.226,2	41,65	47,81	46,48	51,68
<b>4. AREA OF ASD (1+2+3)</b>	<b>28.635.498</b>	<b>31.663.671</b>	<b>15.661.488</b>	<b>19.692.480</b>	<b>12.974.010</b>	<b>11.971.191</b>	<b>1.338.076,0</b>	<b>21,40</b>	<b>23,66</b>	<b>54,69</b>	<b>62,19</b>

SOURCE OF BASIC DATA: i) IBGE. Demographic censuses of 1991 and 2000; and ii) BRITO, José Ivaldo Barbosa de. Regional model of estimation of the water balance applied to the climate variability of the Northeast of Brazil. Campina Grande: Universidade Federal da Paraíba-UFPB, 2000. (Doctoral thesis in Natural resources, 2000.)

**ANNEX 2**  
**MUNICIPALITIES OF THE SEMI-ARID AREAS OF THE AREAS SUSCEPTIBLE TO DESERTIFICATION-ASD**

STATES	NAMES OF THE MUNICIPALITIES	NUMBER OF MUNICIPALITIES
PIAUI	Acauã, Alagoinha do Piauí, Alegrete do Piauí, Anísio de Abreu, Assunção do Piauí, Bela Vista do Piauí, Belém do Piauí, Betânia do Piauí, Bocaina, Bonfim do Piauí, Brejo do Piauí, Buriti dos Montes, Caldeirão Grande do Piauí, Campinas do Piauí, Campo Alegre do Fidalgo, Campo Grande do Piauí, Canto do Buriti, Capitão Gervásio Oliveira, Caracol, Caridade do Piauí, Castelo do Piauí, Colônia do Piauí, Conceição do Canindé, Coronel José Dias, Curral Novo do Piauí, Dirceu Arcoverde, Dom Expedito Lopes, Dom Inocêncio, Fartura do Piauí, Flores do Piauí, Floresta do Piauí, Francisco Macedo, Francisco Santos, Fronteiras, Geminiano, Guaribas, Inhumas, Ipiranga do Piauí, Isaías Coelho, Itainópolis, Itaueira, Jacobina do Piauí, Jaicós, João Costa, Jurema, Lagoa do Barro do Piauí, Lagoa do Sítio, Marcolândia, Massapê do Piauí, Monsenhor Hipólito, Morro Cabeça no Tempo, Nazaré do Piauí, Oeiras, Padre Marcos, Paes Landim, Pajeú do Piauí, Paquetá, Patos do Piauí, Paulistana, Pavussu, Pedro Laurentino, Nova Santa Rita, Picos, Pimenteiras, Pio IX, Queimada Nova, Ribeira do Piauí, Rio Grande do Piauí, Santa Cruz do Piauí, Santana do Piauí, Santo Antônio de Lisboa, Santo Inácio do Piauí, São Braz do Piauí, São Francisco de Assis do Piauí, São Francisco do Piauí, São João da Canabrava, São João da Varjota, São João do Piauí, São José do Peixe, São José do Piauí, São Julião, São Lourenço do Piauí, São Luis do Piauí, São Miguel do Fidalgo, São Miguel do Tapuio, São Raimundo Nonato, Simões, Simplício Mendes, Socorro do Piauí, Sussuapara, Tamboril do Piauí, Valença do Piauí, Várzea Branca, Vera Mendes, Vila Nova do Piauí, Wall Ferraz	96
CEARÁ	Abaiara, Acopiara, Aiuaba, Altaneira, Alto Santo, Antonina do Norte, Apuiarés, Aracati, Ararendá, Araripe, Arneiroz, Assaré, Aurora, Baixio, Banabuiú, Barbalha, Barro, Beberibe, Boa Viagem, Brejo Santo, Campos Sales, Canindé, Caririçu, Cariús, Catarina, Catunda, Cedro, Choró, Crateús, Crato, Deputado Irapuan Pinheiro, Ererê, Farias Brito, General Sampaio, Granjeiro, Hidrolândia, Ibaratama, Ibicuitinga, Icapuí, Icó, Iguatu, Independência, Ipaoranga, Ipaumirim, Ipu, Ipueiras, Iracema, Irauçuba, Itaiçaba, Itatira, Jaguaratama, Jaguaribara, Jaguaribe, Jaguaruana, Jardim, Jati, Juazeiro do Norte, Jucás, Lavras da Mangabeira, Limoeiro do Norte, Madalena, Mauriti, Milagres, Milhã, Missão Velha, Mombaça, Monsenhor Tabosa, Morada Nova, Nova Olinda, Nova Russas, Novo Oriente, Ocara, Orós, Palhano, Parambu, Paramoti, Pedra Branca, Penaforte, Pereiro, Piquet Carneiro, Poranga, Porteiras, Potengi, Potiretama, Quiterianópolis, Quixadá, Quixelã, Quixeramobim, Quixeré, Russas, Saboeiro, Salitre, Santana do Cariri, Santa Quitéria, São João do Jaguaribe, Senador Pompeu, Sobral, Solonópole, Tabuleiro do Norte, Tamboril, Tarrafas, Tauá, Tejuçuoca, Umari, Várzea Alegre.	105
RIO GRANDE DO NORTE	Acari, Açu, Afonso Bezerra, Água Nova, Alexandria, Almino Afonso, Alto do Rodrigues, Angicos, Antônio Martins, Apodi, Areia Branca, Augusto Severo, Baraúna, Barcelona, Bento Fernandes, Bodó, Bom Jesus, Caiçara do Norte, Caiçara do Rio do Vento, Caicó, Campo Redondo, Caraúbas, Carnaúba dos Dantas, Carnaubais, Cerro Corá, Coronel Ezequiel, Coronel João Pessoa, Cruzeta, Currais Novos, Doutor Severiano, Encanto, Equador, Felipe Guerra, Fernando Pedroza, Florânia, Francisco Dantas, Frutuoso Gomes, Galinhos, Governador Dix-Sept Rosado, Grossos, Guamaré, Ielmo Marinho, Ipanguaçu, Ipueira, Itajá, Itaú, Jaçanã, Jandaíra, Jandúis, Januário Cicco, Japi, Jardim de Angicos, Jardim de Piranhas, Jardim do Seridó, João Câmara, João Dias, José da Penha, Jucurutu, Lagoa d'Anta, Lagoa de Pedras, Lagoa de Velhos, Lagoa Nova, Lagoa Salgada, Lajes, Lajes Pintadas, Lucrécia, Luís Gomes, Macaíba, Macau, Major Sales, Marcelino Vieira, Martins, Messias Targino, Monte das Gameleiras, Mossoró, Nova Cruz, Olho-d'Água do Borges, Ouro Branco, Paraná, Paraú, Parazinho, Parelhas, Passa e Fica, Patu, Santa Maria, Pau dos Ferros, Pedra Grande, Pedra Preta, Pedro Avelino, Pendências, Pilões, Poço Branco, Portalegre, Porto do Mangue, Presidente Juscelino, Pureza, Rafael Fernandes, Rafael Godeiro, Riacho da Cruz, Riacho de Santana, Riachuelo, Rodolfo Fernandes, Tibau, Ruy Barbosa, Santa Cruz, Santana do Matos, Santana do Seridó, Santo Antônio, São Bento do Norte, São Bento do Trairi, São Fernando, São Francisco do Oeste, São João do Sabugi, São José do Campestre, São José do Seridó, São Miguel, São Miguel de Touros, São Paulo do Potengi, São Pedro, São Rafael, São Tomé, São Vicente, Senador Elói de Souza, Serra de São Bento, Serra do Mel, Serra Negra do Norte, Serrinha, Serrinha dos Pintos, Severiano Melo, Sítio Novo, Taboleiro Grande, Taipu, Tangará, Tenente Ananias, Tenente Laurentino Cruz, Timbaúba dos Batistas, Touros, Triunfo Potiguar, Umarizal, Upanema, Venha-Ver, Vera Cruz, Viçosa.	143

