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FOURTH NATIONAL REPORT TO THE CONVENTION ON BIOLOGICAL DIVERSITY: BRAZIL

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PREFACE

By adopting the Strategic Plan of the Convention on Biological Diversity (CBD), the Parties committed to achieve, by 2010, a significant reduction in the rate of biodiversity loss at the global, regional and national levels. Brazil's Fourth National Report to the CBD presents the country's progress in the achievement of this global target and the current status of the Brazilian ecosystems and biodiversity.

Through a participatory process, Brazil established in 2006 (CONABIO Resolution n^{o} 03) its National Biodiversity Targets for 2010, based on the CBD 2010 Targets and in response to its Decision VIII/15. The set of 51 national targets is even more ambitious than the global targets, which are completely addressed by the national targets. Since 2006, numerous public policies and new projects and programs were developed, seeking the achievement of the three objectives of the CBD (biodiversity conservation and sustainable use, and benefit sharing) and addressing its numerous specific themes, such as the conservation of species and ecosystems, the sustainable use of biodiversity, mainstreaming biodiversity themes into different sectors, traditional knowledge, agrobiodiversity, genetic resources, forests, marine ecosystems, among many others.

In addition to these instruments, Brazil adjusted its institutional structure, creating a new institution – the Chico Mendes Institute for Biodiversity Conservation (ICMBio) – to provide a specific focus on conservation to the federal environmental management. ICMBio was given the responsibility for creating and managing protected areas, and defining and implementing strategies for biodiversity conservation, particularly regarding threatened species, protecting the Brazilian natural heritage and promoting the sustainable use of biodiversity in protected areas of sustainable use. Other structures were also created to improve environmental and natural resources management, such as the Brazilian Forest Service, to conciliate the use and conservation of Brazilian public forests, and the National Center for Flora Conservation (CNCFlora), at the Research Institute of the Rio de Janeiro Botanical Garden, to periodically update the list of threatened plant species and develop action plans for the conservation of threatened species, among other responsibilities. In 2010, CNCFlora published the Catalogue of Brazilian Flora, updating for the first time in one hundred years the original work of cataloguing the Brazilian flora (*Flora Brasiliensis*) initiated by naturalist von Martius in 1840 and concluded in 1906.

The third Global Biodiversity Outlook published in 2010 by the CBD Secretariat concluded that the objective of reducing the rate of biodiversity loss was not reached at the global level and indicated that none of the 21 global targets was completely achieved, obtaining at most 50% fulfillment of the objectives for some targets. In Brazil, although the progress obtained in the achievement of national biodiversity targets was not homogeneous, two of the 51 targets were fully achieved: the publication of lists and catalogues of Brazilian species (target 1.1) and the reduction by 25% of the number of fire occurrences in each biome (target 4.2), surpassing the achievement of the latter by at least 100% in all biomes, despite the renewed intensification in the occurrence of forest fires in this extremely dry year of 2010. Additionally, four other targets reached 75% achievement: the conservation of at least 30% of the Amazon biome and 10% of the other biomes (target 2.1); increase in

the investments in studies and research on the sustainable use of biodiversity (target 3.11); increase in the number of patents generated from biodiversity components (target 3.12); and reduction by 75% in the Amazon deforestation rate (target 4.1).

Although it is still necessary to develop a more encompassing monitoring system capable of providing a more accurate measure of the progress and that allows quantitative analyses of the achievement of all national targets, information currently available indicate that, while notable progress was obtained for several targets, for various other targets the progress was merely modest. The direct protection of habitats is among the most significant achievements, due to the marked effort to increase the number and extension of protected areas in the country. Under this theme, according to the third Global Biodiversity Outlook, Brazil is responsible for the protection of almost 75% of all hectares conserved in protected areas established around the world since 2003. Another significant national progress is related to biome monitoring: increasing the scope of the excellent work developed since 1988 in the Amazon and since 1985 in the Atlantic Forest, in 2002 Brazil started to monitor vegetation cover in all biomes, which will allow the continuous enhancement of strategies to combat illegal deforestation.

Important progress was also obtained for themes related to increasing knowledge on biodiversity and increasing investments in sustainable use practices involving biodiversity components. The 2010 launching, by the National Scientific and Technological Research Council (CNPq) in partnership with other research support agencies, of the National Biodiversity Research System – SISBIOTA is noteworthy among the investments in biodiversity research, with a more than R$ 50 million (approximately US$ 30 million) budget. SISBIOTA seeks to promote scientific research to increase knowledge and understanding of Brazilian biodiversity and to enhance the capacity to forecast responses to global change, particularly related to land use and land cover change as well as climate change, associating the capacity building of human resources to environmental education and the dissemination of scientific knowledge. However, it must be recognized that the country presented insufficient progress regarding other themes, particularly those related to alien invasive species, recovery of fish stocks, and benefit sharing and regulated access to genetic resources. The country needs to significantly increase its efforts related to biodiversity, particularly regarding the national target themes where modest progress was achieved in the past 10 years.

We expect that, based on a COP-10 decision in Nagoya, Brazil will be able to update its national targets and increase its efforts invested in the implementation of its national and international biodiversity commitments. This report identifies the main challenges encountered by the country, including those that still remain on the path of the national implementation efforts. To overcome them, among other factors it is necessary to further advance international cooperation and increase the means of support to CBD implementation, including the transfer of financial resources and technology, and the exchange of experiences among Parties to the Convention. It is also necessary to progress in the engagement of consumers and the business sector in the national effort to achieve CBD objectives.

The Ministry of the Environment acknowledges and expresses its gratitude to all those who contributed to the development of this document. This report gathers a remarkable amount of data on biodiversity, organized in a broad national outlook of the status of Brazilian biodiversity and ecosystems. We hope that this report becomes an important reference to guide efforts supporting biodiversity conservation and sustainable use, as well as the fair and equitable sharing of the benefits resulting from the use of Brazilian genetic resources and associated traditional knowledge.

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Minister of the Environment

FOREWORD

Brazil's Fourth National Report to the Convention on Biological Diversity was prepared in accordance with Article 26 of the Convention and COP decision VIII/14. The structure of the report is based on the *Guidelines for the Fourth National Report* published by the Convention. The proposed guidelines required the collection of a large volume of information and analyses, particularly given Brazil's status of mega-diverse country of continental size. Additionally, much of the information needed for the report is still dispersed and/or difficult to access, both among the various institutions and within them. Although this reflects the need for greater investment in the systematization of biodiversity information in the country, these factors resulted in a long and labor-intensive preparation period to produce the final document.

The first national report to the CBD provides a detailed characterization of the national biodiversity and of the legal and institutional structure for the environment in the country at that time, in addition of describing the main existing programs for biodiversity management. The second and third reports provide an extensive inventory of the main initiatives in Brazil to implement its commitments under the Convention. This fourth national report is essentially analytical, presenting an analysis of the status of Brazilian biodiversity and ecosystems, of the effectiveness of the national biodiversity strategy, and of the degree of achievement of the national and global biodiversity targets, among other related themes.

To complete the complex preparation of this report, the Ministry of the Environment organized a team of consultants which, with the assistance of the Ministry's analysts, collected the necessary information based on official published data and through interviews and consultations with the various relevant agencies and actors from different sectors. This information was gathered and analyzed to answer the questions posed by CBD in this fourth report.

The first chapter presents an evaluation of the current status and, whenever serial historical data were available, of the trends of Brazilian biodiversity and ecosystems. This evaluation was carried out based on available data on the mapping of terrestrial biomes; studies on the marine environment; inventories and studies on biodiversity and official data on the conservation status of species; initiatives related to the knowledge and conservation of genetic resources, particularly for food and agriculture; recording the associated traditional knowledge; and other related information. This chapter also presents the main threats to biodiversity in the country, such as agricultural expansion, invasive alien species, deforestation, fire, pollution and climate change, and includes a specific section on the main threats to the marine environment. The main actions for biodiversity conservation identified in this chapter are related to the area increase and management of protected areas, monitoring vegetation cover in the Brazilian biomes, integrated landscape management, sustainable forest management and sustainable production chains of non-timber products, sustainability of agricultural production, and the conservation of threatened or overexploited species.

The second chapter evaluates the implementation of the national biodiversity strategy in terms of the degree, progress and effectiveness of its implementation, and the national

biodiversity targets and indicators. This chapter also presents the existing funds in the country available to the priority activities of the national implementation of CBD objectives, the initiatives of the private sector related to these objectives, and the challenges encountered by Brazil during CBD implementation; and describes the progress achieved by the country in relation to specific issues raised by COP-8.

The third chapter assesses the initiatives and effectiveness of the integration of biodiversity considerations in other sectors outside the environmental sector, developed both by the government and by the private sector and non-governmental organizations. The achievements under this theme demonstrate that, despite the growing number of initiatives to this end, it is still necessary to significantly increase the national investments and efforts to attain the effective integration of biodiversity conservation and sustainable use issued in the policies, programs and attitudes of the various sectors. This chapter also presents the Brazilian experiences with the application of the ecosystem approach and the environmental impact assessments.

The conclusions presented in the fourth chapter provide a summary of the country's progress during the past eight years regarding the achievement of the national and global biodiversity targets for 2010. The chapter also summarizes the main issues addressed by the previous chapters and briefly discusses the future post-2010 priorities, which should be defined after COP-10.

The Fourth National Report to the CBD was approved by the National Biodiversity Commission – CONABIO during its 41st ordinary meeting, held in Brasília on 17 and 18 August 2010. A preliminary version of this report was made available to the Secretariat of the Convention on Biological Diversity in May 2010.

Braulio Ferreira de Souza Dias
Secretary of Biodiversity and Forests

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ABBREVIATIONS AND ACRONYMS

	English	Portuguese
ABC	Brazilian Cooperation Agency	Agência Brasileira de Cooperação
ABS	Access and Benefit Sharing	Acesso e Repartição de Benefícios
ANA	National Water Agency	Agência Nacional de Águas
ANP	National Oil Agency	Agência Nacional do Petróleo
APP	Permanent Preservation Area	Área de Preservação Permanente
ARPA	Protected Areas of the Amazon Program	Programa Áreas Protegidas da Amazônia
CBD	Convention on Biological Diversity	Convenção sobre Diversidade Biológica
CGEN	Genetic Resources Management Council	Conselho de Gestão dos Recursos Genéticos
CNPq	National Scientific and Technological Research Council	Conselho Nacional de Pesquisa Científica e Tecnológica
CNUC	National Cadastre of Protected Areas	Cadastro Nacional de Unidades de

		Conservação
CONAB	National Supply Company	Companhia Nacional de Abastecimento
CONABIO	National Biodiversity Commission	Comissão Nacional de Biodiversidade
CONAMA	National Environment Commission	Comissão Nacional de Meio Ambiente
COP	Conference of the Parties of the CBD	Conferência das Partes da CDB
DETER	Real Time Deforestation Detection System	Sistema de Detecção de Desmatamento em Tempo Real
EIA	Environmental Impact Assessment	Avaliação de Impacto Ambiental
EEZ (1)	Exclusive Economic Zone (marine)	Zona Econômica Exclusiva (marinha)
EEZ (2)	Ecological-Economic Zoning	Zoneamento Ecológico-Econômico
EIA/RIMA	Environmental Impact Study/Environmental Impact Report	Estudo de Impacto Ambiental/Relatório de Impactos sobre o Meio Ambiente
EMBRAPA	Brazilian Agricultural and Livestock Research Company	Empresa Brasileira de Pesquisa Agropecuária
EMBRATUR	Brazilian Tourism Company	Empresa Brasileira de Turismo
FAO	Food and Agriculture Organization	Organização para Alimentação e Agricultura
FAP	Protected Areas Fund (under the ARPA Program)	Fundo de Áreas Protegidas (no âmbito do ARPA)
FAPESP	São Paulo State Research Support Foundation	Fundação de Amparo à Pesquisa do Estado de São Paulo
FLONA	National Forest	Floresta Nacional
FUNAI	National Foundation for Indigenous Peoples	Fundação Nacional do Índio
GEF	Global Environment Facility	Fundo para o Meio Ambiente Global
GNP	Gross National Product	Produto Interno Bruto
HDI	Human Development Index	Índice de Desenvolvimento Humano
IBAMA	Brazilian Institute for the Environment and Renewable Natural Resources	Instituto Brasileiro de Meio Ambiente e Recursos Naturais Renováveis
IBGE	Brazilian Geography and Statistics Institute	Instituto Brasileiro de Geografia e Estatística
ICMBio	Chico Mendes Institute for Biodiversity Conservation	Instituto Chico Mendes para a Conservação da Biodiversidade
ICMS	Merchandise Circulation and Services Tax	Imposto sobre Circulação de Mercadorias e Serviços
ILAC	Sustainable Development Initiative for Latin America and the Caribbean	Iniciativa Latino-Americana e Caribenha para o Desenvolvimento Sustentável
IMCAM	Integrated Marine and Coastal Areas Management	Gerenciamento Integrado das Áreas Marinhas e Costeiras
INPE	National Space Research Institute	Instituto Nacional de Pesquisa Espacial
IPEA	Applied Economic Research Institute	Instituto de Pesquisa Econômica Aplicada
IT PGRFA	International Treaty on Plant Genetic Resources for Food and Agriculture	Tratado Internacional sobre Recursos Fitogenéticos para Alimentação e Agricultura (TIRFAA)
IUCN	International Union for Nature Conservation	União Internacional para a Conservação da Natureza
JBRJ	Rio de Janeiro Botanical Garden	Jardim Botânico do Rio de Janeiro
MCT	Ministry of Science and Technology	Ministério de Ciência e Tecnologia
MMA	Ministry of the Environment	Ministério do Meio Ambiente
NBSAP	National Biodiversity Strategy and Action Plan	Estratégia e Plano de Ação Nacional para a Biodiversidade (EPANB)
NGO	Non-Governmental Organization	Organização Não-Governamental
PA	Protected Areas	Áreas Protegidas (Unidades de Conservação)
PAE	Program to Support the Production and Commercialization of Extractive Products	Programa de Apoio à Produção e Comercialização de Produtos Extrativistas
PNAP	National Protected Areas Plan	Plano Nacional de Áreas Protegidas
PNB	National Biodiversity Policy	Política Nacional de Biodiversidade
PNRH	National Water Resources Policy	Política Nacional de Recursos Hídricos
PPA	Federal Multi-Year Plan	Plano Plurianual Federal
PROBIO	Brazilian Biodiversity Conservation and Sustainable Use Project	Projeto de Conservação e Uso Sustentável da Biodiversidade Brasileira
PROBIO II	National Biodiversity Mainstreaming and Institutional Consolidation Project	Projeto Nacional de Transversalização da Biodiversidade e Consolidação Institucional

PRODES	Legal Amazon Deforestation Monitoring Project	Projeto de Monitoramento do Desflorestamento na Amazônia Legal
RAPPAM	Rapid Assessment and Prioritization of Protected Area Management	Método de avaliação rápida e priorização da gestão de áreas protegidas
REDD	Reduction of Emissions from Deforestation and Degradation	Redução das Emissões por Desmatamento e Degradação
RL	Legal Reserve	Reserva Legal
RPPN	Private Reserve of the Natural Heritage	Reserva Particular do Patrimônio Natural
SAE	Strategic Environmental Assessment	Avaliação Ambiental Estratégica
SBF	Biodiversity and Forests Secretariat	Secretaria de Biodiversidade e Florestas
SFB	Brazilian Forest Service	Serviço Florestal Brasileiro
SINIMA	National Environmental Information System	Sistema Nacional de Informações sobre o Meio Ambiente
SISBIO	Biodiversity Information System	Sistema de Informação sobre Biodiversidade
SISNAMA	National Environment System	Sistema Nacional de Meio Ambiente
SNUC	National Protected Areas System	Sistema Nacional de Unidades de Conservação
spp	Species (plural)	Espécies
TI	Indigenous Land	Terra Indígena
UC/UCs	Protected Areas (under SNUC)	Unidade(s) de Conservação (áreas protegidas no âmbito do SNUC)
UN	United Nations	Organização das Nações Unidas
UNEP	UN Environmental Program	Programa das Nações Unidas para o Meio Ambiente (PNUMA)
UNESCO	UN Organization for Education, Science and Culture	Organização das Nações Unidas para a Educação Ciência e Cultura

CHAPTER 1

OVERVIEW OF STATUS, TRENDS AND THREATS

1.1. Introduction

This chapter provides a brief overall picture of current status and trends of Brazil's biodiversity, based on vegetation monitoring and mapping, available information on species status and trends, and other biodiversity/ecosystem assessments. The sections below also provide an explanation of the main threats to biodiversity in Brazil and how they affect different biomes and types of environments, and a brief discussion of the implications of biodiversity loss for human well-being.

First country to sign the Convention on Biological Diversity and largest country in South America, Brazil is the most biologically diverse nation in the world with six terrestrial biomes and three large marine ecosystems, and at least 103,870 animal species and 43,020 plant species are currently known in Brazil. There are two biodiversity hotspots currently acknowledged in Brazil – the Atlantic Forest and the Cerrado, and 6 biosphere reserves are globally recognized by UNESCO in the country. Please refer to the First National Report to the Convention for an earlier characterization of the country's biodiversity, its legal and institutional structure and major programs to manage biodiversity. The Second and Third National Reports to the Convention provide a broad survey of major initiatives in Brazil to implement its commitments under the Convention.

In an effort to improve monitoring of progress toward the 2010 Target, Brazil has been developing a set of National Biodiversity Indicators to monitor the status of the country's biodiversity building on earlier large scale initiatives which started in the early 1970's with the RADAMBRASIL project. That project mapped natural resources and vegetation cover at the 1:1,000,000 scale, followed in the mid 1980's by the ongoing Amazon Deforestation Monitoring project (with a 30m resolution) and the ongoing National Fire Monitoring project (with a 1 km resolution). These initiatives were complemented in the 1990's and in the 2000's with the Mapping of Priority Areas for Biodiversity Conservation and Sustainable Use; the Mapping of Vegetation Cover and Land Use of all Brazilian biomes at the 1:250,000 scale; the National Program for Monitoring Coral Reefs (ReefCheck Brazil); the First National Survey of Alien Invasive Species; the National Database of Protected Areas; the continuing updating of National Lists of Threatened Species of Fauna and Flora; the National Sustainability Indicators; the GEOBrazil Environmental Reports; the National Water Resources Reports; and the national reports for the Millennium Development Goals and for the Sustainable Development Initiative for Latin America and the Caribbean (ILAC). The adoption in 2006 by the National Biodiversity Commission (CONABIO) of a comprehensive set of National Biodiversity Goals for 2010 (CONABIO Resolution 3/2006) automatically defined the relevant national biodiversity indicators. Currently, the Ministry of the Environment has started a process to consolidate a single list of standardized environmental indicators to be utilized in a uniform way across different institutions and

reports. Where possible, indicators from this list were included in the chapter. Where available, time series comparisons were also provided.

1.2. The status and trends of Brazil's biodiversity

Brazil has six terrestrial biomes (Amazon, Atlantic Forest, Caatinga, Cerrado, Pampas, and Pantanal; see Figure I-1 below), three marine ecosystems (Large Marine Ecosystems – LME) which include 8 marine ecoregions[1], and 12 major hydrographic regions. The terrestrial biomes are subdivided into 47 major vegetation types according to IBGE's national vegetation cover map[2]. In 2004, this map indicated a rate of 27.75% of the total Brazilian territory as land converted by human use (see section 1.2.1 below).

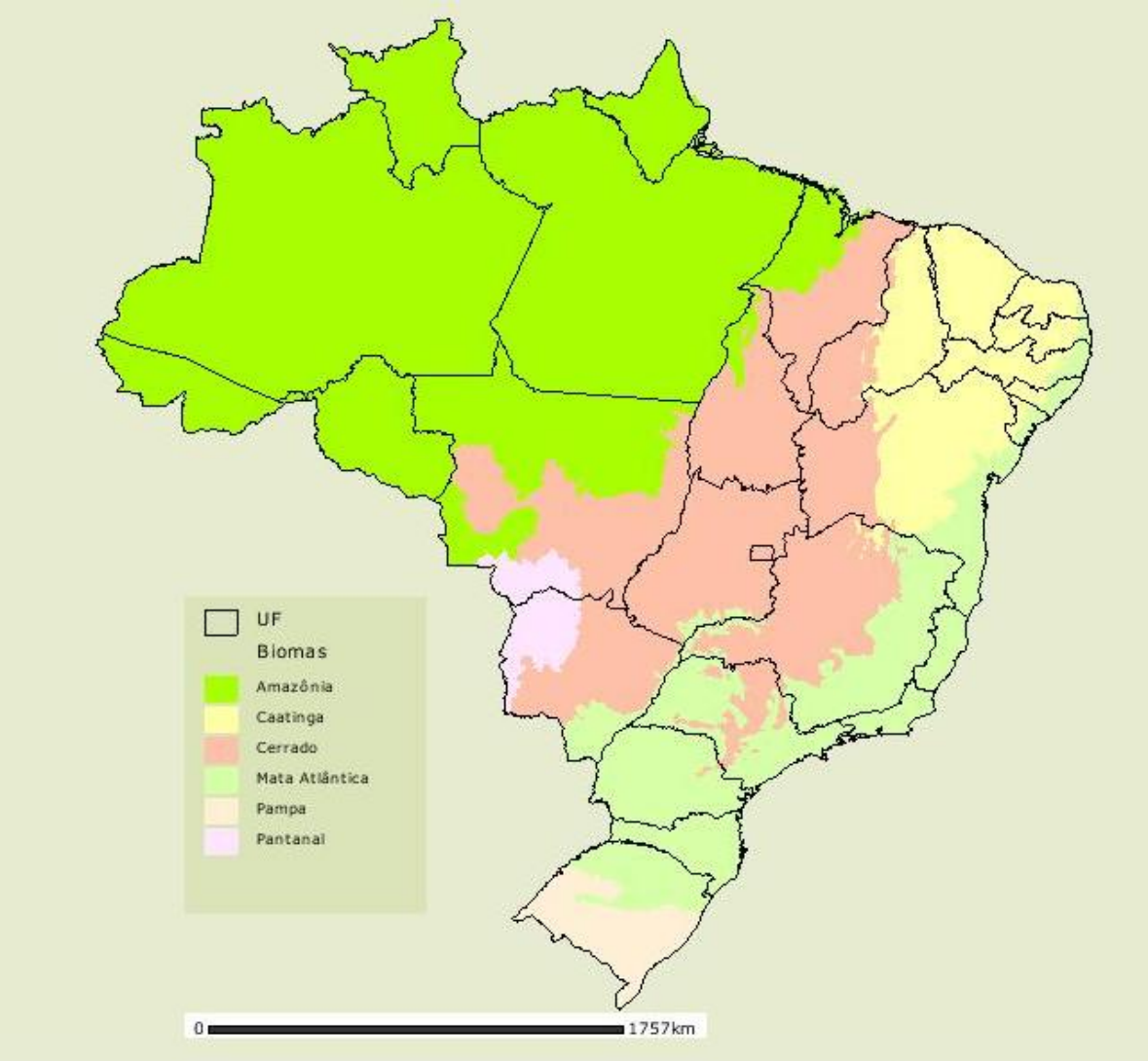

Figure I-1: Map of Brazilian Biomes. Source: Brazil, IBGE 2010 (www.ibge.gob.br).

[1] MMA, 2010 (in press). Outlook of the conservation of coastal and marine ecosystems [*Panorama da conservação dos ecossistemas costeiros e marinhos*].
[2] IBGE, 2004. Brazil's Vegetation Map [*Mapa de Vegetação do Brasil*], 1:5,000,000 scale. http://www.ibge.gov.br/mapas_ibge/tem_vegetacao.php

Responding to CBD Decision VIII/15, Brazil set in 2006 the National Biodiversity Targets for 2010 which build on the CBD 2010 Targets. However, only a sub-set of the national targets are being monitored. Brazil also created the National Environmental Information System (SINIMA) to monitor the National Environmental System (SISNAMA), which is composed of federal, state and municipal environmental agencies, and the status of the environment and its management in Brazil. SINIMA is currently undergoing a strengthening process, which includes the definition of a set of environmental and sustainable development indicators. In the short term (by July 2009), SINIMA will measure and publish (www.mma.gov.br) the following set of biodiversity indicators: (i) trends of biomes and ecosystems; (ii) extension of protected areas; and (iii) changes in status of endangered species. In the medium term (by July 2010), SINIMA will refine and expand this first set of indicators, institutionalizing the methodology to measure the evolving set of indicators.

The sections below present an overview of the status and trends of Brazilian ecosystems and species, as well as the main threats to biodiversity conservation and the country's efforts to counteract them.

1.2.1. Ecosystems and habitats

Vegetation cover

From 2004 to 2007 MMA promoted a national vegetation mapping exercise by terrestrial biome under the Project for the Conservation and Sustainable Use of Brazilian Biological Diversity - PROBIO. The resulting maps were produced based on 2002 Landsat satellite images and the 2004 vegetation cover map produced by IBGE, and analyzed the status of the major vegetation types within each biome, summarized below.

The predominant vegetation type in the **Amazon biome** is the broadleaf evergreen forest, which covers 41.67% of the biome. Native non-forest vegetation (pioneer formations, ecological refuges, bush and grass-woody campinaranas, park and grass-woody savanna, steppe park savanna, and steppe grass-woody savanna) covers 4.23% of the biome. Approximately 12.47% of the broadleaf evergreen forest has already been altered by human action. Of these, 2.87% are undergoing a natural regeneration process with secondary vegetation, and 9.50% are under agricultural use, occupied by crops or pasture (Table I-1).

Table I-1: Characterization of the Amazon Biome by Grouped Phyto-ecological Region

Grouped Phyto-ecological Regions	Area (km^2)	%
Native forest	3,416,391.23	80.76
Native non-forest vegetation	178,821.18	4.23
Human use	401,855.83	9.50
Secondary vegetation	125,635.01	2.97
Water	107,787.52	2.55
Total	4,230,490.77	100.00

Source: Ministry of the Environment (2007)[3].

[3] MMA, 2007. *Vegetation Cover Maps of the Brazilian Biomes*. Editor: Júlio Cesar Roma. 16pp.

The **Pantanal biome** is still well preserved as compared to 2002, maintaining 86.77% of its native vegetation cover. Non-forested vegetation predominates (Cerrado savanna, Chaco steppe savanna, pioneer formations, and ecological transition areas) in 81.70% of the biome. Of these, 52.60% are covered with Cerrado savannas and 17.60% are occupied by ecological transition areas or ecotones. Forest vegetation types (seasonal semideciduous forest and seasonal deciduous forest) represent 5.07% of the Pantanal. The vast majority of the 11.54% altered by humans is used for extensive cattle ranching on planted pastures (10.92%), with only 0.26% being used for agricultural crops (Table I-2).

Table I-2: Characterization of the Pantanal Biome by Grouped Phyto-ecological Region

Grouped Phyto-ecological Regions	Area (km^2)	%
Native forest	7,622.00	5.07
Native non-forest vegetation	123,527.00	81.70
Human use	17,439.90	11.54
Water	2,577.30	1.69
Total	151,186.20	100.00

Source: Ministry of the Environment (2007).

The **Cerrado biome** is the second largest biome in Brazil, covering approximately 22% of the national territory and extending into the neighboring countries of Paraguay and Bolivia. Native Cerrado vegetation in various degrees of conservation still covers 60.42% of the biome in Brazil. The predominant phyto-ecological region is the woody savanna, corresponding to 20.42% of the biome, followed by park savanna (15.81%). The area covered by the various forest vegetation types encompasses 36.73% of the biome, while the non-forest area covers 23.68% of the biome. The remaining area (38.98%) corresponds to human use areas, where cultivated pasture is the predominant category (26.45% of the biome), and to water (Table I-3).

Table I-3: Characterization of the Cerrado Biome by Grouped Phyto-ecological Region

Grouped Phyto-ecological Regions	Area (km^2)	%
Native forest	751,943.49	36.73
Native non-forest vegetation	484,827.26	23.68
Human use	797,991.72	38.98
Water	12,383.88	0.60
Total	2,047,146.35	100.00

Source: Ministry of the Environment (2007).

The **Caatinga** is the only Brazilian biome located entirely within the national territory, corresponding to approximately 10% of Brazil. This semi-arid biome maintains approximately 62.69% of its native vegetation in various degrees of conservation. The steppe savanna dominates with 35.90% of the biome, followed by ecological transition areas (18%) and enclaves of Cerrado and Atlantic Forest vegetation types (8.43%) (Table I-4).

Table I-4: Characterization of the Caatinga Biome by Grouped Phyto-ecological Region

Grouped Phyto-ecological Regions	Area (km^2)	%
Native forest	201,428.00	24.39
Native non-forest vegetation	316,889.00	38.38
Human use	299,616.00	36.28
Water	7,817.00	0.95
Total	825,750.00	100.00

Source: Ministry of the Environment (2007).

The **Atlantic Forest biome** is by far the most altered (70.95%) of the terrestrial biomes, having been historically the first to be extensively explored and occupied since European arrival in 1500. The total area covered by native vegetation in 2002 was calculated as 26.97%, of which 21.80% are composed by distinct forest physiognomies (Table I-5). The broadleaf evergreen forests (9.10%) are the main forest component of the biome, followed by seasonal semideciduous forests (5.18%). The worst scenario belongs to the open broadleaf forests (with palm trees), which are almost extinct today (0.25% of the biome). Among the enclaves, the grass-woody steppes (pampas) are the most representative physiognomy (2.69% of the biome).

Table I-5: Characterization of the Atlantic Forest Biome by Grouped Phyto-ecological Region

Grouped Phyto-ecological Regions	Area (km^2)	%
Native forest	230,900.49	21.80
Native non-forest vegetation	40,689.04	3.84
Pioneer formations	14,051.26	1.33
Human use	751,372.78	70.95
Water	15,364.13	1.45
Unclassified	6,650.15	0.63
Total	1,059,027.85	100.00

Source: Ministry of the Environment (2007).

Second smaller biome in Brazil (2.10% of the national territory), the **Pampas biome** comprises the grasslands of Missions and of the southern portion of Rio Grande do Sul state, extending into Uruguay and Argentina. Covered primarily with grasslands (23.03%), the Pampas is also severely modified by human use (48.70%), particularly by cattle raising activities and forest plantations (Table I-6).

Table I-6: Characterization of the Pampas Biome by Grouped Phyto-ecological Region

Grouped Phyto-ecological Regions	Area (km^2)	%
Native forest	9,591.05	5.07
Native grassland	41,054.61	23.03
Native vegetation - Transition	23,044.08	12.91
Human use	86,788.70	48.70
Water	17,804.57	9.98
Total	178,243.01	100.00

Source: Ministry of the Environment (2007).

National Territory. In 2004 Brazil had 27.75% (approximately 2,356,065 km^2) of its territory altered by human use (agricultural and urban areas, deforestation, other). From 2004 to 2006 this percentage increased to approximately 30% (see section 1.3.2), leaving an estimated 70% of the national territory still covered with original vegetation at various degrees of conservation.

Provision of environmental goods and services

Brazil established in 2004 and revised in 2007 its Priority Areas for the Conservation and Sustainable Use of Biodiversity[4], to guide conservation and development actions and

[4] http://www.mma.gov.br/sitio/index.php?ido=conteudo.monta&idEstrutura=72&idMenu=3812

policies. These 3,190 areas distributed throughout all biomes include areas that are already protected in officially protected areas (under the National Protected Areas System – SNUC) and Indigenous Lands, as well as areas that were identified as important for biodiversity and where conservation is urgent. These areas were defined and are periodically revised through a participatory process at regional workshops specifically directed to each biome and with the contribution of a large number of experts. The methodology applied to define and assess each area uses the IBGE Map of Brazilian Biomes as the main base and incorporates the principles of systematic planning for biodiversity conservation and its basic criteria (representativeness, environmental persistence and vulnerability). The current list is officially recognized through a legal document (MMA Administrative Ruling n^{o} 9, of 03 January 2007) and the use of the Map of Priority Areas as a management instrument has increased in the past several years, including in sectors other than the environmental sector.

The Brazilian Institute for the Environment and Renewable Natural Resources (IBAMA) initiated in 2010 an assessment of the integrity of current Priority Areas, through its new biome deforestation monitoring system. The results of this analysis should be available by the end of 2010 and its future periodic updates will contribute to the next revision of the Priority Areas. However, a different study on the current protection of the vegetation in private properties, and a preliminary analysis of the remaining vegetation cover in Priority Areas, provide preliminary parameters to estimate the degree of maintenance of the capacity of Brazilian ecosystems to provide environmental goods and services in each biome.

A 2010[5]study assessed the protection of the natural vegetation according the Brazilian Forest Code and found that the Permanent Preservation Areas (APPs) and the Legal Reserves (RLs) in rural private lands cover, respectively, 12% and 30% of the national territory, which together correspond to over two times the area currently covered by officially protected areas. According to the legislation, the original vegetation cover of these areas should be maintained by land owners. However, 42% of the APPs present illegal deforestation, as do 16.5% of the RLs. Additionally, 3% of the protected areas and indigenous lands also suffered illegal deforestation. This study also found that the effectiveness of the protection required by law in private properties varies according to geographical region and biome.

In addition to this study on APPs and RLs, data from the Project for Satellite Monitoring of Deforestation in Brazilian Biomes (PMDBBS [6]) available for the Cerrado, Caatinga, Pantanal and Pampas biomes[7], overlapped with the Map of Priority Areas for Biodiversity contributed to a preliminary[8] estimate of the maintenance of the vegetation cover in Priority Areas and, indirectly, of the capacity of ecosystems in these areas to provide environmental goods and services. The Priority Areas of the Cerrado still maintain, on average, 65.9% of

[5] Sparovek, G. *et al.* 2010 (in press). *Brazilian agriculture and environmental legislation: status and future challenges*. Environ. Sci. Technol., manuscript accepted in June 30, 2010.
[6]Monitoring project implemented through a MMA, IBAMA and UNDP partnership: http://www.mma.gov.br/sitio/index.php?ido=conteudo.monta&idEstrutura=72&idConteudo=7422&idMenu=7508
[7] Monitoring data for the Amazon and Atlantic Forest biomes were not accessible at the time of this analysis.
[8] de Lima, M.G. (in prep). Estimate of the remaining vegetation cover in priority areas for conservation: the case of the Cerrado, Caatinga, Pantanal and Pampas.

their original vegetation cover. However, there is large variation with the most deforested areas in the south of the biome (area of strong agricultural expansion) and the best conserved to the north, varying between 0.3% remaining cover to 100% cover in each Priority Area. The Pampas Priority Areas maintain on average 63.3% of their original vegetation cover, varying from 7.0% to 100%. The average remaining cover in the Caatinga is 70.5%, varying from 4.2% to 100%. The Priority Areas of the Pantanal present the highest average of the analyzed biomes (89.7%), suggesting better maintenance of the vegetation, but all Priority Areas in this biome have already suffered some measure of deforestation, with the remaining original vegetation cover varying from 28.0% to 99.9%.

The Priority Areas were classified according to their priority for conservation (high, very high, or extremely high) and their biological or ecological importance (high, very high, extremely high or insufficiently known). The preliminary analysis of the remaining vegetation cover in Priority Areas indicates that, while in some biome those areas with the highest conservation priority (extremely high) are also the best preserved areas, in other biomes these are the areas presenting the lowest percentage of remaining vegetation cover in Priority Areas, which may suggest an increase in the degree of urgency for their conservation or the need to define new conservation strategies for the least preserved Priority Areas. However, the variation of remaining vegetation cover in each of the two classes (priority and importance) is high (see Table I-7).

Table I-7: Preliminary estimate of the remaining vegetation cover in Priority Areas for the Conservation and Sustainable Use of Biodiversity per biome (2010).

Classification of Priority Areas		**Average remaining cover**	**Variation**
CAATINGA	**Total average remaining vegetation cover in Priority Areas: 70.5%**		
Priority	High	63.9%	4.2% - 100%
	Very High	68.1%	19.0% - 100%
	Extremely High	70.8%	10.6% - 100%
Importance	High	74.1%	32.7% - 100%
	Very High	66.8%	19.0% - 100%
	Extremely High	67.8%	10.6% - 100%
	Insufficiently known	61.4%	4.2% - 99,3%
CERRADO	**Total average remaining vegetation cover in Priority Areas: 65.9%**		
Priority	High	60.0%	21.4% - 100%
	Very High	63.1%	11.6% - 100%
	Extremely High	63.0%	0.3% - 99.4%
Importance	High	60.0%	21.4% - 100%
	Very High	58.6%	13.1% - 100%
	Extremely High	65.4%	0.3% - 100%
PAMPAS	**Total average remaining vegetation cover in Priority Areas: 63.3%**		
Priority	High	57.0%	7.0% - 100%
	Very High	66.6%	33.5% - 100%
	Extremely High	54.7%	15.2% - 100%
Importance	High	61.2%	7.0% - 100%
	Very High	60.4%	25.7% - 96.9%
	Extremely High	56.4%	15.2% - 100%
	Insufficiently known	40.3%	14.6% - 65.9%

PANTANAL	**Total average remaining vegetation cover in Priority Areas: 89.7%**		
Priority	High	87.6%	45.8% - 99.7%
	Very High	94.4%	87.2% - 99.4%
	Extremely High	79.3%	28.0% - 99.9%
Importance	High	82.1%	45.8% - 99.7%
	Very High	87.0%	28.0% - 99.9%
	Extremely High	85.8%	57.6% - 99.9%
	Insufficiently known	96.5%	(one area)

Source: Estimate of the remaining vegetation cover in priority areas for conservation: the case of the Cerrado, Caatinga, Pantanal and Pampas. MMA/DAP 2010.

Hydrographic Regions

Brazil's National Water Resources Council approved in 2006 the National Water Resources Plan (PNRH – *Plano Nacional de Recursos Hídricos*), in response to the Johannesburg Global Summit on Sustainable Development. This plan defines the 12 hydrographic regions in Brazil (Figure I-2): Amazonian, Tocantins-Araguaia, Western Northeast Atlantic, Parnaíba, Eastern Northeast Atlantic, São Francisco, East Atlantic, Southeast Atlantic, Paraná, Uruguai, South Atlantic, and Paraguai.

Figure I-2: Map of Brazilian hydrographic regions. Source: Secretariat of Water Resources, Ministry of the Environment.

Despite the existing efforts to systematize biodiversity information (see sections 2.3 and 2.6), Brazil does not have specific databases on aquatic ecosystems (hydromorphology, biodiversity and regional physical and chemical characteristics). Existing data for monitoring aquatic environments still do not include biological variables. However, data are available on water quantity and quality, as well as on sanitation services, which can contribute to an estimate of existing pressures on aquatic ecosystems.

The PNRH includes an overview of the quality and quantity of freshwater in Brazil and estimates three scenarios for 2020 (www.mma.gov.br/srhu). Rainfall and fluvial data are regularly obtained from a network of 14,169 monitoring stations throughout the country, with the Water Quality Index (IQA – *Índice de Qualidade das Águas*) as the main indicator

used in Brazil, which reflects primarily the degree of water contamination by domestic wastewater discharges.

Water quantity: The average annual water flow of rivers with the entire length in the Brazilian territory is 179,000 m^3/s (5,660 km^3/year), which corresponds to approximately 12% of the global available water resources. If the water flow of rivers that cross Brazil but begin in other countries is considered, this average increases to 267,000 m^3/s, or 18% of the global available freshwater (Table I-8).

Table I-8: Average and dry season water flow in the Brazilian hydrographic regions.