Continua

		<b>continued</b>
<b>STATES</b>	<b>NAMES OF THE MUNICIPALITIES</b>	<b>NUMBER OF MUNICIPALITIES</b>
PARAÍBA	Água Branca, Aguiar, Alcantil, Algodão de Jandaíra, São João do Rio do Peixe, Amparo, Aparecida, Araruna, Areia de Baraúnas, Aroeiras, Assunção, Baraúna, Barra de Santana, Barra de Santa Rosa, Barra de São Miguel, Belém do Brejo do Cruz, Bernardino Batista, Boa Ventura, Boa Vista, Bom Jesus, Bom Sucesso, Bonito de Santa Fé, Boqueirão, Igaracy, Brejo do Cruz, Brejo dos Santos, Cabaceiras, Cachoeira dos Índios, Cacimba de Areia, Cacimba de Dentro, Cacimbas, Cajazeiras, Cajazeirinhas, Camalaú, Campina Grande, Caraúbas, Carrapateira, Casserengue, Catingueira, Catolé do Rocha, Caturité, Conceição, Condado, Congo, Coremas, Coxixola, Cubati, Cuité, Curral Velho, Damião, Desterro, Vista Serrana, Diamante, Emas, Fagundes, Frei Martinho, Gado Bravo, Gurjão, Ibiara, Imaculada, Itaporanga, Itatuba, Jericó, Juazeirinho, Junco do Seridó, Juru, Lagoa, Lastro, Livramento, Mãe d'Água, Malta, Manaíra, Marizópolis, Mato Grosso, Maturéia, Monte Horebe, Monteiro, Nazarezinho, Nova Floresta, Nova Olinda, Nova Palmeira, Olho d'Água, Olivados, Ouro Velho, Parari, Passagem, Patos, Paulista, Pedra Branca, Pedra Lavrada, Piancó, Picuí, Pocinhos, Poço Dantas, Poço de José de Moura, Pombal, Prata, Princesa Isabel, Queimadas, Quixaba, Riachão, Riacho de Santo Antônio, Riacho dos Cavalos, Salgadinho, Santa Cecília, Santa Cruz, Santa Helena, Santa Inês, Santa Luzia, Santana de Mangueira, Santana dos Garrotes, Santarém, Santa Teresinha, Santo André, São Bento, São Bentinho, São Domingos do Cariri, São Domingos de Pombal, São Francisco, São João do Cariri, São João do Tigre, São José da Lagoa Tapada, São José de Caiana, São José de Espinharas, São José de Piranhas, São José de Princesa, São José do Bonfim, São José do Brejo do Cruz, São José do Sabugi, São José dos Cordeiros, São Mamede, São Sebastião do Umbuzeiro, Seridó, Serra Branca, Serra Grande, Soledade, Sossêgo, Sousa, Sumé, Campo de Santana, Taperoá, Tavares, Teixeira, Tenório, Triunfo, Uiraúna, Umbuzeiro, Várzea, Vieirópolis, Zabelê.	150
PERNAMBUCO	Afogados da Ingazeira, Afrânio, Agrestina, Águas Belas, Alagoinha, Altinho, Araripina, Arcoverde, Belém de São Francisco, Belo Jardim, Betânia, Bezerros, Bodocó, Brejinho, Brejo da Madre de Deus, Buíque, Cabrobó, Cachoeirinha, Calumbi, Carnaíba, Carnaubeira da Penha, Caruaru, Cedro, Cumarú, Custódia, Dormentes, Exu, Flores, Floresta, Frei Miguelinho, Granito, Iati, Ibirimir, Ibirajuba, Igaraci, Inajá, Ingazeira, Ipubi, Itacuruba, Itaíba, Itapetim, Jataúba, Jatobá, Lagoa Grande, Lajedo, Manari, Mirandaíba, Orocó, Ouricuri, Parnamirim, Pedra, Pesqueira, Petrolândia, Petrolina, Poção, Quixaba, Riacho das Almas, Salgueiro, Sanharó, Santa Cruz, Santa Cruz da Baixa Verde, Santa Cruz do Capibaribe, Santa Filomena, Santa Maria da Boa Vista, Santa Maria do Cambucá, Santa Terezinha, São Bento do Una, São Caitano, São José do Belmonte, São José do Egito, Serra Talhada, Serrita, Sertânia, Moreilândia, Solidão, Surubim, Tabira, Tacaimbó, Tacaratu, Taquaritinga do Norte, Terra Nova, Toritama, Trindade, Triunfo, Tupanatinga, Tuparetama, Venturosa, Verdejante, Vertente do Lério, Vertentes.	90
ALAGOAS	Água Branca, Batalha, Belo Monte, Cacimbinhas, Canapi, Carneiros, Craíbas, Delmiro Gouveia, Dois Riachos, Estrela de Alagoas, Girau do Ponciano, Igaci, Inhapi, Jacaré dos Homens, Jaramataia, Major Isidoro, Maravilha, Mata Grande, Minador do Negrão, Monteirópolis, Olho d'Água das Flores, Olho d'Água do Casado, Olivença, Ouro Branco, Palestina, Pão de Açúcar, Pariconha, Piranhas, Poço das Trincheiras, Santana do Ipanema, São José da Tapera, Senador Rui Palmeira, Traipu.	33
SERGIPE	Canindé de São Francisco, Gararu, Monte Alegre de Sergipe, Nossa Senhora da Glória, Poço Redondo, Porto da Folha.	6
		<b>Continued</b>

		conclusion
STATES	NAMES OF MUNICIPALITIES	NÚMBER OF MUNICIPALITIES
BAHIA	Abaré, América Dourada, Anagé, Andorinha, Antas, Antônio Gonçalves, Aracatu, Araci, Baixa Grande, Banzaê, Barra, Barra do Mendes, Barro Alto, Belo Campo, Boa Vista do Tupim, Bom Jesus da Lapa, Bonito, Boquira, Brotas de Macaúbas, Brumado, Buritirama, Caculé, Caém, Caetanos, Caetité, Cafarnaum, Caldeirão Grande, Campo Alegre de Lourdes, Campo Formoso, Canarana, Candiba, Cândido Sales, Cansanção, Canudos, Capela do Alto Alegre, Capim Grosso, Caraíbas, Carinhanha, Casa Nova, Central, Chorrochó, Cícero Dantas, Conceição do Coité, Condeúba, Cordeiros, Coronel João Sá, Curaçá, Dom Basílio, Euclides da Cunha, Filadélfia, Gavião, Gentio do Ouro, Glória, Guajeru, Guanambi, Iaçú, Ibiassucê, Ibipêba, Ibipitanga, Ibiquera, Ibitiara, Ibititá, Ibotirama, Igapor, Ipirá, Ipupiara, Iraquara, Irecê, Itaberaba, Itaguaçu da Bahia, Itiúba, Ituaçu, Iuiú, Jacaraci, Jacobina, Jaguarari, Jeremoabo, João Dourado, Juazeiro, Jussara, Lagoa Real, Lajedinho, Lapão, Licínio de Almeida, Livramento do Brumado, Macajuba, Macururé, Maetinga, Mairi, Malhada, Malhada de Pedras, Matina, Miguel Calmon, Mirangaba, Mirante, Monte Santo, Morpará, Morro do Chapéu, Mortugaba, Mulungu do Morro, Mundo Novo, Nordestina, Nova Fátima, Novo Triunfo, Oliveira dos Brejinhos, Ourulândia, Palmas de Monte Alto, Paramirim, Paratinga, Paulo Afonso, Pé de Serra, Pedro Alexandre, Pilão Arcado, Pindaí, Pindobaçu, Pintadas, Piripá, Piritiba, Ponto Novo, Presidente Dutra, Presidente Jânio Quadros, Queimadas, Quijingue, Quixabeira, Remanso, Retirolândia, Riachão do Jacuípe, Riacho de Santana, Ribeira do Pombal, Rio de Contas, Rio do Antônio, Rodelas, Ruy Barbosa, Santa Brígida, Santaluz, São Domingos, São Gabriel, São José do Jacuípe, Saúde, Seabra, Sebastião Laranjeiras, Senhor do Bonfim, Sento Sé, Serrolândia, Sítio do Quinto, Sobradinho, Souto Soares, Tanhaçu, Tremedal, Tucano, Uauá, Uibaí, Umburanas, Urandi, Valente, Várzea da Roça, Várzea do Poço, Várzea Nova, Xique-Xique.	159
MINAS GERAIS	Catuti, Espinosa, Gameleiras, Indaiabira, Jaíba, Janaúba, Juvenília, Mamonas, Matias Cardoso, Mato Verde, Monte Azul, Montezuma, Ninheira, Nova Porteirinha, Pai Pedro, Porteirinha, Rio Pardo de Minas, Santo Antônio do Retiro, São João do Paraíso, Serranópolis de Minas, Vargem Grande do Rio Pardo, Verdelandia.	22
<b>TOTAL MUNICIPALITIES</b>		<b>804</b>

SOURCE OF BASIC DATA: i) IBGE. **Demographic censuses of 1991 and 2000**; and ii) BRITO, José Ivaldo Barbosa de. **Regional model of estimation of the water balance applied to the climate variability of the Northeast of Brazil**. Campina Grande: Universidade Federal da Paraíba-UFPB, 2000. (Doctoral thesis in Natural resources, 2000.)

**ANNEX 3**  
**MUNICIPALITIES OF THE DRY SUB-HUMID AREAS OF THE AREAS SUSCEPTIBLE TO DESERTIFICATION-ASD**

STATES	NAMES OF THE MUNICIPALITIES	NÚMERO OF MUNICIPALITIES
MARANHÃO	Barão de Grajaú	1
PIAUÍ	Alvorada do Gurguéia, Amarante, Aroazes, Arraial, Avelino Lopes, Baixa Grande do Ribeiro, Barra d'Alcântara, Bertolínia, Bom Jesus, Cajazeiras do Piauí, Canavieira, Colônia do Gurguéia, Corrente, Cristalândia do Piauí, Cristino Castro, Curimatá, Currais, Elesbão Veloso, Eliseu Martins, Floriano, Francinópolis, Francisco Ayres, Gilbués, Jerumenha, Juazeiro do Piauí, Júlio Borges, Landri Sales, Manoel Emídio, Milton Brandão, Monte Alegre do Piauí, Novo Oriente do Piauí, Palmeira do Piauí, Parnaguá, Pedro II, Redenção do Gurguéia, Regeneração, Riacho Frio, Santa Cruz dos Milagres, Santa Luz, Santa Rosa do Piauí, São Félix do Piauí, São Gonçalo do Gurguéia, São João da Serra, Sebastião Barros, Sebastião Leal, Tanque do Piauí, Uruçuí, Várzea Grande	48
CEARÁ	Acarape, Acaraú, Amontada, Aracoiaba, Barreira, Baturité, Caridade, Cariré, Cascavel, Chorozinho, Croatá, Forquilha, Fortim, Groaíras, Guaiúba, Guaraciaba do Norte, Horizonte, Itapagé, Itapipoca, Itapiúna, Itarema, Marco, Massapê, Meruoca, Miraíma, Morrinhos, Pacajus, Paracuru, Paraipaba, Pentecoste, Pindoretama, Pires Ferreira, Reriutaba, Santana do Acaraú, São Gonçalo do Amarante, São Luís do Curu, Trairi, Tururu, Umirim, Uruburetama, Varjota	41
RIO GRANDE DO NORTE	Brejinho, Ceará-Mirim, Espírito Santo, Maxaranguape, Montanhas, Monte Alegre, Rio do Fogo, Passagem, Pedro Velho, São Gonçalo do Amarante, São José de Mipibu, Várzea	12
PARAÍBA	Alagoa Grande, Alagoinha, Araçagi, Areal, Bananeiras, Belém, Caiçara, Caldas Brandão, Cruz do Espírito Santo, Curral de Cima, Dona Inês, Duas Estradas, Esperança, Guarabira, Gurinhém, Ingá, Itabaiana, Itapororoca, Jacaraú, Juarez Távora, Juripiranga, Lagoa de Dentro, Lagoa Seca, Logradouro, Mari, Massaranduba, Matinhas, Mogeiro, Montadas, Mulungu, Natuba, Pilar, Puxinanã, Remígio, Pedro Régis, Riachão do Bacamarte, Riachão do Poço, Salgado de São Félix, São José dos Ramos, São Miguel de Taipu, São Sebastião de Lagoa de Roça, Sapé, Serra da Raiz, Serra Redonda, Sertãozinho, Sobrado, Solânea.	47
PERNAMBUCO	Angelim, Bom Conselho, Bom Jardim, Bonito, Caetés, Calçado, Camocim de São Félix, Camutanga, Canhotinho, Capoeiras, Casinhas, Cupira, Feira Nova, Garanhuns, Glória do Goitá, Gravatá, Itambé, João Alfredo, Jucati, Jupi, Jurema, Lagoa dos Gatos, Limoeiro, Macaparana, Orobó, Pannels, Paranatama, Passira, Pombos, Quipapá, Sairé, Salgadinho, Saloá, São João, São Joaquim do Monte, São Vicente Ferrer, Terezinha, Timbaúba, Vitória de Santo Antão.	39
ALAGOAS	Arapiraca, Campo Grande, Coité do Nóia, Feira Grande, Igreja Nova, Junqueiro, Lagoa da Canoa, Limoeiro de Anadia, Olho d'Água Grande, Palmeira dos Índios, Porto Real do Colégio, São Brás, São Sebastião.	13
SERGIPE	Amparo de São Francisco, Aquidabã, Canhoba, Capela, Carira, Cedro de São João, Cumbe, Feira Nova, Frei Paulo, Gracho Cardoso, Itabi, Japoatã, Malhada dos Bois, Muribeca, Neópolis, Nossa Senhora Aparecida, Nossa Senhora das Dores, Nossa Senhora de Lourdes, Pinhão, Poço Verde, Propriá, Riachão do Dantas, Ribeirópolis, São Francisco, São Miguel do Aleixo, Simão Dias, Telha, Tobias Barreto.	28

Continued

		conclusion
STATES	NAMES OF THE MUNICIPALITIES	NUMBER OF MUNICIPALITIES
BAHIA	Abaíra, Adustina, Água Fria, Érico Cardoso, Amargosa, Andaraí, Angical, Baianópolis, Barra da Estiva, Barra do Choça, Barreiras, Biringa, Boa Nova, Bom Jesus da Serra, Boninal, Botuporã, Brejões, Brejolândia, Caatiba, Canápolis, Candeal, Catolândia, Caturama, Cipó, Cocos, Contendas do Sincorá, Coribe, Correntina, Cotegipe, Cristópolis, Encruzilhada, Fátima, Feira da Mata, Feira de Santana, Formosa do Rio Preto, Heliópolis, Ibicoara, Ichu, Inhambupe, Irajuba, Iramaia, Itaeté, Itambé, Itapetinga, Itapicuru, Itaquara, Itarantim, Itatim, Itiruçu, Jaborandi, Jaguaquara, Jequié, Jussiape, Lafaiete Coutinho, Lajedo do Tabocal, Lamarão, Lençóis, Macarani, Macaúbas, Maiquinique, Manoel Vitorino, Mansidão, Maracás, Marcionílio Souza, Milagres, Mucugê, Muquém de São Francisco, Nova Itarana, Nova Redenção, Nova Soure, Novo Horizonte, Olindina, Palmeiras, Paripiranga, Piatã, Planaltino, Planalto, Poções, Rafael Jambeiro, Riachão das Neves, Ribeira do Amparo, Ribeirão do Largo, Rio do Pires, Santa Bárbara, Santa Inês, Santa Maria da Vitória, Santana, Santanópolis, Santa Rita de Cássia, Santa Teresinha, São Desidério, São Félix do Coribe, Sátiro Dias, Serra do Ramalho, Serra Dourada, Serra Preta, Serrinha, Sítio do Mato, Tabocas do Brejo Velho, Tanque Novo, Tanquinho, Tapiramutá, Teofilândia, Utinga, Vitória da Conquista, Wagner, Wanderley.	107
MINAS GERAIS	Águas Vermelhas, Almenara, Cachoeira de Pajeú, Araçuaí, Bandeira, Berilo, Berizal, Bonito de Minas, Brasília de Minas, Capitão Enéas, Chapada do Norte, Chapada Gaúcha, Comercinho, Cônego Marinho, Coronel Murta, Cristália, Curral de Dentro, Divisa Alegre, Divisópolis, Francisco Badaró, Francisco Sá, Fruta de Leite, Grão Mogol, Ibiracatu, Itacarambi, Itaobim, Itinga, Jacinto, Januária, Japonvar, Jequitinhonha, Jordânia, José Gonçalves de Minas, Josenópolis, Lontra, Luislândia, Manga, Mata Verde, Medina, Mirabela, Miravânia, Montalvânia, Montes Claros, Novorizonte, Padre Carvalho, Padre Paraíso, Patis, Pedra Azul, Pedras de Maria da Cruz, Ponto dos Volantes, Riacho dos Machados, Rubelita, Rubim, Salinas, Santa Cruz de Salinas, São Francisco, São João da Ponte, São João das Missões, Taiobeiras, Varzelândia, Virgem da Lapa.	61
<b>TOTAL MUNICIPALITIES</b>		<b>397</b>

SOURCE OF BASIC DATA: i) IBGE. **Demographic censuses of 1991 and 2000**; and ii) BRITO, José Ivaldo Barbosa de. **Regional model of estimation of the water balance applied to the climate variability of the Northeast of Brazil**. Campina Grande: Universidade Federal da Paraíba-UFPB, 2000. (Doctoral thesis in Natural resources, 2000.)