Hydrographic Region	**Area (km^2)**	**Average water flow (m^3/s)**	**Dry season water flow[1] (m^3/s)**
Amazonian[2]	3,869,953	131,947	73,748
Tocantins-Araguaia	921,921	13,624	2,550
Western Northeast Atlantic	274,301	2,683	328
Parnaíba	333,056	763	294
Eastern Northeast Atlantic	286,802	779	32
São Francisco	638,576	2,850	854
East Atlantic	388,160	1,492	253
Southeast Atlantic	214,629	3,179	989
South Atlantic	187,522	4,174	624
Uruguai[3]	174,533	4,121	391
Paraná	879,873	11,453	4,647
Paraguai[4]	363,446	2,368	785
Brazil	**8,532,722**	**179,433**	**85,495**

Notes: 1 – Flow with 95% permanence; 2 – The Amazonian watershed comprises an additional area of 2.2 million km^2 in foreign territory, which contribute additional 86,321 m^3/s average flow; 3 – The Uruguai River watershed comprises additional 37,000 km^2 in foreign territory, which contribute 878 m^3/s; 4 – The Paraguai River watershed comprises additional 118,000 km^2 in foreign territory, which contribute 595 m^3/s. Source: ANA, 2005.

Water quality: At the national level, domestic wastewater discharge is the main problem affecting quality of surface waters. Mining, industrial effluents, diffuse inflows from urban and agricultural soil drainage, and solid waste are also national scale problems occurring in all hydrographic regions. Other problems are of localized relevance, such as hog raising in the south of Brazil, and water salinization in reservoirs in northeastern Brazil. Considering the 859 monitoring stations in which the Water Quality Index is calculated, 71% of the sampling points present good water quality (Figure I-3).

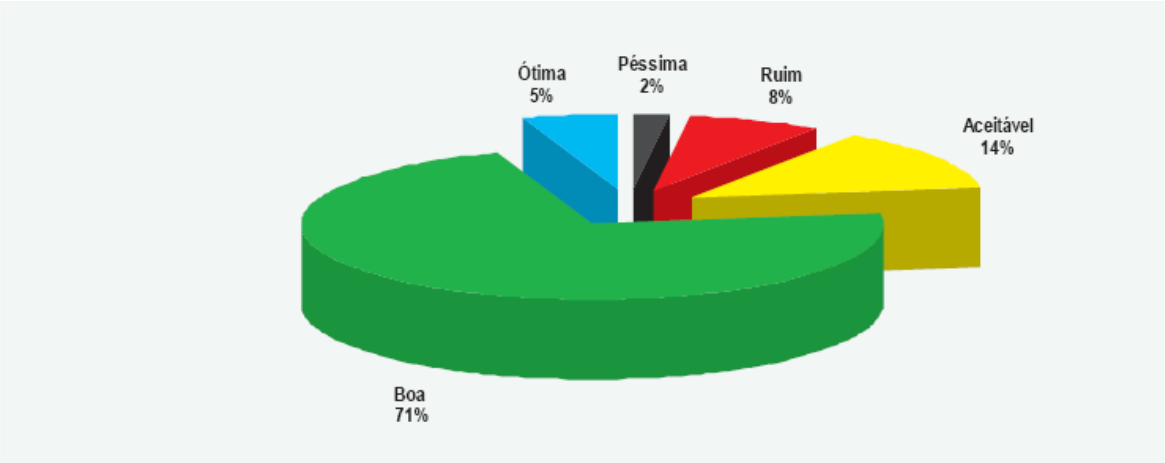

Figure I-3: Percent distribution of the Water Quality Index. Source: National Water Resources Plan, 2006.

An extensive study[9] on the water quality in Brazilian rivers of all hydrographic regions was conducted between 2003 and 2004 by Gérard and Margi Moss, who sampled 1,160 points throughout the country (Figure I-4). The resulting map of water quality was developed based on the variation of total phosphorus (P), inorganic dissolved nitrogen (NID), and cyanobacteria content.

[9] The project *Brasil das Águas: Revelando o Azul do Verde e Amarelo*, idealized and implemented by Gérard and Margi Moss, with support from Petrobras and other Brazilian private, governmental, and non-governmental institutions (http://www.brasildasaguas.com.br).

Figure I-4: Water quality in Brazilian rivers; where: ● = Natural waters; ■ = Water with moderate contents of nitrogen and phosphorus of natural origin (light blue color = clean water w/ no undesirable interferences on water use); ● = Water under low to moderate impact (water bodies w/ intermediary productivity, w/ possible implications on water quality at acceptable levels in most cases); ● = Water under impact; ■ = Water being impacted primarily by agriculture (orange color = water bodies presenting high productivity in comparison to natural condition, low transparency, generally affected by human activities resulting in undesirable alterations in water quality and interference in its multiple uses); ● = Water presenting high human impact (water bodies significantly affected by high concentrations of organic matter and nutrients compromising its uses, presenting risks to the survival of aquatic animals); ▶ = Potentially toxic cyanobacteria present in the water. Source: http://www.brasildasaguas.com.br/bda_mapas.php.

Water use. Demand for water has intensified with population growth and economic development, both in quantity and in the variety of uses. As a consequence, conflicts among water users are arising, particularly in those areas where water availability is limited. Environmental conservation has recently become an additional factor in the water use dispute. The National Water Agency – ANA calculated the demand for water for the various uses, dividing water use in three classes: (i) water collection, corresponding to the amount of water removed by users, (ii) returned water, which is the portion of collected water that returns to the water source; and (iii) actual consumption, corresponding to the actual consumption, calculated as the difference between the two first classes. The results for 2000 indicate that 53% of the total water collection (1,592 m^3/s) is effectively consumed, noting that 46% of this total is for irrigation alone (Table I-9). This percentage increases if the total actual consumption (841 m^3/s) is considered: 69% are used for

irrigation, 11% for urban use, 11% for animal use, 7% for industrial use, and 2% for rural use.

Table I-9: Water use in Brazil (2002).

Type of use	Water collection		Water consumption		Returned water	
	Amount (m^3/s)	%	Amount (m^3/s)	%	Amount (m^3/s)	%
Urban	420	26	88	11	332	44
Industrial	281	18	55	7	226	30
Rural	40	3	18	2	22	3
Animal	112	7	89	11	23	3
Irrigation	739	46	591	69	148	20

Source: Brasil – Secretaria de Recursos Hídricos e Ambiente Urbano, 2007. Plano Nacional de Recursos Hídricos, Volume 1: Panorama e estado dos recursos hídricos do Brasil. In: *Vamos cuidar de nossas águas – Plano de Águas do Brasil* CD-ROM.

When hydrographic regions are compared, irrigation predominates in six of them, while urban use is higher in the five most populated regions, and animal use predominates in one (Figure I-5).

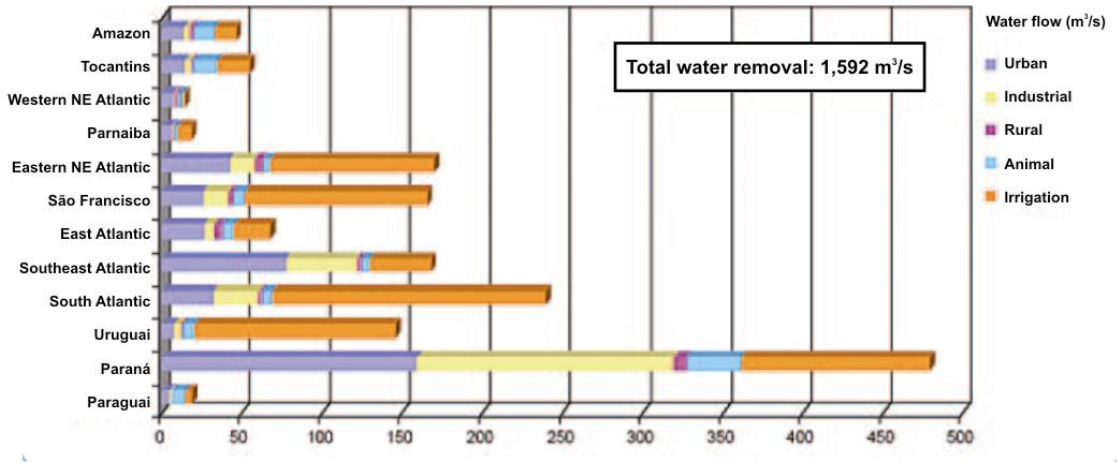

Figure I-5: Water use in the 12 Brazilian hydrographic regions.
Source: Brasil – Secretaria de Recursos Hídricos e Ambiente Urbano, 2007. Plano Nacional de Recursos Hídricos, Volume 1: Panorama e estado dos recursos hídricos do Brasil. In: *Vamos cuidar de nossas águas – Plano de Águas do Brasil* CD-ROM.

Brazil has a history of innovation in water use legislation, with its first major specific legal instrument, the Water Code (*Código de Águas*) instituted in 1934, globally recognized as one of the most complete legal instruments regarding waters ever to be developed. Until 1970, water management in Brazil was based primarily on disciplining water property and use within an economic-financial model, without considering conservation needs. Since then, water management in Brazil evolved to an integrated management model geographically organized by watershed, with Watershed Management Committees composed by various sectors including civil society, and the institution of other important water legislation instruments, such as the National Water Resources Policy and the National Water Resources Plan, which complies with the recommendations of the Johannesburg Global Summit on Sustainable Development (Rio+10) and the water Millennium Development Goals.

Coastal and Marine Areas

The South West Atlantic Ocean includes four Large Marine Ecosystems (LME), three of which along the Brazilian coast: the North Brazil Shelf, the East Brazil Shelf, and the South Brazil Shelf. Of these, the North Brazil Shelf is the only LME that extends beyond the Brazilian borders, and is strongly influenced by the Amazon River discharges, the largest in the world at 220,000 cubic meters per second. The East Brazil Shelf LME is characterized by calcareous deposits and biogenic shoals, with offshore islands and the only atoll in the South Atlantic Ocean, the Atol das Rocas. This LME also contains coral reef formations parallel to the Brazilian coast. In contrast, the seabed environment of the South Brazil Shelf is a complex topography of valleys and submarine canyons, with seasonal wind-driven upwelling of cold, nutrient-rich waters.

The recent (2009) UN report on the global assessment of the seas (Assessment of Assessments-AoA, http://www.unga-regular-process.org/images/Documents/regional%20summaries%20finalv.pdf) provides an overview of the existing data and marine resources assessment initiatives among other information on this region, and summarizes the main threats to the coastal and marine biodiversity along the Brazilian coast. These include one of the highest coastal population densities in the world, the well developed agriculture and livestock farming, petroleum extraction, fishing (particularly in the more productive north and south areas), navigation, mariculture in mangrove areas, and tourism.

Brazil has a diversity of coastal and marine ecosystems distributed in approximately 4.5 million km^2, and which include extensive mangroves and coral reefs. However, as there are no broad studies on the status of Brazilian marine and coastal ecosystems, surrogate data such as information on fisheries production and biodiversity can assist in estimating this status (see also section 1.2.2).

With the purpose of integrating governmental actions related to the various marine themes, Brazil created in 1974 the Inter-ministerial Commission for Sea Resources (CIRM – *Comissão Interministerial para Recursos do Mar*) to support implementation of the National Policy for Sea Resources, and has been investing, since 1982, in the assessment of the state of living and non-living resources within its Exclusive Economic Zone (EEZ), including regular assessments based on catch and landings for some fish stocks by IBAMA. Additionally, the National Protected Areas Plan (2006) recognized the importance of establishing no-take zones or marine reserves as a fisheries management tool, providing a policy incentive to the establishment of a system of marine protected areas. To provide a technical basis for this system, an assessment of priority coastal and marine areas for conservation was completed in 2006 by the Ministry of the Environment with support from NGO The Nature Conservancy, identifying priority areas and setting a 2012 conservation target (www.mma.gov.br).

Fisheries production. The government monitors fisheries activities along the Brazilian coast through the specialized centers[10] of the Chico Mendes Institute for Biodiversity

[10] CEPENE – Research and Management Center for Fisheries Resources of the Northeastern Coast; CEPNOR – Research and Management Center for Fisheries Resources of the Northern Coast; CEPERG – Research and

Conservation – ICMBio and published, in 2006, the results of an extensive assessment of the sustainability potential of marine living resources in the Brazilian Exclusive Economic Zone – the REVIZEE Program. The REVIZEE Report[11] informs that a large portion of the Brazilian Economic Zone is characterized by the low concentration of nutrients in its waters and by low productivity. Thus, despite its great extension, the EEZ does not offer the necessary conditions for the existence of significant fisheries resources of high biomass. Some fish stocks were identified as potential resources although different limiting factors must be considered. A summary of the REVIZEE results is presented under section 1.2.2.

At the end of the 1960's the Brazilian government started to strongly promote fisheries activities, offering new credit lines and tax incentives for the development of the national fisheries industries, mainly directed to the external market. This development led to the rapid increase of fisheries production: the marine fisheries production jumped from 294,000 tons to 760,000 tons from 1965 to 1985. Starting in 1985, despite increased efforts of fisheries activities, the marine production began to fall, reaching 435,000 tons in 1990 and, since then, oscillating between the minimum of 419,000 tons in 1995 and the maximum of 540,000 tons in 2007. This scenario indicates a process of rapid exhaustion of the marine fish stocks that are traditionally exploited, and freshwater fish stocks face a similar situation. For example, the REVIZEE Program identified, at the end of the 1990's, the blackfin goosefish (*Lophius gastrophysus*) as a potential resource for the Brazilian fisheries industries. The identification of a market for this product (mainly Spain) triggered a process of intense exploitation of this resource with leased foreign vessels, with no concern regarding its actual sustainable potential. Three years were enough to reach overexploitation of this resource. Fisheries activities directed at the deep water crab, reopened in 1999 by leased foreign vessels, also led this resource to over-fished status in five years.

The marine environment remains the primary source of fisheries production (49% in 2003), followed by freshwater fisheries, freshwater aquaculture, and marine aquaculture[12]. Seeking the sustainable use of fisheries resources, composed of approximately 157 marine species (134 fish species, 13 crustacean species and 10 mollusk species) the Ministry of the Environment published the national list of threatened and overexploited marine fish and aquatic invertebrate species. The official list[13] includes both marine and fresh water species, and lists 78 aquatic invertebrate species and 154 fish species as threatened with extinction, as well as 11 aquatic invertebrate species and 39 fish species that are overexploited or threatened with overexploitation, as defined by MMA Normative Instruction 05, of 21 May

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Management Center for Lagoon and Estuarine Fisheries Resources; and CEPSUL – Research and Management Center for Fisheries Resources of the Southeast and South Coast. Two other centers (CEPAM – Research and Management Center for Aquatic Biodiversity and Continental Fisheries Resources of the Amazon; and CEPTA – Research and Conservation Center for Continental Fisheries Resources) are responsible for monitoring freshwater fisheries.

[11] Brazil, Ministry of the Environment. 2006. REVIZEE Program – Executive Report: Assessment of the sustainability potential of the living resources in the Brazilian Exclusive Economic Zone [*Programa REVIZEE – Relatório Executivo: Avaliação do potencial sustentável de recursos vivos na Zona Econômica Exclusiva do Brasil*].

[12] IBAMA, 2004; in: REVIZEE Report, 2006.

[13] MMA Normative Ruling 05 of 21 May 2004, adjusted by MMA Normative Ruling 52 of 8 November 2005.

2004 (http://www.ibama.gov.br/rec_pesqueiros/legislacao.php?id_arq=98), which determines the no-take of the threatened species and establishes the need to develop and implement restoration and management plans. Table I-10 presents the status of exploitation of the main Brazilian marine and estuarine resources targeted by fisheries activities.

Table I-10: Exploitation status of marine and estuarine stocks in Brazil (studies carried out between 1996-2004)

Scientific name **Common name**	**Type (*)**	**Status**	***Scientific name*** **Common name**	**Type (*)**	**Status**
Large migratory fish			**Central Region**		
Tetrapturus albidus Atlantic white marlin	lp	Not assessed	*Caulolatillus chrysops* Atlantic goldeye tilefish	dsl	Not assessed
Istiophorus albicans Atlantic sailfish	lp	Not assessed	*Squalus megalops* Shortnose spurdog	dsl	Not assessed
Carcharhinus maou Oceanic whitetip shark	lp	Not assessed	*Squalus mitsukurii* Shortspine spurdog	dsl	Not assessed
Carcharhinus falciformis Silky shark	lp	Not assessed	*Epinephelus nigritus* Warsaw grouper	dsl	Not assessed
Thunnus atlanticus Blackfin tuna	lp	Underexploited	*Epinephelus mystacinus* Misty grouper	dsl	Not assessed
Thunnus obesus Bigeye tuna	lp	Exhausted	*Epinephelus niveatus* Snowy grouper	dsl	Not assessed
Thunnus alalunga Albacore	lp	Exhausted	*Genypterus brasiliensis* Cusk eel	dsh	Not assessed
Thunnus albacares Yellowfin tuna	lp	Exhausted	*Trichiurus lepturus* Largehead hairtail	dsh	Not assessed
Makaira nigricans Atlantic blue marlin	lp	Overexploited	*Etelis oculatus* Queen snapper	dsl	Not assessed
Coryphaena hippurus Common dolphinfish	lp	Overexploited	*Pseudopercis semifasciata* Argentinian sandperch	dsl	Not assessed
Xiphias gladius Swordfish	lp	Overexploited	*Pseudopercis numida* Namorado sandperch	dsl	Not assessed
Carcharhinus longimanus Oceanic whitetip shark	lp	Overexploited	*Cookeolus japonicus* Longfinned bullseye	dsh	Not assessed
Prionace glauca Blue shark	lp	Overexploited	*Priacanthus arenatus* Atlantic bigeye	dsh	Not assessed
Sphyrna lewini Scalloped hammerhead	lp	Overexploited	*Pagrus pagrus* Common seabream	dsh	Not assessed
Carcharhinus signatus Night shark	lp	Overexploited	*Balistidae and Monacanthidae* Triggerfishes and Filefishes	dsh	Not assessed
			Urophycis mystacea Phycid hake	dsl	Not exploited
			Engraulis anchoita Argentine anchoita	sp	Not exploited
North Region			*Diodon holocanthus* Long-spine porcupinefish	sp	Not exploited
Lutjanus synagris Lane snapper	dsh	Not assessed	*Chaceon ramosae* Royal crab	dsl	Not exploited
Arius grandicassis Thomas sea catfish	dsh	Not assessed	*Decapterus tabl* Roughear scad	sp	Not exploited
Lutjanus analis Mutton snapper	dsh	Not assessed	*Merluccius hubbsi* Argentine hake	dsl	Not exploited
Cynoscion jamaicensis Jamaica weakfish	dsh	Not assessed	*Maurolicus stehmanni* Marine hatchefish	sp	Not exploited
Romboplites aurorubens Vermilion snapper	dsh	Not assessed	*Lophius gastrophysus* Blackfin goosefish	dsl	Not exploited **
Ctenosciaena gracilicirrhus Barbel drum	dsh	Not exploited	*Thyrsitops lepidopoides* White snake ackerel	dsl	Not exploited
Aristeus antillensis	dsl	Not exploited	*Lutjanus jocu*	dsh	Exhausted

Scientific name **Common name**	**Type (*)**	**Status**	***Scientific name*** **Common name**	**Type (*)**	**Status**
Purplehead gamba prawn			Dog snapper		
Aristaeopsis edwardsiana Scarlet gamba prawn	dsl	Not exploited	*Lutjanus vivanus* Silk snapper	dsh	Exhausted
Acantephyra eximia Deep-sea shrimp	dsl	Not exploited	*Lutjanus synagris* Lane snapper	dsh	Overexploited
Parasudis truculenta Longnose greeneye	dsl	Not exploited	*Lopholatilus villarii* Tile fish	dsl	Overexploited
Chaceon spp. Deepsea crabs	dsl	Not exploited	*Lutjanus analis* Mutton snapper	dsh	Overexploited
Upeneus parvus Dwarf goatfish	dsl	Not exploited	*Ocyurus chrysurus* Yellowtail snapper	dsh	Overexploited
Arius parkeri Gillbacker sea catfish	dsh	Exhausted	*Rhomboplites aurorubens* Vermilion snapper	dsh	Overexploited
Lutjanus purpureus Southern red snapper	dsh	Exhausted			
Cynoscion acoupa Acoupa weakfish	dsh	Exhausted	**South Region**		
Macrodon ancylodon King weakfish	dsh	Exhausted	*Illex argentinus* Argentine shortfin squid	dsl	Not assessed
Dasyatis guttata Longnose stingray	dsl	Exhausted	*Zenopsis conchifera* Silvery John dory	dsl	Not assessed
Scomberomorus brasiliensis Serra Spanish mackerel	mp	Exhausted	*Loligo sanpaulensis* Sao Paulo squid	dsh	Not assessed
Sphyrna tiburo Bonnethead	dsh	Exhausted	*Opisthonema oglinum* Atlantic thread herring	sp	Not assessed
Rhizoprionodon porosus Caribbean sharpnose shark	dsh	Exhausted	*Helicolenus lahillei* Demersal fish (local name: Sarrão)	dsl	Not assessed
Carcharhinus acronotus Blacknose shark	mp	Exhausted	*Mugil platanus* Mullet	sp	Not assessed
Carcharhinus porosus Smalltail shark	mp	Exhausted	*Engraulis anchoita* Argentine anchoita	sp	Not exploited
Isogomphodon oxyrhynchus Daggernose shark	dsh	Overexploited	*Selene setapinnis* Atlantic moonfish	sp	Overexploited
Sphyrna lewini Scalloped hammerhead	lp	Overexploited	*Urophycis brasiliensis* Brazilian codling	dsh	Exhausted
			Urophycis mystacea Deepsea codling	dsh	Exhausted
			Pomatomus saltatrix Bluefish (Southeast & South)	sp	Exhausted
Northeast Region			*Katsuwonus pelamis* Skipjack tuna	lp	Exhausted
Seriola dumerili Greater amberjack	dsh	Not assessed	*Prionotus punctatus* Bluewing searobin	dsh	Exhausted
Lopholatilus villarii Tile fish	dsl	Not assessed	*Artemesia longinaris* Argentine stiletto shrimp	dsh	Exhausted
Haemulon plumieri Grunt	dsh	Not assessed	*Pleoticus muelleri* Argentine red shrimp	dsh	Exhausted
Mustelus canis Dusky smooth-hound	dsl	Not assessed	*Umbrina canosai* Argentine croaker	dsh	Exhausted
Farfantepenaeus sp. Shrimp (local name: camarão-rosa)	dsh	Not assessed	*Trachurus lathami* Rough scad	sp	Exhausted
Chaceon sp. Deepsea crab	dsl	Not assessed	*Loliglo plei* Slender inshore squid	dsh	Exhausted
Rochinia crassa Spiny crab	dsl	Not assessed	*Merluccius hubbsi* Argentine hake	dsl	Exhausted
Epinephelus niveatus Snowy grouper	dsl	Not assessed	*Chloroscombrus crysurus* Atlantic bumper	sp	Exhausted

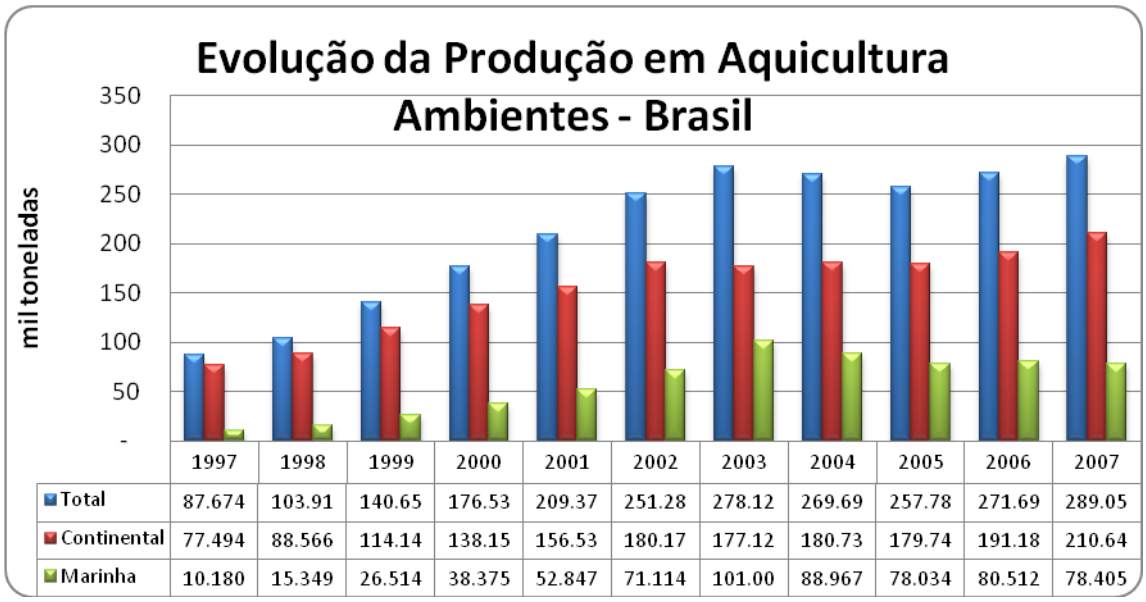
Scientific name **Common name**	**Type (*)**	**Status**	***Scientific name*** **Common name**	**Type (*)**	**Status**
Caranx latus Horse-eye jack	sp	Not assessed	*Cynoscion jamaicensis* Jamaica weakfish	dsh	Exhausted
Mycteroperca bonaci Black grouper	dsh	Not assessed	*Octopus cf. vulgaris* Common octopus	dsh	Exhausted
Rhizoprionodon porosus Caribbean sharpnose shark	dsl	Not assessed	*Netuma spp.* Sea catfish	dsh	Overexploited
Squalus asper Roughskin spurdog	dsl	Not assessed	*Squatina guggenheim* Angular angel shark	dsh	Overexploited
Squalus megalops Shortnose spurdog	dsl	Not assessed	*Squatina occulta* Hidden angel shark	dsh	Overexploited
Squalus mitsukurii Shortspine spurdog	dsl	Not assessed	*Galeorhinus galeus* Tope shark	dsl	Overexploited
Hemiramphus brasiliensis Ballyhoo	sp	Underexploited	*Rhinobatus horkelli* Shark (local name: cação-viola)	dsh	Overexploited
Carangoides crysos Blue runner	sp	Underexploited	*Mustelus schmitti* Narrownose smooth-hound	dsh	Overexploited
Carangoides bartholomaei Yellow jack	sp	Underexploited	*Farfantepenaeus brasiliensis* Red spotted shrimp	dsh	Overexploited
Haemulon arolineatum Tomtate grunt	dsh	Underexploited	*Farfantepenaeus paulensis* Sao Paulo shrimp	dsh	Overexploited
Pseudupeneus maculates Spotted goatfish	dsh	Underexploited	*Xiphopenaeus kroyeri* Atlantic seabob	dsh	Overexploited
Scomberomorus cavalla King mackerel	mp	Exhausted	*Chaceon ramosae* Royal crab	dsl	Overexploited
Lutjanus jocu Dog snapper	dsh	Exhausted	*Chaceon notialis* Red crab	dsl	Overexploited
Lutjanus vivanus Silk snapper	dsh	Exhausted	*Umbrina canosai* Argentine croaker	dsh	Overexploited
Opisthonema oglinum Atlantic thread herring	sp	Exhausted	*Polyprion americanus* Wreckfish	dsh	Overexploited
Scomberomorus brasiliensis Serra Spanish mackerel	mp	Exhausted	*Micropogonias furnieri* Whitemouth croaker (SE & S)	dsh	Overexploited
Hyporhamphus unifasciatus Common halfbeak	sp	Overexploited	*Paralichthys patagonicus* Patagonian flounder	dsh	Overexploited
Lutjanus synagris Lane snapper	dsh	Overexploited	*Pogonias cromis* Black drum	dsh	Overexploited
Lutjanus analis Mutton snapper	dsh	Overexploited	*Pagrus pagrus* Common seabream (SE & S)	dsh	Overexploited
Lutjanus chrysurus Yellowtail snapper	dsh	Overexploited	*Lapholatilus villarii* Tile fish	dsl	Overexploited
Panulirus laevicauda Smoothtail spiny lobster	dsh	Overexploited	*Trichiurus lepturus* Largehead hairtail	sp	Overexploited
Panulirus argus Caribbean spiny lobster	dsh	Overexploited	*Ballistes capriscus* Grey triggerfish	dsh	Overexploited
Lutjanus purpureus Southern red snapper	dsh	Overexploited	*Lophius gastrophysus* Blackfin goosefish	dsl	Overexploited
Hirundichthys affinis Fourwing flyingfish	sp	Overexploited	*Cynoscion guatucupa* Stripped weakfish	dsh	Overexploited
			Macrodon ancylodon King weakfish (Southeast & South)	dsh	Overexploited
			Sardinella brasiliensis Brazilian sardinella	sp	Overexploited
			Euvola ziczac Zigzag scallop	dsh	Overexploited

* Type of marine organism: lp = large pelagic organism; dsl = demersal organism (continental slope); dsh = demersal organism (continental shelf); sp = small pelagic organism; mp = medium pelagic organism (coastal pelagic environment). ** As noted in the previous text, this species has since become overexploited.

Source: Brazil, Ministry of the Environment. 2006. REVIZEE Program – Executive Report: Assessment of the sustainability potential of the living resources in the Brazilian Exclusive Economic Zone [*Programa REVIZEE – Relatório Executivo: Avaliação do potencial sustentável de recursos vivos na Zona Econômica Exclusiva do Brasil*].

To enhance and complement the monitoring activities currently carried out by ICMBio's specialized centers (see section 1.2.1), the Ministry of the Environment, IBAMA and the recently (2009) created Ministry of Fisheries and Aquaculture have been discussing and adopting measures to control fisheries activities, with significant community participation. This participatory management process is implemented through a shared management system (currently being regulated), which operates primarily through advisory councils, such as the already established management committees for the sustainable use of the Brazilian sardinella and lobsters.

Aquaculture and mariculture can contribute significantly not only to fisheries production, but also to social and economic development and food security. Nevertheless, the sustainability of these activities depend on careful planning based on solid environmental, social and economic criteria for the establishment of these activities to prevent and/or reduce social and environmental impacts. In Brazil, aquaculture production (Figure I-6) increased 329.7% from 1997 (87,674 tons) to 2007 (289,050 tons).



	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Total	87.674	103.91	140.65	176.53	209.37	251.28	278.12	269.69	257.78	271.69	289.05
Continental	77.494	88.566	114.14	138.15	156.53	180.17	177.12	180.73	179.74	191.18	210.64
Marinha	10.180	15.349	26.514	38.375	52.847	71.114	101.00	88.967	78.034	80.512	78.405

Figure I-6: Evolution of aquaculture production in Brazil between 1997 and 2007. Source: IBAMA, 2009. Estatística da pesca 2007 Brasil: grandes regiões e unidades da federação. Brasília – Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis.

The Ministry of Fisheries and Aquaculture (MPA – *Ministério da Pesca e Aquicultura*) prepared a Plan for Aquaculture Development [14] (2008-2011) defining actions and principles for the sustainable development of aquaculture, to be implemented in aquaculture areas and parks: aquaculture areas are individual sites in public areas or waters granted to

[14] Ministry of Fisheries and Aquaculture, 2010 – Internal Report.

the use of individuals or legal entities; while aquaculture parks are groups of several aquaculture areas within an organized economic or production context. The Plan foresees support to production activities in salt water and freshwater of the production chains for mollusks, freshwater species and native species (Table I-11), including the establishment of demonstrative units, and support to the commercialization infrastructure.

Table I-11: Main native species in Brazilian aquaculture

Common name	Scientific name
Tambaqui	*Colossoma macropomum*
Pacu	*Piaractus mesopotamicus*
Round hybrids (tambacu, tambatinga, etc.)	
Pintado	*Pseudoplatystoma corruscans*
Piau	*Leporinus steindachneri*
Jundiá	*Rhamdia quelen*
Pirarucu	*Arapaima gigas*
Beijupirá	*Rachycentrum canadum*
Oysters	*Crassostrea*
Vieiras	*Nodpectem nodosus*
Seaweed	*Gracillaria, Hypnea*
Mussels	*Perna perna*

Source: Ministry of Fisheries and Aquaculture – MPA (*Ministério da Pesca e Aquicultura*), 2010 – Internal Report.

The Plan's principles for sustainable aquaculture are: (i) support to the control of diseases in aquatic animals; (ii) quality and safety control of aquaculture products; and (iii) territorial planning and regularization for aquaculture (including plans for the development of local shrimp production; territorial planning for freshwater aquaculture; promotion of family aquaculture in rural areas; mariculture; and development of coastal communities).

Nevertheless, it is worth noting that aquaculture actions may cause relevant impacts if environmental laws and directives are not followed (see section 1.3.3).

1.2.2. Species diversity

Status of Knowledge on Brazil's Biodiversity

The Ministry of the Environment supported a study to assess the status of knowledge on Brazil's biodiversity and the current technical capacity to improve and maintain this knowledge[15]. The results published in 2006 indicate that, considering possible taxonomic review needs, at least 103,870 animal species and 43,020 plant species are known to occur in Brazil (Table I-12). On average, 700 new animal species are recognized per year in Brazil. From 1985 to 1999, 395 field zoological inventories were carried out in all Brazilian biomes, 103 of which in the Amazon. However, current installed taxonomic capacity is insufficient to analyze the existing biological materials in Brazilian collections at the pace necessary to update scientific information on national biodiversity. For example, only 7,302

[15] Brazil, Ministry of the Environment. Lewinsohn, T., Coordinator. 2006. Assessment of the Status of Knowledge on Brazilian Biodiversity [*Avaliação do Estado do Conhecimento da Biodiversidade Brasileira*], Volumes I and II. Biodiversity Series n° 15.

Brazilian animal species are scientifically described, even though biological materials in zoological collections suggest that 120,384 animal species are known in the country.

Table I-12: Estimated number of known species in Brazil and in the world (2006).

Kingdom / Phylum	Estimated number of known species	
	Brazil	World
VIRUS	**310-410**	**3,600**
MONERA (Bacteria & Archaea)	**800-900**	**4,310**
FUNGI	**13,090-14,510**	**70,600-72,000**
PROTOCTISTA	**7,650-10,320**	**76,100-81,300**
PLANTAE	**43,020-49,520**	**263,800-279,400**
ANIMALIA	**103,870-137,080**	**1,279,300-1,359,400**
Invertebrates	96,660-129,840	1,218,500-1,289,600
Vertebrates	7,210-7,240	60,800
TOTAL	**168,730-212,740**	**1,697,600-1,798,500**

Source: Brazil, Ministry of the Environment. Lewinsohn, T., Coordinator. 2006. Assessment of the Status of Knowledge on Brazilian Biodiversity [*Avaliação do Estado do Conhecimento da Biodiversidade Brasileira*], Volumes I and II. Biodiversity Series n° 15.

The NGO Conservation International published in 2009, in partnership with the Feira de Santana State University (UEFS), a book on the rare Brazilian plants[16], listing 2,291 exclusively Brazilian phanerogamous plants of punctual distribution, representing 108 families. Of these, five families include more than 100 rare species each in Brazil: Leguminosae (190), Melastomataceae (120), Asteraceae (109), Eriocaulaceae (109), and Bromeliaceae (107). On the other hand, 21 families hold only one rare species each, and 61 families present up to 10 rare species. The family Turneraceae was highlighted by the authors for its large proportion of rare species, as 60% of its Brazilian species were identified as rare, which corresponds to approximately one fourth of all Turneraceae species. Among the 177 plant families assessed in this book 11 are little represented in the country (less than 100 species) and at least one fifth of five other families (Lythraceae, Velloziaceae, Malpighiaceae, Cactaceae, and Verbenaceae) were also defined as rare. This book also points out that most of the rare species are located in high altitude fields of Minas Gerais, Bahia and Goiás states, with a high concentration of punctual endemisms also found in the Atlantic Forest.

The Rio de Janeiro Botanical Garden (JBRJ) recently published (in 2010) a comprehensive Catalogue of the Brazilian Flora[17]. This Catalogue is a re-edition of Martius' Flora Brasiliensis, one hundred years after the publication of this work, which was previously the most complete compendium of Brazilian plant species. The new publication presents extensive information on currently known species, including their threatened status. Up to now, 32,269 accepted taxa have been included in the catalogue, representing 517 families and 4,124 genera. Of these 32,269 taxa, 1,576 are bryophytes; 1,229 are pteridophytes; 2,752 fungi; and 26,837 phanerogamous plants. The list was revised by approximately 150 experts at national and international institutions.[18]

[16] Conservation International, 2009. Plantas Raras do Brasil. Ana Maria Giulietti, Coordinator. Belo Horizonte, MG. 496pp.
[17] http://floradobrasil.jbrj.gov.br/2010/
[18] Forzza, R.C. and Leitman, C. 2009. A elaboração da lista do Brasil: metodologia e resultados parciais. Symposium presentation at the 60th National Botany Congress, Salvador-BA, Brazil.

Threatened species

An assessment of Brazilian threatened animal species was conducted in 2006[19] based on information provided by approximately 600 consultants who contribute to the IBAMA Advisory Committees on Threatened Species, NGO Fundação Biodiversitas, and IUCN information on threatened species from 1982 to 2006. The animal groups evaluated by this assessment included mammals, birds, reptiles, amphibians, insects (butterflies, beetles, bees, ants, and dragonflies), arachnids, myriapods, and gastropods. By 2003, the official lists indicated 395 threatened animal species in Brazil (Table I-13), over 200 of these in the Atlantic Forest.

Table I-13: Evolution of the Official Lists of Brazilian Threatened Species

Group	**Administrative Ruling IBDF nº 303 of 29 May 1968**	**Administrative Ruling IBDF nº 3481 of 31 May 1973**	**Administrative Ruling IBAMA nº 1522 of 19 Dec 1989**	**Normative Instruction MMA nº 03 of 22 May 2003**	**Estimated trend for 2010:** Optimistic Intermediary Pessimistic
Mammals	18	28	67	69	70 / 70 / 70
Birds	22	53	109	160	179/185.5/192
Reptiles	2	3	9	20	24/25.5/27
Amphibians	-	-	1	16	22/ 23.5 / 25
Insects	-	1	29	89	112/119/127
Terrestrial invertebrates	-	-	30	130	168/180/193
TOTAL	**42**	**85**	**219**	**395**	**574/604/633**

Source: Mello, R., Soavinsky, R., and Marini Filho, O., 2006. Status of the Brazilian Fauna Threatened with Extinction.

A general increasing trend in the number of threatened species can be observed for most groups (Table I-14 and Figure I-7), although it must be kept in mind that the methodology applied to prepare these lists has evolved, and the scientific knowledge on Brazilian biodiversity and the threatened status of its elements increased significantly since the official list was first published. If current trends continue, the total number of threatened animal species should reach 604 by 2010 and 744 by 2020.

Table I-14: Rate of species added to the official threatened species lists.

Group	**Period**			**Trend**	**Estimated rate 2010:** Optimistic Intermediary Pessimistic
	1968-1973	**1973-1989**	**1989-2003**		
Mammals	2.0	2.4	0.1	<	0.1 / 0.1 / 0.2
Birds	6.2	3.5	3.6	=	2.7 / 3.6 / 4.6
Reptiles	0.2	0.4	0.8	>	0.6 / 0.8 / 1.0
Amphibians	0	0.1	1.1	>	0.8 / 1.1 / 1.3
Insects	0.2	1.8	4.3	>>	3.2 / 4.3 / 5.4

[19] Mello, R., Soavinsky, R., and Marini Filho, O., 2006. Status of the Brazilian Fauna Threatened with Extinction [*Estado da Fauna Brasileira Ameaçada de Extinção*]: Powerpoint presentation to the MMA 2006 Workshop to Define the National Biodiversity Targets for 2010.

Terrestrial invertebrates	0	1.9	7.1	>>	5.4 / 7.1 / 8.9
Total	**8.6**	**8.4**	**12.6**	>	**9.4 / 12.6 /15.7**

Source: Mello, R., Soavinsky, R., and Marini Filho, O., 2006. Status of the Brazilian Fauna Threatened with Extinction.