## ANNEX 4

## MUNICIPALITIES OF THE SURROUNDING AREAS OF THE AREAS SUSCEPTIBLE TO DESERTIFICATION-ASD

STATES	NAMES OF MUNICIPALITIES	NÚMERO OF MUNICIPALITIES
MARANHÃO	Água Doce do Maranhão, Anapurus, Araisos, Barreirinhas, Belágua, Brejo, Buriti, Chapadinha, Humberto de Campos, Magalhães de Almeida, Mata Roma, Matões, Milagres do Maranhão, Morros, Parnarama, Paulino Neves, Primeira Cruz, Santa Quitéria do Maranhão, Santana do Maranhão, Santo Amaro do Maranhão, São Benedito do Rio Preto, São Bernardo, São Francisco do Maranhão, Timon, Tutóia, Urbano Santos.	26
PIAUI	Agricolândia, Água Branca, Alto Longá, Altos, Angical do Piauí, Barras, Barreiras do Piauí, Barro Duro, Batalha, Beneditinos, Boa Hora, Bom Princípio do Piauí, Boqueirão do Piauí, Brasileira, Buriti dos Lopes, Cabeceiras do Piauí, Cajueiro da Praia, Campo Largo do Piauí, Campo Maior, Capitão de Campos, Caraúbas do Piauí, Caxingó, Cocal, Cocal de Telha, Cocal dos Alves, Coivaras, Curralinhos, Demerval Lobão, Domingos Mourão, Esperantina, Hugo Napoleão, Ilha Grande, Jardim do Mulato, Jatobá do Piauí, Joaquim Pires, Joca Marques, José de Freitas, Lagoinha do Piauí, Lagoa Alegre, Lagoa de São Francisco, Lagoa do Piauí, Luís Correia, Luzilândia, Madeiro, Matias Olímpio, Miguel Alves, Miguel Leão, Monsenhor Gil, Morro do Chapéu do Piauí, Murici dos Portelas, Nossa Senhora de Nazaré, Nossa Senhora dos Remédios, Novo Santo Antônio, Olho d'Água do Piauí, Palmeirais, Parnaíba, Passagem Franca do Piauí, Piracuruca, Piri-piri, Porto, Prata do Piauí, Santo Antônio dos Milagres, São Gonçalo do Piauí, São João da Fronteira, São João do Arraial, São José do Divino, São Miguel da Baixa Grande, São Pedro do Piauí, Sigefredo Pacheco, Teresina, União.	71
CEARÁ	Alcântaras, Aquiraz, Aratuba, Barroquinha, Bela Cruz, Camocim, Capistrano, Carnaubal, Caucaia, Chaval, Coreaú, Cruz, Eusébio, Fortaleza, Frecheirinha, Graça, Granja, Guaramiranga, Ibiapina, Itaitinga, Jijoca de Jericoacoara, Maracanaú, Maranguape, Martinópolis, Moraújo, Mucambo, Mulungu, Pacatuba, Pacoti, Pacujá, Palmácia, Redenção, São Benedito, Senador Sá, Tianguá, Ubajara, Uruoca, Viçosa do Ceará.	38
RIO GRANDE DO NORTE	Parnamirim, Extremoz, Natal.	3
PARAÍBA	Alagoa Nova, Arara, Areia, Borborema, Cuitégi, Cuité de Mamanguape, Mamanguape, Pilões, Pilõezinhos, Píripituba, Serraria.	11
PERNAMBUCO	Aliança, Brejão, Correntes, Lagoa do Ouro, Machados, Vicência.	6
ALAGOAS	Coruripe, Paulo Jacinto, Penedo, Piaçabuçu, Quebrangulo, Taquarana, Teotônio Vilela.	7
SERGIPE	Brejo Grande, Campo do Brito, Ilha das Flores, Itabaiana, Itabaianinha, Lagarto, Macambira, Malhador, Moita Bonita, Pacatuba, Pedra Mole, Santana do São Francisco, São Domingos, Tomar do Geru.	14
BAHIA	Acajutiba, Alagoinhas, Amélia Rodrigues, Anguera, Antônio Cardoso, Aporá, Aramari, Cabaceiras do Paraguaçu, Castro Alves, Conceição da Feira, Conceição do Jacuípe, Conde, Coração de Maria, Crisópolis, Esplanada, Governador Mangabeira, Ipecaetá, Irará, Ouriçangas, Rio Real, Santo Amaro, Santo Estêvão, São Gonçalo dos Campos.	23
MINAS GERAIS	Angelândia, Aricanduva, Ataléia, Bocaiúva, Botumirim, Buritizeiro, Campo Azul, Capelinha, Carai, Carbonita, Claro dos Poções, Coração de Jesus, Couto de Magalhães de Minas, Datas, Diamantina, Engenheiro Navarro, Felício dos Santos, São Gonçalo do Rio Preto, Felisburgo, Francisco Dumont, Franciscópolis, Glaucilândia, Guaraciama, Ibiaí, Icaraí de Minas, Itacambira, Itamarandiba, Itambacuri, Jenipapo de Minas, Jequitaiá, Joaíma, Juramento, Lagoa dos Patos, Lassance, Leme do Prado, Malacacheta, Minas Novas, Monte Formoso, Novo Cruzeiro, Olhos-d'Água, Palmópolis, Pintópolis, Pirapora, Ponto Chique, Rio do Prado, Rio Vermelho, Salto da Divisa, Santa Maria do Salto, Santo Antônio do Jacinto, São João da Lagoa, São João do Pacuí, Setubinha, Senador Modestino Gonçalves, Serro, Turmalina, Ubaí, Uruçuia, Várzea da Palma, Veredinha.	59
ESPÍRITO SANTO	Água Branca, Água Doce do Norte, Alto Rio Novo, Baixo Guandu, Barra de São Francisco, Boa Esperança, Colatina, Ecoporanga, Mantenópolis, Marilândia, Montanha, Mucurici, Nova Venécia, Pancas, Pedro Canário, Pinheiros, Ponto Belo, Rio Bananal, São Domingos do Norte, São Gabriel da Palha, Sooretama, Vila Pavão, Vila Valério.	23
<b>TOTAL MUNICIPALITIES</b>		<b>281</b>

SOURCE OF BASIC DATA: i) IBGE. **Demographic censuses of 1991 and 2000**; and ii) BRITO, José Ivaldo Barbosa de. **Regional model of estimation of the water balance applied to the climate variability of the Northeast of Brazil**. Campina Grande: Universidade Federal da Paraíba-UFPB, 2000. (Doctoral thesis in Natural resources, 2000.)

**ANNEX 5**  
**HISTORICAL ANTECEDENTS OF RELATED EVENTS TO COMBAT DESERTIFICATION**

FACT	DATA / PERIOD	PLACE
Severe and extensive drought hits the US	The 30's, of the 20 <sup>th</sup> century	United States
Sahel Region – more than 200 thousand people and millions of animals die of hunger during the drought period.	1967-1973	Sub-Saharan Africa
Drought in Africa, aggravated by a process of environmental devastation which impacted agricultural production and productivity, led to the impoverishment of the populations, increase of the infant mortality rate, epidemics etc. Famine and war provoke international commotion due to migratory movements of a legion of starving refugees.	The 60's, and chiefly starting from the 70's	African Continent
1 <sup>st</sup> International Conference on Human environment, promoted by the UN – discussion of innumerable themes relating to environment, including the African catastrophe, represented by the great drought of Sahel (67-73) and problems resulting from desertification.	1972	Stockholm, Sweden
The Permanent Interstate Committee to Struggle against the Drought in Sahel (Cilss) is created. It counted on the participation of representatives of the Sahel Region.	September of 1973	Africa
Brazil begins the preparations for the National Report to be presented in the Conference on Desertification convoked by the UN, in 1977.	1974	Recife, Brazil
Publication of the book “The Great Brazilian Desert,” written by Vasconcelos Sobrinho and the creation of the concept of “Nuclei of Desertification”, adopted, officially until today.	1974	Recife, Brazil
1 <sup>st</sup> United Nations Conference on Desertification, where the problem of desertification was recognized in world scope. Brazil presented to the world its situation with respect to the problem of desertification which until then only was recognized as grave in Africa.	August / September 1977	Nairobi, Kenya
EMBRAPA (CPATSA), the Joaquim Nabuco Foundation, UFRPE, SUDENE and the Nucleus Desert of UFPI develop studies and works relative to the theme of the Brazilian Semi-arid Region.	The 80's	Brazil
The United Nations Program for the Environment - PNUMA evaluated the actions undertaken, verifying the weak performance of the actions of the 1 <sup>st</sup> Conference. With these results, various countries with problems of desertification, especially in Africa, decided to propose the elaboration of a Convention on the theme.	1991	Nairobi
International Conference on Climatic Variations and Sustainable Development in the Semi-arid Region – ICID (Brazil). The only world event dedicated to the Arid and Semi-arid Regions of the planet, preparatory for the UNCED (ECO-92), brought together representatives of more than 70 countries of the 4 continents. With this Conference the countries affected by desertification consolidated their technical and political bases for demanding the celebration of a specific Convention for these areas.	January –February 1992	Fortaleza – Brazil
United Nations Conference on Environment and Development – UNCED (ECO-92). Brazil stands out in the discussions about Desertification, which result in the Negotiation of a Convention to Combat Desertification, proposed by the African countries attending to what is foreseen in chapter 12 of World Agenda 21, begun and approved in this Conference.	June 1992	Rio de Janeiro – Brazil

**continued**



Continued

FACT	DATE / PERIOD	PLACE
ONG's of five continents, meeting in the Parallel Forum to ECO-92, elaborated 46 "Treaties", among which are the "Treaty about the Arid and Semi-arid Zones", which affirms in its principles that the 'arid and semi-arid zones are complex ecosystems natural potential sufficient to provide good quality of life for its populations, provided that one adopts a conception of development which is socially just, ecologically sustainable, and culturally appropriately.	June 1992	Rio de Janeiro – Brazil
The Intergovernmental Negotiation Panel of the text of the Convention is created.	1992	New York
The meeting to discuss the preliminary text of the Brazil Convention had the participation of representatives of government and of civil society of Brazil and of Latin America.	August 1993	Brasilia – DF
The International Conference and Latin American Seminar on Desertification – ICLASD, where government representatives and representatives of civil society in Latin America formulate and negotiate the final text of the "Regional Annex of Latin America".	February 1994	Fortaleza, Brazil
Regional annex of Latin America is approved by the Intergovernmental Negotiation Panel; the original text of this document serves as a basis for the negotiations of the Regional Annexes of Asia and of the North of the Mediterranean.	March 1994	Geneva
Conclusion of the negotiations of the "United Nations Convention to Combat Desertification - CCD". The date of June 17 is set as the World Day for the Struggle against Desertification.	17 of June of 1994	Paris, France
Brazil adheres to the Convention to Combat Desertification, in a formal act of the Brazilian Government.	15 of October of 1994	Brasilia – DF, Brazil
Convenium of the Federal Government with the United Nations Program for Development – UNDP and the United Nations Organization for Agriculture and Food - FAO, aiming to elaborate the National Action Program to Combat Desertification – PAN-Brazil. This agreement generated various documents among which stands out the Map of the Occurrence of Desertification, the Map of Areas Susceptible to Desertification and the document of Guidelines for the National Policy of Combating Desertification approved in a Resolution of the National Environment Council – CONAMA, in 1997.	1994 to 1998	Brasilia – DF, Brazil
The Convention enters into effect after the ratification of the 50 <sup>th</sup> country.	26 of December of 1996	New York
The Brazilian National Congress ratifies the CCD.	25 of June de 1997	Brasilia – DF, Brazil
The CCD begins to be in effect in Brazil.	24 of September of 1997	Brasilia – DF, Brazil
COP 1: attention to the bureaucratic and financial questions relative to the functioning of the CCD, established the norms of functioning of the COP's and regulated the functions of the World Mechanism, responsible for the financing of the Convention.	September of 1997	Rome, Italy
COP 2: gave priority to different technical aspects, as indicators of Desertification; traditional knowledge; network of information. Holding of the First Meeting of Congressmen about Desertification.	November of 1998	Dakar, Senegal

continued

FACT	Conclusion	
	DATE / PERIOD	PLACE
COP 3: elaboration of the medium range goals to be fulfilled by the CCD and definition of the forms of operation and activities of the World Mechanism.	November of 1999	Recife, Brazil
Elaboration of "The Declaration of the Semi-arid Region", during the COP 3, through the Parallel Forum promoted by Civil Society. Consolidation of the ASA – Articulation of The Semi-arid Region, largest organization of Brazilian civil society for living with the semi-arid region.	November of 1999	Recife, Brazil
COP 4: adoption of an annex relative to the adherence of countries of Central and East Europe, foreseeing that in the decade of 2001-2010 the potential of execution of the activities to Combat Desertification and mitigate the effects of the Drought should be broadened. Definition that the countries which are Parties should elaborate their PAN-Brazil by 2005. In the Meeting of the Congressmen one defined that these should establish efficacious mechanisms of follow-up of the CCD.	December of 2000	Bonn, Germany
COP 5: emphasis on the science and Technology Committee which defined the parameters and indices for the warning systems of Combating Desertification. Establishment of a Group of Specialists to support the technical examination of the questions relative to Desertification and the creation of the Committee for Review of the Application of the Convention (CRIC).	October 2001	Geneva, Switzerland
Creation of the Work Group to Combat Desertification – of the Articulation in the Brazilian Semi-arid Region – GTCD/ASA to articulate the action of civil society in the theme of Desertification.	April 2002	Recife, Brazil
World Summit on Sustainable Development. ON this occasion, the governments made an appeal to the Global Fund for the Environment (GEF) in the sense that this organ should become a mechanism of financing the CCD.	August / September 2002	Johannesburg, South Africa
Convenium signed between the Esquel Group Foundation/Brazil – FGEB, the Inter-American Institute for Cooperation for Agriculture - IICA, the Interamerican Bank for Development – BID and the Special Fund of the Government of Japan, for the execution of the Program to Combat Desertification and Mitigating the Drought in South America, involving Argentina, Bolivia, Brazil, Chile, Equator and Peru.	September de 2002	Brasilia – DF, Brazil
First Meeting for the Committee for Review of Implementation of the Convention – CRIC. The Term of Adherence of the countries participating in the Convenium BID-IICA-FGEB.	November 2002	Rome, Italy
Meeting of the Nuclei of Desertification of the Brazilian Semi-arid, where for the first time, representatives of entities of civil society, of the nuclei of desertification met to debate on this theme.	June of 2003	Salgueiro / PE, Brazil
Ninth Regional Meeting of the CCD, where Brazil is elected as representative of the South Cone for the Regional Executive Committee, which aims to collaborate in the coordination of activities of application of the CCD in Latin /America and the Caribbean. In this same meeting The Regional Network of Desertification and Drought in Latin America and the Caribbean Region – DESELAC was reimplemented.	June of 2003	Bogota, Colombia
COP 6: definition of the Global Fund for the Environment (GEF) as a financing mechanism of the Convention. Increase of the budget of the World Mechanism, an instrument of financing the Convention.	August / September 2003	Havana, Cuba
Process of participatory elaboration of PAN-Brazil up to its launching during the South American Conference on desertification.	June of 2003 to August 2004	Brasilia/DF Fortaleza/CE

## **ANNEX 6.**

### **Summary-Chart of the Contributions of the State Workshops**

#### **Thematic line: Reduction of Poverty and Inequality**

##### **Sub-theme: Education**

- RESAB as a reference for education in the Areas Susceptible to Desertification – ASD;
- Broaden the access to quality schools not only for children and adolescents but also for young people and adults;
- To educate teachers education in context, according to what is set out in the base-text; qualify teachers for working in the rural zone with tools of knowledge of local reality, inserting it in the experiences of the classroom.
- Make the best possible school transportation system for the rural environment;
- Expand / decentralize secondary school;
- Create Pole Schools with a foundation, giving priority to all day school;
- Guarantee in the curricula, contents generated by the popular and universal bodies of knowledge; to give value to local culture;
- Increment free time activities in the country;
- Speed up the review of the state Public Teaching Statute and of the Career Plan (State Plan);
- Regulate the all day schools which already exist (ex.: CIERs);
- Create and strengthen councils of peers;
- Insert in the educational Policy, the integration of the teaching basic to the proposal of education for living in the semi-arid region and the dry sub-humid region, additionally with the themes agro-ecology, environment, hydrographic basins, sole culture, agrarian reform and citizenship;
- Create and strengthen the EFA' s the Rural Family Houses and other experiences, recognizing the “pedagogy of alternation” as a pedagogical matrix for the rural environment;
- Broaden the access to the school for the rural population, broadening the number of rural schools and the improvement of their infra-structure;
- Direct the resources of Fundef directly for the school treasury (To make a better management of these resources, making possible the effective participation of the school community and greater inspection);
- Adapt the school calendar to the rural environment, considering the agricultural cycle of the region (to avoid cutting of school classes in the planting and harvesting periods);
- Guarantee the participation of all the actors in the educational process in the

discussion and elaboration of the curriculum of the elementary and higher level teaching;

- Assure the interdisciplinarity of the curriculum for the education for the living with the semi-aridity; and identify and make successful legitimate experiences of education oriented for the living with the semi-arid region;
- Elaborate, edit, disseminate didactic materials (books) and paradidactic materials (games, video tapes and booklets) starting from experiences developed in the communities of the ASD by the state and municipal secretariats and NGO's, in the ASD, aiming at education in context;
- Create and support programs of initial and continuing education of teachers, developed by universities and NGO's in the ASD;
- Broaden the "quality program of education in the municipality" for all the regional poles of the ASD which capacitate educational managers and teachers;
- Hold forums of discussion and proposals about the theme of desertification;
- Provide environmental education courses in formal spaces and non-formal spaces;
- Assure in the National Curricular Parameters (PVN's) the environmental education in the basic and higher levels (interdisciplinary and transversal), as a specific subject;
- To give greater potential to the actions of environmental education existing in civil society and government; and guarantee environmental education in the programs of revitalization of the hydrographic basins of the ASD
- To destine a percentage of the resources of the programs for the EFA's, with the objective of broadening the infra-structure and attend to the demand of education for the children of farmers, according to the conditions of the ASD;
- To propose studies aiming at becoming familiar with and reviewing the policy of the Fundef, so that one can give greater potential to education in the ASD; and increase the quota of the Fundef for the municipalities of the ASD (cost/pupil in the ASD is low compared with that of other regions);
- Increase the number of Research Centers oriented towards the conditions of the ASD;
- Broaden the access to day care and to nursery school education for the rural population broadening the number and improving the infra-structure of the rural day care centers and schools with nursery school education;
- Form partnerships between the public authorities (Coordinators, directors and pedagogical assistants) and cooperatives of production for supplying sufficient and quality products for the school lunch, considering the food habits and the nutritional needs of the pupils, having in mind the strengthening of the local economy; and
- Guarantee and assure specific resources for school transportation at all levels of education, especially for basic education, according to the specific need of each municipality.

### **Sub-theme: Environmental Sanitation**

- Make a selective collection of urban and rural garbage;
- Promote courses of alternative medicine;
- Offer medical and dental assistance to the low income population in the rural communities;
- Construct septic tanks;
- Implement actions of environmental sanitation in the cities of the semi-arid region, giving priority to those in the most critical situation in relation to the economic and social indicators;
- Do studies aiming at identifying alternatives for the implementation and operation of the services of environmental sanitation in municipalities of small and middle size;
- Do studies and make information available in relation to the viability of systems of the reuse of water (cost X benefit), as a form of making industries, small, middle-sized and large municipalities sensitive to the potentialities of the reuse of water in the broadening of the offer of raw water in the ASD;
- Give incentives to increase the efficiency in the use of water, through the implantation, on an adequate scale of technologies of reuse of water for the urban centers;
- Give incentives for the implantation of systems of impounding, storing and utilization of rainwater at the urban level, with priority for public buildings, schools industries and other establishment which have great covered areas, as a form of broadening the offering of water in the municipalities of the semi-arid, that is, in the Areas Susceptible to Desertification - ASD;
- Identify and disseminate technological alternatives for the disposition of excrement and for the better taking advantage of the waters (surface, underground and rainwater, to solve or diminish the problem of scarcity of lack of drinking water, as well as problems related to health;
- Recover and implement systems of desalinization of water, favoring their utilization of the rejected material of the desalinators through the implementation of system of production of fish and halophyte plants;
- Implement educational processes and of social mobilization for the sustainable living together with the semi-arid, diffusion of good hygienic and sanitary practices and giving value to water;
- Strengthen institutionally the base organizations with a view to greater efficacy of PAN-Brazil and the broadening of the participation and of the inspection by society;
- Do studies to obtain better information in relation to the viability of these systems (cost X benefit) in the ASD;
- Create and strengthen the cooperatives of the pickers of garbage;
- Give incentives to associations and cooperatives of artisans starting from the recyclable materials and products; and

- Strengthen the program Health in the family.