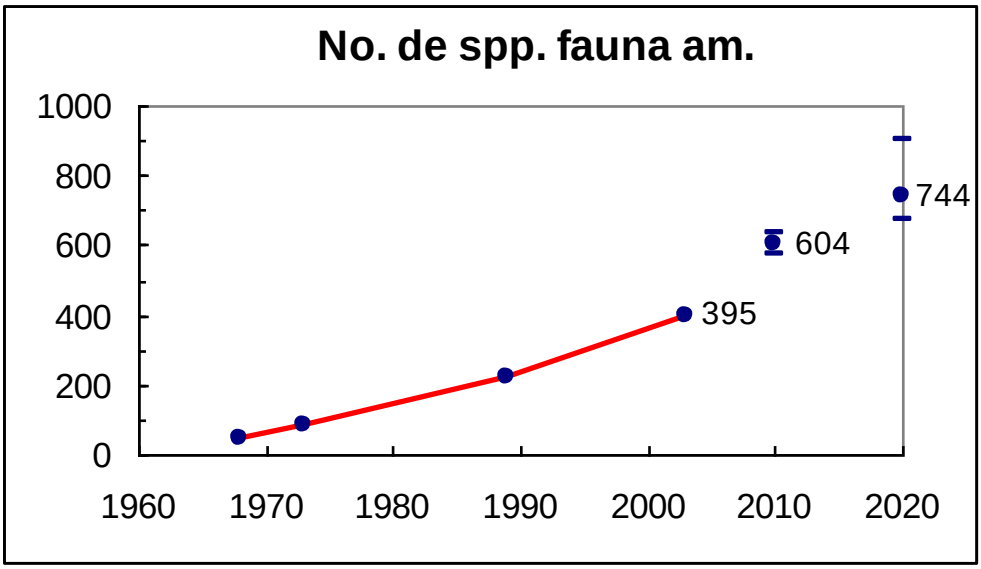


Figure I-7: Trend of officially recognized threatened species. Source: Mello, R., Soavinsky, R., and Marini Filho, O., 2006. Status of the Brazilian Fauna Threatened with Extinction.

Loss of habitat is by far the most important cause driving species towards a threatened status (Table I-15), which reinforces the importance of Brazil's investments in significantly increasing the number and extension of protected areas in all biomes.

Table I-15: Primary drivers of threat to the Brazilian fauna.

Drivers of threat	**Amazon (N=34 spp.)**	**Cerrado (N=36 spp.)**	**Pantanal (N=20 spp.)**	**Caatinga (N=7 spp.)**	**Pampas (N=19 spp.)**	**Atlantic Forest (N=34 spp.)**	**Coastal & Marine (N=34 spp.)**	**Total N° of species affected**
Loss of habitat (breeding, migration, etc.)	22 65%	26 72%	17 85%	4 57%	16 84%	96 53%	9 26%	**190** **30.1%**
Habitat degradation & ecological unbalance (development, highways, fire, pollution, settlements)	5 15%	10 28%	7 35%	0	3 16%	62 34%	21 62%	**108** **17.1%**
Lack of knowledge	18 53%	16 44%	7 35%	2 29%	2 11%	40 22%	8 24%	**93** **14.7%**
Hunting for consumption, incidental	8 24%	8 22%	8 40%	1 14%	2 11%	19 10%	23 68%	**69** **10.9%**

capture, conflicts with humans.								
Population fragmentation or isolation & genetic issues	1 3%	4 11%	1 5%	0	1 5%	54 30%	2 6%	**63** **10.0%**
Lack of protected areas	3 9%	8 22%	2 10%	0	13 68%	14 8%	5 15%	**45** **7.1%**
Capture for trade (pets, skins, art, etc.)	4 12%	4 11%	4 20%	1 14%	3 16%	16 9%	0	**32** **5.1%**
Invasive species, diseases, competition, hybridization	0	1 3%	1 5%	0	0	7 4%	16 47%	**25** **4.0%**
Climate change	1 3%	0	0	0	0	0	5 15%	**6** **1.0%**

Source: Mello, R., Soavinsky, R., and Marini Filho, O., 2006. Status of the Brazilian Fauna Threatened with Extinction.

IBGE published several maps with the geographical location of the Brazilian threatened animal species, according to the 2004 official threatened species list[20]. The maps available for download include: (i) mammals, reptiles and amphibians; (ii) birds; (iii) insects and other terrestrial invertebrates; and (iv) aquatic invertebrates and fish.

Seven plant species are considered completely extinct in Brazil, and two others are presumably extinct in nature. Although lists of threatened plant species are not prepared with the same frequency as the lists for animal species, expert botanists estimate that in 2005 a total of 1,537 plant species were threatened in Brazil (Table I-16). However, since reliable information is not currently available on most of these, the official list of threatened plants (MMA Normative Instruction n°6, of 23 September 2008) recognizes this status for 472 species, and indicates 1,079 other as insufficiently known species of high priority for research.

Table I-16: Number of possibly threatened plant species in the Brazilian biomes

Biome	**Number of threatened plant species (2005)**
Amazon	65
Pantanal	10
Cerrado	563
Caatinga	165
Atlantic Forest	727
Pampa	66
Total	1,596

Source: Drummond, G.M (2006) and Drummond & Martins (2005), in: Brazil, MMA. 2006. Final Report of the Workshop to Define the National Biodiversity Targets for 2010, presented to the 20th Ordinary Meeting of the National Biodiversity Commission (in Portuguese).

Status of Coastal and Marine Biodiversity

The Coastal and Marine Zone spreads over approximately 4.5 million km^2 under Brazil's jurisdiction, named by the Inter-ministerial Commission on Marine Resources as the "Blue

[20] http://www.ibge.gov.br/mapas_ibge/tem_fauna.php

Amazon", along a 7,400 km coastline. Brazil also harbors the largest continuous stretch of mangroves in the world (1.3 million hectares) and the only reef environments of the South Atlantic, distributed along 3,000 km of the northeastern coast.

Most of the reef-forming coral species are endemic to Brazilian waters, contributing to the formation of structures that are not found anywhere else in the world. As in other parts of the world, coral reefs in Brazilian waters have been undergoing a rapid degradation process due to the impact of human activities. Such activities range from coral harvesting, overexploitation and predatory fisheries, and uncontrolled tourism, to impacts from coastal activities, such as coastal development and occupation, pollution from solid and toxic wastes, and inadequate soil use – deforestation and forest fires along water courses, resulting in high sediment loads being dumped in coastal zones[21].

In addition to the rich reef environments and large variety of fisheries resources (see below), the Brazilian coastal and marine zone is home to a vast diversity of species of mammals, birds and cheolonids, including 43 registered cetacean species, one sireniad, seven pinnipeds, approximately 100 registered resident and migratory birds, and five of the seven existing sea turtle species. A study[22] carried out by NGO The Nature Conservancy and the Ministry of the Environment based on extensive regional consultations with experts identified the main threats (see section 1.3) to coastal and marine Brazilian ecosystems and biodiversity, as well as 608 priority areas for conservation, of which 145 (14,841,200 hectares) in the coastal zone and 22 (19,633,200 hectares) in the marine environment are considered candidates for the creation of new protected areas with varying degrees of protection. The definition of these priority areas took into account the 239 conservation targets identified by the same study, comprised of 85 coastal ecosystems, 55 marine ecosystems, and 99 coastal and marine species or taxa.

One of the most efficient instruments for recovering fish stocks is the designation of marine protected areas (Figure I-8). Some Brazilian reefs are protected by integral protection or sustainable use marine protected areas. Currently, however, Brazil has only 3.14% of its coastal and marine area (comprised of the coastal zone, territorial sea and Exclusive Economic Zone) in protected areas and is applying efforts to achieve 10% under protection by 2012. Under the Brazilian Coral Reefs Conservation Program, the Ministry of the Environment has been leading and encouraging initiatives to establish a network for the protection of corals, among which: the publishing of the Atlas of Coral Reefs in Brazilian Protected Areas[23]; the campaign for responsible conduct in reef environments; the National Coral Reef Monitoring Program[24]; and the Living Coral Project[25], with research objectives.

[21] Brazil. Ministry of the Environment/Chico Mendes Institute for Biodiversity Conservation, 2008. Brazilian Coastal and Marine Biodiversity: International Year of the Reef.
[22] The Nature Conservancy, 2007. Priorities for Coastal and Marine Conservation in South America. Anthony Chatwin, Ed. 76pp.
[23] http://www.ambientebrasil.com.br/composer.php3?base=./snuc/index.html&conteudo=./snuc/atlas/atlas.html
[24] This program started in 2001 and applies the Reef Check methodology. The program is coordinated by the Federal University of Pernambuco (UFPE) and executed by the Coral Reefs Institute (*Instituto Recifes Costeiros - IRCOS*) and funded by the Ministry of the Environment.
[25] Project coordinated by the National Museum (UFRJ) with funding from Petrobras. The Ministry of the Environment is a member in the project's Management Council.

Additionally, other projects developed at the local level contribute to research, education and the conservation of coral reefs in Brazil, such as: the establishment/replication of reef recuperation areas along the Costa dos Corais Environmental Protection Area by CEPENE / ICMBio; reef recuperation initiatives developed by Conservation International Brazil (CI) with ICMBio at the Corumbau Extractive Reserve; and Pró-Abrolhos Project, leaded by the University of São Paulo, with the participation of the Federal University of Bahia and CI, with resources from CNPq/MCT.

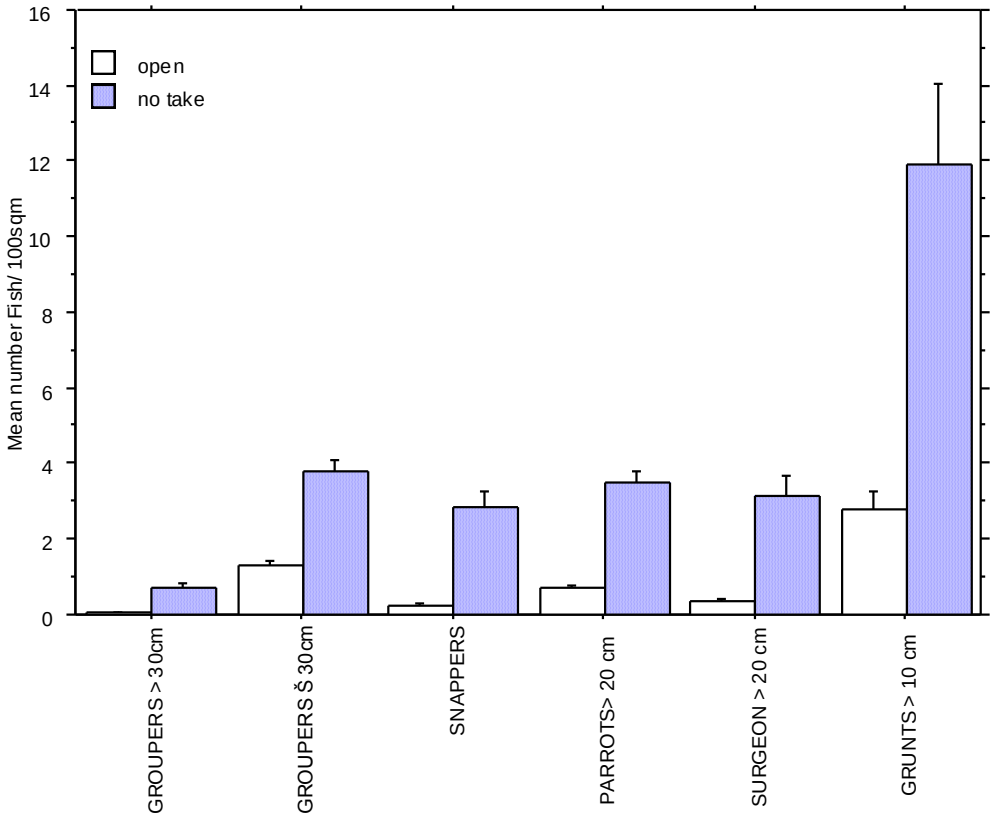


Figure I-8: Mean abundance of fish per 100 m^2 inside fished (open) and non-fished (no-take) areas. Data from the National Coral Reef Monitoring Program, MMA/IRCOS/UFPE 2002-2008.

To enhance protection of its important mangrove coastline, Brazil is beginning implementation of the Project for the Effective Conservation and Sustainable Use of Mangrove Ecosystems in Protected Areas (GEF-Mangrove), with support from the GEF. This project aims at developing and strengthening a network of mangrove protected areas; implementing ecosystem management principles to fisheries in mangrove areas; coordinating the territorial planning instruments with protected area management; and disseminating the value and ecological functions of mangroves. Estimates indicate that approximately 25% of the Brazilian mangroves have already been destroyed, mostly by aquaculture ventures and coastal development. This project intends to build the basis for improving, in the long term, the conservation and sustainable use of mangroves in the country.

The REVIZEE Report[26], which assessed the sustainability potential of Brazilian living marine resources, informs that a large portion of the Brazilian Economic Zone is characterized by the low concentration of nutrients in its waters and by low productivity. Thus, despite its great extension, the EEZ does not offer the necessary conditions for the existence of significant fisheries resources. Some fish stocks were identified as potential resources although different limiting factors must be considered. The North Region presents a potential for increasing capture of snapper (*Lutjanus synagris*), barbell drum (*Ctenosciaena gracilicirrhus*), dwarf goatfish (*Upeneus parvus*), and sea catfish (*Arius grandicassis*). However, fishing these species may lead to high incidental capture of other species, whose stocks are already severely depleted. The deep-sea shrimps (*Aristeopsis edwardsiana* and *Aristeus antillensis*) occur in specific areas at depths from 700 to 800 meters. These resources are extremely sensitive to exploitation, requiring strong control of fishing activities to avoid their rapid depletion. The longnose greeneye (*Parasudis truculenta*) presented its highest abundance off the coast of Amapá state, at depths varying between 300 and 750 meters. This species is not currently targeted by fisheries activities in this region.

In the Northeast Region the greater amberjack (*Seriola dumerili*) is an abundant species throughout the region, but the population parameters, stock status, and sustainable threshold for its capture have not yet been determined. Surveys using bottom long-line indicated the following species as potential resources, though with low yields: *batata* (*Lopholatilus villarii*); snowy grouper (*Epinephelus niveatus*); sharks of the genus *Squalus*, and dusky smooth-hound (*Mustelus canis*), which are deep water, low temperature species characterized by their low reproductive potential. The forecast of low yields suggest that these resources may be exploited as an alternative to artisanal fisheries only, given their individual economic value. The catch of blackfin tuna (*Thunnus atlanticus*) may be expanded throughout the region. However, the recreational oceanic fishing of this species should also be taken into account, as this activity adds to commercial fishing to affect the stocks. The stock of ballyhoo (*Hemiramphus brasiliensis*) is still under-exploited. However, it is recommended that any increase in fishing activities be accompanied by measures promoting the increase of length at first capture.

In the Central Region, the results clearly indicated the availability of large-size pelagic resources, with the swordfish (*Xiphias gladius*) being the most notable and accessible for small local artisanal vessels equipped with surface long-lines. Among the small pelagic species identified, only the roughear scad (*Decapterus tabl*) may be considered as a potential resource in the region of oceanic banks. In the Southeast-South, the Atlantic thread herring (*Opisthonema oglinum*) and the Atlantic moonfish (*Selene setapinnis*) were identified as under-exploited species. However, the analysis of the historical landing data indicates that the biomass of these stocks is not significant. The Argentine anchoita (*Engraulis anchoita*) occupies the continental shelf in considerable abundance in the southern edge, and is moderately abundant in the southeast. Its broad distribution and ease

[26] Brazil, Ministry of the Environment. 2006. REVIZEE Program – Executive Report: Assessment of the sustainability potential of the living resources in the Brazilian Exclusive Economic Zone [*Programa REVIZEE – Relatório Executivo: Avaliação do potencial sustentável de recursos vivos na Zona Econômica Exclusiva do Brasil*].

of capture make this species an important resource, although still with no use in Brazil. The Argentine squid (*Illex argentinus*) is a potential resource. However, its abundance varies sharply both seasonally and from one year to the next, which means that fishing this species may not be economically viable.

Concerning the main living resources already exploited, it was found that, in most cases, there is no possibility of increasing production by intensifying fishing activities. The stocks identified as promising still require a more precise definition of their production potential. The prospect of increasing production is limited, and will also be conditioned to conservation strategies of planning and regularization. Thus, as a rough estimate, it may be concluded that the group of stocks presenting some production potential, and which were evaluated by the REVIZEE Program, represent a minor contribution to the national marine extractive production. Only the Argentine anchoita presents a significant potential for commercial use, if the problems of on-board conservation and available markets are solved. On average, an annual production approaching 100,000 tons may be estimated, although with probable significant seasonal and year-to-year variations.

The REVIZEE Program led to increased knowledge on marine biodiversity and species richness, both along and off the Brazilian coast. By 2006, 14 new fish species and around 50 new benthic species were described, and the occurrence of approximately 130 species and genera, and ten families of benthic organisms was recorded, which were still unknown to Brazil and/or the South Atlantic Ocean.

1.2.3. Genetic resources

In 1995, when the first National Report on the State of Plant Genetic Resources for Food and Agriculture was prepared, Brazil had just joined the World Trade Organization (WTO) and ratified the CBD. Back then, most of the legislation related to access to and movement of genetic resources was still under discussion. Some of the older laws, such as those concerning plant health or environment, were since included into Brazil's legal framework. Today, Brazil has a number of control mechanisms, with which any intended use of genetic material, native and alien alike, must comply. Thus, the use of plant genetic resources – understood as import, export, research and development – is especially regulated by legislation governing the following aspects: phytosanitary, environmental, access and benefit-sharing, and intellectual property.

Despite harboring approximately 18% of the global plant diversity, Brazil's agriculture and food security are, to a great extent, completely dependent on the introduction of genetic resources from other countries. Nevertheless, several Brazilian native species are important human foods of regional and local relevance, such as cassava, pineapple, peanuts, cocoa, cashew, cupuassu, passion fruit, Brazil nut, guarana, jabuticaba, and assai, among others. Additionally, native forage species support a good part of the national livestock sector and,

more recently, native medicinal and ornamental plants have been increasingly valued in Brazilian agribusiness context[27].

Genetic resources are crucial for breeding programs. Over the last decade, Brazil has achieved significant results in agriculture-related research thanks to a heightened investment in science and technology. New cultivars and varieties adapted to the various climatic conditions of the vast national territory have allowed substantial progress in food production, increasing agricultural production as a result of increased yield, without a significant expansion of the growing area. Breeding programs account for the production of materials with higher resistance to different conditions.

Conservation of agrobiodiversity[19]

The National System of Agricultural Research (SNPA – *Sistema Nacional de Pesquisa Agropecuária*), under EMBRAPA's coordination, is composed by public federal and state institutions, universities, private companies, and foundations that conduct cooperative research in different geographic areas and scientific knowledge fields. Since its establishment, EMBRAPA (Brazilian Agricultural Research Corporation) was entrusted with the duty of promoting and making possible the safe introduction of genetic resources considered strategic for the country. EMBRAPA Genetic Resources and Biotechnology, one of EMBRAPA's 39 Research Centers, coordinates genetic resources conservation activities through a broad system known as National Genetic Resources Platform. Between 1976 and 2007, the Germplasm Exchange and Quarantine System dealt with over 500,000 samples, of which over 400,000 were imported from all over the world. This System feeds a network of 350 Germplasm Banks as well as a Base Collection (long term conservation) composed of 212 genera, 668 species, and over 107,000 accessions. The Campinas Agronomic Institute, for example, initiated the organization of its collections in the 1930's and today conserves approximately 32,543 samples of 5,104 plant species, making this institution one of the main keepers of germplasm in Brazil. This whole system provides support to hundreds of public and private genetic breeding programs developed across Brazil. The Germplasm Bank network and the Base Collection currently keep these assets in cold chambers, on farm and *in vitro*. EMBRAPA created its curatorial system in the early 1980's. Over the last decade, this system has been improved to define, systematize, and integrate all indispensable activities for germplasm management, conservation and use. By 2008, there were 38 Product or Product Group Curators; 35 Assistant Curators; 111 Germplasm Bank Curators; and *Ad Hoc* Curators, in a total of approximately 200 people involved in germplasm curatorial activities. The establishment of Core Collections in Brazil has been prioritized by EMPRAPA Genetic Resources and Biotechnology which, during the first stage based on partnerships, created cassava, maize and rice Core Collections. Following this experience, other Core Collections will be considered.

The knowledge of potentially useful genes and their incorporation into elite cultivars has been very important to foster the use of genetic resources and broaden the genetic base for breeding programs. Research involving germplasm prospection, conservation and

[27] Brazil, 2009. State of the Brazil's plant genetic resources: Second Report on the Conservation and Sustainable Utilization for Food and Agriculture. Organizers: Arthur S. Mariante, Maria J.A. Sampaio, and Maria C.V. Inglis. Report to FAO, 163 pp.

characterization has become strategically important for Brazil. For vegetables, many efforts have been made to foster the efficient and effective use of the variability conserved in Germplasm Banks. Another important initiative is the Orygens project, based on a wide network of researchers from different public and private institutions in the country, which has the objective of promoting the use of current knowledge on the rice genome to develop more competitive cultivars. For maize, a relevant example was the Latin American Maize Project (LAMP), which involved 12 countries. Additionally, coffee pre-breeding programs have been developed for a number of years by the Campinas Agronomical Institute, yielding significant results for Brazil.

Pre-breeding activities have been conducted to select accessions with agronomic features and take advantage of the variability derived from natural crossings. Crop wild relatives are an extremely important part of Brazilian and global heritage as they developed, in the course of evolution, mechanisms allowing them to survive under extreme adverse conditions such as drought, flood, heat, cold, pest, and disease. In this context, within the PROBIO Project[28], the Brazilian Ministry of the Environment (MMA) pioneered the identification and mapping of land races varieties and wild relatives of some of the main crops grown in Brazil. This is a complex and uniquely important task, demanding the involvement of several sectors of Brazilian society. Seven subprojects involved some of the major crops in the country: cotton, peanuts, rice, cucurbits, cassava, maize, and peach-palm. Most of these wild relatives might either be included in the relevant crop improvement process as part of the primary gene pool, or become a new crop following the domestication process.

Also under PROBIO, MMA coordinated the identification of species of the Brazilian flora of current and potential economic value utilized at local and regional levels – the Plants for the Future project. This project was carried out from 2005 to 2007 with the following objectives: (i) prioritize new commercially underused species of the Brazilian flora, providing small farmers with possible uses; (ii) create new investment opportunities for entrepreneurs in the development of new products; (iii) identify the degree of utilization of and gaps in scientific/technological knowledge about locally and regionally used species; (iv) value biodiversity, clearly demonstrating to society the importance and possible uses of these resources; and (v) enhance food security, broadening previously available options. The outcomes of this project evidence its importance, as 755 species were prioritized: 255 from the south region, 128 from the southeast, 131 from the center-west, 162 from the northeast, and 99 from the north region.

Agrobiodiversity and traditional communities in the Amazon

Traditional communities in the Amazon, indigenous and other, have selected along their history an immense variety of plants for cultivation, and inclusion in their diet. Some examples of this variety are the over 140 varieties of 30 different species that are cultivated by the Khaiabi; the 49 varieties cultivated by the Ianomâmi; and the 17 cassava varieties, 14 banana varieties and 9 bean varieties cultivated by the rubber-tapers of the upper Juruá River. This diversity of cultivated plants allows better adaptation to the different

[28] PROBIO Project: the GEF-funded Project for the Conservation and Sustainable Use of Brazilian Biodiversity. Its first phase, PROBIO I, was carried out from 1996 to 2006.

environmental conditions, leading to the relative stability of local agriculture systems and supplying the local diversified demand for food and medicinal products, and other plant products for self consumption and commercialization.[29]

This agricultural biodiversity has a biological basis, but exists as a result of human action, and is therefore important both as genetic heritage and as cultural heritage. The diversity connected to individual cultigens is in several cases – e.g. cassava in the Amazon – connected to the cultural logic for plant production and management.

Although progress is being achieved, the *ex situ* conservation of this agrobiodiversity is still happening in a manner that is very dissociated from cultural and local contexts, often marginalizing interested local communities from the conservation processes. This conservation may be further enhanced if complemented with the *in situ* conservation carried out with the participation of local communities, according to the recommendations of the International Technical Conference on Plant Genetic Resources held in Leipzig (2006), which emphasized the need to conserve the gene flow among wild relatives of cultivated species.

Plant genetic resources

The country invested in infrastructure enhancement, capacity building and transfer of technologies to improve food security, and in activities to enrich genetic variability and ensure the conservation, evaluation, characterization, and documentation of plant genetic resources. Brazilian plant breeding is among the most efficient in the world and has made significant contributions to the development of a wide variety of crops adapted to tropical conditions. Additionally, germplasm collections have been carried out in all Brazilian biomes since the 1970's, both from natural populations and from rural producers, and some plants have been object of ongoing projects since then, such as pineapple, cotton, peanut, rice, sweet potato, cashew, yam, native forages (grasses and legumes), beans, cassava, maize, palms, peppers, rubber tree, various ornamentals, forest trees, and medicinal plants. New species and products are being sought as potential alternatives for the agricultural sector, especially in forestry but including native species that can be of great value for food security, through investigation and collection of native germplasm. Ultimately, it is expected that these initiatives will result in reduced or no dependence of the main economically important crops on foreign germplasm.[16]

Brazil's efforts to increase knowledge on national genetic resources include the identification of wild relatives and landrace varieties of various crops such as cucurbits, cotton, peanuts, rice, cassava, maize, and *pupunha*. Landraces contain genes that are potentially adaptable to specific environments and can greatly contribute to genetic breeding programs and ultimately to the adaptation of crops to the effects of climate change. In addition to these efforts and to the unprecedented increase in the number and extension of protected areas contributing to the *in-situ* conservation of biodiversity and genetic variability, *ex-situ* management is also extremely important to ensure the maintenance of

[29] Emperaire, L., 2005. A biodiversidade agrícola na Amazônia brasileira: recurso e patrimônio. *In*: Revista do Patrimônio Histórico e Artístico Nacional, nº 32/2005. Organização: Manuela Carneiro da Cunha. Publicada pelo IPHAN, Ministério da Cultura, Brasil.

genetic variability of native species, particularly in biomes other than the Amazon, where habitat fragmentation is significant, increasing the chances of genetic variability loss.

The country has also advanced in terms of biotechnology, with various projects currently being carried out by EMBRAPA for the molecular characterization of 22 species of peppers and sweet peppers, with the description of nine new species. Other work involves the use of markers to study *Heliconia*, *Ananas* and *Anthurium* species. Some species are well characterized, with 14 species and 1,353 samples analyzed for genetic variability in populations (Table I-17). EMBRAPA is also developing molecular markers for native species. Today, SSR markers have been developed for the characterization and studies on population genetics of 23 species: *Caryocar brasiliense* (pequi); *Copaifera langsdorffii* (copaíba); *Euterpe edulis* (heart of palm); *Swietenia macrophylla* (mahogany); *Caesalpinia echinata* (Brazil wood); *Capsicum spp.* (peppers and sweet peppers); *Cedrella fissilis* (cedar); *Ceiba pentandra* (sumauma); *Carapa guianensis* (andiroba); *Amburana cearense* (cerejeira); *Manilkara huberi* (massaranduba); *Symphonia globulifera* (anani); *Cocos nucifera* (coconut); *Araucaria angustifolia* (araucaria); *Hymenaea coubaril* (jatoba); *Bagassa guianensis* (tatajuba); *Jacaranda copaia* (parapara); *Dipteryx odorata* (cumaru); *Bactris gasipaes* (pupunha); *Annona crassiflora* (araticum); *Bertholletia excelsa* (Brazil nut); *Orbignya phalerata* (babassu); and *Ilex paraguariensis* (erva mate).[16]

Table I-17: Genetic variability of samples of species characterized using molecular markers.

Species	Common (local) name	N° of samples	Genetic variability (%)
Butia eriospatha	Butiá-da-serra	100	89.9
Clethra scabra	Caujuja	74	50.0
Dicksonia sellowiana	Xaxim	290	84.5*
Dorstenia tenuis	Figueirilha	66	83.7*
Dyckia distachya	Bromelia	100	40.0
Erythrina falcate	Corticeira	83	60.0
Ficus enormis	Figueira	48	60.0
Maytenus ilicifolia	Cancorosa	120	60.0
Myrocarpus frondosus	Cabreúva	49	50.0
Podocarpus lambertii	Pinheiro-bravo	106	92.5*
Sinningia lineate	Rainha-do-abismo	51	40.0
Trithrinax brasiliensis	Buriti	50	40.0
Zeyheria tuberculosa	Ipê felpudo	120	64.0
Bauhinia pulchella	Bauhinia	96	67.2

* Variability within populations.
Source: Brazil, EMBRAPA/Ministry of Agriculture, Livestock and Supply. 2009. State of the Brazil's plant genetic resources: Second Report on the Conservation and Sustainable Utilization for Food and Agriculture. Organizers: Arthur S. Mariante, Maria J.A. Sampaio, and Maria C.V. Inglis. Report to FAO, 163 pp.

Brazil's Second Report on the Conservation and Sustainable Utilization for Food and Agriculture, prepared in 2009 for FAO, includes extensive information on the state of diversity and relative importance of major crops; the state of *in situ* and *ex situ* management; the state of use of genetic resources; the state of national programs, training and legislation; and access to plant genetic resources and benefit-sharing, among other related subjects.[30]

[30] http://www.fao.org/docrep/012/i0680e/i0680e00.htm

Loss of genetic variability. A study[31] carried out by Charles Clement and collaborators assessed different populations of wild peach palm (*Bactris gasipaes* var. *chichagui*) in the Amazon Region and the effects of deforestation on the genetic pool of this species. The peach palm is the only domesticated palm in the Neotropics and its wild relatives are most often found in small populations of less than 10 plants, in open forests located across the Arc of Fire (or Deforestation Arc) in southern Amazon, and in the western Amazon Region. This species' populations are strongly affected by the substitution of forest with soybean fields and pastures, and the construction of BR-163 Highway. As a result of deforestation and fragmentation, many of these populations are now isolated, a condition that will lead to decreased reproduction due to inbreeding depression and eventual extinction even without complete deforestation. The relatively few conservation areas and the numerous indigenous lands located along the Arc of Fire still contain viable populations of wild peach palm, but require better protection. Nevertheless, even with better protection of these viable populations, genetic variability of this species is rapidly being lost through deforestation. As the Arc of Fire is also home to the wild relatives of several other native South American crops, such as annatto (*Bixa orellana*), manioc (*Manihot esculenta*), cocoyam (*Xanthosoma sagittifolium*), and jack bean (*Canavalia plagiosperma*), the loss of genetic variability through deforestation and fire may have serious impacts on the resilience of important food crops.

Another study[32] on the genetic variability and conservation of the *Euterpe edulis* palm tree, which is the most popular and over-exploited heart-of-palm species in the Atlantic Forest, found lower levels of genetic variability within than among populations. As genetic distance was not correlated to geographical distance for all studied populations, the low genetic variability detected was attributed primarily to the effects of predatory exploitation and forest fragmentation and degradation due to the expansion of agriculture. This study analyzed *E. edulis* populations in the southern state of Rio Grande do Sul and also listed close proximity among analyzed populations; loss of populations and individuals within populations due to predatory activities; isolation of subpopulations and self-fertilization in small isolated populations leading to genetic drift as other factors contributing to the loss of genetic variability.

Seeds networks. In 2001 the ministry of the Environment supported, through a public bid, the creation of seven regional networks for the conservation and enhancement of native species through the production and commercialization of seeds and seedlings: the Cerrado Seeds Network (with over 1,300 collaborating members); Pantanal Seeds Network; Caatinga Forest Seeds Network; Rio-São Paulo Forest Seeds Network (Atlantic Forest – RIOESBA); Atlantic Forest Seeds Network; South Seed Network; and Meridional Amazon Seeds Network.[33] These networks also disseminate technical and scientific information,

[31] Clement, C.P.; R.P. Santos; S.J.M. Desmouliere; E.J.L. Ferreira; and J.T.F Neto. 2009. Ecological adaptation of wild peach palm, its *in situ* conservation and deforestation-mediated extinction in southern Brazilian Amazonia. Public Library of Science (http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0004564).

[32] Fundação de Apoio à Tecnologia e Ciência – FATEC/UFSM, 2005. Final Report to FNMA on the Project for the Conservation of the Palm Tree *Euterpe edulis*. M.P.M. Corder, Project Coordinator. 232 pp.

[33] http://www.rededesementesdocerrado.com.br/; http://sementesdopantanal.dbi.ufms.br/entrada.php; http://www.plantasdonordeste.org/sementes/index.html; http://www.sementesriosaopaulo.sp.gov.br/;

support research and projects, and provide technical support for the conservation and sustainable use of native species, among other activities.

Animal breeds

Brazil has various races of farm animals that were developed from breeds brought by the Portuguese at the time of colonization. Since then, through selection along five centuries, those breeds adapted to specific conditions of the different Brazilian environments creating local breeds known as "crioulo", "local" or "naturalized". At the end of the 19th century and beginning of the 20th century some more productive foreign breeds were imported and, although not possessing the adaptation and disease/parasite-resistant characteristics of the naturalized breeds, they gradually bred out and substituted the local breeds, which are now threatened with extinction[34].

To avoid the loss of these important genetic resources, since 1983 EMBRAPA CENARGEN included animal genetic resources in its Program for the Conservation of Genetic Resources, which previously protected exclusively plant genetic resources. Today, in addition to several EMBRAPA research centers, other state and academic centers, as well as private producers, are involved in the *in situ* and *ex situ* conservation of these resources, under CENARGEN's national coordination. EMBRAPA's Conservation Program focuses on local breeds only, given their threatened status (Table I-18).

Table I-18: Breeds included in research projects for the conservation and use of genetic resources (2006)

Type of animal	Breed	Region of the country
Bovine cattle	National Polled Pantaneiro Curraleiro or Pé-duro Crioulo Lageano	Southeast Central west (Pantanal) Northeast South
Buffaloes	Baio, Carabao	North
Donkeys	Northeastern donkey or Jegue Brazilian donkey	Northeast Southeast
Horses	Pantaneiro Campeiro Baixadeiro Marajoara, Puruca, Lavradeiro	Central west (Pantanal) South Northeast North
Goats	Canindé, Gurguéia, Moxotó, Marota, Repartida	Northeast
Sheep	Crioulo Lanado Santa Inês, Morada Nova	South Northeast
Pigs	Moura	South
Various species	Animal Germplasm Bank (BGA)	Central west

Source: Mariante, A.S. and Cavalcante, N. 2006. Animals of the Discovery: Domestic breeds in the history of Brazil. EMBRAPA, Brasília. 274 pp.

There are currently 38 naturalized livestock breeds in Brazil, distributed in the five geographical regions of the country. Several of these breeds are threatened, being gradually substituted by imported or mixed breeds (Table I-19). The country's 2003 report to FAO on

http://www.maternatura.org.br/qfazemos/projetos/proj_rss.htm; http://www.ufmt.br/redesementes/; http://www.geocities.com/sementesmatatlantica/.

[34] Mariante, A.S. and Cavalcante, N. 2006. Animals of the Discovery: Domestic breeds in the history of Brazil. EMBRAPA, Brasília. 274 pp.

animal genetic resources details the origin and causes of herd decrease for each of these livestock breeds.

Table I-19: Geographic distribution and conservation status of naturalized breeds in Brazil.

Livestock	Breed	Region	Conservation status
Bovine cattle	Caracu	Southeast	Not threatened
	Crioulo Lageano	South	Threatened
	Curraleiro or Pé-duro	Northeast	Threatened
	Junqueira	Southeast	Critical
	Mocho Nacional	Southeast	Threatened
	Pantaneiro	Center-west (Pantanal)	Threatened
Buffaloes	Baio	North	Critical
	Carabao	North	Threatened
Donkeys	Jumento Nordestino	Northeast	Not threatened
	Jumento Brasileiro	Southeast	Threatened
Horses	Campeiro	South	Critical
	Lavradeiro	North	Critical
	Marajoara	North	Threatened
	Pantaneiro	Center-west (Pantanal)	Threatened
	Puruca	North	Critical
Goats	Azul	Northeast	Threatened
	Moxotó	Northeast	Not threatened
	Repartida	Northeast	Threatened
	Canindé	Northeast	Not threatened
	Gurguéia	Northeast	Threatened
	Marota	Northeast	Threatened
Sheep	Santa Inês	Northeast	Not threatened
	Morada Nova	Northeast	Threatened
	Rabo Largo	Northeast	Critical
	Crioulo Lanado	South	Threatened
Pigs	Caruncho	Center-west	Threatened
	Monteiro	Center-west	Threatened
	Moura	South	Threatened
	Pereira	Southeast	Threatened
	Piau	Southeast	Threatened
	Pirapitinga	Southeast	Threatened
	Tatu (Macau, Baé)	Center-west	Threatened
	Nilo	Center-west	Threatened
	Canastra	Center-west	Threatened
	Casco de mula	Center-west	Critical
	Canastrão	Southeast & Center-west	Threatened
	Sorocaba	Southeast	Threatened
	Junqueira	Southeast	Threatened

Source: Brazil, EMBRAPA/ Ministry of Agriculture Livestock and Supply, 2003. Brazilian Country Report on Animal Genetic Resources. Report to FAO, 72pp.

1.2.4. Traditional knowledge.

There are at least 231 indigenous peoples in Brazil with an estimated total population of 600,000 people, with the higher concentration in the Amazon. These peoples speak over 180 different languages and dialects. Estimates indicate that before Europeans arrived, approximately 1,000 different languages and dialects were probably spoken in the current

Brazilian territory. Indigenous peoples in Brazil hold immense and diversified traditional knowledge, most of which is not officially recorded.[35]

In addition to the indigenous peoples that originally inhabited the national territory, a large variety of other traditional groups are present in Brazil, such as quilombolas, rubber tappers, *fundo de pasto*, *faxinais*, *ribeirinhos*, *geraizeiros*, romani, *pomeranos*, *quebradeiras de coco babaçu*, and *caiçaras*, among others. As most of the indigenous peoples, these communities maintain their original traditional knowledge incorporated in their ways of life, including the use of biodiversity and natural resources.

The right of the quilombola communities (traditional groups of African origin) to the official recognition of their traditional lands is secured by the 1988 Brazilian Constitution. The protection of quilombola lands collaborates to the preservation of traditional agricultural production methods and seeds/crop varieties of land races. The process to officially recognize and demarcate quilombola lands is already legally regulated and the Palmares Foundation is responsible for its implementation.

Contributing to the implementation of Article 8j, a Federal Decree of July 13, 2006 created the inter-ministerial National Commission for the Sustainable Development of Traditional Communities. This Commission provides an interlocution channel between the federal government and these communities, and a legitimate forum to protect the interests of this target population. One of the first important achievements of this Commission was the development and approval of the National Policy for the Sustainable Development of Traditional Communities (Decree 6040 of February 7, 2007).

Brazil has also developed a National Policy to Promote the Socio-biodiversity Production Chains, which involves the Ministries of Social Development, Agrarian Development, Agriculture Livestock and Supply, and Ministry of the Environment. This policy was developed based on eight regional consultations and has the objective of strengthening the production chains of traditional communities while conserving biodiversity and ensuring social and market inclusion.

To safeguard this variety of cultures, most indigenous schools teach both in Portuguese and in the specific people's language or dialect or exclusively in the indigenous language. Examples are the Ashaninka in the state of Acre, who published their community development plan entirely in the Ashaninka language, and the Wayanas and Apalay, also in the Amazon Region (http://www.unesco.org/culture/ich/index.php?pg=00145&categ=06#menu_onglet).

Additionally, the National Institute for the National Historical and Cultural Heritage (IPHAN) implements the Monumenta Program to record the traditional know-how of the various indigenous and other traditional communities in Brazil (www.monumenta.gov.br).

Brazil published in 2001 the Provisional Ruling 2186-16 (of August 23, 2001) to regulate in Brazil the CBD provisions ruling on the access to biodiversity resources and associated traditional knowledge, and benefits resulting from their use. This was followed by the

[35] http://pib.socioambiental.org/pt/c/no-brasil-atual/quantos-sao/introducao

publication of several Decrees regulating parts of the Provisional Ruling, among which the Decree 3945 of September 28, 2001, which created and defined the operation of the inter-ministerial Management Council of the Genetic Heritage (CGEN), composed by 19 representatives of governmental sectors and by permanent guests representing traditional communities, and leaded by the Ministry of the Environment. Another important legal instrument is Decree 5459 of June 7, 2005, which establishes and regulates infringements to the Provisional Measure and remedies to illegal activities involving the genetic heritage and associated traditional knowledge.

Since its establishment, the CGEN has published several Technical Rulings and 34 Resolutions for the adequate implementation of the Provisional Ruling, all available on-line at www.mma.gov.br/cegen. Up to mid-2009, over 200 projects requesting access to the genetic heritage and/or associated traditional knowledge were approved by the Council. Institutions receiving access permits are required to present annual reports to CGEN and are subject to permit suspension and legal sanctions if misuse is identified.

However, despite ongoing efforts and the legal instruments that are already in place, various challenges remain before satisfactorily achieving the conservation and protection of traditional knowledge, particularly regarding information that is already published and the use of this information by third parties. As noted by Azevedo and Moreira (2005)[36], an example of this concern is the consultation presented to CGEN in 2004 by NGO Articulação Pacari, which is responsible for the organization of the First Popular Pharmacopoeia of the Cerrado, on how to systematize and disseminate traditional knowledge to allow its broader use while ensuring that this knowledge is not misused by third parties. There are still other challenges and controversies for which practical solutions have not yet been identified, such as those cases where it is very difficult or impossible to clearly identify the community from which specific knowledge originated, as well as the issue of associated traditional knowledge that exist out of the traditional context in which knowledge was produced, and knowledge that is already widely disseminated, among other challenges.[37]

As part of Brazil's efforts to implement CBD Article 8j, the Ministry of the Environment implements, since 2006, a capacity building and sensitization program directed at indigenous peoples and other traditional communities on the existing access legislation. As part of this empowerment process, at the end of 2006 broad public consultations were held in the five geopolitical regions of the country to discuss the means for benefit sharing and the criteria to decide which communities should have the right to receive specific benefits. Results[38] from this consultation process, including the suggestion for the creation of a Fund to which benefits would be paid for distribution among communities sharing the same knowledge, informed the preparation of a draft Bill on access to genetic resources and associated traditional knowledge, and benefit sharing. However, despite the strong effort

[36] Azevedo, C.M.A. e Moreira, T.C., 2005. A proteção dos conhecimentos tradicionais associados: desafios a enfrentar [*The protection of associated traditional knowledge: challenges to be faced*]. *In*: Revista do Patrimônio Histórico e Artístico Nacional, nº 32/2005. Organização: Manuela Carneiro da Cunha. Publicada pelo IPHAN, Ministério da Cultura, Brasil.

[37] Este parágrafo foi acrescentado após a reunião de fevereiro de 2010 da CONABIO.

[38] www.mma.gov.br/cgen

applied during the past three years by the government to develop a final draft bill, a consensus has not yet been reached among the different governmental sectors involved in the preparation of this complex instrument.

Additionally, Brazil recently ratified the ILO Convention 169 and the UN Declaration on Indigenous Peoples Rights. Both instruments contain provisions related to the protection of traditional knowledge.

1.3. Major threats to biodiversity in Brazil

Causes of biodiversity loss

Loss of habitat and habitat degradation are the primary drivers of threat to Brazilian biodiversity (see section 1.2.2). Agricultural expansion and deforestation are important factors contributing to this scenario, particularly when combined with other primary causes of biodiversity loss such as the voluntary and involuntary introduction and spread of alien invasive species; the use of fire to clear land; and water and soil pollution and contamination. Coastal development is the leading threat to coastal and marine zones, followed by pollution and fisheries and extraction activities. Although the effects of climate change have only been determined as the main cause leading to the threatened status of species in two biomes (one species in the Amazon and 5 coastal and marine species), Brazil is taking preventive measures to address climate change impacts (see section 1.4).

The subsections below provide an overview of important causes of biodiversity loss in Brazil and the country's reaction to combat or prevent them.

1.3.1. Agricultural Expansion

In 2004 Brazil had 27.75% (approximately 2,356,065 km^2) of its territory altered by human use (agricultural and urban areas, deforestation, other). The most recent national agricultural census (2006)[39] indicated a total of 2,549,779 km^2 of the national territory occupied by agricultural activities, including natural and planted pastures (Table I-20). This leads to a coarse estimate of approximately 70% (5,942,065 km^2) of the total territory still maintaining original vegetation ranging from intact to varying degrees of conservation or recuperation.

Table I-20: Area (km^2) occupied by agricultural activities over time in Brazil.

Year	Total area w/ agricultural activities	Planted and natural pasture	Crops	Other
1940	1,486,347.83	881,417.33	188,354.30	416,576.20
1950	1,762,120.25	1,076,330.43	190,950.57	494,839.25
1960	1,919,170.37	1,223,353.86	287,122.09	408,694.42
1970	2,362,642.84	1,541,385.29	339,837.96	481,419.59
1975	2,531,741.53	1,656,522.50	400,013.58	475,205.45
1980	2,766,867.18	1,744,996.41	491,042.63	530,828.14
1985	2,859,413.30	1,791,884.31	521,477.08	546,051.91

[39] National Statistics and Geography Institute – IBGE: http://www.ibge.gov.br/series_historicas.

1996	2,593,176.48	1,777,004.72	417,944.55	398,227.21
2006	2,549,779.14	1,723,330.73	766,973.24	59,475.17

Source: http://www.ibge.gov.br/series_estatisticas

Over the last three decades, Brazil experienced an explosive growth in agricultural production unmatched by any other country. It is one of the world leaders in the production and export of coffee, sugar, orange juice, soybean, beef and chicken, among other agricultural products.[40] This growth enhanced the importance of agricultural production to the country's economy, with agribusiness representing approximately 5.7% of the country's GDP in 2008[41]. Sustainable agricultural development is a recent concept in Brazil. Although agricultural technology has improved significantly, allowing increased production without necessarily increasing the production area, land conversion to pasture and crop lands remains an important factor of habitat modification, fragmentation, and loss.

1.3.2. Alien Invasive Species

Numerous alien invasive species are currently established in Brazil, affecting terrestrial and aquatic environments. The dissemination of alien invasive species creates complex challenges yet to be resolved, and which threaten global biodiversity, human health, and the economy. The most common impact of these species is the competition with native species, but invasive organisms also increase predation on native species; reduce the available habitat and change habitat physiognomy; cause economic loss; alter the water regime in rivers and streams and cause physical-chemical alterations in the environment; bring new diseases to the country; and in some cases drive native species to extinction.

Terrestrial habitats. A diagnosis of the current and potential terrestrial alien invasive species carried out in 2005 under the PROBIO Project, based on interviews with professionals of the environmental, agricultural, and related fields recorded 171 of these species, of which 63 (37%) are animal species and 108 (63%) are plant species. Of the 108 invasive plant species, 34% are arboreal; 29% are herbaceous; 15% are bushes; 11% are grasses; 8% are climbing plants; 2% are succulent; 2% are palm trees; and 1% is bromeliform. Of the 64 invasive animal species, 25% are mollusks, 21% are mammals, 17% are crustaceans, 13% are insects, 13% are reptiles, 6% are birds, 3% are earthworms, and 3% are amphibians.[42]

According to the collected information, the study noted that 76% of the listed species were purposefully introduced in the country (or in a different biome), most of them for an intended economic use. However, several of these species have already caused environmental and economic damages that largely surpass any economic benefit accrued

[40] Brazil, EMBRAPA/Ministry of Agriculture, Livestock and Supply. 2009. State of the Brazil's plant genetic resources: Second Report on the Conservation and Sustainable Utilization for Food and Agriculture. Organizers: Arthur S. Mariante, Maria J.A. Sampaio, and Maria C.V. Inglis. Report to FAO, 163 pp.
[41] http://www.bcb.gov.br/pec/boletim/banual2008/rel2008cap1p.pdf
[42] PROBIO, 2005. National Report on Alien Invasive Species Affecting Terrestrial Habitats (in Portuguese) – Final Activities Report, Volume I. 41pp. (http://sistemas.mma.gov.br/sigepro/arquivos/_6/Volume%20I%20-%20Relatorio%20final.pdf).

to-date. Examples of these species are the giant African snail (*Achatina fulica*), wild boar (*Sus scrofa*), and the annoni grass (*Eragotis plana*). Only 17% of the listed species were accidentally introduced in the national territory or in a Brazilian biome different from the invasive species' origin.

Agriculture, for example, is an important economic sector in Brazil but still relies heavily on foreign species, despite the country's rich biodiversity. Examples of important crops developed from non-native plants are sugarcane, originally from New Guinea; coffee from Ethiopia; rice from the Philippines; soybean and oranges from China; wheat from Asia Minor; and even some cocoa varieties from Mexico, despite the existing one native species. Brazilian forestry also relies on non-native species, with eucalyptus from Australia and pine trees from Central America and the Caribbean. Most cattle raising activities rely on bovines from India, horses from Central Asia and, to some extent, pastures planted with African grasses. Apiculture is based on varieties deriving from crossbreeding of *Apis* honey bees from Europe and Tropical Africa.[43] Fish farming relies heavily on carp from China and tilapia from Eastern Africa, both carnivorous species which represent a threat to various native aquatic organisms when released (intentionally or not) into the wild.

Nevertheless, the leading cause for purposeful introduction is the ornamental use of plants and animal species (as pets or aquarium species), totaling 24% of the species listed in the 2005 PROBIO study. Fourteen percent of the species were introduced for breeding programs, 13% as forage species, and 9% for forest use. This information is crucial to inform the development of official prevention and control measures to avoid future introduction of invasive species.

The country's existing infrastructure to prevent and control alien invasive species, including quarantine protocols, is directed at detecting and preventing potential agricultural pests with the purpose of protecting the agricultural sector, which is extremely important for the country's economy. The concept of invasive species harmful to natural environments is new in the country and, despite the potential direct and indirect impacts of many of these species on production landscapes, is still confusing to agriculture and quarantine officials, and to the wider public. The country still lacks a specific legal and procedural framework to address the threat of alien invasive species, regardless of their association with agricultural activities.[44] Table I-21 presents the status and trends of alien invasive species in Brazil, according to a 2006 estimate.

[43] Brazil, EMBRAPA/Ministry of Agriculture, Livestock and Supply. 2009. State of the Brazil's plant genetic resources: Second Report on the Conservation and Sustainable Utilization for Food and Agriculture. Organizers: Arthur S. Mariante, Maria J.A. Sampaio, and Maria C.V. Inglis. Report to FAO, 163 pp.
[44] PROBIO, 2005. National Report on Alien Invasive Species Affecting Terrestrial Habitats (in Portuguese) – Final Activities Report, Volume I. 41pp. (http://sistemas.mma.gov.br/sigepro/arquivos/_6/Volume%20I%20-%20Relatorio%20final.pdf).

Table I-21: Status and trends of alien invasive species in Brazil

Biome	**Status in 2005** Nº of alien invasive spp/biome (1) Nº of alien spp/Nº of alien invasive spp	**Trends** (new species/year) (2) 2006-2010 (3) 1970-2000
Terrestrial biomes		
Amazon	33	
Pantanal	7	
Cerrado	59	
Caatinga	42	
Atlantic Forest	116	
Pampas	22	
Total terrestrial	179	1 species/year (2)
Aquatic habitats		
Continental waters	137 / 56 (1)	
Marine zone	49	1.8 species/year (3)
Total aquatic		

Sources: Zenni, Rafael D. (2006) – Hórus Institute/The Nature Conservancy [Informe Nacional sobre Espécies Exóticas Invasoras – baseline: 2005, and Hórus Institute/TNC database incorporated to the results of the Project of Conservation and Sustainable Use of Brazilian Biological Diversity – PROBIO (2003-2004)]; Latini, A.O. (2006) – Informe sobre espécies invasoras que afetam as águas continentais; and Lopes, Rubens (2006) Oceanographic Institute of the University of São Paulo.

Freshwater habitats. The PROBIO Project also supported in 2005 a study on invasive species in Brazilian freshwater habitats, which was updated in 2008 and its results are currently being prepared for publication.[45] This study recorded 1,593 occurrences of alien species in freshwater habitats. These occurrences translate into 180 alien organisms, 167 of which identified down to species: 116 fish (including two hybrids), 19 microorganisms (including micro-crustaceans), 14 macrophytes (including one hybrid), 6 crustaceans, 4 amphibians, 5 mollusks, 2 reptiles, and 1 leech. In addition to these species, 11 other fish identified down to genera were also recorded, as were two other microorganisms.

The less altered region of the country (north – the Amazon) is also the one with less occurrences of alien invasive species in freshwater habitats, followed by the central-west region (mostly Cerrado and Pantanal). The most populated and coastal regions of the country (southeast, south and northeast) are also the most invaded areas (Figure I-9).

[45] Brazil – MMA/SBF, 2009. Invasive Fauna, Flora and Microorganisms in Brazilian Continental Waters. In press. 449pp. Authors: A.O. Latini, D.C. Resende, R.O. Latini, D.P. Lima, L.T. Oporto, and F.A. Ferreira.

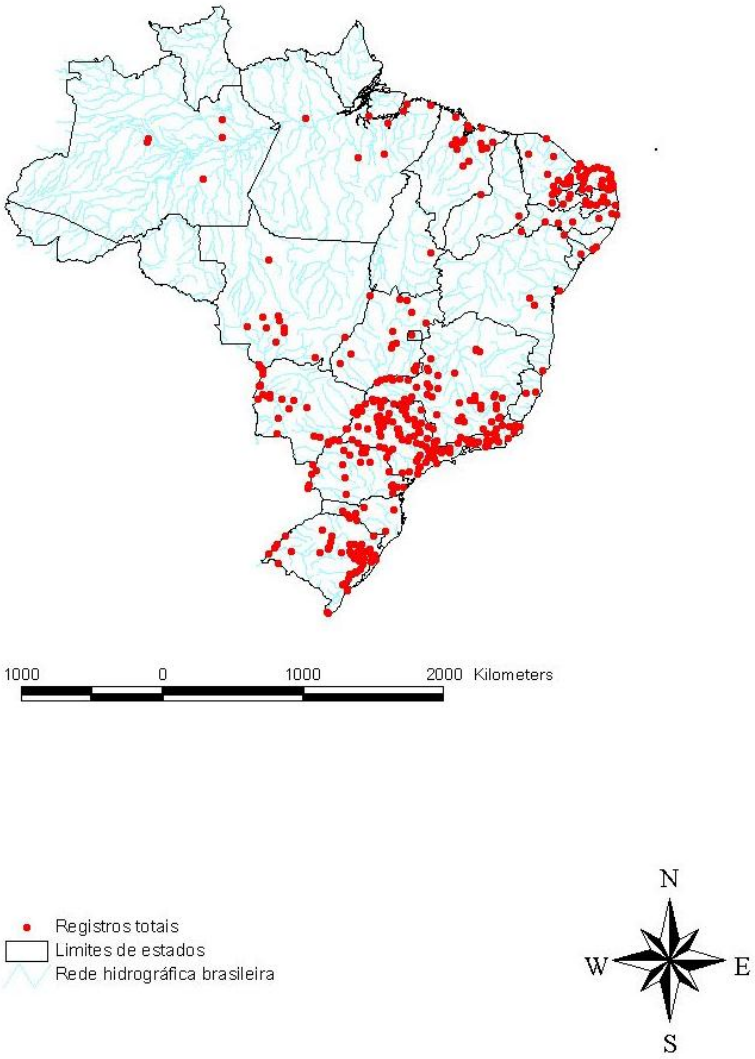


Figure I-9: Distribution of occurrences of aquatic alien organisms in Brazil. Each dot represents a municipality to which at least one occurrence was reported. Source: Brazil – MMA/SBF, 2009. Invasive Fauna, Flora and Microorganisms in Brazilian Continental Waters. In press. 449pp. Authors: A.O. Latini, D.C. Resende, R.O. Latini, D.P. Lima, L.T. Oporto, and F.A. Ferreira.

Of the 180 alien aquatic organisms identified by this study, 51 are confirmed as alien invasive species. From 2006 to 2008, six new alien fish species and one new alien microorganism were recorded in Brazilian continental waters. This is, however, a first national estimate and does not represent a thorough inventory of the vast Brazilian hydrographic system. Nevertheless, these data can inform the development of policies and action plans for preventing the further spread of these species and the introduction of new ones.

Marine environment. MMA also published in 2008 another study supported by PROBIO on the invasive alien species affecting the marine environment. This study inventoried 58 alien species, as follows: 3 phytoplankton species, 6 zooplankton, 40 zoobenthos, and 4 fish

species. Of these, 9 species (16%) were considered invasive, 21 (36%) established and 28 (48%) detected in the natural environment (Table I-22).[46]

Table I-22: Status of marine alien species in Brazil.

Biological community	Number of species				Relative contribution of each biological community
	Detected	Established	Invasive	Total	
Phytoplankton	-	1	2	**3**	5%
Zooplankton	3	3	-	**6**	10%
Phytobenthos	1	3	1	**5**	9%
Zoobenthos	21	13	6	**40**	69%
Fish	3	1	-	**4**	7%
Total	**28**	**21**	**9**	**58**	100%

Source: Brazil – MMA/SBF, 2008. Report on Alien Invasive Species Affecting the Brazilian Marine Environment (in Portuguese). 439pp.

Most (30%) of the current and potential marine invasive species originate from the Indo-Pacific Ocean, followed by the Eastern Pacific (14%), Western Pacific and Western Atlantic/Caribbean (10% each), Eastern Atlantic (8%), Europe (5%), and Indy and East Africa (2% each). The origin of 19% of these organisms remains undetermined. Ballast water is the primary (26%) probable vehicle of dispersion for the marine invasive species. From the original introduction point, marine currents are the natural means of further dispersion, contributing to 23% of secondary introductions. Given the large number of zoobenthos species, 20% of the alien species in this biological community disperse through incrustation. Other important vectors are mariculture and aquaculture (18%), seafood processing (6%), association with other organisms and aquariums (3% each), and migratory birds (1%).[21]

Agricultural landscape. A study carried out in 2005 by the Brazilian Agricultural Research Company (EMBRAPA) under the PROBIO project inventoried the known alien invasive species affecting Brazilian agricultural systems, including livestock and silviculture. The study assessed mites, bacteria, fungi, insects, nematodes, viruses, viroids and phytoplasmas affecting agriculture; insects, bacteria, fungi, and nematodes affecting silviculture; bacteria, fungi, nematodes and viruses affecting the production of foraging plants; bacteria, viruses and prions affecting small livestock (goats and sheep); and viruses affecting pigs and fowl. Results identified 50 alien invasive species currently affecting agricultural, silvicultural and livestock production in the country, and 104 other alien insect, mite and pathogen species with potential to become invasive in the Brazilian production landscapes (Table I-23). The Pantanal is the least affected biome, followed by the Amazon and Caatinga biomes. As expected, the biomes where rural production is most intense and has occurred for a longer period (Atlantic Forest, Cerrado and Pampas) present higher numbers of identified alien invasive harmful species.

[46] Brazil – MMA/SBF, 2008. Report on Alien Invasive Species Affecting the Brazilian Marine Environment (in Portuguese). 439pp.

Table I-23: Alien insects, mites and pathogens affecting Brazilian rural production systems.

\Non-native \pathogens Production \ System \	Pest status	Mites	Bacteria	Fungi	Insects	Nematodes	Viruses, viroids, prions, phytoplasma
Agriculture	current	-	3	9	3	2	1
	potential	11	6	26	14	6	10
Silviculture	current	-	-	1	14	-	-
	potential	-	1	12	1	1	-
Foraging plants	current	-	1	4	-	2	1
	potential	-	1	-	-	-	2
Goat & sheep	current	-	2	-	-	-	5
	potential	-	5	-	-	-	3
Pigs & fowl	current	-	-	-	-	-	2
	potential	-	-	-	-	-	5
Current alien invasive species affecting agricultural landscapes in each biome							
Amazon		-	1	2	2	-	1
Atlantic Forest		-	1	6	10	1	6
Caatinga		-	3	-	-	1	3
Cerrado		-	3	6	7	3	4
Pampas		-	1	3	14	1	4
Pantanal		-	-	-	-	-	-

Source: Brazil, EMBRAPA/Ministry of Agriculture Livestock and Supply, 2005. Final Report on Alien Invasive Species in Agricultural, Livestock and Silviculture Production Systems, presented to the PROBIO Project. Six volumes; 1,219pp.

Trends. By request of the Ministry of the Environment, three scenarios were estimated for 2010 (base year 2002) regarding the occurrence of alien invasive species (AIS) in Brazilian continental waters and coastal marine waters (Table I-24). Additionally, several important actions were identified directed at technical capacity building; public education; development of a national strategy to deal with AIS; AIS monitoring and control; scientific research; and fund raising, although most are still incipient and require better coordination to achieve effectiveness at scale.

Table I-24: Scenarios for 2010 for occurrence of alien invasive species in Brazilian habitats.

Qualitative and quantitative variables	**Pessimistic scenario (no action taken)**	**Business-as-usual scenario**	**Optimistic scenario (actions taken to implement national strategy)**
Continental waters			
Occurrences and actions to halt the introduction of new alien species in the country.	Aggravation by lack of action (40 new species introduced)	Isolated prevention and control actions (20 new species introduced)	Halting introduction by 80% (4 new species introduced)
Status of existing biological invasions / number of foci	Increase	Increase	Gradual decrease
Impact of invasions / percent of establishment of introduced species with free living populations in the country	Increase / 35% of introduced species established with free living populations in the country	Increase / 35% of introduced species established with free living populations in the country	Reduction / 15% of introduced species established with free living populations in the country

Coastal and Marine Habitats			
New AIS introduced per year	3.3 spp/year = ~13 new AIS by 2010	1.35 spp/year = ~5.3 new AIS by 2010	0.5 spp/year = ~2 new AIS by 2010

Sources: Zenni, Rafael D. (2006) – Hórus Institute/The Nature Conservancy; Lopez, Rubens (2006) – Oceanographic Institute of the University of São Paulo; Latini, A.O. (2006) – Informe sobre espécies invasoras que afetam as águas continentais; Results of the Working Groups of the 1st Brazilian Symposium on Alien Invasive Species (I SBEEI, 2005); Recomendações de Políticas Públicas para Espécies Exóticas e Espécies Exóticas Invasoras do Encontro dos Coordenadores dos Projetos de Manejo de Espécies Ameaçadas de Extinção e Invasoras – Public Bid from the National Environment Fund – FNMA/PROBIO 04/2001 (2006).

Alien invasive species that affect human health

The Oswaldo Cruz Foundation completed in 2005 an inventory of alien invasive species present in Brazil that affect human health[47]. A total of 98 species were identified (Table I-25), among which the most abundant groups were helminthes (26 species), followed by plants (20 species), arthropods (15 species), viruses (12 species), bacteria (10 species), fungi (4 species), and protozoa (4 species). This report notes that most of the listed species were introduced accidentally in Brazil during the colonial period by incoming ships, associated to containers, domestic animals and people.

Table I-25: Alien invasive species that affect human health in Brazil (2005)

Kingdom/Phylum	Family	Species
VIRUS (12 species)		
	Buyanaviridae	Hantavirus var. Seoul
	Deltaviridae	Delta Virus
	Flaviviridae	Flavivirus 1
		Flavivirus 2
		Flavivirus 3
	Orthamyxoviridae	Influenzavirus A, B, C
	Orthopoxvirus	Vaccinia
	Paramyxoviridae	Metapneumovirus
		Morbillivirus (small pox)
	Picornaviridae	Poliovirus
	Retroviridae	HIV
	Roeviridae	Rotavirus
MONERA (14 species)		
Bacteria (10 species)	Brucellaceae	*Brucella mellitensis*
	Clostridiaceae	*Clostridium botulinum*
	Corynebacteriaceae	*Corynebacterium diphtheriae*
	Enterobacteriaceae	*Escherichia coli* 0157:H7
		Yersinia pestis
	Leptospiraceae	*Leptospira interrogans*
	Mycobacteriaceae	*Mycobacterium leprae*
		Mycobacterium tuberculosis
	Spirothaetaceae	*Borrelia burgdoferi*
	Vibrionaceae	*Vibrio cholerae*
Protozoa (4 species)	Babesiidae	*Babesia bigemina*
	Eimeriidae	*Isospora belli*
	Trypanosomatiade	*Leishmania infantum*
		Leishmania major

[47] Fundação para o Desenvolvimento Científico e Tecnológico em Saúde e Fundação Oswaldo Cruz, 2005. Espécies exóticas invasoras que afetam a saúde humana [Alien invasive species that affect human health]. Final report to the PROBIO Project under the Ministry of the Environment, 186 pp.

FUNGI (4 species)		
	Filobasidiaceae	*Cryptococus neoformans*
	Onygenaceae	*Blastomyces dermatitides*
		Coccidioides immitis
		Histoplasma capsulatum var. duboisii
ANIMALIA (48 species)		
Acanthocephala (3 species)	Polymorphydae	*Corynosoma strumosum*
	Oligoacanthorhynchidae	*Macracanthorynchus hirudinaceu*
	Moniliformidae	*Moniliformis moniliformis*
Nematoda (10 species)	Angiostrongylidae	*Angiostrongylus cantonensis*
		Angiostrongylus costaricensis
	Ascarididae	*Ascaris lumbricoides*
		Toxocara canis
	Capilariidae	*Capilaria hepatica*
	Syngamidae	*Mammamogamus laryngeus*
	Onchocercidae	*Dirofilaria immitis*
		Onchocerca volvulus
		Wuchereria bancrofti
	Trichuridae	*Trichuris trichiura*
Platyhelminthes (13 species)	Heterophyidae	*Ascocotyle longa*
	Opistorchiidae	*Clonorchis sinensis*
	Diphillobotriidae	*Diphyllobothrium dentriticum*
		Diphyllobothrium latum
		Diphyllobothrium pacificum
	Dilepididae	*Dypilidium caninnum*
	Taeniidae	*Echinochocus granulosos*
		Taenia solium
		Taeniarhynchus saginata
	Fasciolidae	*Fasciola hepatica*
	Hymenolepididae	*Hymenolepis nana*
	Paragonimidae	*Paragonimus mexicanus*
	Schistosomatidae	*Schistosoma mansoni*
Molusca (7 species)	Achatinidae	*Achatina fulica*
	Agriolimaceidae	*Deroceras laeve*
	Bradybaenidae	*Bradybaena sinensis*
	Helicidae	*Helix aspersa*
	Limacidae	*Limax flavus*
		Limax maximus
	Thiaridae	*Melanoides tuberculatus*
Artropoda (15 species)		
Arachnida (6 species)	Ixodidae	*Anocentor nitens*
		Booplhilus microplus
		Hyalomma hidromedarii
		Hyalomma marginatum
		Riphicephalus sanguineus
	Apidae	*Argas miniatus*
Insecta (9 species)	Culicidae	*Aedes aegypti*
		Aedes albopictus
	Apidae	*Apis mellifera*
	Calliphoridae	*Chrysomya albiceps*
	Cyclorrhapha	*Chrysomya megacephala*
		Chrysomya putoria
	Cimicidae	*Cimex hemipterus*

		Cimex lectularius
	Reduvidae	*Triatoma infestans*
PLANTAE (20 species)		
	Amaranthaceae	*Amaranthus viridis*
	Apocynaceae	*Nerium oleander*
	Asteraceae	*Silybum marianum*
		Sonchus oleraceus
		Taraxacum officinale
		Chamomilla recutita
		Emilia sonchifolia
	Bignoniaceae	*Sapathodea campanulata*
		Tecoma stans
	Boraginaceae	*Symphytum officinale*
	Convolvulaceae	*Ipomoea pés-caprae*
	Cucurbitaceae	*Momordica charantia*
	Cyperaceae	*Cyperus rotundus*
	Euphorbiaceae	*Euphorbia tirucalli*
		Ricinus communis
	Poaceae	*Cymbopogon citratus*
	Polypodiaceae	*Pteridium aquilinum*
	Solanaceae	*Brugmansia suaveolens*
	Urticaceae	*Urtica dióica*
	Zygophyllaceae	*Tribulus terrestris*

Source: Fundação para o Desenvolvimento Científico e Tecnológico em Saúde e Fundação Oswaldo Cruz, 2005. Espécies exóticas invasoras que afetam a saúde humana [*Alien invasive species that affect human health*]. Final report to the PROBIO Project under the Ministry of the Environment, 186 pp.

Invasive pathogens can alter the parasite-host relationship established thousands of years before and launch new diseases, including in human beings, which were previously not present in that location or were restricted to biological cycles that did not previously include humans. Although these species have accompanied human being throughout the planet along human evolution and dispersal, the importance of alien invasive species was fully understood only when their impact was accounted as losses in the productive sector and in human and animal health. This national report on alien invasive species that affect human health provides valuable information to support the development and enhancement of preventive and control measures and instruments, and contributes to the more detailed understanding of the challenges the country faces regarding invasive species.

1.3.3. Deforestation

Amazon. The Amazon is the largest of Brazilian biomes, corresponding to approximately 50% of the national territory and expanding into several neighboring countries. The National Space Research Institute – INPE implements the program for monitoring the Amazon forest, which currently uses two operational systems: PRODES and DETER. These two systems are complementary and were developed for different objectives. DETER is a system to support enforcement and control of deforestation in the Amazon (http://www.obt.inpe.br/deter/), monthly publicizing a map of Deforestation Alert, indicating deforested areas larger than 25 hectares. These maps point out those areas that were completely deforested and areas suffering progressive forest degradation. The Legal Amazon Deforestation Monitoring Project (PRODES) measures the annual rates of clear

cuts since 1988, based on increments above 6.25 hectares (http://www.obt.inpe.br/prodes/). Since PRODES relies on more detailed data and depends on seasonal climatic variations to acquire cloud-free satellite images (usually obtained between May and September), this calculation is carried out only once per year and publicized by every December. INPE has been systematically monitoring deforestation in the Amazon forest since 1988, applying remote sensing and geoprocessing technologies. The scientific and technological capacity developed since then to conduct this monitoring is broadly acknowledged.

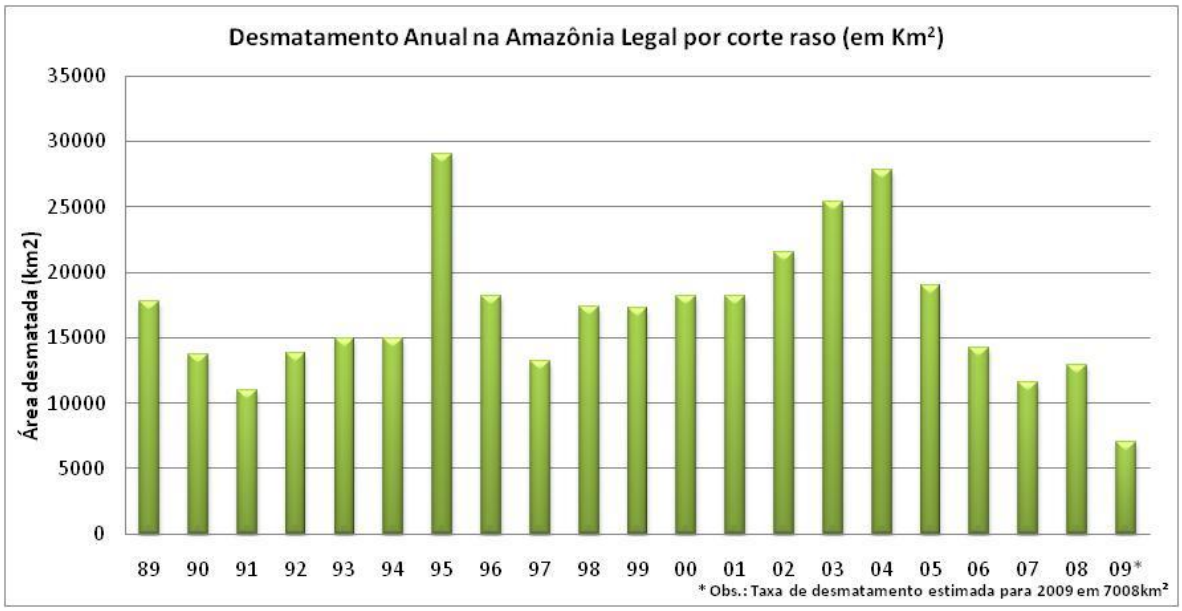


Figure I-10: Annual deforestation rate in Legal Amazon[48]. Source: MMA, 2010[49].

One of Brazil's National Targets set in 2006 is to reach a 40% decrease in deforestation in the Amazon by 2010, as compared to the average of the previous 10 years (1996-2005). With an intense increase in monitoring capacity, and coordinated enforcement and control actions, by 2009 deforestation decreased by 75% in comparison to 2004 (Figure I-10). It is expected that deforestation rates will continue to decrease significantly in response to the strong investment Brazil is applying to reach the 2010 target of a maximum 11,720 km^2 deforestation rate.

In addition to the National 2010 Deforestation Target, the Brazilian National Climate Change Plan established in 2004 the target of reducing deforestation in the Amazon by 30% every 4 years, as compared to the previous period, until 2017 (Figure I-11). The ultimate goal is to achieve 0% illegal deforestation in the medium and long term.

[48] Legal Amazon is a Brazilian political subdivision that corresponds to an area larger than the Amazon biome, including the states of Amazonas, Pará, Acre, Roraima, Rondônia, Amapá, Tocantins, Mato Grosso and part of Maranhão, totaling approximately 5.1 million km^2, containing Amazon forest and transitional vegetation. The Brazilian Amazon biome designates an area covered exclusively by this biome's ecosystems within the national territory, totaling approximately 4.1 million km^2.
[49] Ministry of the Environment, Department of Action Coordination for the Amazon (DAAM/SECEX).

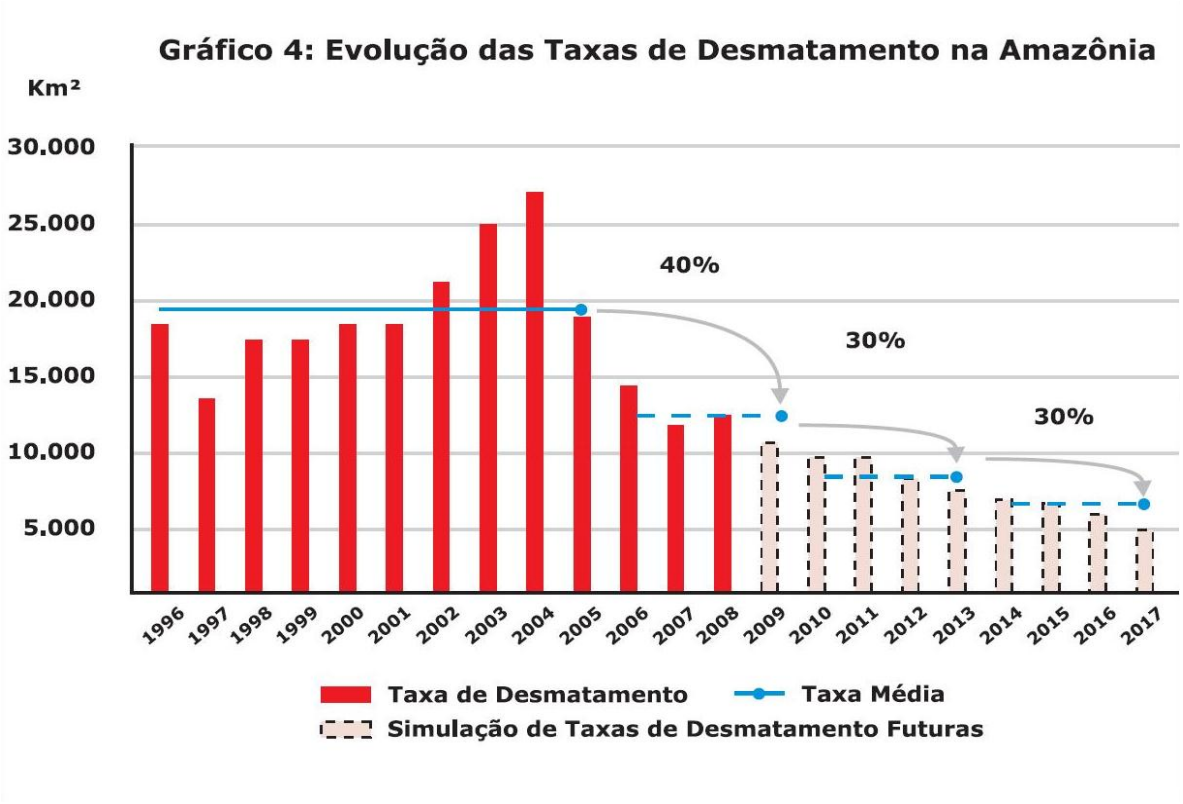


Figure I-11: Evolution of deforestation rates in the Brazilian Amazon. Source: Brazilian National Climate Change Plan.

Starting in 2004, Brazil intensified its efforts to revert the climbing curve of deforestation rates in the Amazon (Figure I-10 above). These efforts included the development of the Legal Amazon Deforestation Prevention and Control Action Plan - PPCDAM in 2004, which focuses on three main lines of action: (i) Land tenure regularization; (ii) Environmental monitoring and control; and (iii) Promotion of sustainable production. Land tenure regularization invested strongly in the strategic creation of protected areas at the deforestation arc in the southern Amazon Region, where previously only indigenous lands presented an obstacle to the advance of deforestation in unregulated public lands. The creation of these new state and federal protected areas, beginning in 2005 and totaling to-date 50 million hectares, in addition to the ratification of 10 million hectares of indigenous lands and combined with the suspension of 70,000 illegal land titles, greatly contributed to reduce illegal land-grabbing and public land commercialization, leading to reduced deforestation. With this heavy investment in land tenure regularization, the Deforestation Combat Policy Department of the Ministry of the Environment also found that, in the Brazilian Amazon, indigenous lands are the primary deterrents of illegal deforestation, followed by protected areas of sustainable use (where the presence of extractive communities inhibit land-grabbing and deforestation), and lastly by integral protection protected areas, where human presence is reduced and enforcement actions more challenging.

Additionally, environmental monitoring and control actions were strongly improved with enhanced monitoring systems (PRODES and DETER) and civil society monitoring (e.g.,

IMAZON: http://www.imazongeo.org.br/imazongeo.php); strategic joint enforcement operations carried out by IBAMA in collaboration with the Federal Police, Federal Highway Patrol and the Army; intensified highway control operations to inhibit transportation of illegal timber; and an unprecedented operation to combat corruption, which resulted in the detention of over 600 public servants guilty of crimes against the environment. Furthermore, the government is investing in sustainable production and extractive activities with the development of policies and directives for sustainable forest use (including the new paradigm establishing that forests must be maintained as forest environments and must remain of public ownership); development of management plans for Extractive Reserves; the creation of funds and credit lines for sustainable activities; and the establishment of agreements with economic sectors, among other initiatives.