### **Sub-theme: Food Security**

- Implement public policies which favor family agriculture, guaranteeing the organization, qualification, credit and technical assistance, in a way to promote agro-ecology;
- Give incentives to the formation of organized groups: Cooperatives/Associations;
- Simplify, de-bureaucratize and assist credit for Family Agriculture;
- Diversify the cultivation of the crops;
- Make conveniums between small farmers and schools/hospitals (by associations and cooperatives) for the supplying to them of agricultural products;
- Furnish more education and information for the country families;
- Unify the programs, aiming at the articulation of the actions of production and directioning of the foods produced in the ASD;
- Broaden the programs of government purchases and implant fairs of agricultural products of family agriculture;
- Install programs of popular restaurants with organic products which come from family agriculture;
- Set up stores/ banks of Seeds of Traditional Varieties (Creole types);
- Promote the development of agro-industrial products based on culturally adapted foods, with specific legislation which facilitates their commercialization;
- Install Workshops of Technical Qualification in Production and Administration and Management of processes and businesses;
- Give Incentives to the municipalities in the identification of areas and implantation of Municipal Programs of Urban Agriculture;
- Implement the installation of school vegetable gardens;
- Workshops of Technical Qualification in Production and Administration and Management of processes and business in the associations and cooperatives of production;
- Give incentives to the municipalities for identifying areas and implanting Municipal programs of Urban Agriculture;
- Re-orient the nutritional base of the school lunch programs of the municipalities of the ASD;
- Strengthen the creation of community vegetable gardens in land of the neighborhood/community or backyards through the neighborhood or community associations.

## **Thematic Line: Sustainable broadening of the Productive Capacity**

### **Sub-theme: Agrarian Reform**

- Promote the land financing based on the updated tax module;
- Define the agro-ecological model starting from two proposals: the Eco Agrarian Reform (social and environmental character) and the Agro-ecological Management of the ASD;
- Create a systemized mobilizing action to disseminate the agrarian reform;
- Awaken in the population ideas for a culture of agrarian reform;
- Seek the approval of the Law of Limits for tracts of lands, according to the regional characteristics;
- Plan the use of the hydrographic micro-basins with a view to agrarian reform;
- Include youth in the productive activities of the settlements;
- Include in the Projects the specific regional cultural qualities;
- Create integrating actions for the programs;
- Give priority to the appropriation of unproductive land holdings in areas “near” to the springs of rivers, brooks and other sources of water, both in the Caatinga as well as in the Cerrado, respecting the forest legislation, in what refers to the areas of permanent preservation; the small farmers have conditions to manage these areas sustainably in a collective way;
- Give priority to the appropriation of land concentrated in the same geographic area constructing real “reformed areas”, as a way of cheapening the costs relative to the collective infra-structure and the constitution of sustainable rural communities;
- Concentrate the actions of the public organisms in the “reformed areas” seeking the productive integration between the diverse segments – the pre-existing settlements, the new settlements the regularized squatters and the family farmers - transforming them into local systems of rural production which integrated plans of territorial development;
- Utilize methods for the analysis of the properties to be appropriated and parceled (agro-environmental analysis and participatory agro-ecological analysis) considering the “logic of family agriculture” and the edaphoclimatic conditions of the areas susceptible to desertification;
- Implement a specific policy of resettlement of the populations affected by dams and other infrastructure works, with actions which minimize the social environmental economic and cultural impacts which consider beside this, the complexity and the benefits for the population affected as in the example of the non-authorization of works that do not take care of the previously unfulfilled requirements of the license;
- Confer priority to the recovery (economic, productive, social and environmental) and consolidation of the settlements created along the last years;
- Make the social and basic infrastructure investments (roads, electricity, housing,

sanitation and schools with alternating pedagogy) previously programmed and implement the specific contracts of productive costs and of support for the commercialization foreseen in the Harvest Plan;

- Regularize the debt situation of the settlements with relation to the environmental licensing, making them adequate to resolution 289/01 of Conama and to what was established by the Term of Adjusting of Conduct formalized by the Environment Ministry, Ibama, Federal Public Ministry, Incra and the Agrarian Development Ministry;
- Give greater operational and bureaucratic agility to the activities done between the governmental instances;
- Promote the reorganization/ Land Reordering in the places of greater family agriculture, where normally the individual lots do not permit a sustainable exploitation from the environmental, social and economic point of view;
- Promote the productive integration between the diverse segments (settled persons, regularized squatters and family farmers), with the institution of a plan of territorial development;
- Promote the constitution of the National List of Rural Properties – CNIR as an instrument for the regularization of small holdings, the collecting of the lands given back (reincorporating of these lands to the public patrimony and destination for the settlement of rural workers) and the promotion of actions annulling about occupation of lands with irregular registrations, use for drug traffic and exploitation of child and slave labor.
- Accelerate the process of recovery of public lands (in Minas Gerais there are 280 thousand hectares) given in the system of borrowing to reforestation companies or others, destining them to the settling of family farmers or for their collective use by the surrounding communities;
- Review the concept of reformable property with the insertion of coefficients of environmental and labor taking advantage;
- Up date the indices of the definition of unproductivity of lands which can be appropriated;
- Give priority to the review of internal norms of MDA/INCRA, aiming at the fulfillment of the deadlines established and make the process of obtaining the lands more rapid, discipline the implantation of the settlements and the actions, promotion of equality of sexes, of removal of non-Indians and giving title to the remaining areas of descendents of run-away slaves;
- Broaden and strengthen the participation of women in the productive and handicraft activities of settlements, facilitate the access to credit and guarantee the right of the women to the process of receiving title to the lands;
- Implement a specific policy of deoccupation of the Indian reserves and resettlement of the Non-Indian populations resident in these areas;
- Promote the land regularization of the communities of descendents of run-away slaves;



- Finance the acquisition of rural property and of basic investments and communities in the cases in which the areas are not capable of appropriation for social interest for purposes of agrarian reform;
- Direct the investment for entities representative of the workers both men and women;
- Emphasize the rural communities and the settlements in the actions;
- Concentrate the actions of public organisms in the “reformed areas”, seeking the productive integration between the diverse segments - the pre-existing, the new settlements the regularized squatters and the family farmers -, transforming them in sustainable local systems of rural production (participants of a plan of territorial development);
- Use the “pasture funds” with reference to the broadening of the possibilities of raising on the part of the small farmers;
- Guarantee the technical assistance of quality and quantity, having as a parameter agro-ecology and the guarantee of sustainability in the areas of settlements;
- Promote the reorganization/Land Reordering in the places of greatest sustainable exploitation, from the environmental, social, and economic point of view, considering the need to broaden the size of the modules, considering the specific nature of the semi-arid in respect to natural resources;
- Promote the productive integration between the diverse segments (settled people, regularized squatters, and family farmers) with the constitution of a plan of territorial development;
- Support the process of recuperation of public lands given in the system of exchange to reforestation businesses or other businesses, destining them for the settlement of family farmers or for their collective utilization by the surrounding communities;
- Broaden and strengthen the participation of the women in the productive activities of the settlement, facilitate the access to credit, guarantee the rights of the women in the process of obtaining title to the lands;
- Land regularization of the communities of the descendants of run-away slaves; and
- Financing for acquisition of rural property and of basic investments and communities in the cases in which the areas are not capable of being disappropriated for social interest for the purpose of agrarian reform.

### **Sub-theme: Salinization**

- Develop and disseminate techniques of recovery of salinized soils;
- Promote the survey of the real situation of the semi-arid and dry sub-humid irrigated soils with respect to the processes of salinization;
- Make a technical evaluation, dimensioning and compulsory implantation of efficient systems of drainage in irrigated areas and those susceptible to the process of salinization;
- Give incentives to recover the soils in the process of salinization;

- Develop plans of management for the use of saline waters;
- Furnish technical assistance oriented towards the efficient use of water and rational use of irrigated soils of the semi-arid areas and dry sub-humid areas;
- Do studies which will give subsidies for the zoning by state of the areas with potential for the installation of small irrigation projects, taking into account the edaphoclimatic factors and above all, the quantity and quality of water;
- Develop studies aiming at the precise surveying of the irrigable potential of all the Northeast, including the alluvial areas and those located in sedimentary regions;
- Give incentives to the development and dissemination of technologies which save water in irrigation;
- Make studies about the dynamics of the springs for irrigation, taking into account the quantitative and qualitative aspects of the water with the objective of minimizing the risks of salinization;
- Develop and disseminate techniques for recovery of saline soils which are economically viable;
- Create a special credit line, with rebates in the interest rates, aiming at the implantation of drainage systems and recovery of the soils in the processing of salinization;
- Create a special credit line for the substitution of inefficient equipment in relation to the consumption of water or not adequate for the reality of the semi-arid region;
- Promote the conservation and maintenance on the part of the governments of irrigated perimeters;
- Substitute the systems of parceled irrigation with methods that squander less (losses causes).