A study promoted by The Applied Economic Research Institute (IPEA) in 2001 estimated the economic cost of deforestation in the Amazon as US$108.1 per hectare per year, an amount large enough to finance the sustainable use of a vast portion of the Amazon Region.[50] This estimate took into account the direct and indirect value, such as provision of extractive resources and environmental services; and the option value and the intrinsic value of the future use of genetic resources and the existence of non-human species, as well as external factors.

Atlantic Forest. The Atlantic Forest has also been consistently monitored since 1991 by INPE in partnership with NGO SOS Mata Atlântica, using remote sensing and geoprocessing with satellite images capable of detecting intact fragments down to 10 hectares up to 2005. After 2005, it became possible to obtain improved images allowing the identification of deforested areas of at least 3 hectares for the period 2005-2008 (http://mapas.sosma.org.br/site_media/download/atlas%20mata%20atlantica-relatorio2005-2008.pdf). Data are available on deforestation occurring in five-year periods (Table I-26) and indicate strong human pressure and intervention on native vegetation, resulting in a high level of forest fragmentation and low rates of vegetation regeneration. These results attest the high fragility and degree of threat to the biome and its biodiversity. Despite the overall 77% decrease in deforestation rates estimated in 2008 as compared to 2000, the Atlantic Forest lost at least 15,880 km^2 in the last 20 years, which represents an area approximately the size of Belgium. It is important to know that, although this assessment covers over 90% of the Atlantic Forest, it does not include the section of the biome north of Bahia state, due to the difficulty of obtaining cloud-free satellite images, and considered exclusively those forest fragments over 100 hectares covered with primary forest or forest in advanced stages of succession. Additionally, this analysis also does not include non-forest vegetation, such as high altitude fields.

Table I-26: Deforestation of the Atlantic Forest

Period	Deforestation rate (hectares)
1985-1990	536,480
1990-1995	500,317
1995-2000	445,952
2000-2005	174,827

[50] Brazil, Ministry of Planning Budget and Administration/IPEA, 2001. Estimate of the Economic Cost of Deforestation in the Amazon. Author: Ronaldo Seroa da Motta. 29pp.

2005-2008	102,939
Total	1,760,515

Source: SOS Mata Atlântica / INPE

However, it is important to mention that the legislation put in place for the Atlantic Forest in 2001 and 2006 based on CONAMA's Resolution 278[51], combined with enhanced monitoring and control, have prevented further management and degradation of primary forests or forest fragments at intermediary or advanced succession stage containing endangered species. This led to a notable reduction of illegal activities and to the visible recuperation of these forest fragments and particularly of endangered plant species in this biome.

Cerrado. In 2008 the Federal University of Goiás, through its Images Processing and Geoprocessing Laboratory (LAPIG – *Laboratório de Processamento de Imagens e Geoprocessamento*), published a first assessment of the status of the original vegetation cover of the Cerrado biome[52]. This work, carried out with support from two NGOs – The Nature Conservancy and Conservation International – assessed changes in vegetation cover based on MODIS satellite images obtained from October 2003 to October 2007 and the map of remaining vegetation cover in the Cerrado biome produced by EMBRAPA Cerrados in 2002 in collaboration with the Federal Universities of Goiás and Uberlândia. As resolution of the MODIS images is low (250 meters), only areas larger than 25 hectares were considered for deforestation analysis. Based on this information, LAPIG developed an Integrated Deforestation Alert System (SIAD – *Sistema Integrado de Alerta de Desmatamentos*) to identify significant variation (>30% change) in vegetation cover occurred during the period 2003-2007.

Results indicated an area of approximately 18,900 km^2 as possible new deforestation, of which about 60% are concentrated in 50 municipalities of the states of Bahia, Piauí and Maranhão in northeastern Brazil and Tocantins, Mato Grosso, and Mato Grosso do Sul in the central-west region (Figure I-12). LAPIG institutionalized this first assessment as one of its research lines, and continues to monitor the biome to generate yearly deforestation alerts based on MODIS images, as a contribution to the National Sustainable Cerrado Program.

[51] http://www.mma.gov.br/port/conama/legiabre.cfm?codlegi=276

[52] Press release dated September 23, 2008 – UFG/LAPIG: "Monitoring Changes in the Remaining Vegetation Cover of the Cerrado Biome" [*Monitoramento de Mudanças na Cobertura Vegetal Remanescente do Bioma Cerrado*].

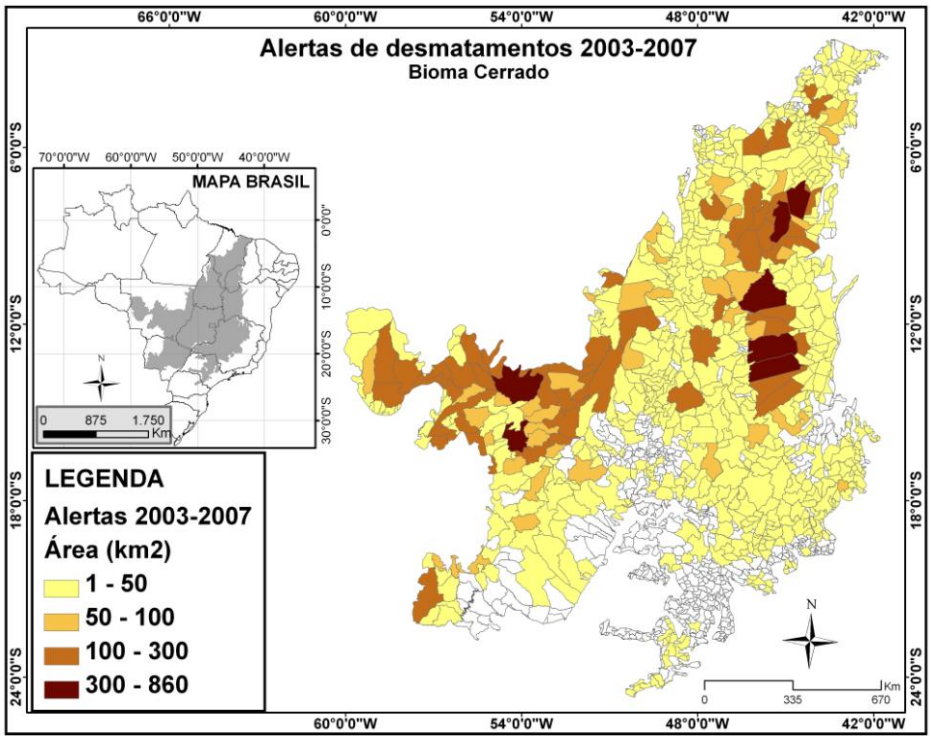


Figure I-12: Distribution of deforestation events detected between October 2003 and October 2007 per municipality in the Cerrado biome. Source: Final report to PROBIO/MMA – Mapping of the Vegetation Cover of the Cerrado Biome, 2007.

The 2008 report produced by IBAMA/Ministry of the Environment on Cerrado vegetation monitoring (Figure I-13) verified that the original vegetation patches went down from 55.73% to 51.54% of the biome in 2008, in comparison to the total area of the biome (2,039,386 km^2 as calculated by the ArcGIS software)[53].

[53] MMA/IBAMA, 2009. Relatório Técnico de Monitoramento do Desmatamento no Bioma Cerrado, 2002 a 2008: Dados Revisados. Technical Cooperation Agreement MMA/IBAMA/UNDP. Avaliable at: http://www.mma.gov.br/estruturas/sbf_chm_rbbio/_arquivos/relatorio_tecnico_monitoramento_desmat .

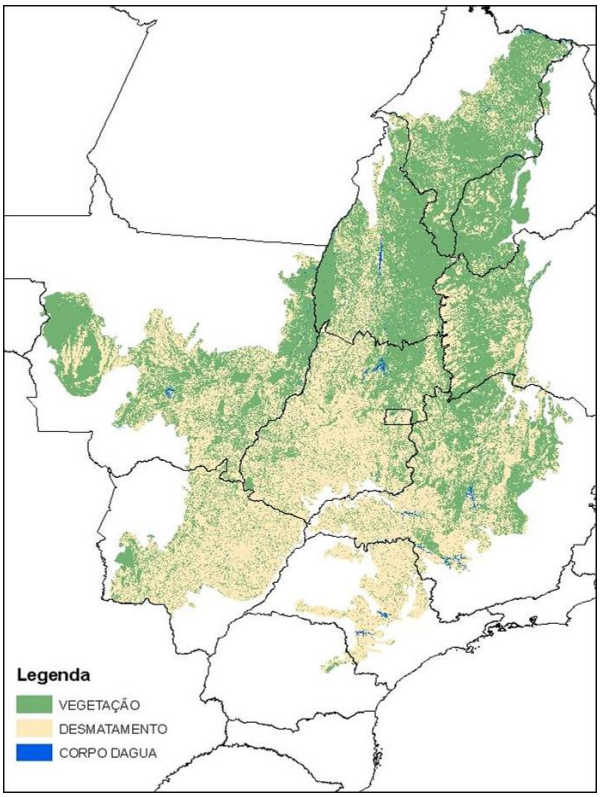


Figure I-13: Distribution of areas of the Cerrado biome covered by native vegetation and modified by human use. Source: MMA/IBAMA – Brazilian Biomes Satellite Monitoring Project, 2008.

Second only to the Atlantic Forest, the Cerrado is the Brazilian biome that suffered the most with human occupation. The growing pressure for the deforestation of new areas to increase the production of beef and grains for export is leading to a progressive exhaustion of the region's natural resources. During the last three decades, the Cerrado has been degraded by the expansion of the Brazilian agricultural frontier, notably in the region of the west of Bahia, south of Goiás, and Sinope in Mato Grosso state. Among these three critical areas, the west of Bahia is the region with the most intense soil use in the biome, particularly along the São Francisco River watershed.[54] Additionally, the Cerrado forests are also tremendously affected by the predatory demand for charcoal. Biologically, the Cerrado is the richest savanna in the world, hosting over 11,000 native plant species in its various ecosystems, of which 4,400 are endemic.

Other terrestrial biomes

During the last two decades, the high deforestation rates attracted national and international attention and pressure in favor of the conservation of the Brazilian Amazon. This scenario resulted in the concentration of governmental efforts and resources directed to the Amazon, to the detriment of the other major terrestrial biomes: the Cerrado, Pantanal, Caatinga, Atlantic Forest and Pampas. Large technical and financial investments were directed to the Amazon, which allowed the development of the two satellite monitoring systems currently detecting deforestation in that biome: PRODES and DETER. It is important to note that the

[54] MMA/IBAMA, 2009.
http://www.mma.gov.br/estruturas/sbf_chm_rbbio/_arquivos/relatorio_tecnico_monitoramento_desmat .

Amazonian vegetation is very different from the vegetation present in the non-Amazon Brazilian biomes, in several aspects: the number of phytophysiognomies; responses to seasonal climatic changes; spectral reflection patterns; and variation of vegetation indexes along the year, among other aspects. These particularities prevent the direct application of the monitoring systems developed by INPE for the dense rainforests of the Amazon to the other Brazilian terrestrial biomes, requiring specific adaptations for each biome.

Recognizing the strategic importance and success of deforestation monitoring for improving conservation and environmental enforcement, following the example of the Amazon biome the Ministry of the Environment and IBAMA initiated in 2009 the systematic vegetation cover monitoring of all remaining terrestrial biomes[55] that were not previously monitored (Caatinga, Pantanal and Pampas), adapting the methodology to the particularities of each biome. The same monitoring methodology was now expanded to the Atlantic Forest to allow future comparative analyses. Monitoring of deforestation in the Amazon biome will continue under INPE.[56]

Coastal Zone - Mangroves

Under the GEF Mangrove Project, Brazil is initiating the monitoring of the vegetation cover of mangroves. The initial (baseline – 2008) mapping was already completed, with the identification of the remaining areas and areas with significant deforestation inside mangrove ecosystems (Figure I-14).

State	Remaining vegetation cover in mangrove ecosystems (km^2)	Deforested area in mangrove ecosystems occupied by shrimp aquaculture (km^2)
MA	4,901.51	
PA	2,870.81	
AP	1,782.96	
BA	847.64	25.96
PR	339.55	2.67
SP	250.58	
SE	240.43	14.16
PE	176.33	23.41
CE	167.24	53.12
RJ	133.65	
PB	127.63	9.10
RN	126.18	295.44
SC	115.96	3.70
ES	79.73	
AL	58.38	1.13
PI	45.86	
TOTAL	**12,664.43**	**435.03**

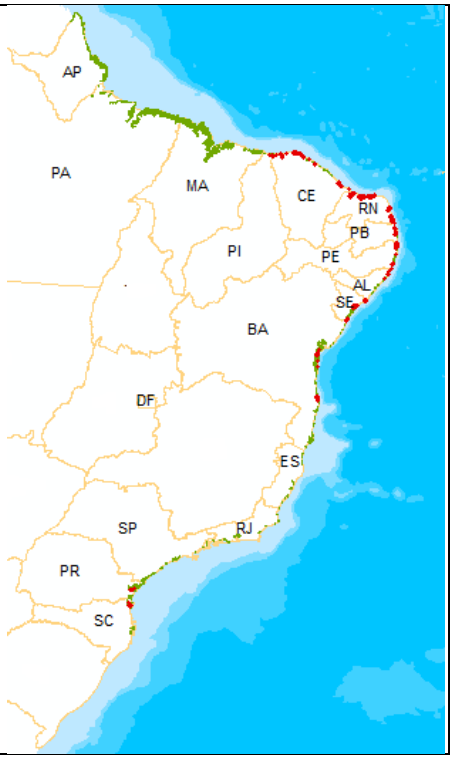


Figure I-14: Remaining vegetation (green) and area occupied by shrimp aquaculture (red) in mangrove ecosystems. Baseline year: 2008

[55] http://siscom.ibama.gov.br/monitorabiomas/

[56] Brazil, Ministry of the Environment, 2008. Project document, MMA/UNDP: Monitoramento do desmatamento nos biomas brasileiros por satélite [*Deforestation monitoring in Brazilian biomes using satellite data*].

Caption: MA=Maranhão; PA=Pará; AP=Amapá; BA=Bahia; PR=Paraná; SP=São Paulo; SE=Sergipe; PE=Pernambuco; CE=Ceará; RJ=Rio de Janeiro; PB=Paraíba; RN=Rio Grande do Norte; SC=Santa Catarina; ES=Espírito Santo; AL=Alagoas; PI=Piauí.
Source: MMA, 2010 (in press). Outlook of the conservation of coastal and marine ecosystems in Brazil.

In addition to the shrimp aquaculture, other activities also cause significant impacts on the mangrove ecosystems, particularly those resulting from coastal development.

1.3.4. Fire

A study promoted by the Applied Economic Research Institute (IPEA) in 2002 estimated the economic cost of fire in the Amazon to be on average US$102 million per year, or 0.2% of the regional GDP for the period 1996-1999. This estimate may vary according to the value attributed to the carbon liberated into the atmosphere by the burning of forests.[57]

Brazil has been monitoring fire occurrences continuously since 1987, with readily available historical and current data since 2000 (http://www.dpi.inpe.br/proarco/bdqueimadas; Table I-27). The resulting real time data (updated every three hours) is used by IBAMA to inform enforcement and control actions and for the development of environmental management policies.

Table I-27: Evolution of the number of fire occurrences in Brazil

Biomes	2002	2003	2004	2005	2006	2007	2008	2009
Amazon	116,546	96,872	124,211	123,950	67,927	87,694	50.258	28,725
Cerrado	72,695	61,899	67,049	63,267	28,467	68,523	44,203	20,238
Caatinga	24,569	32,017	26,722	22,543	11,907	18,945	22,442	13,100
Pantanal	10,142	17,415	9,190	8,151	7,796	8,200	7,912	4,834
Atlantic Forest	10,093	2,547	5,195	7,426	1,059	3,992	2,011	2,568
Pampas	315	137	244	266	146	145	245	140
TOTAL	**235,360**	**210,887**	**232,611**	**225,603**	**117,302**	**187,499**	**127,071**	**69,605**

Source: INPE, 2010 (http://www.dpi.inpe.br/proarco/bdqueimadas). Data captured by NOAA-12 (nocturnal) from 2002 to August 10, 2007. After August 10, 2007 data were captured by NOAA-15 (nocturnal).

Records indicate a peak in 2004 and a smaller one in 2007, after which fire occurrences entered a decreasing trend which tends to continue as a result of strengthened government action and deforestation monitoring. In the Amazon, fire occurrences are closely related to deforestation. As presented in Figure I-15 below, data for the Amazon Region indicate increasing levels since 1999, with 2004 presenting the highest number of fires detected by satellite, followed by a sharp decreasing trend. The year 2006 presented a marked reduction in the number of fire occurrences due to the reduction of deforestation in the "fire arc" or "deforestation arc" in southern Amazon, as a result of a significant increase in governmental enforcement and control actions.

[57] Brazil, Ministry of Planning Budget and Administration/IPEA, 2002. The Economic Cost of Fire in the Amazon. Authors: R.S. Motta, M.J.C. Mendonça, D. Nepstad, M.C.V. Diaz, A. Alencar, J.C. Gomes, and R.A. Ortiz. 42pp.

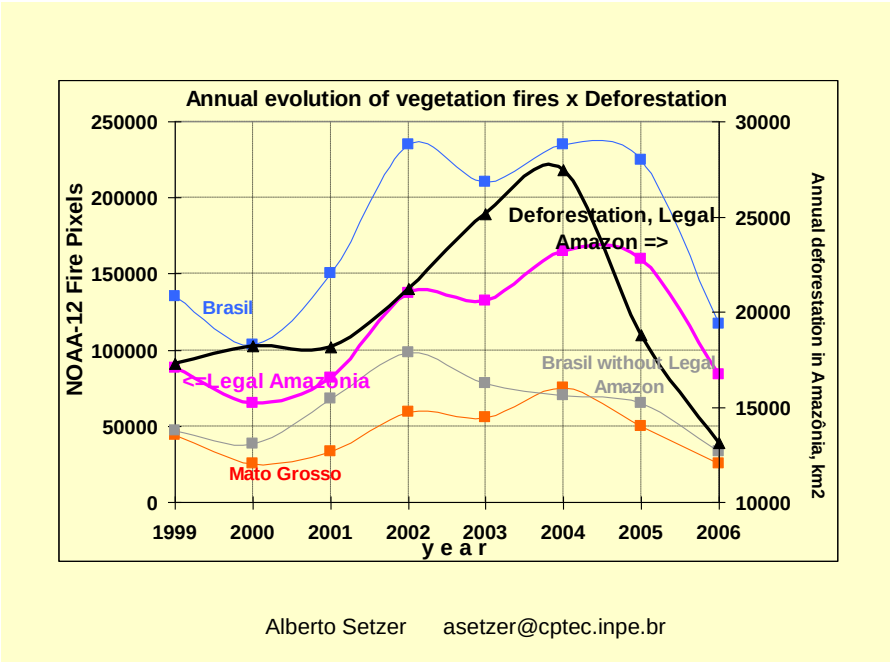


Figure I-15: Annual evolution of forest fire occurrences and deforestation in the Amazon. Source: http://sigma.cptec.inpe.br/queimadas/documentos/compara_focos_desmat.ppt#2

Figure I-16 below indicates the Amazon as the biome with the largest number of fire occurrences at all times, followed by the Cerrado, with the Pampas biome presenting the lowest number of occurrences. However, when the proportionate effect of fire is calculated according to the size of the biome, a different pattern is revealed: the Pantanal is in fact the Brazilian biome most negatively affected by fire (Table I-28), followed by the Caatinga and the Cerrado with very similar rates, leaving the Amazon in fourth place. The Atlantic Forest and the Pampas have notably lower rates compared to the other biomes.

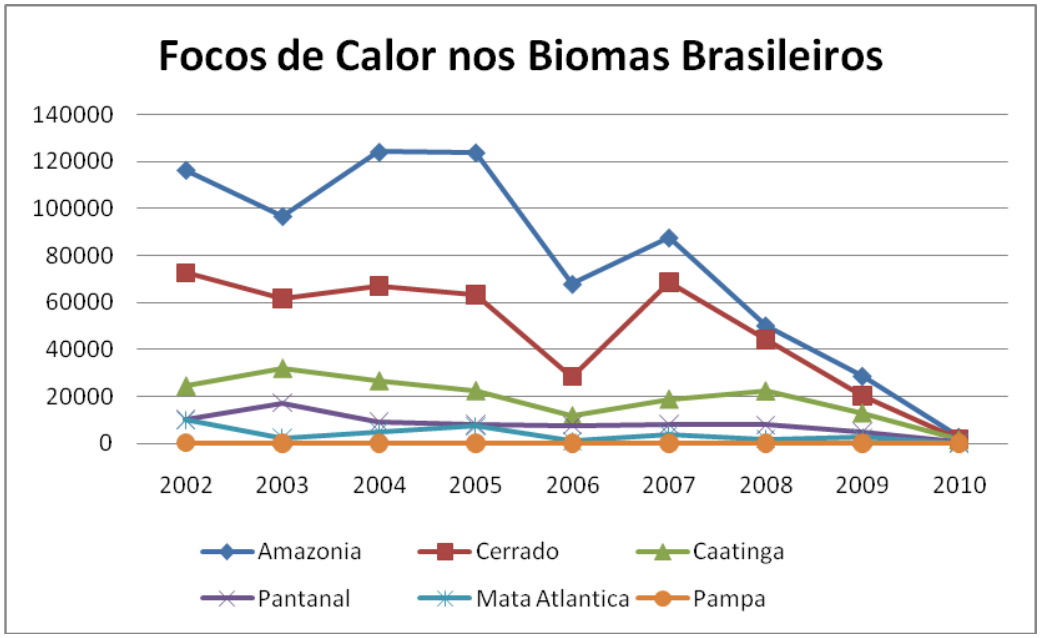


Figure I-16: Evolution of fire occurrences per biome. Source: http://www.dpi.inpe.br/proarco/bdqueimadas, data collected up to June 15, 2010.

Table I-28: Proportion of fire occurrences according to biome size*.

Biomes	No. of heat sources / 1,000 km^2							
	2002	2003	2004	2005	2006	2007	2008	2009
Amazon	27.6	22.9	29.4	29.3	16.1	20.7	11.9	6.8
Cerrado	35.5	30.2	32.8	30.9	13.9	33.5	21.6	9.9
Caatinga	29.8	38.8	32.4	27.3	14.4	22.9	27.2	15.9
Pantanal	67.1	115.2	60.8	53.9	51.6	54.2	52.3	32.0
Atlantic Forest	9.5	2.4	4.9	7.0	1.0	3.8	1.9	2.4
Pampas	1.8	0.8	1.4	1.5	0.8	0.8	1.4	0.8

*Calculated based on fire data obtained from http://www.dpi.inpe.br/proarco/bdqueimadas and IBGE map of Brazilian biomes (2010).

The total percent reduction of the number of heat sources in 2009 as compared to 2002 was 75.35% in the Amazon; 74.56% in the Atlantic Forest; 72.16% in the Cerrado; 55.56% in the Pampas; 52.34% in the Pantanal; and 46.68% in the Caatinga. This translates into a national reduction average of 70.30%, well above the National 2010 Target n^o 4.1, which aimed at a reduction of 25% in fire occurrences in each biome by 2010, as compared to 2002. This target was fully reached in all biomes, being surpassed in approximately 100% in the Caatinga, Pantanal and Pampas biomes, and approximately 200% in the Amazon, Cerrado and Atlantic Forest.

1.3.5. Pollution

Water quality

The government provides four types of sanitation services at its three levels (federal, state and municipal): (i) water supply; (ii) wastewater treatment; (iii) urban drainage; and (iv) urban cleaning and collection of solid waste. Until the 1960s, provision of these services was localized and sporadic, with stronger investments being applied particularly starting in the 1980s, with the new 1988 constitution and reformulation of public services. A comparison of 1989 with 2000 data can provide an idea of the dimension of the evolution of these services: in 1989 Brazil had 4,425 municipalities, 95.9% of which had a general network for the water supply services, provided by public or private companies, but only 47.3% had wastewater collection networks. In 2000 the number of municipalities increased to 5,507 and the water supply network was expanded to 97.9% of the municipalities, while the expansion of the wastewater collection network lagged behind with 52.2% of municipalities with this service available, one third of which provided wastewater treatment services. In 2000, 78.6% of the Brazilian municipalities had urban drainage services, but this proportion varies with population size: the larger the population, the greater the percentage of municipalities with urban drainage services, reaching 100% for municipalities with more than 300,000 inhabitants (corresponding to 1.6% of all municipalities). Additionally, an improving trend was noted for solid waste collection and disposal: in 1989 (time of first published national assessment) only 10% of municipalities presented adequate disposal of solid wastes, while in 2000 a total of 32.2% used landfills as

final destination for collected waste (corresponding to 69% of all solid waste collected in the country).[58]

At the national level, the main current problem related to water quality is the inflow of domestic wastewater, as only 52.2% of the Brazilian municipalities have an established wastewater collection system, and only 18% of wastewaters produced receive some kind of treatment. The estimated total domestic organic discharge is 6,389 tons OBD/day. Nevertheless, it is important to note that, for the 81 larger cities in Brazil (over 300,000 inhabitants) from 2003 to 2008 the wastewater collection service increased by 11.7%, and the wastewater treatment service increased by 4.6%[59]. According to IBGE[60], the primary environmental problem pointed out by most Brazilian municipalities is the siltation of water bodies (53% of municipalities); followed by water pollution (38%); landscape alteration (35%); soil contamination (33%); air pollution (22%); and degradation of protected areas (20%).

In addition to domestic wastewater (Figures I-17 and I-18), the industrial pollution, agriculture runoff, inadequate disposal of solid waste, and inadequate soil management also cause negative impacts on water quality in many watersheds. Nevertheless, industrial organic pollution has significantly decreased in some states, such as sugar and alcohol production effluents in São Paulo state, which are now being reused as fertilized irrigation. Adequate solid waste management, however, remains as a challenge for a great number of cities and an important pollution source of surface water bodies and groundwater[61].

[58] IBGE, 2000. Pesquisa Nacional de Saneamento Básico [National Basic Sanitation Assessment]. 397pp.
[59] Trata Brasil, 2009. Ranking de Saneamento [Sanitation Ranking].
[60] IBGE, 2002. Perfil dos Municípios Brasileiros – Meio Ambiente [Profile of Brazilian Municipalities - Environment]. www.ibge.gov.br
[61] BRASIL, 2005. Ministério do Meio Ambiente. Agência Nacional de Águas (ANA). Cadernos de Recursos Hídricos 1 – Panorama da Qualidade das Águas Superficiais no Brasil [*Water Resources Book 1 – Overview of the Quality of Superficial Waters in Brazil*]. Brasília: TDA Desenho & Arte Ltda.

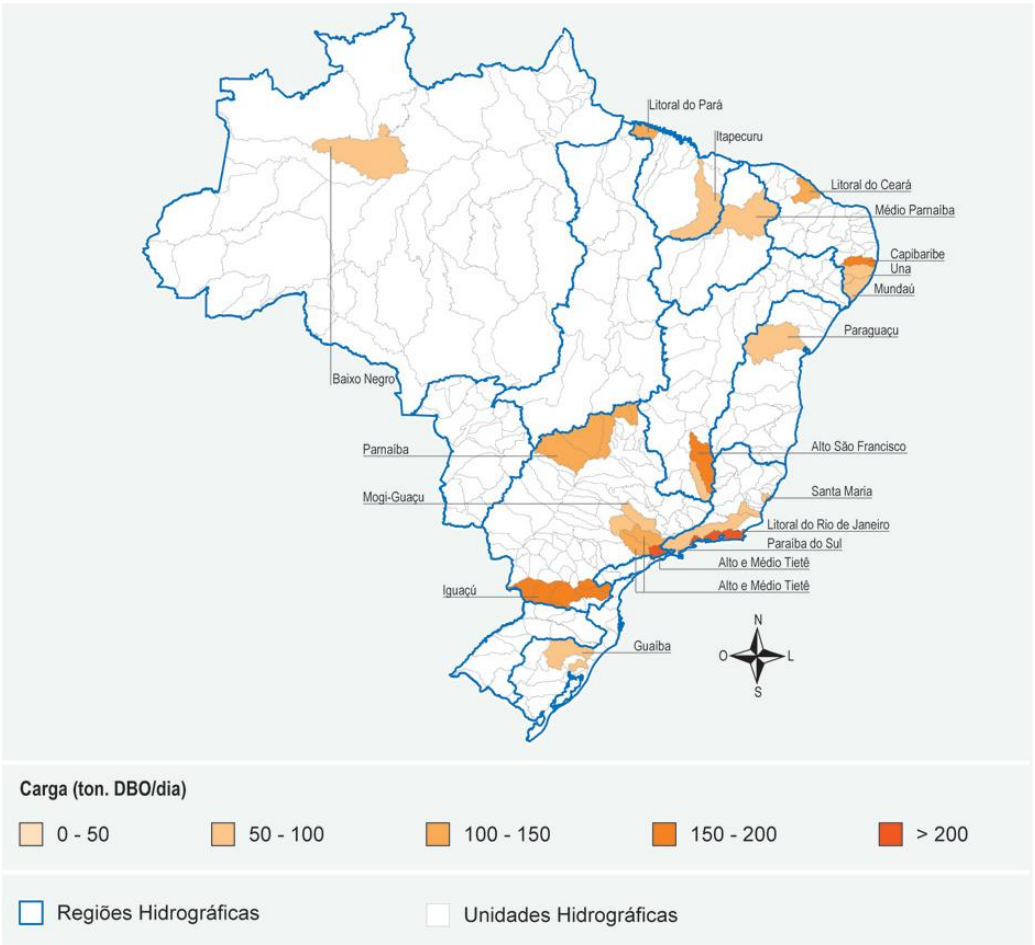


Figure I-17: Domestic organic discharges (tons OBD/day) in the hydrographic regions. Source: ANA, 2003.

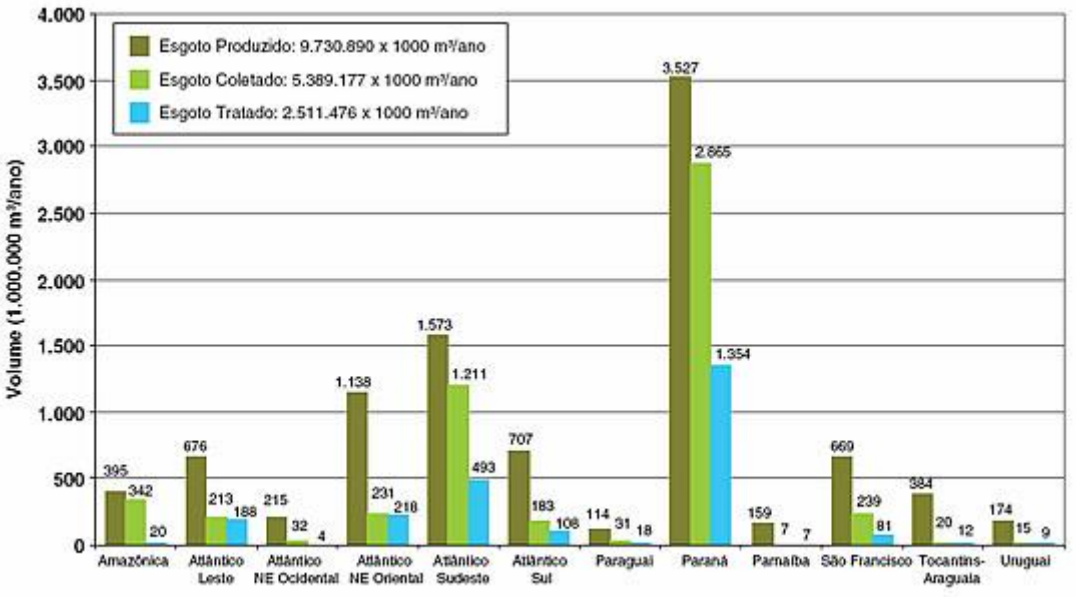


Figure I-18: Produced, collected and treated wastewaters in the hydrographic regions. Source: http://conjuntura.ana.gov.br/.

Approximately 90% of the Brazilian population has access to the service of solid waste collection, although regional percentages vary from less than 20% to over 80%.[62] However, most of the collected waste (58%) has inadequate disposal: 21% goes to dumps; 37% to landfills; 0.1% to flooded areas (Figure I-19). Only 451 Brazilian cities provide selective solid waste collection, separating recyclable waste[63]. After a long process, on March 10, 2010 the Chamber of Deputies unanimously approved the Bill 203/91, which institutes the National Solid Waste Policy. This is an important step to improve not only sanitary conditions, but also environmental quality, particularly regarding surface and ground water. However, this bill still requires the Senate's approval before becoming a federal Law.

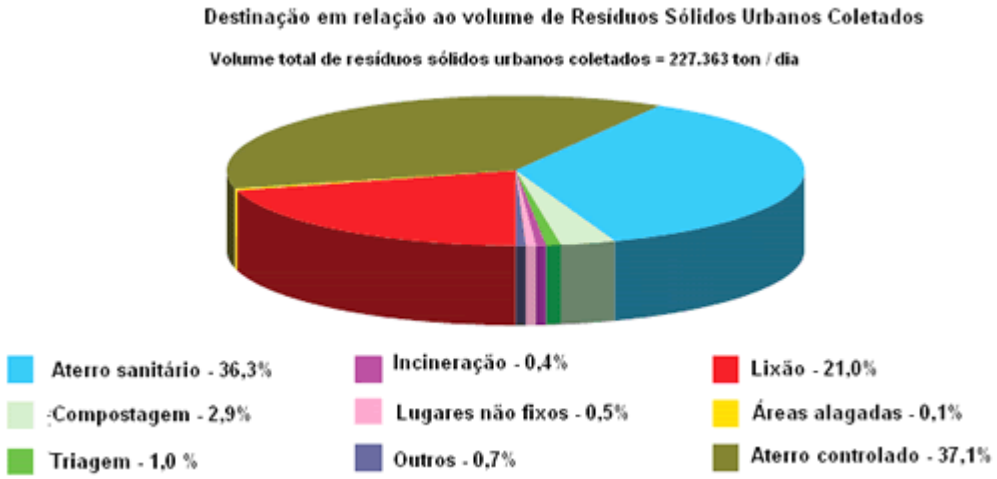


Figure I-19: Destination of collected urban solid waste (2000 data). Source: National Water Agency – ANA (http://conjuntura.ana.gov.br/).

Agricultural pollution

The use of agricultural chemicals is still very high in Brazil (Table I-29), which holds today the first place in the world as importer of these substances. Although organic production and consumption of organic products is gradually increasing in the country, initiatives to reduce the use of agricultural chemicals still represent a small proportion of the total agricultural activities in Brazil.

Table I-29: Estimate of the market of agricultural chemicals in Brazil from January to September.

Type of chemical	Estimate (in million R$)		
	2007	2008	Variation (%)
Herbicide	2,685	3,881	45%
Fungicide	1,351	1,721	27%
Insecticide	1,916	2,456	28%
Miticide	127	159	25%
Other	212	266	26%
Total	6,291	8,484	35%

Source: National Union of the Industry of Products for Agricultural Defense (SINDAG), 2008. Estimate of the market for agricultural chemicals. http://www.sindag.com.br/upload/ApresentacaoCTIAjan-setembro08.ppt

[62] Source: National Water Agency (2000 data). http://conjuntura.ana.gov.br/ - last accessed in March 2010.
[63] ISTOÉ magazine, edition nº 1696 of 03 April 2009.

Irrigation is widely used in agriculture, particularly in the Cerrado and Caatinga biomes (e.g., the São Francisco River valley, with a strong fruit production for national and international markets). In irrigated areas, most of the water entering the planted area and adjacent soils comes from irrigation rather than rain, which aggravates soil and water contamination by agricultural chemicals that drain with superficial waters or that leach, reaching underground water. Initiatives such as organic agriculture, Integrated Pest Management, and origin traceability are contributing to reduce the use of agricultural chemicals and guide proper and minimal use of these substances. However, such initiatives are recent, as is the voluntary movement of a segment of rural producers to seek qualification for their products to achieve better acceptance by national and export markets.

Brazil instituted the Law n^{o} 7802 on Agricultural Chemicals and Like-substances in 1989, establishing that these substances must be registered with the relevant federal agency to be used in Brazil, and their use must follow specific directives and requirements from the health, environmental and agricultural sectors. The National Agency of Sanitary Vigilance (ANVISA) is conducting a reassessment of the toxic levels of various active ingredients of agricultural chemicals, resulting in use restrictions or prohibition of various chemicals due to their adverse impacts on human health. Detailed information on this reassessment and the list of forbidden or restricted substances can be found at the ANVISA webpage: http://portal.Anvisa.gov.br/wps/portal/Anvisa/home/agrotoxicotoxicologia. ANVISA's report indicates that the active ingredients currently being reassessed correspond to only 1.4% of the 431 active ingredients in agricultural chemicals authorized in the country; and many of the ingredients under reassessment continue to be imported in large quantities, according to import information from the Integrated Foreign Trade System (SISCOMEX).

ANVISA implements since 2001 the Program on Analysis of Agricultural Chemicals Residue Content in Food (PARA Program), which provides annual analysis for selected produce. Agricultural chemicals are the second primary cause of intoxication in Brazil, second only to medical drugs[64]. The major problems detected by PARA in 2009 were: agricultural chemical residue contents above acceptable thresholds and the non-authorized use of these substances for specific produce types. Thirty types of produce were monitored in 2009 (lettuce, potato, strawberry, tomato, apple, banana, papaya, carrot, orange, pineapple, rice, onion, beans, mango, bell pepper, cabbage, grapes, kale, beet, and cucumber). Of the 3,130 samples tested in 2009, 29.0% were rated unsatisfactory. The 2009 results of the PARA program[65] confirm the illegal use of agricultural chemicals in cultures where, in general, the exposure of small and medium producers to these chemicals occur in high rates, as most of these producers use portable equipment to pulverize cultures. As family agriculture represents 84.4% of the rural properties in the country, this is a widespread issue in Brazil.

[64] ANVISA, 2009. http://www.anvisa.gov.br/divulga/noticias/2009/150409_1.htm

[65] http://portal.anvisa.gov.br/wps/wcm/connect/d214350042f576d489399f536d6308db.RELAT%C3%93RIO+DO+PARA+2009.pdf?MOD=AJPERESConfira

Mining pollution and degradation

The national ore extraction has increased significantly since 2001 (Table I-30). Although environmental legislation for mining ventures and enforcement has also increased, the potential environmental pollution resulting from mining activities and wastes is still high.

Table I-30: Examples of the evolution of mineral ore production in Brazil 2001 – 2007

Production (tons)	2001	2002	2003	2004	2005	2006	2007
Concentrated plumb	14,779	12,865	15,667	21,339	23,616	25,764	24,574
Concentrated copper	32,734	32,711	26,275	103,153	133,325	147,836	205,728
Chromite	419,049	283,991	404,477	593,476	616,534	562,739	627,772
Sulfur	384,672	383,989	395,399	395,609	398,528	435,696	479,666
Contained tin	13,016	12,023	12,217	12,202	11,739	9,528	12,596
Processed iron (10^3t)	201,438	214,560	234,478	261,696	281,462	317,800	354,674
Concentrated phosphate (10^3t)	4,684	5,083	5,790	5,689	5,631	5,801	6,158
Potassium (T K2O)	318,585	337,266	394,652	403,080	404,871	403,080	471,333

Source: DNPM - http://www.dnpm.gov.br/assets/galeriadocumento/balancomineral2001

The production of aggregates for construction is widespread through the country. Approximately 250 family-owned businesses produce crushed rock, where 10% of these businesses produce over 500,000 tons/year; 30% produce between 200,000 and 500,000 tons/year; and the remaining 60% produce less than 200,000 tons/year. Additionally, approximately 2,000 businesses, mostly family-owned, extract sand for works and construction. Of these, 5% produce over 300,000 tons/year; 35% produce between 100,000 and 300,000 tons/year; and 60% produce less than 100,000 tons/year.

Sand is extracted from riverbeds (90%), floodplains, lake deposits, and layers of eroded rocks and sandstone. However, the official records available from the National Department of Mineral Production (DNPM) have always reflected a very small portion of the actual number of aggregate producers, which work mostly without permits. The historical series (Table I-31) is based on data obtained from DNPM, mineral tax documentation, and producer associations.

Table I-31: Evolution of the production (m^3) of aggregates for construction 1988 – 2000.

YEARS	**AGGREGATES**		
	SAND	**CRUSHED ROCK**	**TOTAL**
1988	31,726,200	58,094,330	89,820,530
1989	38,841,993	60,397,369	99,239,262
1990	9,343,744	53,370,215	62,713,959
1991	8,804,024	50,461,839	59,265,863
1992	50,672,750	60,689,739	111,362,489
1993	47,138,916	57,115,496	104,254,412
1994	49,523,297	60,231,776	109,755,073
1995	54,481,032	65,538,785	120,019,817
1996	99,399,160	59,990,050	159,389,210
1997	127,898,870	87,972,232	215,871,102
1998	125,219,419	91,263,583	216,483,002
1999	128,093,698	88,695,759	216,789,457
2000	141,100,000	97,300,000	238,400,000

Source: DNPM - http://www.dnpm.gov.br/assets/galeriadocumento/balancomineral2001

Although pollution and degradation caused by mining and aggregate extraction are mostly localized impacts, such impacts cause non-reversible changes in the landscape through removal of soil and habitat. Legislation requires the environmental restoration of areas after the cessation of mining activities, which mitigates biodiversity loss but does not prevent it.

Air pollution

The Ministry of the Environment carried out in 2007 a national assessment of the status and trends of pollutant emissions by motorized vehicles, developing scenarios up to 2020.[66] The objective of this study is to assess the PROCONVE – National Program for Controlling Air Pollution Caused by Vehicles, establishing a basis to develop new actions and strategies to combat and mitigate air pollution in the next decade. Current national consumption of fuels by the transport sector (buses, cars and trucks) is equivalent to 1.7 times the consumption of electric energy in the entire country, and the combined potency of engines in the entire fleet is equivalent to 170 Itaipu hydroelectric power plants. These facts clearly indicate that the air pollution issues in urban areas result mostly from the lack of efficiency in the vehicles and the transport system, requiring a differentiated environmental strategy targeted at the entire transport system.

The study evaluated the trends from 1980 and extrapolated to 2030 for various polluting elements based on a "business as usual" scenario, producing emission evolution patterns for carbon monoxide (Figure I-20), total hydrocarbons, aldehydes, volatile organic composites, nitrogen oxide, particles, sulfates, and fossil carbon dioxide (Figure I-21).

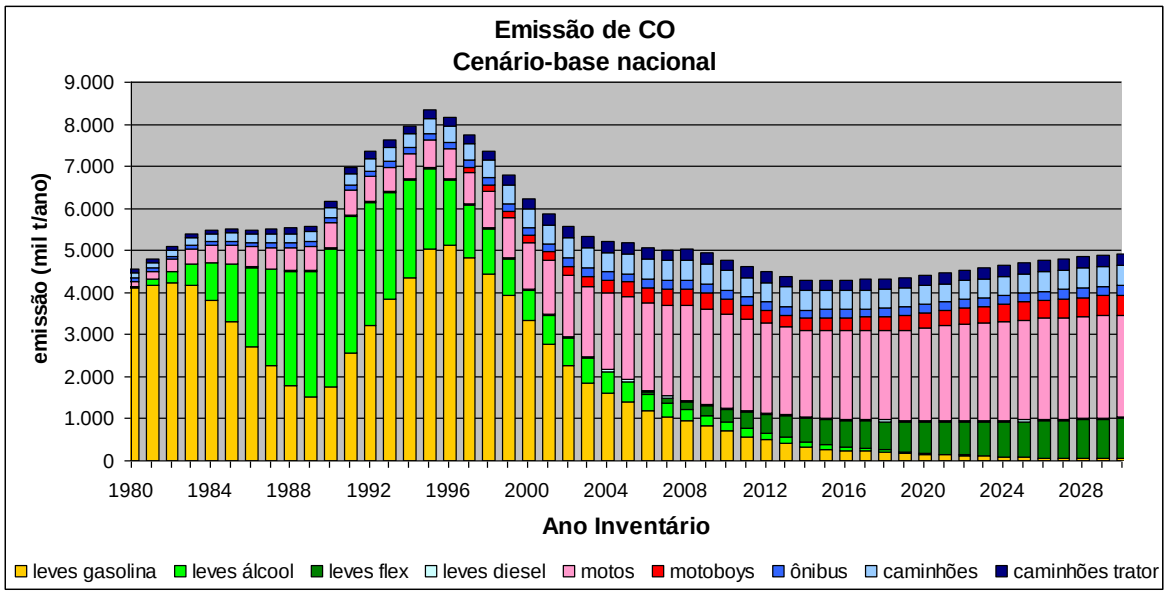


Figure I-20: Annual CO emission by vehicle exhaust by class of vehicle according to current regulation. Source: MMA 2007.

[66] Brazil - Environmental Quality Secretariat/Ministry of the Environment, 2007. Inventory of Mobile Sources: prospective and retrospective analysis of the PROCONVE benefits for air quality from 1980 to 2030. Brasília, in press.

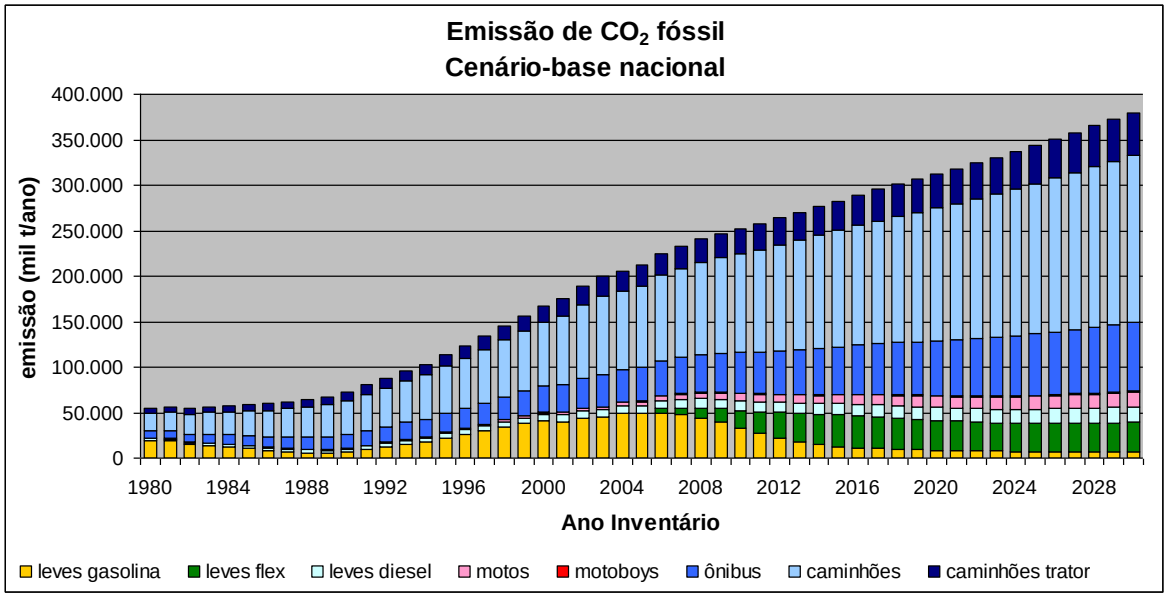
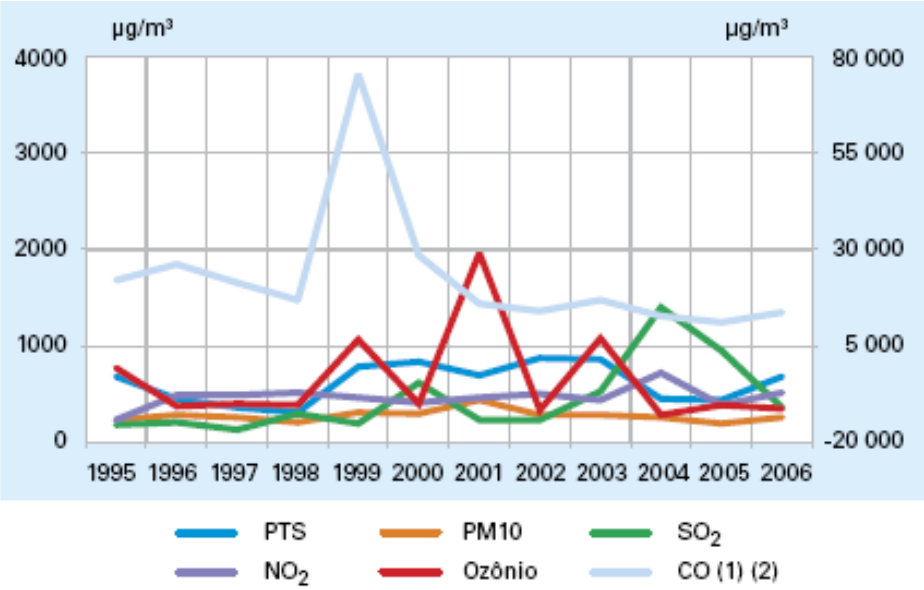


Figure I-21: Annual emission of fossil CO_2 through vehicle exhaust by class of vehicle according to current regulation. Source: MMA 2007.

The 2007 study concludes that the technological evolution introduced by PROCONVE along the past 20 years played an extremely important role in the efforts to halt the growing atmosphere degradation in the large Brazilian cities, but it represented only the first step to address this issue. It will be necessary to improve the established strategies during the next decade, as well as to enhance methods and assessment procedures to make Brazilian vehicles increasingly economic and less polluting. It will also be necessary to alter the distribution of the means of transportation, seeking a better balance among the demand of the various types of fuel.

IBGE also carried out an assessment of the annual emission of selected pollutants in the largest Brazilian state capitals and the Federal District for the period 1995 to 2006 (Figure I-22).



Fontes: Belo Horizonte (Fundação Estadual do Meio Ambiente - FEAM); Curitiba (Instituto Ambiental do Paraná - IAP); Distrito Federal (Secretaria de Meio Ambiente e Recursos Hídricos do Distrito Federal - SEMARH); Porto Alegre (Ar do Sul - Rede de Monitoramento da Qualidade do Ar - FEPAM); Rio de Janeiro (Fundação Estadual de Engenharia de Meio Ambiente-FEEMA); Região Metropolitana de Salvador - RMS (Empresa de Proteção Ambiental - CETREL S.A.); São Paulo (Companhia de Tecnologia de Saneamento Ambiental-CETESB); Recife (Agência Estadual do Meio Ambiente e Recursos Hídricos - CPRH); Vitória (Rede Automática de Monitoramento de Qualidade do Ar da Região da Grande Vitória – RAMQAr/ Instituto Estadual de Meio Ambiente e Recursos Hídricos - IEMA e Secretaria Municipal de Meio Ambiente - SEMMAM).

(1) A concentração de CO é muito maior que a dos outros poluentes; por conta disto, esta tem como referência o eixo da direita.

(2) Para o CO não foram considerados os dados de Camaçari .

Figure I-22: Maximum annual concentration of some pollutants in the Metropolitan Regions of Belo Horizonte, Curitiba, Federal District, Porto Alegre, Rio de Janeiro, Salvador, São Paulo, Recife, and Vitória; 1995-2006. Source: Brazil, IBGE. 2008. Sustainable Development Indicators. Available at the following website: ftp://geoftp.ibge.gov.br/documentos/recursosnaturais/ids/ids2008.pdf

1.3.6. Climate Change

In 2006 the Weather Forecast and Climatic Studies Center of the National Institute of Space Research (CPTEC/INPE) published a study on the global climate change and its effects on biodiversity, including an assessment of the climatic changes in the Brazilian territory during the 21st century[67]. The study's review of the climatic variability and trends during the 20th century observed that the variability of rainfall and water flow rates in rivers in the Amazon and the country's northeast region occurring between years and decades is more important than increase or reduction trends. This variability is associated to the variation patterns in the Pacific and Atlantic Oceans at the same time scale, such as El Niño and the North Atlantic Oscillation, among others. Additionally, increased rainfall and river flow trends have been observed in southern Brazil, while no significant changes were detected

[67] Marengo, José A. 2006. Mudanças Climáticas Globais e seus Efeitos sobre a Biodiversidade: Caracterização do Clima Atual e Definição das Alterações Climáticas para o Território Brasileiro ao longo do Século XXI. Brasília, MMA.

for these aspects in the Amazon for the last 20 years. A slight increase in rainfall was observed in the northeast region in the long term, though not statistically significant. Impacts from El Niño and La Niña have been felt more severely in the north and northeast (droughts) and south (droughts with La Niña and excessive rain and floods during El Niño) regions of Brazil. If these events increase in intensity or frequency in the future, Brazil may be exposed to more frequent droughts or floods and heat waves; however, these changes remain uncertain and some extreme climatic events may occur independent of El Niño or La Niña.

Marengo (2007) also presented various climate change scenarios for Brazil using the IPCC models. Based on current climate patterns, the models presented higher predictability for the north-northeastern portion of the country and medium predictability for the southern portion. The model presents lower predictability for the central section of the country. The average of the models suggests an increase in winter temperatures for the period 2071-2100, particularly in the Amazon, where the difference may reach 3^{o}-5^{o}C warmer. Three models suggest an increase in rainfall, while one model indicates decreased rainfall in the northeast and Amazon and increased rainfall in the south of Brazil, with anomalies intensifying in 2050 and 2080. Another model suggests increased rainfall in the northeast and southeast Brazil and central-east Amazon.

A comparative analysis prepared by this study for specific Brazilian regions suggests increased temperatures and reduced rainfall for the Amazon, intensified for the 2050 and 2080 time slices, predicting a warmer and drier future climate for the region. Total rainfall reduction for the Amazon could reach 20% if the entire forest is substituted by pastures. For the northeast region (mostly comprised by Caatinga and some Atlantic Forest), the suggested trends point toward a warmer and more humid future climate. The forecast is not as clear for the large floodplains of the Pantanal, where all models suggest increased temperature, but some indicate increased rainfall and others indicate reduced rainfall. As the Pantanal functions as a gigantic flood regulation system for the Paraguai river watershed, alterations in rainfall can significantly affect the system's capacity to retain and control flood events. The other region analyzed by this study is the Prata river watershed (southern Brazil), an area of high economic importance for South America. The scenarios for this region suggest an increase in temperature and decrease in rainfall.

Under a pessimistic scenario, climate change would reduce the total area of the Amazon, Pantanal, Atlantic Forest, and Pampas biomes, promoting the expansion of the two biomes containing drier grasslands: Cerrado and Caatinga[68].

Based on observed evidence and climatic trends suggested by IPCC models, Marengo (2007) foresees the following impacts from climate change in Brazil:

Amazon: If the progress of the agricultural frontier and timber industry is maintained at the current levels, the forest cover may be reduced from the current 5.3 million km^2 (85% of its original extension) to 3.2 million km^2 by 2050 (53% of its original extension). Global

[68] Nobre, Carlos A./INPE. 2006. Presentation to the MMA 2010 National Biodiversity Target Workshop. Acre, Brazil 2006.

warming would increase temperatures in this region possibly leading to a drier climate, changing the forest to a savannah ecosystem. Under a pessimistic scenario, temperature may increase by 8^{o}C. Water levels in rivers may reduce significantly and the drier air may increase the risk of forest fires.

Semi-arid: Temperatures in northeastern Brazil may increase by 2-5^{o}C by the end of the 21st century, substituting the Caatinga for a more arid vegetation. Deforestation in the Amazon may make the semi-arid drier. With warmer temperatures, evaporation increases and water availability decreases. The warmer and drier climate could lead to population migrations to the large urban centers of the northeast or other Brazilian regions, resulting in large waves of "environmental refugees".

Coastal and marine zone: Higher sea levels could lead to large economic and environmental losses along the coastal zone, destroying buildings and port infrastructure, and causing population relocation. Precarious sewage systems would collapse and new hurricanes may reach the Brazilian coast. Additionally, the TEEB Report[69] indicates that the coral reefs may constitute the first ecosystem to become functionally extinct.

Southeast and Prata watershed: Even if rainfall increases in the future, higher temperatures forecasted by the climatic models could jeopardize water availability for agriculture, human consumption and hydroelectric power generation due to the foreseen increased evaporation. Longer dry seasons in some regions of the country could affect the regional hydrological balance, thus jeopardizing human activities.

South region: The production of grains may be jeopardized in this region with increased temperatures, increasingly frequent droughts, and rains restricted to extreme events of short duration. Increasingly intense rains could damage cities, with large social impacts in the poorer neighborhoods. Intense winds of short duration could also affect the coastal zone. Higher and extreme temperatures at shorter time periods could lead to increased disease rates.

Agriculture: Perennial cultures such as citrus tend to seek moderate temperatures and their production may move further south. Higher summer temperatures would condition translocation of cultures such as rice, beans and soybean to the central-west region, changing the current production axis.

Water resources: Reduced rainfall and reduced water flow in rivers would limit waterway transportation and sewage systems. Water and sewage treatment facilities may overflow. Energy generation would be jeopardized by the lack of rain and high evaporation rates in some regions.

Large cities: Metropolitan regions would face even higher temperatures, increasing flooding and mudslide events, particularly in areas with steeper grades.

[69] TEEB, 2009. The Economics of Ecosystems and Biodiversity: Climate Issues Update, September 2009. UNEP. Authors: Sukhdev, P. et al.

Human health: Cases of transmissible infectious diseases could increase. Dengue fever may spread throughout the country. Disease proliferation would tend to increase in urban areas.

Despite these scenarios, up to now only two biomes (Amazon and the Coastal & Marine Zone) have species listed as officially threatened due to negative effects of climate change in Brazil (see section 1.2.2).

National Plan for Climate Change

Brazil published in December 2008 its National Plan for Climate Change, with the objective to promote the development and enhancement of climate mitigation actions in Brazil, contributing to reduce the emission of greenhouse gases, and to create internal conditions for adaptation to the impacts of climate change.

The National Plan for Climate Change[70] is structured around four axes: (i) mitigation opportunities; (ii) vulnerability and adaptation; (iii) research and development; and (iv) education, capacity building and communication. The Plan establishes targets to minimize the effects of global climate change through the reduction of emissions and actions to achieve environmental and socio-economic gains, such as: reduce by 80% the annual deforestation rate in the Amazon by 2020; increase by 11% per year the internal consumption of ethanol fuel in the next ten years; double the area of planted forest to 11 million hectares by 2020, of which 2 million hectares should be planted with native species; substitute 1 million old refrigerators per year in the next ten years; increase the total offer of co-generation electricity, particularly that resulting from sugar cane pulp, to 11.4% of the total energy available in the country by 2030; and reduce non-technical losses in the distribution of electric energy to a 1,000 GWh rate per year in the next ten years; among other targets.

This is an inter-ministerial Plan, which counts with the contribution of states and municipalities, as well as of various sectors of society. Its development was participatory with the organization of public consultations and sectoral meetings promoted by the Brazilian Forum on Climate Change, and the contributions provided by recommendations of the 3rd National Conference on the Environment (held in May 2008), which discussed a climate change agenda. The National Plan for Climate Change is a dynamic document and, as such, will periodically undergo revision and results assessment to ensure adequate implementation according to the decisions of the Brazilian society.

1.3.7. Key threats to coastal and marine biodiversity

A study carried out in 2006 by the Ministry of the Environment with support from NGO The Nature Conservancy identified, through four regional technical meetings, the target ecosystems and species for coastal and marine biodiversity conservation, as well as the main threats to their conservation. Most of the factors listed in section 1.3 are also important drivers of threat for coastal biodiversity along the Brazilian coastline, but coastal

[70] http://www.mma.gov.br/sitio/index.php?ido=conteudo.monta&idEstrutura=141&idConteudo=7466&idMenu=7555

development is the leading threat to this type of environment, while fisheries activities are the major factor leading to biodiversity decline in the marine zone (Table I-32)[71].

Table I-32: Key threats to coastal and marine biodiversity in Brazilian waters

Key threats	Importance (%) of threat in each coastal and marine region			
	North	Northeast	Southeast	South
Threats to coastal biodiversity				
Coastal development	21.7%	22.0%	23.0%	30.7%
Pollution	17.1%	15.0%	17.4%	16.5%
Fisheries activities	16.2%	15.0%	15.3%	9.0%
Resource extraction	14.4%	8.0%	7.9%	8.4%
Sedimentation	8.3%	< 0.1%	< 0.1%	2.6%
Maritime transportation	4.4%	1.2%	5.6%	1.4%
Agriculture	4.3%	3.0%	1.6%	10.4%
Aquaculture	3.8%	6.0%	2.6%	1.0%
Cattle ranching	3.1%	< 0.1%	1.3%	4.4%
Invasive species	0.1%	2.6%	< 0.1%	3.8%
Tourism	2.0%	14.0%	13.2%	10.2%
Climate change	2.1%	1.6%	1.2%	0.6%
Oil and gas activities	0.8%	0.6%	6.0%	< 0.1%
Noise	0.1%	< 0.1%	0.8%	< 0.1%
Governance	1.7%	< 0.1%	4.2%	0.8%
Threats to marine biodiversity				
Fisheries activities	29.4%	(not assessed)	49.0%	52.5%
Pollution	16.7%	(not assessed)	6.5%	36.4%
Maritime transportation	13.8%	(not assessed)	2.5%	-
Oil and gas activities	9.8%	(not assessed)	21.0%	1.0%
Resource extraction	9.2%	(not assessed)	2.1%	2.0%
Agriculture	1.7%	(not assessed)	< 0.1%	-
Aquaculture	2.3%	(not assessed)	0.9%	-
Invasive species	< 0.1%	(not assessed)	0.3%	-
Coastal development	8.6%	(not assessed)	3.7%	1.0%
Sedimentation	2.6%	(not assessed)	< 0.1%	-
Tourism	2.3%	(not assessed)	4.6%	-
Climate change	2.0%	(not assessed)	2.2%	-
Governance	1.4%	(not assessed)	7.5%	7.1%

Source: The Nature Conservancy, 2007. Priorities for Coastal and Marine Conservation in South America. Anthony Chatwin, Ed. 76pp.

1.4. Major actions to protect biodiversity

1.4.1. Protected areas

Created in 2006, the National Cadastre of Protected Areas (CNUC)[72] is the official database on Brazilian protected areas (conservation units – UC). CNUC is managed by the Ministry of the Environment, with the collaboration of the federal, state and municipal environmental agencies, which insert the information on the protected areas under their

[71] Prates, A.P. *et al*., 2007. Coastal and Marine Conservation Priorities in Brazil. In : The Nature Conservancy, 2007. Priorities for Coastal and Marine Conservation in South America. Anthony Chatwin, Ed. 76pp.
[72] www.mma.gov.br/cadastro_uc

management into the Cadastre. This information is later validated by the Ministry of the Environment. The process of inserting and validating information was already completed for federal protected areas, but is still being finalized for state and municipal protected areas, as well as for all Private Reserves of the Natural Heritage (RPPN).

Responding to Target 1 of the CBD Strategic Plan, Brazil set in 2006 the goal of protecting at least 30% of the Amazon and 10% of its other biomes in protected areas, including the Coastal and Marine Zone. At that time, terrestrial protected areas covered 8.0% (681,266 km^2) of the national territory. By 2010, considering the validated data already included in CNUC and available data on the remaining state protected areas and RPPNs still not listed in CNUC, this total increased to 17.42% (1,539,416 km^2) of the continental area and 3.14% (116,278 km^2) of the marine and coastal zone (Tables I-33 A and B)[73].

Table I-33 A: Percentage of the National Protected Areas Target for 2010 Achieved by August 2010 according to data already validated and included in CNUC and data still requiring validation and inclusion in CNUC.

Protected Areas			**TOTAL**	**Amazon**		**Caatinga**		**Cerrado**	
		N° of PAs	**Area (km^2)**	**Area (km^2)**	**% of biome**	**Area (km^2)**	**% of biome**	**Area (km^2)**	**% of biome**
Federal PAs	Integral Protection	137	359,440	293,102	6.98%	6,981	0.83%	41,167	2.02 %
	Sust. Use	173	411,874	326,806	7.79%	27,019	3.20%	17.683	0.87%
	Total Federal	310	771,314	619,908	14.77%	34,000	4.03%	58,850	2.89%
State PAs	Integral Protection	306	155,369	118,714	2.83%	1,617	0.19%	16,945	0.83 %
	Sust. Use	315	601,419	398,281	9.49%	25,756	3.05%	90,104	4.43%
	Total State	621	756,788	516,995	12.32%	27,373	3.24%	107,049	5.26%
Municipal PAs*	Integral Protection	314	33,111						
	Sust. Use	375	72,327						
	Total Munic.	689	105,438						
RPPNs	Federal	538	4,878	397	0.01%	496	0.06%	1,048	0.05%
	State	435	2,176	0	0.00%	38	0,00%	818	0.04%
	Total RPPN	973	7,055	397	0.01%	535	0.06%	1,866	0.09%
Total SNUC (CNUC + estimated data)		**1,963**	**1,539,416**	**1,137,305**	**27.10%**	**61,907**	**7.33%**	**171,616**	**8.43%**
National 2010 Target				1,259,083	30.00%	84,445	10.00%	203,645	10.00%
% of national target achieved (2010)				**90.33%**		**73.31%**		**84.27%**	

Table I-33 B: Percentage of the National Protected Areas Target for 2010 Achieved by August 2010 according to data already validated and included in CNUC and data still requiring validation and inclusion in CNUC.

Protected Areas		**Atlantic Forest**		**Pampas**		**Pantanal**		**Coastal/Marine**	
		Area (km^2)	**% of biome**	**Area (km^2)**	**% of biome**	**Area (km^2)**	**% of biome**	**Area (km^2)**	**% of biome**
Federal PAs	Integral Protection	10,964	0.99%	1,435	0.81%	1,499	1.00%	10,319	0.28%
	Sust. Use	24,735	2.23%	3,198	1.81%	0	0.00%	22,124	0.60%
	Total Fed.	35,699	3.22%	4,633	2.62%	1,499	1.00%	32,443	0.88%

[73] Data provided in 2010 by the Protected Areas Department of the Ministry of the Environment (DAP/MMA) based on data in the National Cadastre of Protected Areas (CNUC: www.mma.gov.br/cadastro_uc) and other information still not in the Cadastre. These data include the federal, state and municipal protected areas recorded in the CNUC. Only part of the state and municipal protected areas was already included in the Cadastre. As the pieces of data related to the Private Reserves of the Natural Heritage (RPPNs) that can be publicized are still being defined, no RPPN is yet included in the Cadastre.

State PAs	Integral Protection	14,098	1.27 %	464	0.26%	2,910	1.93 %	1,715	0.05%
	Sust. Use	48,198	4.34%	1,031	0.59%	0	0.00%	82,072	2.21%
	Total State	62,296	5.61%	1,495	0.85%	2,910	1.93 %	83,786	2.26%
Municipal PAs*	Integral Protection								
	Sust. Use								
	Total Mun.								
RPPNs	Federal	763	0.07%	12	0.01%	2,163	1.44%	-	-
	State	676	0.06%	29	0.02%	614	0.41%	-	-
	Total RPPN	1,440	0.13%	40	0.02%	2,777	1.85%	-	-
Total SNUC (CNUC + estimated data)		**99,815**	**8.99%**	**6,173**	**3.50%**	**7,205**	**4.79%**	**116,278**	**3.14%**
National Target		111,018	10.00%	17,650	10.00%	15,036	10.00%	370,684	10.00%
% of national target achieved (2010)		**89.91%**		**34.97%**		**47.92%**		**31.37%**	

Caption: PAs = Protected Areas; RPPN = Private Reserve of the Natural Heritage; SNUC = National Protected Areas System; CNUC = National Cadastre of Protected Areas.
(*) Source: Perfil dos Municípios Brasileiros: Meio Ambiente, 2002 [Profile of Brazilian Municipalities: Environment, 2002]. Rio de Janeiro, IBGE, 394pp, 2005.
Source of all other data: Internal report prepared in 2010 by the Department of Protected Areas – DAP/MMA.

Considering only the federal and state areas with the recording process in CNUC already concluded, which do not correspond to all existing protected areas, the total target achievement would be 79.75% for the Amazon; 67.98% for the Atlantic Forest; 63.36% for the Cerrado; 61.20% for the Caatinga; 26.27% for the Pampas; 22.24% for the Pantanal; and 18.95% for the Coastal and Marine Zone (Tables I-34 A and I-34 B).

Table I-34 A: Percentage of the National Protected Areas Target for 2010 Achieved by August 2010 according to validated data already included in CNUC.

Protected Areas			**TOTAL**	**Amazon**		**Caatinga**		**Cerrado**	
		N° of PAs	**Area (km^2)**	**Area (km^2)**	**% of biome**	**Area (km^2)**	**% of biome**	**Area (km^2)**	**% of biome**
Federal PAs	Integral Protection	137	359,440	293,102	6.98%	6,981	0.83%	41,167	2.02 %
	Sust Use.	173	411,874	326,806	7.79%	27,019	3.20%	17,683	0.87%
	Total Federal	310	771,314	619,908	14.77%	34,000	4.03%	58,850	2.89%
State PAs	Integral Protection	210	127,102	103,371	2.46%	1,561	0.18%	8,999	0.44 %
	Sust. Use	164	391,047	280,859	6.69%	16,123	1.91%	57,327	2.82%
	Total State	374	518,149	384,230	9.15%	17,684	2.09%	39,392	3.55%
Municipal PAs	Integral Protection	32	109	5	0.00%	0	0.00%	0	0.00%
	Sust. Uso	27	4,150	0	0.00%	0	0.00%	3,850	0.19%
	Total Mun.	59	4,259	5	0.00%	0	0.00%	3,850	0.19%
Total CNUC		**743**	**1,293,722**	**1,004,143**	**23.93%**	**51,683**	**6.12%**	**129,027**	**6.34%**
National 2010 Target				1,259,083	30.00%	84,445	10.00%	203,645	10.00%
% of the national target achieved (2010) according to data included in CNUC				**79.75%**		**61.20%**		**63.36%**	

Table I-34 B: Percentage of the National Protected Areas Target for 2010 Achieved by August 2010 according to validated data already included in CNUC.

Protected Areas	**Atlantic Forest**		**Pampas**		**Pantanal**		**Coastal/Marine**	
	Area (km^2)	**% of biome**	**Area (km^2)**	**% of biome**	**Area (km^2)**	**% of biome**	**Area (km^2)**	**% of biome**

Federal PAs	Integral Protection	10,964	0.99%	1,435	0.81%	1,499	1.00%	10,319	0.28%
	Sust. Use	24,735	2.23%	3,198	1.81%	0	0.00%	22,124	0.60%
	Total Fed.	35,699	3.22%	4,633	2.62%	1,499	1.00%	32,443	0.88%
State PAs	Integral Protection	11,167	1.01 %	0	0.00%	1,826	1.21 %	1,137	0.03%
	Sust. Use	28,225	2.54%	0	0.00%	0	0.00%	36,605	0.99%
	Total State	39,392	3.55%	0	0.00%	1,826	1.21 %	37,742	1.02%
Municipal PAs	Integral Protection	85	0.01%	0	0.00%	19	0.01%	4	0.00%
	Sust. Use	295	0.03%	5	0.00%	0	0.00%	45	0.00%
	Total Mun.	380	0.03%	5	0.00%	19	0.01%	48	0.00%
Total CNUC		**75,471**	**6.80%**	**4,637**	**2.63%**	**3,344**	**2.22%**	**70,234**	**1.89%**
National Target		111,018	10.00%	17,650	10.00%	15,036	10.00%	370,684	10.00%
% of the national target achieved (2010) according to CNUC data		**67.98%**		**26.27%**		**22.24%**		**18.95%**	

Caption: PAs = Protected Areas; RPPN = Private Reserve of the Natural Heritage; CNUC = National Cadastre of Protected Areas.
Source: National Cadastre of Protected Areas (CNUC).

Brazil has not yet achieved its 2010 national target for any biome, but made considerable progress in three biomes (Amazon, Atlantic Forest and Cerrado). The Caatinga reached over 70% of the target by mid-2010, while the three other biomes (Pantanal, Pampas and the Coastal and Marine Zone[74]) have not yet achieved 50% of the target, where the Pampas and the Coastal and Marine Zone are the least protected biomes. New protected areas are still being created in 2010, but despite the national effort applied in the last few years to meet the Brazilian 2010 target for protected areas, it is unlikely that the national target will be achieved in any of the seven Brazilian biomes by the end of the year.

To achieve the complete national 2010 target for all biomes, Brazil needs to create additional 207,170 km^2 of continental protected areas and 299,871 km^2 of marine protected areas, increasing to 19.86% of the national continental area or 29.86% of the national jurisdiction under official protection. It is important to note, however, that the numbers presented for part of the state and municipal protected areas and for private reserves of the natural heritage are considered estimates, as the process to validate the data provided on these protected areas to include them in the National Cadastre of Protected Areas (CNUC) is still ongoing.

The Municipal Information Research (Munic)[75] published by the Brazilian Institute of Geography and Statistics (IBGE) in 2002 indicated that up to that year Brazil had 689 municipal protected areas under the various management categories for full protection (46%) and sustainable use (54%), totaling 105,437.78 km^2 distributed in 436 municipalities. Although this is a small area in comparison to the state and federal protected areas, the municipal concern with the environment has increased since 2002: the percentage of municipalities with a specific agency for the environment increased from only 6% in 2002

[74] The Coastal Zone is comprised by continental ecosystems that suffer marine influence (e.g., mangroves, dunes, etc.), and the Marine Zone is comprised by the Territorial Sea and the Exclusive Economic Zone.
[75] Munic 2002: http://www.ibge.gov.br/home/presidencia/noticias/noticia_visualiza.php?id_noticia=363&id_pagina=1

to 77.8% in 2008; and the proportion on municipalities with Municipal Environmental Councils increased from 34% in 2002 to 47.6% in 2008.[76]

The federal, state, and municipal protected areas (Figure I-23) integrate the National Protected Areas System (SNUC – *Sistema Nacional de Áreas Protegidas*), created in 2000 by Law 9985 and regulated in 2002 by Decree 4340. Brazil also has a significant portion (1,096,496.85 km^2) of its territory protected by 522 indigenous lands, at least 398 of which (922,192 km^2) have completed the regularization process. The vast majority of these areas (290) are located in the Amazon biome (Table I-35)[77]. Studies are being carried out for the possible creation of additional 123 areas. In compliance with constitutional rights and the *Estatuto do Índio*, indigenous lands are managed by indigenous populations according to their traditions, but are not officially recognized as part of SNUC. Nevertheless, these indigenous lands are, for the most part, reasonable preserved and important for biodiversity conservation, and are recognized by the CBD as protected areas. Therefore, the National Protected Areas Plan (PNAP – *Plano Estratégico Nacional de Áreas Protegidas*, instituted by Decree 5758 in 2006) includes indigenous lands in the planning and implementation of integrated biodiversity conservation and management.

Table I-35: Indigenous Lands in Brazil

Biome	N° of indigenous lands	Total area (km^2)
Amazon	290	992,177.64
Atlantic Forest	117	6,347.91
Caatinga	30	2,901.37
Cerrado	75	92,350.13
Pampas	4	23.72
Pantanal	6	2,696.08
Total	**522**	**1,096,496.85**

Source of data: FUNAI 2009, adapted by DAP/SBF/MMA in March 2010, based on the shape files available at: http://www.funai.gov.br/ultimas/informativos/daf/cgdp/2008/arquivos/Shapes_atuais.rar.

[76] Munic 2008: http://www.ibge.gov.br/home/presidencia/noticias/noticia_visualiza.php?id_noticia=1286&id_pagina=1
[77] www.funai.gov.br

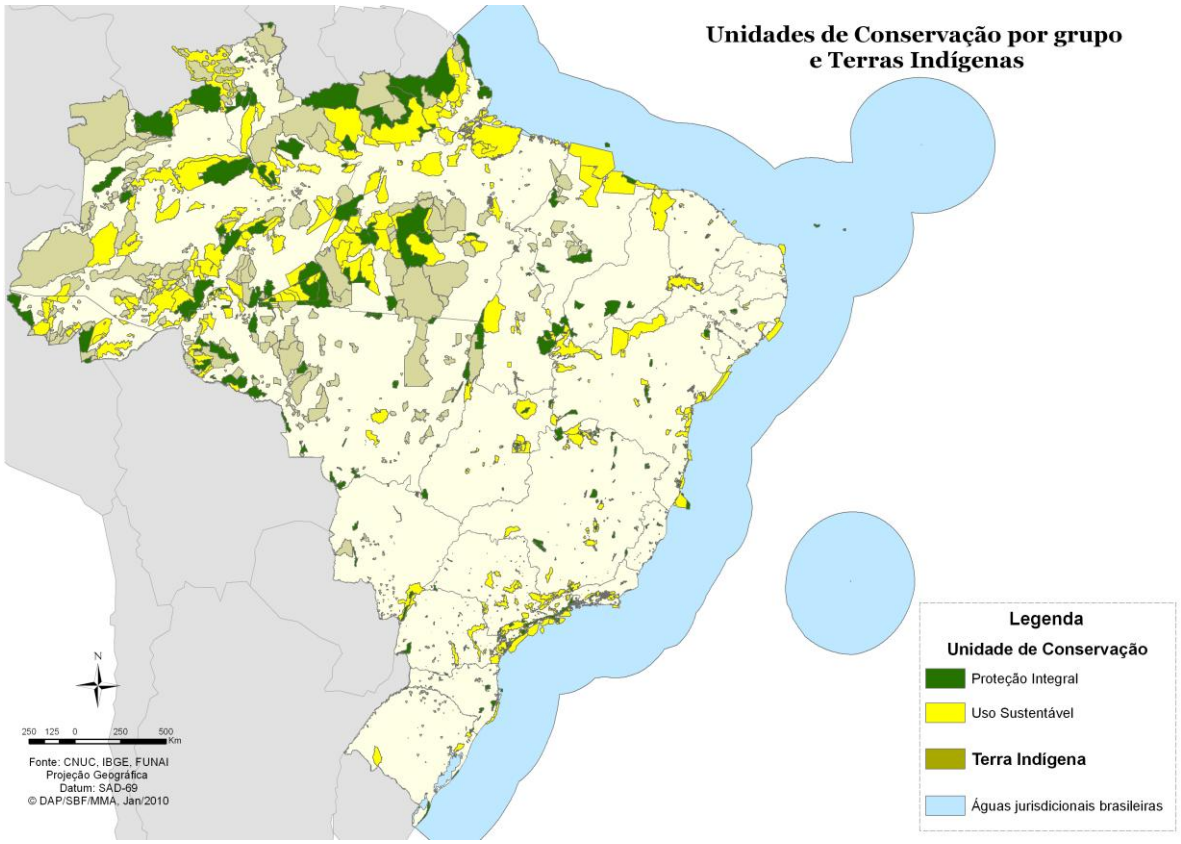


Figure I-23: Map of protected areas and indigenous lands (produced by the Ministry of the Environment with 2010 data).

New protected areas are selected and established according to the updated Map of Priority Areas for Conservation and Sustainable Use of Brazilian Biodiversity (2007, http://mapas.mma.gov.br/mapas/aplic/probio/areaspriori.htm?27b83d8345caa1a2f1db43bdd4731345), instituted by the Brazilian government as a formal policy (Decree 5092 of 21 May 2004, and MMA Administrative Ruling 09 of 23 January 2007) to guide both conservation initiatives and public and private sector investments in development projects. The required procedures to create protected areas under any category are defined in the SNUC Law and include public consultation, respect for the rights of traditional and indigenous populations, resettlement procedures, and conflict resolution, among other guidance.