### **Sub-theme: Water Resources**

- Strengthening and creation of the Local Committees of Micro-basins;
- Qualification for water resources and environmental management in settling of agrarian reform and human settlements;
- Regulate the state laws on water resources where they still are not regulated;
- Regularization of zoning and demarcation of the water recharging areas and mapping of the springs of the semi-arid;
- Strengthen the institution of inspection and water resources councils;
- Discipline the use of the water resources in the irrigation and industrial projects;
- Make the best use of the irrigation equipment with a view to lowering the costs of the irrigated family agricultural projects;
- Make an interface of the environmental policies with the management of the water resources;

- Articulate civil society for the identification and mobilization together with the municipal authorities, aiming at the liberation of the parliamentary amendments for financing projects of basic sanitation (water, sewage, trash etc.).
- Identify and develop campaigns in the communities which have an infestation of the insect “barbeiro” the object of which is to benefit them with a program of habitation improvements for the eradication of the Chagas disease;
- Give incentives and strengthen the Federal and State Hydrographic Basin Committees;
- Give incentives for the creation of Water Resources Consumer Associations;
- Give incentive to the initiatives of negotiated allocation of water (creation of local commissions) involving the public authorities, consumers and local communities;
- Qualify and mobilize the social actors in relation to the process of broadening the participation in the water management;
- Furnish financial support of the collegiate bodies that exercise the water management in settlements of Agrarian Reform in the semi-arid area;
- Give incentive to, implement and broaden actions involving the construction of pre-fabricated cisterns, underground dams, successive dams simplified systems of impounding and storing water, desalinators tubular wells and construction of storage ponds, in partnership with the states, social movements and civil society;
- Promote qualification for Water Resources Management in pre-fabricated cisterns, dams, underground dams, simplified systems etc. as a form of avoiding the contamination, the salinization of the soils and making possible the rational use of these waters;
- Give priority to the attending of the demand for water supply for the spread out rural populations;
- Give incentives to the recovery of wells, desalinators, and systems of supply of water deactivated or with operational and maintenance problems;
- Qualify personnel in the area of Water Resources Management in Agrarian Reform settlements;
- Give incentives for the increase of efficiency and of combat of waste in the use of water;
- Give incentives for the use of wind energy for the irrigation, pumping of water desalinators, among others;
- Adopt the Hydrographic basin as the unit of planning;
- Encourage the implementation of systems of water reuse, at the urban and rural level oriented for the broadening of the offer of raw water.
- Make the zoning of areas of recharge and the mapping of the springs in the semi-arid region.
- Give incentives for the protection of the recharging areas, springs, reservoirs of water the conservation and recovery of the ciliate woods;

- Encourage the implementation of Programs of Environmental Education, formal and non-formal oriented toward all the population of the semi-arid region;
- Make the legislation of the environment and water resources adequate for the reality of the semi-arid region;
- Implant effective systems of monitoring and inspection involving the preservation of the environment and the quality of the water;
- Encourage technologies of rational of irrigation;
- Broaden specific finance lines for research and development of technologies in water resources;
- Promote the technological development for application in degraded areas;
- Implant a Databank of the hydrological potential of the semi-arid and dry sub-humid areas;
- Creation of a research network scientific and technological development and technical assistance in the areas of interest of the CCD in the Areas susceptible to Desertification - ASD;
- Promote the development of technologies adequate for the taking advantage of desalinization waste;
- Promote the technological development of low cost solutions appropriate for water storage in underground dams;
- Encourage the construction of low cost rainwater-impounding systems such as underground dams, successive dams, and cisterns of plates.
- Give financial support to the collegiate bodies which exercise water management in settlements and agrarian reform and or rural communities;
- Promote formal and informal Environmental Education at all levels;
- Create mechanisms for the fulfillment of the legislation facilitating the implantation of a system of monitoring and inspection (RH);
- Democratize the access to water of the large and medium-sized dams giving priority those affected by their construction and the surrounding rural communities, principally in relation to production (in the above mentioned Central Aspect);
- Make and inspection and sanitation of the storage ponds and bodies of water with respect to pollution and contamination caused by the emission of effluents;
- Promote the dissemination of information about the National Water Systems Management System; and
- Promote the development of technologies adequate for the taking advantage of desalinization waste and reuse of water of effluents;

**Thematic line: Conservation, Preservation and Sustainable Management Natural Resources**

### **Sub-theme: Protected Areas**

- Strengthen public authorities and civil society;
- Increase to 30% of the total of the SAB the area to be protected (10% being by means of UC's of indirect use);
- Implant a system of monitoring and control of the protected areas with the participation of the public authorities and of civil society;
- Identify and create new potential areas for UC's;
- Elaborate a specific program for the UC's to be formulated by ASA;
- Conceive a specific program for the ciliate woods;
- Promote the review of the SNUC, proposing other alternatives for proprietors of forest fragments;
- Strengthen the UC's;
- Implement mini-corridors between fragments in priority areas of the central corridor of the Atlantic Woods;
- Regulate and implement fiscal incentive for individuals and juridical entities related to the creation and management of protected areas;
- Promote the integrated management of the UC's with civil society;
- Disseminate information for the mayors' offices and civil society;
- Strengthen sustainable tourism in protected areas and in the rural environment;
- Promote the surveying of the priority pure minerals for the conservation and creation of UC;
- Create educational policies and qualification of rural communities in general.
- Make research which make possible the knowledge of the capacity and support for the management of the Conservation Units and priorities for their creation.
- Strengthen and broaden the network of seeds of the Caatinga, Cerrado and areas of transition;
- Make the services of technical assistance adequate for the accompanying of the management of the projects financed;
- Make available the data produced by the research already done and the putting this data together in a databank;
- Protect at least 10% of the areas of the ASD by means of the UC's of indirect use (integral Protection), installing a participatory process in the definition of the areas and their management; And increase the protected areas by means of UC's of sustainable use in the period of ten years, in both cases, considering the areas already identified as priority for the conservation of the biodiversity
- Implant a system of monitoring and effective control of the protected areas;
- Qualify states and municipalities in the creation and management of the protected

areas;

- Regulate and implement fiscal incentives for individuals and juridical entities related to the creation and management of protected areas;
- Provide conditions so that the states which still do not have access to the resources of PNMA will be benefited;
- Promote the surveying of the protected areas (except UC's), proposing the making of them adequate as much as possible to SNUC;
- Create UC's and encourage the stimulate the socio-economy of the surrounding areas;
- Strengthen the environmental organs;
- Give priority to the work of environmental education of these organs;
- Destine financial resources for the implantation of extraction reserves;
- Do Research on the Cerrado and Caatinga directly with its populations;
- Provide cooperativism, consortiums between municipalities, qualification and massification of Environmental Education;
- Map all the areas or zones, making a profile of States, identifying and giving priority to the degraded areas for recovery and the areas relevant for the establishment of Conservation Units;
- Have at least one Conservation Unit in the Caatinga biome in each state, with representation of its different ecosystems;
- Implant a network of information and monitoring for the effective control of the protected area, allied to a national system of information;
- Regulate in partnerships with the states and municipalities, the structure of inspection for the UC's;
- Implement alternative policies of generation of employment and income according to the local activities, as a form of reducing the pressure on natural resources in the process of exhaustion.
- Decentralize the actions of the federal and state environmental organs;
- Provide actions of Environmental Education and the creation of a environmental guard;
- Create other categories of protected areas existing in the SNUC in states which have not contemplated them;
- Stimulate and qualify states and municipalities for the creation and management of protected areas;
- Create/support state funds to stimulate projects of a environmental and conservationist nature, including making the capture of external resources easier;
- Do surveys of the protected areas (except UC's), proposing their being made as adequate as possible to the SNUC;

- Strengthen SISNAMA;
- Promote personnel qualification in the sphere of the state and municipal authorities, as well as of civil society;
- Establish specific policies of strengthening/monitoring and management of sustainable tourism in its diverse modes (ecological, adventure, radical, historical-cultural, religious, medicinal, rural, caving etc) according to the potential of the region, not forgetting the improvement of the infrastructure, highways, and accesses to the areas;
- Promote greater articulation and complementary public policies between states and municipalities;
- Broaden and adjusting the programs of formal/environmental education for the reality of the Caatinga ecosystem, in a way to create a collective ecological conscience of all the social actors;
- Promote a viability study of the APP's by region and biome for determining them;
- Alter the Forest Code for a new determination of the APPs;
- Protect in fact the forest holding and water resources without detriment to the productive sector (economic instrument);
- Establish minimum distances for the APP's according to the biome of the region(ex. 10m, 20m, 30m)
- Alter the Forest Code for the institution of new patterns and percentages for the RL in the various biomes;
- Note in every property the percentage referring to RL;
- Recover/replant each area of the degraded RL;
- Establish requisites for land registry offices so that they will only be able to effect the transference of rural property when the RL has been noted.