In 2009, the Ministry of the Environment calculated the annual recurrent costs of maintaining the then estimated 1.47 million km^2 (approximately 14% of the national territory) of protected areas as the equivalent to US$ 450 million/year, and estimated a necessary minimum investment cost (infrastructure, equipment and consolidation) of approximately US$ 900 million, in addition to already applied governmental investments[78].

[78] Brazil, Protected Areas Department/Ministry of the Environment. 2009. Pilares para o Plano de Sustentabilidade Financeira do SNUC. 96 pp. Report available at: http://www.mma.gov.br/estruturas/sbf_dap_cnuc2/_arquivos/sustentabilidade.pdf

An initiative to secure enough long term maintenance resources for protected areas in the Brazilian Amazon is being implemented since 2003 through the Amazon Protected Areas Project (ARPA), with support from the GEF, WWF, and the German government through GTZ. ARPA supports not only the creation and consolidation of protected areas in the Amazon Region, but also created a Protected Areas Endowment Fund to support their long term maintenance. This Fund is currently capitalized with US$ 23.4 million with an additional Euro 10 million pledge by the German government, but must reach at least US$ 400-500 million by the end of the project's third phase to be able to provide minimum long term support to the entire system of protected areas in the Brazilian Amazon biome. Furthermore, one of ARPA's objectives for its second phase (currently being prepared) is the identification and implementation of additional funding sources for protected areas' support other than visitation fees and other similar sources of income, which are not viable in remote areas of difficult access, and a fundraising strategy directed at the private sector.

Coastal and marine protected areas. Brazil has currently only 3.14% of the coastal and marine zone inside protected areas, most of which located on the coastal zone (which is comprised of continental ecosystems that suffer marine influence[79]). Considering only the marine zone (territorial sea and Exclusive Economic Zone), only 1.57% is currently under some kind of protection. The need to increase this percentage is recognized as a national priority and is included as part of the national targets for biodiversity. Resolution 03/2000 of the National Biodiversity Commission (CONABIO) approved the need to increase protection to reach, by 2012, at least 10% of the marine and coastal areas under protection and include an additional 10% of these areas in strict protection protected areas and/or no-take zones (areas where fishing and other extractive activities are excluded)[80].

The National Plan for Protected Areas (PNAP), instituted by Decree 5758, of 13 April 2006, provides the policy framework for the creation of these coastal and marine protected areas, and establishes that:

- The coastal and marine protected areas must be designed for biodiversity conservation and as fisheries management tools;
- The system of protected areas must be representative and composed by highly protected areas where extractive uses are prevented and other significant human pressures are removed or minimized to maintain or recover the integrity, structure, function and exchange processes of and among ecosystems;
- An ancillary network of areas must be created to support the biodiversity objectives of the highly protected network, where specific perceived threats are managed in a sustainable manner for the purposes of biodiversity conservation and sustainable use;
- The final percentage of each coastal and marine ecosystem to be protected will be defined after the accomplishment of representativeness assessments;
- The network design must take into account the pressures, threats and conflicts associated with the coastline and the exclusive economic zone, with the definition of a priority map; and

[79] Examples of these ecosystems are the mangroves, *restingas*, rocky coasts, coastal marshes, estuaries, etc.
[80] Brazil, Ministry of the Environment. 2009. Report to the CBD on Coastal and Marine Protected Areas in Brazil – Progress towards the 2012 target on representative networks of marine protected areas. 11pp.

- Sustainable management practices should be established along the wider coastal and marine environment.

Among the Priority Areas for the Conservation, Sustainable Use and Sharing of Benefits from Brazilian Biodiversities (PROBIO, 2007)[81], Brazil identified 506 priority areas for the coastal zone (all interfacing with the continent) and 102 marine areas. Priority actions for a large number of these areas include fisheries management and the creation of no-take zones. For the 2009-2010 biennium there are several projects for the creation of coastal and marine protected areas at different stages of the process. New areas are expected to be created by the end of 2012, and the government intends to reach the national target in eight years.

Global designation. There are two biodiversity hotspots currently acknowledged in Brazil – the Atlantic Forest and the Cerrado (www.conservation.org.br), and 6 biosphere reserves are globally recognized by UNESCO, located in the Atlantic Forest, Cerrado, Pantanal, Caatinga, Central Amazon, and the Pantanal (see Figure I-24 below). Each biosphere reserve has a Management Council and Regional Committees, as necessary. Brazil also harbors 12 of the priority Global 200 ecoregions[82] for biodiversity conservation.

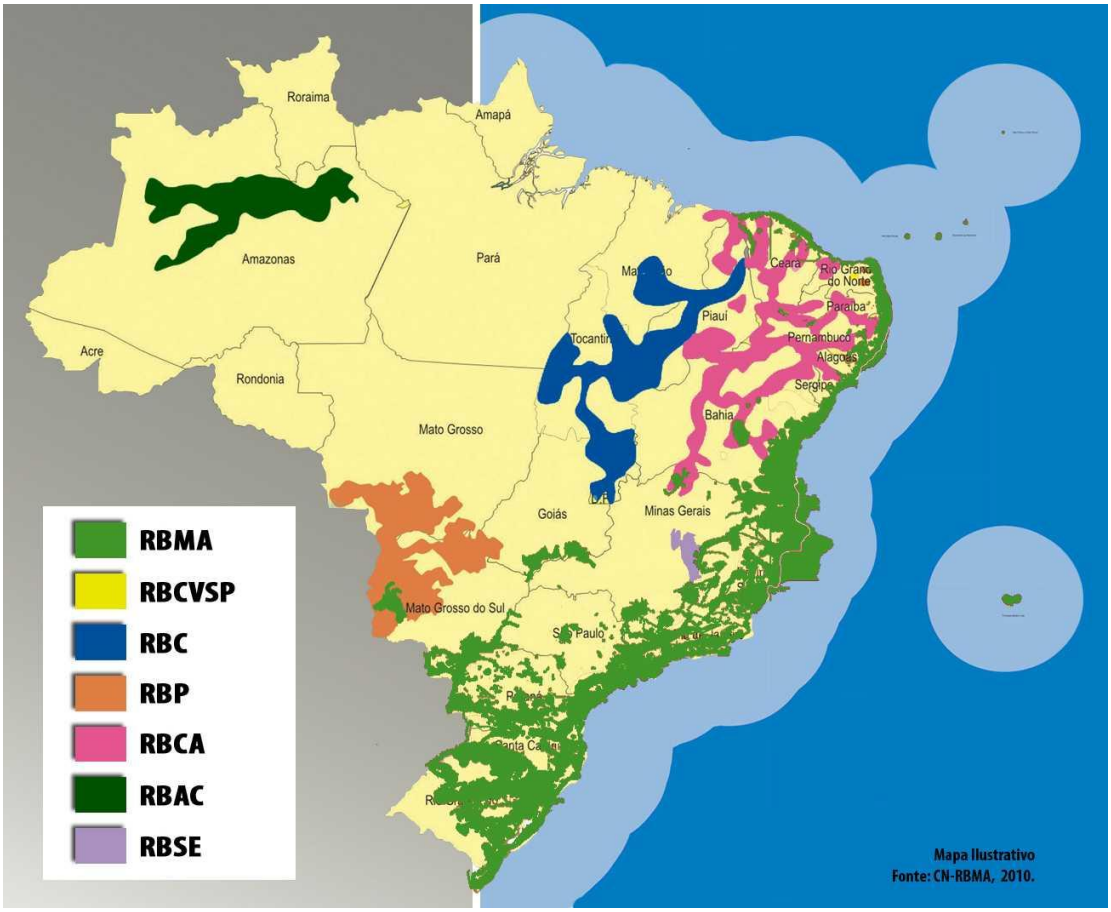


Figure I-24: Brazilian network of biosphere reserves. Source: Council of the Atlantic Forest Biosphere Reserve, 2010.

[81] Decree 5092 of 22 January 2007; www.mma.gov.br/portalbio.
[82] http://www.worldwildlife.org/science/ecoregions/WWFBinaryitem4810.pdf

Brazil also has 11 areas designated as Ramsar sites (Figure I-25) under the Convention on Wetlands of International Importance (Ramsar Convention). These sites are composed of important wetlands, under different protected area categories: Mamirauá Sustainable Development Reserve; Baixada Maranhense Environmental Protection Area; Lagoa do Peixe National Park; Parcel de Manuel Luiz Marine State Park; Araguaia National Park; Pantanal Matogrossense National Park; Rio Doce State Park; Reentrâncias Maranhenses Environmental Protection Area; SESC Pantanal Private Reserve of the Natural Heritage; Fazenda Rio Negro Private Reserve of the Natural Heritage; Abrolhos Marine National Park.

Figure I-25: Location of the Brazilian Ramsar Sites. Source: Map produced in 2010 by the Aquatic Biodiversity Office at the Ministry of the Environment – GBA/SBF/MMA.

1.4.2. Vegetation cover monitoring

Complementing the deforestation monitoring systems mentioned in section 1.3.3, specific systems to monitor illegal deforestation of permanent preservation areas (APPs) and legal reserves (RLs) are being established by several Brazilian states. These systems also provide a basis for landscape management through the compensation of legal reserves to create new protected areas and/or ecological corridors while ensuring compliance of land owners with the Brazilian Forestry Code. The states of Paraná, Mato Grosso, Minas Gerais, and São Paulo have already regulated and started the application of the mechanism for compensating legal reserves.

With support from these improved monitoring tools and increased investment, Brazil has enhanced its efforts to enforce compliance with the national environmental legislation, promoting recuperation of APPs and RLs, promoting land tenure regularization in critical areas such as the Deforestation Arc in the southern Amazon biome, and investing in the development of the cadastres of rural properties as a basis for monitoring and enforcement, among other actions.

Additionally, these monitoring initiatives and tools allow the strategic application of environmental compensation resources where the need to protect or recover original habitats is detected.

1.4.3. Integrated landscape management

Brazil is implementing some initiatives for integrated landscape management, such as the development of regional and state Ecological-Economic Zoning, ecological corridors and watershed committees. The degree of integration of these instruments into local and regional planning and development vary from state to state but, where applied, constitute important elements contributing to increase environmental sustainability.

Ecological-Economic Zoning (EEZ): Brazil developed in 2001 and revised in 2003 and 2006 the methodological guidelines for the preparation of Brazil's Ecological-Economic Zoning, to be developed by state or region. The methodology was initially applied to regional EEZ efforts such as the Rio Parnaíba Watershed and the Macro-EEZ of the Legal Amazon, and was later applied by individual states, although few states have already concluded this planning tool. The state of Acre (in the Amazon Region), for example, concluded its EEZ in 2007 and is applying it as a guiding tool for state development. Acre is currently detailing its EEZ to the municipal level and including the ethnological zoning of the indigenous lands in the state. The state of Rondônia has also concluded its EEZ, currently under implementation. The other seven states of the Legal Amazon (Amapá, Amazonas, Maranhão, Mato Grosso, Pará, Roraima, and Tocantins) have also prepared or are preparing EEZs at least at the 1:1,000,000 scale. Some are detailing the EEZ to the 1:250:000 scale and are applying it at varying degrees for strategic decisions such as environmental licensing. In most of the other 17 states and the Federal District EEZs are being developed for specific priority portions of the territory, usually for the major watershed or the coastal zone, or a different crucial area. By 2010, approximately 48-50% of the national territory was addressed by ecological-economic zoning, currently ready for implementation. These EEZs were developed at the 1:250,000 scale, but some projects were detailed to the 1:100,000 or 1:50,000 scale. The remaining EEZ projects under development address approximately 13% of the national territory.

Ecological Corridors: The Ministry of the Environment (MMA) also coordinates, since 2002, the Ecological Corridors Project with the objective of demonstrating the viability of these corridors as instruments for territorial management. The project is working with two pilots, to be concluded in 2011: the Central Atlantic Forest Corridor (21 million hectares, including 8 million hectares of marine area) and the Central Amazon Corridor (52 million hectares). The Central Amazon Corridor is entirely located within Amazonas state, along the Solimões and Negro Rivers, in one of the most preserved areas of the Amazon Forest.

Therefore, the strategy of the project for this corridor is to maintain forest integrity and invest in alternative activities for income generation with the sustainable use of biodiversity. The Atlantic Forest Corridor crosses two coastal states (Bahia and Espírito Santo) with high human occupation and encompasses mostly private lands, requiring a strategy that involves reforestation, incentives for the maintenance and restoration of permanent preservation areas and registration of legal reserves, and incentives for the creation of new protected areas, especially Private Reserves of the Natural Heritage (RPPNs). Starting in 2009 the 8 million hectares of marine area in the Atlantic Forest Corridor was designated the Marine Corridor, given the need to plan specific actions for this marine portion. The strategy for the Marine Corridor includes a focal area (the Abrolhos Complex Focal Area) and the implementation of mini-corridors through actions related to protected areas; interstitial areas; and enforcement, vigilance and monitoring. The corridors are implemented through partnerships among the three levels of government and NGOs. Decisions are made with the participation of the decentralized committees in each state, and the project receives financial support from the Brazil-Germany Cooperation. The project also developed integrated enforcement plans with the participation of several public agencies, including IBAMA, the Public Ministry, military police, and state agencies. Based on the experience of this project, the Ministry of the Environment, through its Department of Protected Areas, is developing a manual on instruments for territorial management for conservation: ecological corridors, mosaics of protected areas, and Biosphere Reserves.

Mosaics of Protected Areas: This management model seeks the participation, integration and involvement of the managers of protected areas (PAs) and the local population in the management of these protected areas, to harmonize biodiversity conservation and the valuation of socio-biodiversity with the regional sustainable development. The recognition of a mosaic occurs where there is a group of PAs that are closely located, that share borders, or that overlap, belonging to different governmental levels or not. The establishment of a mosaic contributes to overcoming one of the major challenged in PA management, which is the interaction among local population, local government and the management agencies at different governmental levels to promote the protection of the natural areas. The mosaic has the primary objective of harmonizing, integrating and optimizing the activities developed at the member PAs, regarding particularly: the land uses and resource uses at the border between PAs; access to the PAs; enforcement; monitoring and evaluation of management plans; scientific research; and the allocation of resources originating from environmental compensation fees from the environmental licensing of ventures with significant environmental impact. To achieve these objectives, the management of a mosaic is monitored by an Advisory Council presided by one of the PA managers, which should propose directives and actions to harmonize the management of these areas, with the participation of local communities. The Ministry of the Environment is responsible for recognizing the mosaics, responding to requests from the PA management agencies. To-date, six mosaics were recognized: Capivara-Confusões; São Paulo and Paraná Coast; Bocaina; Central Atlantic Forest of Rio de Janeiro State; Mantiqueira; and Sertão Veredas-Peruaçu. Instruments to bring resources to the mosaics and to other territorial management tools in Brazil are being developed through international cooperation between France and Brazil (Ministry of the Environment).

Watershed committees: Watersheds constitute effective geographical units for landscape management. Brazil has currently 159 participatory watershed committees, in addition to 8 interstate committees, acting with various degrees of effectiveness. The National Water Agency (ANA) trained approximately 6,000 people in 2009, on themes related to water resources projects; fund raising; measurement of water flow and discharge; water quality; enforcement; licensing the use of water resources; Cadastre of Water Users; sediment production and transport in water resources; and information systems. Watershed committees play an important role in the implementation of mechanisms such as payments for water use, implemented in two regional watersheds (Paraíba do Sul; and Piracicaba, Capivari and Jundiaí), where the totality of collected fees revert to projects approved by both watershed committees. These committees are also instrumental to the implementation of the Water Producer Program [*Programa Produtor de Água*] in rural areas holding headwaters or ground water recharge areas, where the payment for water environmental services is applied. ANA also created "watershed rules" establishing the rules to regulate the allowed uses of water in watersheds where water availability does not meet the demand.

1.4.4. Sustainable forest management and non-timber products

Brazil created the Brazilian Forest Service (SFB) in 2006, together with the National Fund for Forestry Development (FNDF), to promote and enforce the management of federal public forests, ensuring the efficient and rational use of forests with the protection of ecosystems, soil, water, biodiversity and associated cultural values. The relevant state and municipal environmental agencies are responsible for enforcing adequate forest management in forests under their jurisdiction.

Local communities are granted priority access to public forests and to the benefits resulting from their use and conservation, particularly regarding public forests they traditionally occupy or use. Such forests are protected areas of sustainable use under SNUC in the Extractive Reserve and Sustainable Development Reserve categories. Nevertheless, community use of the forest requires prior use concession according to an approved management plan. The National Community and Family Forest Management Policy, currently in its final approval phase, was developed in response to a request from community leaderships to strengthen community forest management in all biomes. The primary innovation of this policy is the implementation of an annual routine of planning and action involving the various relevant federal, state, and civil society agencies for the effective implementation of credit instruments, technical assistance, capacity building, infrastructure, and commercialization. SFB's goal is to reach four million hectares of forests under community management by 2010.

Forest management by agents other than local communities is granted concession according to public bids, which must comply with the relevant Annual Forest Concession Plan. Public forests eligible for such public bids must be listed in the National Cadastre of Public Forests and are those in exception of integral protection protected areas (or localities where the creation of such areas is being considered), extractive reserves, sustainable development reserves, fauna reserves, areas of relevant ecological interest, and indigenous lands, as well as areas occupied by local communities. Therefore, under SNUC legislation in effect today,

only protected areas in the national forest, state forest or municipal forest categories are available for public bids for non-community forest management.

The strong pressure exerted by public opinion, combined with NGO campaigns and increased governmental enforcement requiring timber companies to adopt forest management led to a reduction of illegal timber production and increased request for timber certification, especially from community ventures. Certified forest plantations already represent 25% of the total area of planted forests in the country. The tendency for large businesses in this sector is to expand production through small producers, collaborating with social inclusion and improving their commercial image[83]. By 2007, over 50,000 km^2 of Brazilian forests had obtained FSC certification for timber and non-timber products (http://www.fsc.org.br/arquivos/Completo_PV.pdf) from planted and native forests, involving 67 forest management projects and 206 chains of custody.

A case study on the impacts of forest certification concluded that, for planted forests in the south of Brazil, FSC forest certification resulted in positive impacts on all socio-environmental aspects evaluated: worker's health and safety, professional training, pesticide handling and reduction, natural resources conservation, forest management, and relationship with the community[84]. In extractive communities in Acre, the same study found that certification contributed to positive impacts, which in this state can be partially granted to public forestry policies. Nevertheless, positive environmental changes were observed among these certified groups, such as better management plans, waste disposal, awareness of the use of fire, measures to protect the fauna from hunting, and the degree of involvement in reports of environmental crimes. Similarly, this study also found positive social and environmental impacts from agricultural certification on the evaluated coffee companies.

The 2009 Annual Forest Concession Plan points out that by June 2008 the National Public Forests Cadastre registered 2,108,705.85 km^2 of federal public forests and 123,543.07 km^2 of state forests in Amazonian states, totaling almost 25% of the Brazilian territory (http://www.mma.gov.br/estruturas/sfb/_arquivos/paof_res_exec_05_08_08.pdf). Of all these public forests, 58.7% are available exclusively for community use[85]; 15.1% are integral protection protected areas; 14.1% are areas for sustainable use; and the remaining 12.1% are federal public forests still lacking management definition. After applying the legal selection criteria, this Annual Forest Concession Plan identifies approximately 429,000 km^2 of federal public forests legally apt for forest management, of which 120,000 km^2 are available for forest concession bids.

[83] Imaflora, 2005. Ten years of contribution to sustainable development [*Dez anos contribuindo para o desenvolvimento sustentável*]. 29 pp.

[84] Does certification make a difference? Impact assessment study on FSC/SAN certification in Brazil/Ana Carolina Barbosa de Lima, André Luiz Novaes Keppe, Fábio Eduardo Maule, Gerd Sparovek, Marcelo Corrêa Alves and Rodrigo Fernando Maule – Piracicaba, SP: Imaflora, 2009. 96 pages. (http://www.imaflora.org/arquivos/Does_certification_make_a_difference.pdf).

[85] These are Sustainable Development Reserves (RDS), Forestry Settlement Projects (PAF), Extractive Settlement Projects (PAE), Extractive Reserves (RESEX), and Indigenous Lands (TI). The latter represent 87.6% of federal public forests for community use.

There are currently 7,780 km^2 of federal public forests being sustainably managed under transition contracts. Management concessions for these areas translate into the potential offer of 110,713.76 m^3 of timber with legal origin. Five other forest management units within two National Forests are currently included in on-going public bids, totaling 96,361 km^2 in the Amazonian states of Rondônia and Pará. In addition to the federal forests, the state Annual Forest Concession Plans of Amapá and Pará indicate that 23,711.65 km^2 and 13,104.48 km^2, respectively, are also available for forest concession in 2009.

The 2009 Annual Forest Concession Plan also presents SFB activities planned for the year, such as delimitation and demarcation of public forests, preparation of Preliminary Environmental Reports, publication of bids, and the development of a monitoring system for public forests, among other. The estimated budget for the 2009 activities is equivalent to US$ 28 million.

1.4.5. Sustainability of agricultural production

For a long time in Brazil the vision that the productive agriculture responsible for income and food production was solely located in large mechanized properties and export monocultures directed the largest portion of public investments to agribusiness. However, the government recently began to recognize and value family agriculture as a fundamental economic force for Brazil's food security and for the country's development. According to data from the IBGE 2009 Agricultural Census, family agriculture produces 70% of all food consumed daily by Brazilians using only 24% of the agricultural land in the country, which makes it 89% more productive than the employer system and responsible for 10% of the entire Brazilian Gross National Product (GNP).[86]

The realization of the importance of the agricultural production in small properties is increasing the attention given to alternative production methods, which are generally more diversified than the conventional agriculture developed in large properties, and which frequently apply traditional practices with lower environmental impacts.

Integrated Production in Agriculture

Brazil is implementing a national strategy for promoting Integrated Production in Agriculture, with the objectives of promoting sustainable development and improving the competitiveness of Brazilian agribusiness. This initiative (SAPI – *Sistema Agropecuário de Produção Integrada*) [87] intends to produce safe foods with reduced use of agricultural chemicals and improved access to production technologies, seeking the environmental, social and economic sustainability and traceability of production.

[86] Brasil, Ministério do Desenvolvimento Agrário. 2010. Um novo Brasil rural (2003-2010). Brasília, MDA. 124pp.

[87] Nasser, L.C.B. (Ministry of Agriculture) 2008. Implementation, progress and challenges of the integrated production of fruits – PIF in Brazil: presentation to the Regional South American Workshop on Capacity Building for National Strategy and their Implementation Across Sectors. Rio Branco/Acre, Brazil

This strategy supports the global and national conservation targets for 2010 by reducing agricultural pollution, decreasing impacts on pollinators, and increasing productivity, which may lead to a decrease in the need for new agricultural lands. In support of this strategy, there is currently a trend among consumers to favor healthy foods with no chemical residues. Furthermore, Brazil's main European markets require products with lower levels of agricultural chemicals and originating from production processes that are environmentally friendly and apply proven socio-environmental management, among other requirements.

Thus, SAPI is a voluntary certification system for production based on sustainability principles and on the use of natural regulation methods to substitute polluting agents, applying adequate monitoring tools to the entire process to ensure economical viability, environmental adequacy and social fairness. This system certifies complying producers through the Ministry of Agriculture. SAPI started in 2001 with the Integrated Fruit Production (PIF) to comply with European markets' requirements. However, adhesion to this program is still incipient as compared to the entire agriculture sector: by 2007, 2,333 certified producers verified improved product quality and increased income, corresponding to a production of 1,686,260 tons in 63,919 hectares (Table I-36).

Table I-36: Integrated Agricultural Production in Brazil (2007).

Product	N° of producers applying Integrated Production practices	Area (hectares)	Production (tons)
Pineapple	37	224	8,400
Banana	54	1,600	56,000
Cashew	10	1,030	500
Persimmon	23	84	3,000
Citrus fruits	214	1,315	43,066
Coconut	12	414	20,368
Fig	25	120	1,093
Apple	283	17,319	606,165
Papaya	38	1,450	145,000
Mango	236	8,739	305,861
Passion fruit	30	56	5,500
Mellon	233	9,240	191,900
Strawberry	203	165	4,429
Peach	469	2,293	19,725
Grapes	352	6,616	167,268
Peanuts	16	20	65
Rice	14	6,000	36,000
Soybean	11	75	271
Potatoes	12	1,000	50,000
Coffee	47	6,000	9,000
Tomatoes	14	159	12,650
Total	**2,333**	**63,919**	**1,686,260**

Source: Nasser, L.C.B. (Ministry of Agriculture) 2008. Implementation, progress and challenges of the integrated production of fruits – PIF in Brazil: presentation to the Regional South American Workshop on Capacity Building for National Strategy and their Implementation Across Sectors. Rio Branco/Acre, Brazil.

The Ministry of Agriculture Livestock and Supply (MAPA) provides training to producers on Integrated Agricultural Production practices to promote their dissemination. In

2007/2008, 493 capacity building courses reaching 30,000 rural extension agents were provided on agricultural technologies and good practices, including environmental preservation; 17 courses on Integrated Agricultural Production were carried out, training 929 technicians; 60 presentations were made in relevant technical meetings, academic courses and field days, reaching 4,200 participants; and several dissemination and technical documents were published, among other dissemination and training activities. By 2008, there were 56 Integrated Agricultural Production on-going projects distributed through 18 states and involving 32 production chains.[88] Results indicate that these practices tend to increase production and decrease costs, as shown in the examples below (Table I-37). There are 102 Integrated Production projects planned for 2008/2009, involving 41 animal and plant products.

Table I-37: Comparative productivity and costs between conventional production and integrated production.

Product	Conventional production	Integrated production	Cost reduction (%)
Potato (tons/ha)	17.0 to 20.0	34.0 to 40.0	19.0 to 25.0%
Coffee (sacs/ha)	18.0 to 20.0	36.0 to 40.0	25.0 to 35.0%
Apple (tons/ha)	24.0 to 27.0	32.0 to 36.0	14.0 to 16.0%
Pineapple (fruits/ha)	28,000	28,000	~18.0%

Source: Nasser, L.C.B. (Ministry of Agriculture) 2008. Implementation, progress and challenges of the integrated production of fruits – PIF in Brazil: presentation to the Regional South American Workshop on Capacity Building for National Strategy and their Implementation Across Sectors. Rio Branco/Acre, Brazil.

The adoption of SAPI can also result in a significant reduction of the use of chemicals in agricultural practices. In 2007, soil fertilization in current production systems applying SAPI principles required 25% less ammonium sulfate; 25% less simple super-phosphate; 31% less urea; and 43% less potassium chlorate. The application of agricultural chemicals for pest control also showed a significant reduction (Table I-38).

Table I-38: Percent reduction of chemical applications in SAPI cultures (2007).

Product	Insecticide	Fungicide	Herbicide	Acaricide
Apple	70.0%	15.0%	67.0%	67.0%
Grapes	89.0%	42.0%	100.0%	100.0%
Papaya	50.0%	50.0%	78.0%	35.7%
Peach (PR state)	75.0%	55.6%	60.0%	100.0%
Peach (RS state)	34.0%	28.0%	50.0%	87.5%
Pineapple	37.0%	20.0%	50.0%	-
Banana	-	40.0%	100.0%	-
Cashew	25.0%	30.0%	-	-
Citrus	-	-	33.0%	40.0%
Mango	70.0%	31.0%	95.0%	72.0%
Mellon	40.0%	40.0%	100.0%	20.0%
Strawberry	60.0%	80.0%	-	-
Rice	100.0%	100.0%	-	-
Peanuts	25.0%	-	-	-
Potato	50.0%	50.0%	100.0%	-
Coffee	50.0%	33.0%	66.0%	-

[88] MAPA, 2009. Produção Integrada no Brasil: agropecuária sustentável, alimentos seguros [*Integrated Production in Brazil: sustainable agriculture and livestock production, safe foods*].

Source: Nasser, L.C.B. (Ministry of Agriculture) 2008. Implementation, progress and challenges of the integrated production of fruits – PIF in Brazil: presentation to the Regional South American Workshop on Capacity Building for National Strategy and their Implementation Across Sectors. Rio Branco/Acre, Brazil.

In 2009, MAPA created the Brazilian Association of Integrated Production, and approved and institutionalized the Integrated Production Seal, which is an important instrument for communication with consumers. To-date, 16 Specific Technical Guidelines for Integrated Fruit Production have already allowed the certification of 19 fruit species, and 35 production chains are being addressed by this program in 21 states: pineapple; peanuts; rice; banana; potato; coffee; citrus fruits; beans; tropical flowers; Tahiti acid lime; apple; papaya; cassava; mango; mangaba; melon; strawberry; peach; post-harvest; roots; roses; soybeans; tomato for direct consumption; tomato for the industry; wheat; table grapes; wine grapes; tropical fruits agro-forestry; leafy greens; guaraná; anonaceas; sugar cane; corn; cotton; tobacco; and the Integrated Agricultural Production Systems in Micro-watersheds project (PISA).

Progress foreseen for 2010 includes the publication of a Normative Ruling as a legal framework for Integrated Agricultural Production; publication of Technical Guidelines for additional products (tobacco, peanuts, potato, coffee, table tomato, flowers, rice, wine grapes, wheat, soybeans, and dairy cattle); implementation of 25 Integrated Production projects; and establishment of a monitoring database, in addition to several dissemination and training activities (these latter to reach at least 2,400 participants).

Family Production

Family agriculture has a very representative participation in Brazilian agriculture, corresponding to 84.4% of the rural properties in the country (4.3 million parcels), according to the IBGE 2006 census, published in 2009. These properties cover 80.3 million hectares (24% of the area occupied by agriculture and livestock) and employ 12.3 million people (74.4% of rural production workers). Family production generates 38% of the gross agriculture value (approximately US$31.8 billion). A significant share (70%) of produce consumed by the Brazilian population is produced by family agriculture: 87% of cassava; 70% of beans; 46% of corn; 38% of coffee; 34% of rice; 21% of wheat; and 16% of soybeans.[89]

Family agriculture generates almost two times the income per hectare generated by the employer system and occupies slightly less than a quarter of the agricultural land in the country. The realization of the importance of this type of production led to the recent development of specific public policies and is increasing the governmental investments directed to family agriculture, the availability of credit lines and crop insurances, in addition to the provision of technical assistance to producers. This favorable environment and the capacity of family agriculture to respond rapidly to incentives led to a productivity increase: in the 2008/2009 harvest, family agriculture increased by 7.8 million tons the

[89] ANVISA 2009 Report of the Program for the Analysis of Residues of Agricultural Chemicals in Foods (PARA) program: http://portal.anvisa.gov.br/wps/wcm/connect/d214350042f576d489399f536d6308db/RELAT%C3%93RIO+DO+PARA+2009.pdf?MOD=AJPERESConfira and http://www.ibge.gov.br .

production of milk, cassava, corn, beans, coffee, rice, and wheat. Family agriculture comprises the most significant portion of rural Brazil and occupies a large diversity of physical environments, natural resources and ecosystems. It is present throughout the country and represents a wide variety of human cultures, types of social organization and technological standards, demonstrating the diversity of the rural area of the country. The investments made by the Ministry of Agrarian Development in family agriculture also seek the improvement of the life quality of these families, and the maintenance and production of cultural heritage and environmental services.[90]

Organic Agricultural Production

The growing increase of the demand for resources free from agricultural chemicals is stimulating organic agriculture in Brazil. As a sustainable management system that foregoes the use of synthetic agricultural chemicals, this agricultural system values environmental preservation, biodiversity, the biological cycles, and the human life quality. The Brazilian organic agriculture is growing at a 20% annual rate and already has large participation in the internal market, with the intention to increase its presence in the international market in the near future. The growing demand for organic products is strongly connected to higher standards required by national and international consumers regarding the quality of food and the agricultural impacts on the environment. However, it should be noted that agricultural properties that produce organic products still represent a very small portion of the national agriculture (only 1.8% of the total in 2006, corresponding to 90,500 organic producers).[91]

According to the 2006 Agricultural Census[92], in the distribution of organic producers by group of economic activity, livestock raising (41.7%) and temporary crops (33.5%) predominate over the other activities. Properties with permanent cultures, and with the production of greens, vegetables and flowers respectively represent 10.4% and 9.9% of total producers, followed by 3.8% of forest organic production (planting and extraction).

Although recent policies connected to rural credit have been developed with the intention to promote organic agriculture through the Program to Promote Sustainable Agricultural Production (PRODUSA), only a portion of the producers are certified. There are currently approximately 20 certifying agencies for organic products in the country[93] but, given the high cost of certification, a portion of the producers is applying an alternative self-certification system through producer associations, where each producer supervises and is supervised by the other members of the association.

[90] Brasil, Ministério do Desenvolvimento Agrário. 2010. Um novo Brasil rural (2003-2010) [*A new rural Brazil*]. Brasília, MDA. 124pp.
[91] Brasil, IBGE. Censo Agropecuário 2006. http://www1.ibge.gov.br/home/estatistica/economia/agropecuaria/censoagro/2006/agropecuario.pdf
[92] http://www1.ibge.gov.br/home/estatistica/economia/agropecuaria/censoagro/2006/agropecuario.pdf
[93] http://www.aao.org.br/certificacao.asp

1.4.6. Species Conservation

One of the indicators included in the federal Multi-Year Plan (PPA) is the percentage of threatened animal species included in conservation action plans. The PPA is prepared for four-year periods (the current Plan refers to the period 2008-2011) and its status is evaluated every year. This indicator shows an increasing trend in the number of Brazilian threatened animals that are object of specific conservation actions (Table I-39).

Table I-39: Federal Multi-Year Plan's Indicator of the conservation of threatened species

Year	Percentage of Brazilian animal species included in official endangered species lists that are object of conservation management action plans.
2003	2%
2004	Data unavailable
2005	7%
2006	9%
2007	10.76%
2008	31.76%

Source:
http://www.planejamento.gov.br/secretarias/upload/Arquivos/spi/plano_plurianual/avaliacao_PPA/relatorio_2008/08_PPA_Aval_cad20_MMA.pdf

The Rio de Janeiro Botanic Garden leads a conservation project for bromeliads that spans the entire length of the Atlantic Forest. By 2006, the project had carried out 25 months of fieldwork in 16 states, bringing 1,866 georeferenced samples for herbarium collections, and 2,081 living individuals for the *ex-situ* conservation collection. This collection currently conserves approximately 6,200 accesses of 54 threatened bromeliad species of the Atlantic Forest. The Bromeliaceae checklist for the Atlantic Forest currently lists 1,169 taxa for this biome and 134 threatened species[94].

Brazil develops action plans to guide the conservation and recuperation of threatened animal and plant species, although these efforts need to be significantly increased to adequately contribute to reduce the loss of biodiversity (Table I-40). These action plans are developed by ICMBio (fauna) and the Rio de Janeiro Botanical Garden (flora). Existing data on threatened plant species inside protected areas indicate that 54% of the total number of species included in the NGO Biodiversitas 2005 list of threatened plant species are represented inside protected areas.

Table I-40: Action plans for the conservation and recuperation of Brazilian threatened animal and plant species.

Biome / Environment	N° of threatened species addressed by action plans		Average n° of threatened species addressed by action plans		N° of threatened species with active Advisory Groups	Average n° of threatened species with active Advisory Groups
	FAUNA (2003)	FLORA (2002)	FAUNA (2002-2006)	FLORA (2006)	FAUNA (2002)	FAUNA (2002-2006)
Amazon	2		4.8	1	1	8

[94] JBRJ, 2006. Presentation to the MMA Workshop to Define the National 2010 Biodiversity Targets. Acre, Brazil.

Pantanal	0		4.8	0	2	2.5
Cerrado	1		7.0	6	3	4
Caatinga	0		5.8	7	2	2
Atlantic Forest	5	1	22.2	1	8	20.5
Pampas	0		4.0	0	0	6
Freshwater Env.	2					
Coastal & Marine	8		6.5		10	4.2
Total	**15**	**1**	**24.7**	**15**	**23**	**38.5**

Sources: Brazilian Network of Botanical Gardens; FNMA; PROBIO; Marini Filho, O.J. (2006) – all in: Brazil, Ministry of the Environment, 2006. Final Report of the Workshop to Define the National Biodiversity Targets for 2010.

Currently, only 29 (5%) of the 627 threatened animal species (419 vertebrate species and 208 invertebrate species) are addressed by conservation Action Plans. To improve effectiveness of the species conservation strategy, starting in 2009 ICMBio redesigned the Action Plans strategy, adopting an approach based on vegetation type, watershed, geographical aspects or threat. With the new design, each plan focuses a group of biologically similar species and may include a specific ecosystem as a focus area (e.g., island reptile species). By the end of 2010, 19 new Action Plans should be completed based on the new approach, increasing the proportion of threatened species addressed by Action Plans to 25%. ICMBio's target is to include all threatened vertebrate species in conservation Action Plans by 2014. ICMBio currently supports the implementation of Action Plans involving 17 species through 22 projects executed by its research centers. New resources are expected in 2011 to increase this support.

To improve the protection of biodiversity, ICMBio established collaboration with IUCN to conduct a regional assessment of fish species with the expectation of assessing approximately 55% of the vertebrate species by the end of 2010. Additionally, ICMBio is comparing data on the distribution of threatened species with existing infrastructure plans to prepare scenarios of threats to biodiversity, which should generate biodiversity vulnerability prognoses, allowing preventive conservation action.

Conservation management and sustainable use of native species

Some projects to repopulate rivers and lakes with native fish and turtles already exist in indigenous lands where the local populations of *tracajás* (a freshwater turtle) and some fish were extremely reduced due to excessive hunting and fishing. For example, in the Mamoadate Indigenous Land, of the Manchineri indigenous people (in Assis Brasil, Acre state) [95], in response to the acute decline of the *tracajá* population in the Iaco River, the community suspended the capture of this species for two years, during which a management program was initiated. This community promotes the reproductive success of wild pairs by protecting the breeding pairs, eggs and newborns, releasing the latter in the river after the hatching phase, when the predation risk decreases. In the natural cycle of this species, only one in a thousand baby turtles reach the adult phase, while in the managed population this number increases to 100 in 1,000, allowing repopulation to occur without leading to overpopulation, with no ecological imbalance and allowing the consumption of this species. To ensure the constant availability of *tracajás* as a local food source and for

[95] http://www.agencia.ac.gov.br/index.php?option=com_content&task=view&id=6421&Itemid=287

commercialization, the community controls slaughter and repopulation rates to maintain the recovered population. In 2009, approximately 2,000 *tracajás* were released in the Iaco River. The traditional management practices are complemented with technical guidance provided by IBAMA and SEAPROF[96].

1.5. Implications of biodiversity loss

The poor are the population segment most dependent on natural resources and ecosystem services and therefore the most vulnerable to their degradation. Over 10 million people in Brazil live with income lower than US$ 300 per month[97] and a significant portion of these live in rural areas, where dependence on ecosystem services is higher.

Environmental degradation result in numerous threats to ecology, livelihoods, and social and economic development. For example, repeated and continuous deforestation lead to the loss of genetic variability, reducing the capacity of ecosystems to adapt to climate change and to provide ecosystem services. The loss of original vegetation also reduces availability of forest products on which many extractive communities are dependent. Additionally, deforestation lower the groundwater level, particularly in areas such as the semi-arid, reducing the availability of surface water and increasing the concentration of salts in soil and water, with negative effects on crops, natural vegetation, wild and domestic animals, and human life quality.