### **Sub-theme: Forest Resources**

- Conceive a program oriented for the living with the semi-arid arid region stimulating the diversification and the integration between vegetation and animal production on the family properties;
- Implement a program of incentives for reforestation based on financial and tax compensations;
- Support and motivate the protection for the wild fauna and flora;
- Support the implementation nurseries of native plants and the establishment of the SAF's and Agro-ecological systems;
- Strengthen and broaden the network of Caatinga seeds and creation of the network of Atlantic Woods;
- Promote the surveying of the forest covering, interacting with the municipalities;

- Work for the dissemination of data and information for the mayors' offices and the civil society;
- Make integrated inspection actions in sub-basins including flying over them;
- Promote recovery and conservation actions of water resources;
- Create mechanisms which guarantee infrastructure for the functioning of the basin committees;
- Create legal mechanisms for capturing of resources by means of civil organizations (ONG's) for support for the committees;
- Stimulate the creation of information systems within the basin committees, aiming at water resources management;
- Create decentralizing instruments, aiming at making the management of water instruments more dynamic in the basin committees, for example, municipal nuclei, coordination and thematic commissions linked to the directing body;
- Strengthen and broaden the network of Caatinga seeds;
- Create a specific line for the project to combat desertification by the FNMA;
- Support the projects which aim at integrated management oriented towards the sustainable production of wood (and/or non-wood products) integrated with the conservation of the biodiversity and ecological services;
- Support the implantation of nurseries of native plants and the establishment of agroforest systems (SAF's);
- Establish specific policies for the ASD, aiming at the strengthening of ecological tourism in the region;
- Give priority to degraded areas for agro-extractive reconversion, with guarantees of financial resources and expand these initiatives for all the ASD;
- Implant a program of activity of farmers and their sons as socio-environmental promoters as a strategy of massification of management practices and conservation of the soils and of recovery of ciliate woods and degraded areas;
- Support and stimulate participatory research of the production chains;
- Support and also stimulate programs to benefit and commercialize the potentials of the Cerrado and Caatinga, associated to practices of sustainable collection of resources, giving priority to the areas already pre-selected as a form of demonstrating their viability;
- To make viable the activity of the state attorneys before the environmental organs ONG's and representative entities;
- Recover the ciliate woods and promote the reforestation of the native woods;
- Improve the techniques of wood burning, through more efficient ovens;
- Adopt techniques of forest management with selective cutting;
- Make viable the best use of other alternative forms of energy including natural gas;



- Make possible management for sustainable production and wood transformation;
- Stimulate strengthen and broaden the seed network of the Caatinga;
- Guarantee resources for projects which aim at integrated management oriented for the sustainable production of wood (and/or non-wood products) integrated with conservation of biodiversity and ecological services;
- To guarantee resources for the implantation of native plant nurseries and the establishment of agroforest systems (SAF's) and new techniques of reforestation, for example, the technique of inoculation;
- Implant ecological corridors;
- Establish specific policies for the ASD, aiming at the strengthening of ecological tourism in the region;
- Adopt agro-silva-grazing practices in the Caatinga biome, with emphasis on taking best advantage of the species of native flora in sustainable systems;
- Promote the application of management techniques integrating in areas of monocultures, with interspersed strips of native vegetation hedges, windbreaks, corridors etc. avoiding the indiscriminate introduction of exotic species with unknown behavior in the region;
- Make economic social and environmental viability studies of the mineral reserves;
- Give norms and inspect the exploitation activities of mineral resources;
- Strengthen and broaden the seed network of the Caatinga;
- Create specific lines of financial support in the scope of the FNMA, for the project to combat desertification;
- To support project which aim at the integrated management oriented for the sustainable production of wood (and/or non-wood products) integrated with the conservation of biodiversity and ecological services;
- To support the implantation of native plant nurseries and the establishment of agroforest systems SAF's);
- To establish specific policies for the ASD, aiming at strengthening ecological tourism in the region;
- To strengthen institutionally the inspection and licensing activities;
- To implement the sectors responsible for the maintenance of herb gardens, orchards (carpotecas) and groves of non-fruit trees referring to the biome;
- To broaden the anatomical knowledge of the woods used in the ASD;
- To intensify the inspection in airports, highways and waterways against the traffic of animals and biopiracy;
- To encourage urbanization with native species;
- To publish books of the species fauna and flora;
- To encourage academic programs for the production of dissertations, theses,

monographs about the semi-arid area;

- To elaborate specific programs of environmental education;
- To promote practices of sustainable tourism based on the capacity of specific support;
- To assure genetic inheritance;
- To promote the furnishing of seeds at the cost price for stimulating the planting of new areas, for revegetation and recovery;
- To make phenological studies of all the species contemplated in the Seed Bank-BANSEMENT;
- To create a databank of environmental infractors (National Bank of Environmental Infractors - BINFRA) for the accumulation of data of all the infractions (including the repeaters) including for the making of this data available to the population and organs of federal, state and municipal inspection, and the public ministry; also making it easier for the reception of penal infractions with immediate knowledge of the public ministry; and
- Give efficacy to the execution of the Law of Environmental Crimes at the federal, state and municipal levels.

### **Sub-theme: Ecological-Economic Zoning**

- Assure the involvement of the municipalities and of civil society in the actions foreseen by the ZEE.
- Disseminate data and information for the mayors' offices and civil society;
- Involve civil society in the discussions of the ZEE;
- Strengthen the farm-cattle-raising grange zoning;
- Create mechanisms to monitor the fulfillment of zoning;
- Guarantee the zoning of ecological corridors existing and of potential and priority areas for the forming of new corridors;
- Insert a specific action of the PZEE for combating desertification, in the PPA 2004-2007;
- Conclude the macro-zoning of the ASD;
- Establish conveniums with the universities and state organs;
- Make zoning on a scale of 1:50,000 (or greater) for the areas identified as priority for the conservation of the biodiversity;
- Guarantee in the process of formulation of the ZEE, the participation of the local actors in their elaboration, considering their forms of knowledge about the environment and their potentialities;
- Make consultations and discussions on the places to be worked on as a process before elaboration or implementation of projects and programs;

- Promote a halt to land-clearing of the cerrados in the ASD until one concludes the ZEE and one defines the possibilities of alteration of the use of soil which damages the quantity and quality of the water resources (except for the small farmers);
- Create a system of information and integrated actions in the institutions which have related actions;
- Make available databanks for the access by universities, ONG's and the public in general;
- Invest in research about the ecological role of the cerrados in the ASD;
- To create mixed commissions of evaluation of programs and projects (successful or unsuccessful) to avoid the repetition of errors;
- To make a regionalized, socio-environmental diagnosis as a part of the ZEE, to give greater potential and create possibilities of giving adequate priorities to the actions foreseen and demands for the ASD;
- To make effective the macro-zoning of the ASD;
- To implant a Geographic Information System (SIG in a network so as to favor the management and making of decisions;
- To encourage the production of didactic/ pedagogical material which explains the biodiversity of the Caatinga;
- To create continuous technical qualification programs; and
- To hold activities of articulation between the Desertification nuclei of the semi-arid area, in a way to facilitate the passing along of positive and negative experiences referring to the Caatinga biome, by means of forums debates seminars etc., and the exchange with other localities through the Internet, starting from the availability of information (Databanks) which are being allocated to the institutions which are working with these possibilities (Databanks), exemplified by those produced for the scenario of the Caatinga biome.

**ANNEX 7**  
**AGREED ON INDICATORS OF DESERTIFICATION**

INDICATORS OF DESERTIFICATION	I M P O R T A N C E	R A N G E	HOW TO MEASURE
Vegetation Covering	1	N	% Covering the Area /total area
Biomass of the Caatinga	2	N	Tons of leafy mass/hectare or m <sup>3</sup> /hectar
Vegetation Biodiversity	1	L	Floristic inventory (species/hectare)
Land-clearing	1	N	Variation of the covering
Presence of species indicators	1	L	Floristic Inventory (species/hectare)
Consumption vegetation products - Firewood/consumption	1	N	Tons/hectare/year
Consumption of vegetation products - consumption/offering	1	N	Tons/hectare/year
Fauna (diversity, density, distribution)	2	L	Fauna inventory
Soil Use	1	N	Area/class of use
Degree of erosion	1	N	Type of class/hectare
Degree of salinization	1	L	Class
Area salinized	1	N	Area salinized/total irrigated area
Overgrazing	1	N	(animal-burden/hectare)/support capacity
Albedo of the surface	2	N	I/R class/area
Use of the surface and underground waters			Supply/demand
Supply/Demand – Water Stress - IPH	1	N	Supply - Drainage (m <sup>3</sup> /sec) Demand –Consumption m <sup>3</sup> /inhab./year(class)
Open air water storage	1	N	Volume estimate (area/hectare)
Water Quality	1	L	Index of water quality (IQA 9 parameters)
Silting/Sedimentation	1	L	Solid discharge/liquid discharge
Surface springs (drainage – time)	1	L	m <sup>3</sup> /s - (river drainage)
Wells (drainage – time)	2	L	Test of pumping (m <sup>3</sup> /hour) DNPM

continued

Continuation

INDICATORS OF DESERTIFICATION	I M P O R T A N C E	R A N G E	HOW TO MEASURE
Demographic density (urban, rural)	1	N	Inhabitant/km <sup>2</sup>
Net rate of migration	2	N	TM=(M/(((E+R)/2)*N)*1000
Average annual population growth rate	2	N	$(P_{t2} - P_{t1}) - 1$
Age structure PEA/Sex	1	N	P(0 - 19 years)/Pt*100 P(20 - 59 years)/Pt*100 P(60 years)/Pt*100
% of women as family heads	1	N	(Women heads of families/total families)*100
Agricultural income of families/total income by families	1	N	(\$ family agriculture/\$ family)
Self-consumption %	1	L	\$ self-consumption/ \$ production
Incidence of poverty	1	N	IDH Poverty index
Greatest incidence of sicknesses (water transmitted)	1	N	Number of consultations in SUS
Sanitation (sanitary service)	1	N	% of rural residences having sanitary installations
Infant mortality rate	1	L	Dead by 5 years/1000
Schooling	1	L	Average number of years in school
Land Structure	1	L	Distribution of classes of properties:
			How many Owners and the
			Coefficient of GINI
<b>INSTITUTIONAL INDICATORS</b>			
State Control/Inspection			
Directing Plan			
Qualification			
Municipal Associations			
ONG's/OSCIP			
Councils			
Budget resources			
Legal landmarks			
Integration programs			
Institutionalization			
<b>CLIMATE INDICATORS</b>			
Aridity index			
Index of Standard Precipitation			

N – National Scale L – Local scale.