The loss of genetic variability also lead to the loss of species of potential economic and biotechnological use and, with the disappearance of wild relatives of cultivated species, traditional crops can be seriously affected, as well as the traditional knowledge associated with waning crops and species used by extractive communities, potentially affecting the nutrition and food safety of poorer communities.

The effects of degraded ecosystem services result in an increase in the frequency and potential effects of floods, droughts, desertification and other natural disasters, leading to the loss of lives, crops, livestock, housing and infrastructure. These events also result in the reduction of available natural resources for food, firewood and income generation.

According to the National Secretariat of Civil Defense[98], to minimize damages and losses resulting from environmental disasters, in 2009 the federal government earmarked R$ 646.6 million (approximately US$ 380.4 million) for preventive actions such as contention of slopes, channeling of rivers and training for Civil Defense agents. However, only 21% of this amount was actually spent. Data from the Integrated Financial Management System (SIAFI) show that the federal government spent 10 times as much to remedy than to prevent environmental disasters. Disbursements from the Disaster Response and Reconstruction program were much larger: of the budgeted amount (R$ 1.9 billion, or

[96] IBAMA = Brazilian Institute for the Environment and Renewable Natural Resources; SEAPROF = Acre State Secretariat of Agroforestry Extension and Household-Based Production.
[97] IBGE, 2007: www.ibge.gov.br
[98] http://www.defesacivil.gov.br/

approximately US$ 1.1 billion) for projects after the occurrence of disasters, R$ 1.4 billion was effectively invested, or 74% of the total budget for 2009.

Additionally, the unsustainable use of fisheries resources lead to depleted fish stocks, with serious negative effects on communities highly dependent on artisanal fisheries. Brazil applies the "*defeso*" rules to several economically important species, whereby fishing such species is not allowed during reproductive periods to ensure the replenishment of stocks, and registered fishermen receive economic support from the government during these periods. However, much larger investments are necessary to achieve an effective recuperation of Brazilian fish stocks.

On the other hand, environmental awareness and social participation and control in environmental management are gradually increasing in Brazil, with community participation in environmental councils, protected area management councils, and watershed committees, among other forums. Environmental protection campaigns are becoming more frequent and widespread, with participation from governmental agencies, NGOs, the media and the private sector, resulting in improved public environmental awareness (see below).

Public Environmental Awareness

Since 1992, the Ministry of the Environment, in partnership with NGO Institute of Religion Studies (ISER), supports periodic public opinion surveys on what Brazilians think about the environment and sustainable development. This initiative is the most complete national study on environmental themes and each survey event includes two sets of questions: a quantitative set directed at the general population (applied by IBOPE), and a qualitative set directed at stakeholders (applied by ISER). Poll events were conducted in 1992, 1997, 2001 and 2006 in collaboration with the Vox Populi Institute, IBOPE, FUNBIO, WWF, and Natura. The questionnaires were constantly updated to incorporate emerging themes, but a set of questions remained unchanged, to allow comparisons among years. The primary objective of this study is to build a consistent database to monitor the increase in environmental awareness in Brazil and support the development of public policies for sustainable development.

The 2006 survey[99] focused the biodiversity theme building on the interest aroused by COP-8, and targeted the adult Brazilian population (16 years and older) living in urban and rural areas of the five geopolitical regions. Considering the 1992-2006 period, environmental awareness has significantly increased in Brazil, with little difference among regions and population groups, but clear higher awareness within the group with higher education level, which is associated with higher income and larger urban centers. The specific questions on biodiversity surprisingly demonstrated knowledge of the concept by an expressive portion of the population. However, human beings and human activities are still seen as separate from concepts such as "environment" and "biodiversity". And unfortunately, the increase in awareness is not followed by an increase in sustainable or environmentally-friendly behavior. Nevertheless, Brazilians perceive changes in the environment and recognize a

[99] MMA and ISER, 2006. What Brazilians Think about the Environment and Sustainable Development. Analysis of survey results for the period 1992-2006. Internal report, CD.

decrease in the number of animals and plants. Complex concepts such as “biodiversity”, “GMOs”, “organic produce” and others have been added to the population’s vocabulary. It is also perceived that it will only be possible to conserve the environment with significant changes in consumption habits and behavior. Top choices to contribute to the solution of environmental problems are to separate recyclable waste and reduce water and energy consumption, but preferred actions do not include financial donations.

CHAPTER 2

NATIONAL BIODIVERSITY STRATEGIES AND ACTION PLANS

2.1. Introduction

Brazil has a long history of legal instruments related to environmental and biodiversity preservation, beginning with the Forest Code in 1934 (fully revised in 1965) and later evolving with the development and adoption of various other legal instruments, including the law on fauna conservation (1967); the environmental advances of the 1988 Federal Constitution; the law on environmental crimes (1998); and the Biosafety Law (2005), among numerous others (see below).

The Brazilian environmental legislation is built through initiatives of both the Legislative and the Executive branches. Legal instruments of various hierarchical levels are constantly added to the country's legal framework: laws, provisional measures, decrees, normative rulings, administrative rulings, resolutions, among other instruments. Since Brazil's adhesion to and ratification of the CBD the country has sought to adjust and complement the national legal framework for the environment, to facilitate and make viable the achievement of CBD biodiversity conservation and sustainable use goals.

The Ministry of the Environment updated in 2009 its inventory of the national environmental legislation[100]. The updated report identified 550 legal instruments related to the CBD biodiversity conservation and sustainable use goals: 53 federal laws; 2 decree-laws; 1 provisional measure; 194 federal decrees; 190 rulings of the National Environment Commission; in addition to 75 laws and 35 decrees at the state level. This effort was non-exhaustive, as it did not include instruments such as normative and administrative rulings, or municipal legislation (see Annex 2 for a short description of all listed instruments).

This diversity of complementary environmental legal instruments combines to form the National Biodiversity Strategy, and is implemented by various environmental agencies and bodies (see next section). This chapter provides an overview of the national legal and institutional framework and instruments for biodiversity conservation and sustainable use.

2.2. Brazil's National Biodiversity Strategy and Action Plan

2.2.1. National Biodiversity Strategy and Action Plan (NBSAP)

Brazil is one of the few countries in Latin America with an officially adopted National Biodiversity Strategy, which in practice is composed by a set of documents. The CBD was ratified by the Brazilian National Congress in 1994 (Legislative Decree 2/94), becoming later a biodiversity law. At that time, Brazil already had a series of thematic laws in place,

[100] Brazil, Ministry of the Environment, 2009. Diagnosis of the Brazilian Environmental Legislation. Technical Report.

which became part of the national NBSAP such as the Forest Code, the Fauna Law and other traditional legislative instruments. These were later complemented by new thematic laws, such as the National Protected Areas System (SNUC, 2000); Biosafety Law; ABS Provisional Measure from 2000 (final law is being negotiated since 1995); Forest Concession Law (2006); Agroecological Zoning for Ethanol Production (2009); National Strategy for Invasive Alien Species (2009); and the National Policy on Climate Change (2009), among many others (see Annex 2 for an updated list). The implementation of the Brazilian NBSAP is further supported by the National Biodiversity Targets for 2010 (CONABIO Resolution 3, of 21 December 2006), defined by the National Biodiversity Commission in 2006 (see section 2.4 below).

The broad discussion supporting the development of the Brazilian National Biodiversity Policy (PNB) resulted in Decree 4339/2002, which defines the Policy, followed by the preparation of the National Biodiversity Action Plan (PAN-Bio), approved just before COP-8. PAN-Bio lists and classifies the priority actions for PNB implementation, but still requires substantial advances in the definition of a strategy to obtain stronger commitment from the agencies responsible for executing these actions. Nevertheless, some actors have advanced in the implementation of specific priority actions, such as those related to knowledge gaps: the Ministry of Science and Technology (MCT) created a biodiversity program (PPBio) which, despite its modest budget, is gradually filling some gaps e.g., with the publication of a book on the biodiversity of the Ducke Reserve and of the Caxiuanã Reserve (both in the Amazon Biome). The Second and Third National Reports to the CBD mapped the existing initiatives in Brazil (biodiversity-related programs included in the Federal Multi-Year Plan; NGO and academic programs and projects; etc.) and promoted workshops to complement information on PANBIO implementation. Over 700 initiatives were listed in those reports; the current 4th National Report to the CBD does not provide an updated list. These initiatives represent a highly substantial effort contributing to the implementation of the CBD in Brazil. It is, however, extremely difficult to define how much of this effort is a direct result of the NBSAP, or CBD, or of individual initiatives. Nevertheless, some of these initiatives can be directly attributed to Brazil's commitment with the CBD, such as the creation of PPBio within MCT; the creation of the National Center for Flora Conservation in the Rio de Janeiro Botanical Garden; the creation of the Chico Mendes Institute for Biodiversity Conservation - ICMBio (public agency in charge of national protected areas and biodiversity); the expansion of the programs related to threatened species within ICMBio under the PROBIO II project; the creation of a national center for biodiversity monitoring currently under way; the Amazon Protected Areas Program (ARPA) and other GEF-financed projects; among others.

As part of NBSAP implementation, Brazil published in 2004 its fist list and map of Priority Areas for the Conservation, Sustainable Use and Benefit Sharing of Brazilian Biodiversity (Decree 5092, of 24 May 2004), which identified the 900 most relevant areas for biodiversity throughout the country. This map was revised and updated in 2007 (MMA Administrative Ruling 09, of 23 January 2007) to better support public policies, direct biodiversity research, and guide the creation of new protected areas, among other initiatives relevant to the biodiversity and sustainable development themes. Although indigenous lands are not considered an official category of biodiversity protection area in Brazil, the National Protected Areas Plan (Decree 5758, of 13 April 2006), approved during COP-8,

follows the CBD concept of protected areas and includes indigenous lands in landscape planning for biodiversity conservation.

Brazil also counts with other important institutional instruments for NBSAP implementation, such as the National Biodiversity Commission (CONABIO); the National Biodiversity Program (PRONABIO); and Agrobiodiversity Program; among others.

To support implementation of NBSAP and the CBD, Brazil significantly increased its effort to make relevant and updated information available, with the publication of important documents such as the National Report on Marine Alien Invasive Species (2009); updated list of threatened species (2008); Rapid Assessment of Protected Areas (2007); among many others, several of which were mentioned in Chapter 1 of this report.

2.2.2. National Institutional Framework for Biodiversity and the Environment

The Brazilian National Environment System (SISNAMA – *Sistema Nacional de Meio Ambiente*) maintains the same overall institutional structure as presented in the 1st National Report to the CBD with the Ministry of the Environment as the overarching federal agency, working with other specialized federal agencies and state and municipal environmental agencies. The few significant changes at the federal level that occurred since presentation of the 1st National Report to the CBD are presented below.

IBAMA and ICMBio: To better implement biodiversity conservation, enforcement and monitoring, the central national agency in charge of executing the Brazilian environmental policy – the Brazilian Institute of Environment and Renewable Natural Resources (IBAMA) – was divided in 2007 into two federal agencies: one maintaining the IBAMA designation and the functions of enforcement, environmental licensing, environmental monitoring and control, and licensing of the use of natural resources; and a second agency named Chico Mendes Institute for Biodiversity Conservation (ICMBio). The new agency was attributed the responsibility for all aspects related to protected areas, including support for implementation of the National Protected Areas System (SNUC) and monitoring the use of protected areas and caves and the use of their resources, where allowed. ICMBio is also responsible for contributing to biodiversity research to generate and disseminate knowledge on biodiversity, biodiversity use and conservation, and protected area/ecosystem management; as well as for creating and promoting environmental education programs, and contributing to the implementation of the National Environmental Information System (SINIMA). Additionally, ICMBio is in charge of applying, within its jurisdiction, the international environmental management agreements and mechanisms. Additionally, a cooperation agreement was signed between MMA and IBAMA for environmental monitoring, to ensure systematic and encompassing monitoring of all biomes, in substitution of the previously conducted *ad hoc* monitoring events associated to denunciations and on a case-by-case basis to respond to specific requests from IBAMA's enforcement sectors to guide the preparation of law enforcement campaigns.

Water Agency – ANA: To regulate water use in Brazil and implement the National Water Resources Plan, the Brazilian Government created in 2000 the National Water Agency – ANA (*Agência Nacional de Águas*). Its mission is to implement and coordinate shared

integrated water management in Brazil and to regulate access to water, promoting its sustainable use for the benefit of current and future generations. Its actions are guided by the National Water Resources Policy (Law nº 9433, of 08 January 1997), known as "Water Law", which provides for the participatory and decentralized management of water resources.

Fisheries - MPA: A relevant responsibility that was originally under MMA was also given to a new agency, created in January 2003: the Special Secretariat for Aquaculture and Fisheries – SEAP, promoted in 2009 to the status of Ministry of Fisheries and Aquaculture – MPA. It shares with the Ministry of the Environment the responsibility for elaborating the policy to promote and develop fisheries and aquaculture in the country, promoting the sector's management and regularization under an environment sustainability perspective, and for the shared management of the use of fisheries resources.

Brazilian Forest Service – SFB: Created in 2006 under the Ministry of the Environment, SBF is a representative council within the Ministry's structure. Its mission is to conciliate the use and conservation of Brazilian public forest. SFB was created immediately after the publication of the Law on Forest Concession, to function as the implementation agent of this legal instrument (see section 1.4 of this report).

Biodiversity - CONABIO (2005): The National Biodiversity Commission was created by Decree 4703, of 21 May 2003 with a relevant role in the discussion and implementation of public policies related to biodiversity. It is responsible for promoting the implementation of Brazil's commitments under the CBD, as well as for identifying and proposing priority areas and actions for biodiversity research, conservation and sustainable use. It is composed by representatives from the government, academic community, NGOs, organized civil society (including rural workers associations), indigenous peoples, agricultural sector, and industrial sector. It works through five Permanent Technical Chambers (Scientific and Biological Collections; PANBIO – Directives and Priorities of the Action Plan for the Implementation of the National Biodiversity Policy; Threatened Species and Overexploited Species or Species Threatened with Overexploitation; Alien Invasive Species; and Biodiversity and Science); and two current Temporary Technical Chambers (Mountain Ecosystems; and Planning and Supervision of the International Year of Biodiversity). Additionally, temporary Working Groups are created according to emerging issues, as necessary.

Rio de Janeiro Botanic Garden – JBRJ. The Rio de Janeiro Botanic Garden received additional responsibilities related to public policies involving the protection of Brazilian flora. The National Center for Plant Conservation (CNCFLORA) was created within JBRJ and, in addition to its research and curatorial activities the institution is now responsible for updating and publishing the list of endangered plant species; coordinating the preparation and periodic updating of the Brazilian Flora Catalogue; and designing action plans for the conservation of endangered plant species, among other responsibilities (Decree 6645 of November 18, 2008).

SISNAMA still counts with a variety of Environmental Advisory and Regulatory Centers, Committees, Councils, Commissions and other bodies, composed by representatives of

various sectors, which support the work of the governmental environmental agencies, as listed in the 1st National Report to the CBD.

2.3. Targets and indicators

Responding to CBD Decision VIII/15, Brazil set in 2006 the National Biodiversity Targets for 2010 which build on the CBD 2010 Targets. However, only a sub-set of the national targets are being monitored. To improve capacity for environmental indicator development and monitoring MMA's Executive Secretariat created a task force to develop a set of environmental indicators covering the following themes: ozone depletion, climate change, marine and coastal zones, biodiversity and forests. The selection of around 40 indicators is based on international guidelines defined mainly in the context of monitoring the Latin American and Caribbean Initiative for Sustainable Development – ILAC (UNEP)[101].

Existing biodiversity indicators at the national level cover the following themes (see section 2.4.1 below): biodiversity knowledge; biodiversity conservation; sustainable use of biodiversity components; impact monitoring, assessment, prevention and mitigation; access to genetic resources and associated traditional knowledge, and benefit sharing; education, public sensitization and dissemination of biodiversity; and legal and institutional strengthening for biodiversity management (see section 2.4.1 for the complete set of national indicators and section 4.1.1 for the analysis of target achievement).

The National Environmental Information System (SINIMA), managed by the Ministry of the Environment, is currently undergoing a strengthening process, with a focus on the technology of information systems and the definition of a set of environmental and sustainable development indicators. The methodology for defining the baseline and periodically measuring environmental indicators is currently under final definition and, in 2009, SINIMA published[102] the following set of biodiversity indicators: (i) trends of biomes and ecosystems; (ii) extension of protected areas; and (iii) changes in status of endangered species. In the medium term, SINIMA will refine and expand this first set of indicators, institutionalizing the methodology to measure the evolving set of indicators.

SINIMA is responsible for developing a consistent Environmental Information Policy directed at the production, collection, systematization and dissemination of environmental information, and its environmental statistics and indicators subcommittee is in charge of the work related to environmental indicator development and monitoring based on the needs of the environmental agencies. The current work on identification of indicator demands will also point out existing information and statistics gaps. To fill these gaps, SINIMA will work with institutions that produce environmental information and statistics to develop a data production and integration strategy. Additionally, SINIMA is in charge of seeking means to adequate the administrative processes of MMA and its related agencies to the generation of periodic statistics and indicator information.

[101] MMA/UNEP 2007. *Indicadores de Acompanhamento da Iniciativa Latino Americana e Caribenha para o Desenvolvimento Sustentável* [Monitoring indicators of the Latin American and Caribbean Initiative for Sustainable Development – ILAC]. Brasília.
[102] http://www.mma.gov.br/sitio/index.php?ido=conteudo.monta&idEstrutura=219&idConteudo=9014&idMenu=9786

The broad national environmental indicators developed and monitored by SINIMA will also contribute to monitor the implementation of CBD, National Biodiversity Policy and NBSAP, as well as to monitor the overall environmental quality. The current set of specific national biodiversity targets (see section below) is closely linked to CBD implementation.

2.4. Progress on the implementation of NBSAP

2.4.1. Overview

Rather than a single strategy document, the Brazilian National Biodiversity Strategy and Action Plan - NBSAP is composed of a series of macro documents and initiatives developed for CBD implementation (Figure II-1). A variety of other projects and initiatives, as mentioned in section 2.2.1 above, also contribute to the achievement of CBD and national biodiversity goals, although not created specifically to address Brazil's commitments under the CBD.

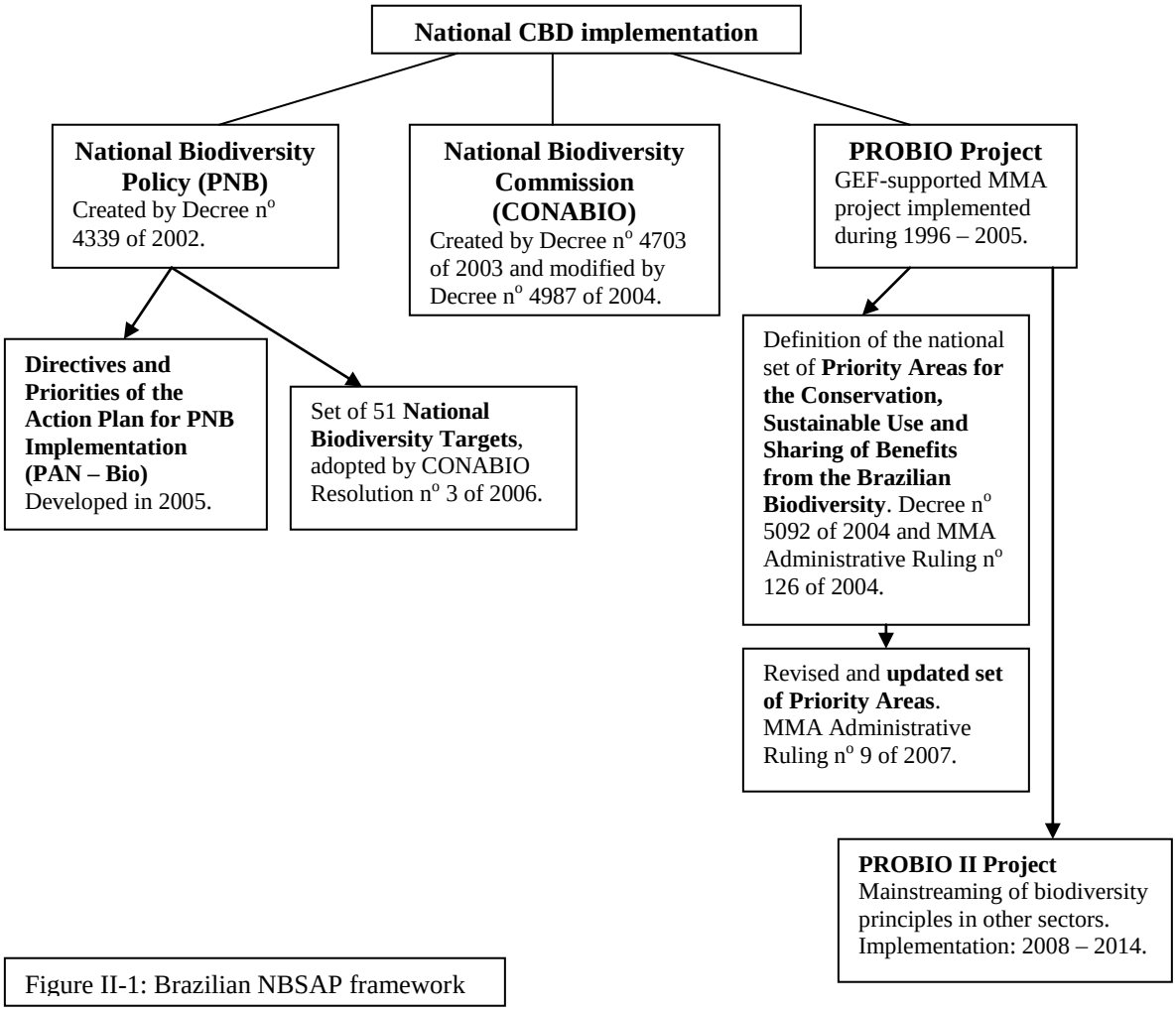


Figure II-1: Brazilian NBSAP framework

Brazil developed a set of 51 national biodiversity targets for 2010, approved by the National Biodiversity Commission (CONABIO) and closely linked to the global 2010

biodiversity targets (see Table II-1 below). However, this set of national targets, developed under a broad participatory process, is even more ambitious than the global targets, which makes it unlikely that the country will achieve most of them by 2010. To improve and better measure the national progress toward these biodiversity targets it is necessary to refine the three main instruments developed for CBD implementation – the National Biodiversity Policy (PNB), the Action Plan for PNB Implementation (PAN - Bio) and the set of National Biodiversity Targets – reorganizing and improving differentiation among targets, directives and actions included in each instrument to define an enhanced set of measurable biodiversity targets and indicators linked to clearly identified actors, budget sources and deadlines.

Although Brazil implements a variety of projects that contribute to the achievement of CBD objectives, the GEF-supported PROBIO projects (I and II) were designed to specifically address CBD implementation. The first PROBIO project (Project on the Conservation and Sustainable Use of Brazilian Biodiversity) had the objective of identifying priority actions to be implemented through its subprojects, promoting public-private partnerships and generating and disseminating biodiversity knowledge and information. Its outcomes included the preparation of the first national map of priority areas for the conservation, sustainable use and sharing of benefits from Brazilian biodiversity. The updated version (2007) of this map is broadly used to guide biodiversity-related actions and to inform the development and implementation of public and private policies and investments in the environment and other sectors. The first PROBIO also represented an important effort to promote the generation and dissemination of biodiversity knowledge through its subprojects, producing over 30 books, reports and publications on priority areas, traditional knowledge, alien invasive species, species inventories, and information on specific biomes/ecosystems, among others[103].

PROBIO II (National Biodiversity Mainstreaming Project) intends to push forward the transformation of the production, consumption and land occupation models, starting with the agricultural, science, fisheries, forest, and health sectors. Its overarching objective is to promote public-private partnerships to overcome the borders between territories under ecological management and the landscapes dominated by economic sectors responsible for large-scale negative environmental impacts, to convert such landscapes into sustainable territories.

Table II-1: Brazilian National 2010 Biodiversity Targets

PNB Component	Target n°	National 2010 Biodiversity Target
Component 1 – Knowledge on biodiversity (focal area A of CBD's GSPC)	1.1	An expanded and accessible list of formally described species of Brazilian plants and vertebrates, and of invertebrates and micro-organisms, these possibly selectively developed, in the form of permanent databases
	1.2	National Taxonomy Program established, aiming at a 50% increase in scientific records with an emphasis on new species descriptions.
	1.3	Virtual Brazilian Biodiversity Institute created and the expansion of the Biodiversity Research Program (PPBio) from the Amazon and the Caatinga to the remaining biomes in order to increase

[103] Brazil – Ministry of the Environment/Secretariat of Biodiversity and Forests, 2006. PROBIO: Ten Years of Activities. 156 pp.

		availability of information on biodiversity.
Component 2 – Biodiversity conservation (CBD focal areas 1 and IV)	2.1	At least 30% of the Amazon biome and 10% of the remaining biomes and the coastal and marine zone effectively conserved through protected areas within the National Conservation Area System (SNUC).
	2.2	Protection of biodiversity guaranteed in at least 2/3 of the Priority Areas for Biodiversity by means of SNUC Protected Areas, Indigenous Lands, and *Quilombola* Territories.
	2.3	Temporary or permanent no-fishing zones, to protect fish stocks and integrated with protected areas, comprising 10% of the marine zone.
	2.4	All species officially recognized as threatened with extinction in Brazil the object of action plans and active advisory groups.
	2.5	100% of threatened species effectively conserved in protected areas.
	2.6	25% reduction in the annual rate of increase of threatened species of fauna on the National List and de-listing of 25% of species currently on the National List.
	2.7	A preliminary national-level assessment of the conservation status of all known plant and vertebrate species and a selective assessment of invertebrate species.
	2.8	60% of threatened plant species conserved in *ex situ* collections and 10% of threatened plant species included in recovery and restoration programs.
	2.9	60% of migratory species are the object of action plans and 30% of these have conservation programs implemented.
	2.10	70% of the genetic diversity of socio-economically valuable cultivated or exploited wild plant species and associated indigenous and local knowledge maintained.
	2.11	50% of priority species under the Plants for the Future Project conserved *in situ* and on-farm.
	2.12	60% of the genetic diversity of Brazilian wild relatives of cultivated plant species of the ten priority genera effectively conserved *in situ* and/or *ex situ*.
	2.13	Capacity of ecosystems within Priority Areas for Biodiversity to deliver goods and services maintained or increased.
	2.14	Significant increase in actions to support *on-farm* conservation of the components of agro-biodiversity that ensure maintenance of sustainable livelihoods, local food security and health care, especially for local communities and indigenous peoples.
Component 3 – Sustainable use of biodiversity components (CBD focal area II)	3.1	30% of non-timber plant products obtained from sustainably managed sources.
	3.2	Recovery of at least 30% of main fish stocks through participative management and capture control.
	3.3	40% of the area in the Amazon under forest management plans certified.
	3.4	80% of Extractive Reserves and Sustainable Development Reserves benefit from sustainable management of fauna and flora species important for food or economically, with management plans prepared and implemented.
	3.5	80% reduction in unsustainable consumption of fauna and flora resources in sustainable development protected areas.
	3.6	No species of wild fauna or flora endangered by international trade in accordance with CITES provisions.
	3.7	Significant reduction in illegal trade in fauna and flora species within Brazil.
	3.8	80% increase in innovation and added value for new biodiversity-based products.
	3.9	80% increase in new sustainable uses of biodiversity in medicine

		and foods leading to marketable products.
	3.10	Significant increase in detection, control and repression of bio-piracy.
	3.11	Significant increase of investment in studies, projects and research on sustainable use of biodiversity.
	3.12	80% increase in the number of patents deriving from components of biodiversity.
	3.13	Support of the Commission for Coordination of Ecological and Economic Zoning for the preparation and conclusion of ecological and economic zoning plans for at least 50% of Brazilian states.
Component 4 – Monitoring, assessment, prevention and mitigation of impacts on biodiversity (CBD focal area III)	4.1	100% reduction in the rate of deforestation in the Atlantic Forest biome, 75% in the Amazon biome and 50% in remaining biomes
	4.2	Overall reduction of 25% in the number of fires (heat spots) in each biome.
	4.3	Creation and consolidation of a systematic and standardized nation-wide biodiversity monitoring network.
	4.4	Action plans for prevention and control prepared for all species listed under the National Assessment of Alien Invasive Species.
	4.5	Management plans implemented for the control of at least 25 of the principal invasive exotic species that threaten ecosystems, habitats or species in Brazil.
	4.6	50% of sources of water and soil pollution and their impacts on biodiversity controlled.
	4.7	Support to bio-geographic studies to include the predictability of species occurrence associated with potential climate changes using Geographic Information Systems.
Component 5 – Access to genetic resources, associated traditional knowledge and benefit sharing (CBD focal areas V and VI)	5.1	All public policies relevant to traditional knowledge implemented in accordance with Article 8(j) of the CBD.
	5.2	Knowledge, innovations and practices of indigenous peoples and traditional communities protected.
	5.3	100% of scientific and general publications deriving from access to traditional knowledge identify the origin of the traditional knowledge.
	5.4	100% of cases of access to traditional knowledge include prior informed consent, obligatory sharing of knowledge generated and sharing of benefits with knowledge holders.
	5.5	Access and benefit sharing legislation, consistent with the CBD, approved by the National Congress and implemented and 100% of access and shipment activities conform to national legislation.
	5.6	Benefits resulting from commercial utilization of genetic resources effectively shared fairly and equitably in support of biodiversity conservation.
	5.7	100% of applications for patents on inventions of products or processes deriving from access to genetic resources and associated traditional knowledge include identification of origin and proof of authorized access.
	5.8	Sharing of benefits in accordance with the International Treaty on Plant Genetic Resources for Food and Agriculture implemented in Brazil.
Component 6 – Education, public awareness, information and outreach on biodiversity (focal area D of CBD's GSPC)	6.1	Inclusion of the importance of biological diversity and the need for its conservation, sustainable use and benefit sharing in communication, education and public awareness programs.
	6.2	Increased access to high quality information on conservation, sustainable use and sharing of benefits of biodiversity.
	6.3	Establishment and strengthening of action networks for the conservation, sustainable use and sharing of benefits of biodiversity.
Component 7 – Increased	7.1	New and additional financial resources, from public and private, domestic and international sources obtained and available for

legal and institutional capacity for biodiversity management (CBD focal area VII)		use in Brazil making possible the effective implementation of its commitments to the CBD programs of work, in accordance with Article 20.
	7.2	Implementation of initiatives that promote the transfer to Brazil of environmentally sustainable technologies developed in other countries for the effective implementation of the CBD programs of work, in accordance with Article 20, paragraph 4 and Article 16.
	7.3	Promotion of the exchange and transfer of environmentally sustainable technologies between developing countries for the effective implementation of the CBD programs of work, in accordance with Article 20, paragraph 4 and Article 16.

CONABIO[104] was created to play a fundamental role in CBD implementation in Brazil, acting as coordinator of the development and implementation of the National Biodiversity Policy, to implement Brazil's commitments under the CBD. It is composed of governmental and civil society representatives and actively contributes to the development of biodiversity-related public policies through Deliberations and Resolutions. Among its many attributions related to biodiversity conservation and knowledge, CONABIO is also responsible for approving the national reports to the CBD.

2.4.2. Contribution of NBSAP actions to the implementation of CBD articles; successes and obstacles encountered in implementation and lessons learned

A number of agencies implement actions that are considered as part of the Brazilian biodiversity strategy. The main federal NBSAP actor is the Ministry of the Environment together with its executing agencies, but other ministries such as the Ministry of Science and Technology, Ministry of Agrarian Development, Ministry of Agriculture Livestock and Supply, among others, also implement actions that are directly connected to one or more CBD objective or that partly collaborate to achieve NBSAP and CBD goals. Such actions include conservation of biodiversity, ecosystems and agrobiodiversity; traditional knowledge and practices; access to genetic resources and technology; and sustainable use of biodiversity, among other CBD-related matters (see section 2.5.3).

Table II-2 below indicates the sections of this report which discuss progress and results of initiatives and activities that contribute to the implementation of CBD articles:

Table II-2: Contribution to the implementation of CBD articles

CBD Article	4th National Report section discussing progress of contribution to article implementation.
Article 6 – NBSAPs/Overall measures for biodiversity conservation and sustainable use	Sections 2.1 through 2.4
Article 7 – Identification and monitoring of biodiversity	Sections 1.2.1, 1.2.2, 1.2.4, 1.2.5, 1.4, 2.4
Article 8 – *In situ* conservation (Protected areas; Regulation and management of biological resources; Regulation and management of activities; Rehabilitation and restoration; Alien species; Living modified organisms; and Traditional knowledge and practices)	Sections 1.2.4, 1.3.3, 1.4

[104] http://www.mma.gov.br/conabio

Article 9 – *Ex situ* conservation	Sections 1.2.3, 1.4
Article 10 – Sustainable use	Sections 1.2.3, 1.4
Articles 11-14 – Measures to promote conservation and sustainable use (Incentives; Research and training; Public education and awareness; Impact assessment and minimization of negative impacts)	Section 1.4
Articles 15-19 – Benefits (Access to genetic resources and benefit sharing; Access to and transfer of technologies; Information exchange; Technical and scientific cooperation; Biotechnology management and benefit sharing)	Sections 1.2.3, 1.2.4
Articles 20-21 – Financial resources (Resources and Mechanisms)	Section 2.5

Implementation progress

Brazil has invested notable efforts and made progress in the implementation of CBD articles. Although no NBSAP document was developed, the government has been investing in the identification of priority areas and actions for biodiversity conservation and creating the necessary instruments and forums to make their implementation viable. An enabling political environment is being built and new environmental funds to support long-term conservation have been created (see section 2.5 below). The production and compilation of knowledge on Brazilian biodiversity has increased very significantly in the last 10 years and stronger, long-term measures for *in situ* and *ex situ* conservation are being applied.

Efforts are also being applied by the Ministry of the Environment to involve other ministries and sectors in biodiversity conservation (e.g. PROBIO II project; see also Chapter 3 of this report), but even though environmental themes already permeate the discourse and some actions of some production sectors, the importance of biodiversity conservation needs to be more widely and deeply mainstreamed into processes and actions of all sectors.

The direct involvement of civil society and of the various production sectors in the development and implementation of environmental policies has also increased notably since the creation of the National Biodiversity Policy (PNB) in 2002. The relevance of this participation is further evidenced by the importance given to CONABIO's resolutions by the decision-making levels of the Ministry of the Environment. And even though PNB has not yet been completely implemented, its continuity is felt in other policy instruments (e.g., National Climate Change Policy, National Protected Areas Plan, National Water Resources Policy, National Policy for the Sustainable Development of Traditional Communities, and National Policy to Promote the Socio-biodiversity Production Chains, among others) developed by agencies other than the Ministry of the Environment since the creation of PNB, which represent a continuity of the work towards achieving CBD objectives.

Albeit significant, the progress achieved in the implementation of CBD commitments will not suffice to achieve the National Biodiversity Targets by 2010. The identification of a national set of targets was a significant advance, but the capacity and cross-sectoral integration necessary to reach the ambitious selected targets are still not fully in place.

Lessons learned

Brazil has adopted a broad participatory approach to develop specific policies to address biodiversity issues and CBD implementation. However, although the effective participation of a variety of sectors is important and necessary for constructing these instruments, such approach requires refinement to ensure they will result in practical instruments where the implementation of targets, goals, directives, actions and indicators is viable, distinction among these elements is clear, and where responsibilities and funding sources are clearly identified.

The importance of clear, measurable indicators and specific, achievable targets cannot be stressed enough. Good indicators and good targets smooth all aspects of strategy development and implementation, such as planning and prioritizing actions, measuring progress, reformulating policies, identifying needs and gaps, among other important aspects. It is also particularly important for biodiversity indicators and targets to be made politically valuable to ensure their broad adoption and the support from other sectors in the achievement of national biodiversity objectives and for indicator monitoring. Otherwise, indicators and targets reflect nothing more than wishes.

One of the most important advances obtained as a result of Brazil's CBD implementation was the gain of precise knowledge on existing information, capacity and instrumental gaps hindering implementation, which suggested ways to overcome these obstacles, such as the development of policies, creation or strengthening/restructuring of institutions, generation of knowledge, methodology development, access to technology, etc.

The need to mainstream biodiversity concepts across sectors is also weighting more heavily as CBD implementation progresses in Brazil; a weight felt particularly by the Ministry of the Environment as the agency responsible for and primary actor in the implementation process. Adequate integration of biodiversity conservation principles and targets in the policies, processes and actions of other sectors, particularly economic and production sectors, is crucial for obtaining support and enhancing/streamlining the country's progress towards achieving national and global biodiversity targets.

Intensifying the efforts to define the monetary value of biodiversity and ecosystem services will greatly advance the work to integrate biodiversity concepts and conservation targets in other sectors. It will particularly improve dialogue with economy-related sectors.

2.5. Funding for priority activities

The Brazilian government has created a variety of federal funds and a few tax incentives to promote environmental conservation (section 2.5.1). Some states also have active state-level environmental funds and the country also counts with socio-environmental funds. There are also private environmental funds that receive donations from the private sector and international agencies (section 2.5.2). Additionally, the federal government also has other budgeted expenditures and program funding (section 2.5.3) that benefit biodiversity. This section also discusses the funding specifically directed to implement NBSAP priority actions (section 2.5.4) and the main private sector initiatives collaborating to the

achievement of national biodiversity targets (section 2.5.5), as well as the funding challenges encountered for NBSAP implementation (section 2.5.6).

2.5.1. Governmental biodiversity/environmental funds

National environmental funds

Brazil counts with five federal funds under coordination of the Ministry of the Environment (listed below from a-e), which provide financial resources for environmental and biodiversity conservation actions throughout the country, among other governmental funds for these purposes.

a) *National Environment Fund (FNMA)*: Created in 1989 by Law 7797 to develop projects for the rational and sustainable use of Brazilian natural resources, including the maintenance, enhancement or recuperation of environmental quality to improve life quality of the Brazilian population. Amounts paid to the Fund originate from the federal budget, donations, interest from asset investments, and other amounts collected from fines applied according to the Law on Environmental Crimes, in addition to other monies earmarked to the Fund by specific legislation. Resources are invested in the conservation and sustainable use of water, forests and biodiversity, territorial planning and management, environmental quality, sustainable societies, and shared fisheries management. The Fund is governed by a decision-making Management Council within the Ministry of the Environment. To-date, the Fund has invested over R$170 million (approximately US$100 million), supporting over 1,300 socio-environmental projects.

b) *National Fund for Forest Development*: Created in 2006 by Law 11284 to promote the development of sustainable forest-based activities in the country and to promote the sector's technological innovation. Currently under implementation, the Fund will receive a portion (at least 20%) of the revenue obtained from forest concessions, which will be invested in projects carried out by governmental agencies or private non-profit organizations. Governance of the Fund is shared by three agencies: IBAMA is in charge of the environmental monitoring of forest management plans; the Brazilian Forest Service enforces the fulfillment of obligations under concession contracts; and independent audits of forest activities must be carried out at least every three years.

c) *National Climate Change Fund*: The creation of this Fund was approved by Congress in December 2009 (Law 12114 of December 09, 2009). Its objective is to secure funds to support projects, studies and ventures to adapt to or mitigate the effects of climate change. The financial resources, to be managed by BNDES (federal development bank), should originate from special participation in profits from oil production, the federal budget, donations, loans, and transference of unused governmental annual budgeted amounts. The Fund's revenue, estimated at R$300 million (approximately US$176 million) per year, should be preferentially invested in environmental management activities related to the oil production chain, including the consequences of oil use.

d) *Amazon Fund*: Created in 2008 by Decree 6527 to support the continuity of Brazilian efforts to voluntarily reduce the emission of greenhouse gases resulting from deforestation

and forest degradation (REDD), as foreseen in the UN Framework Convention on Climate Change, and currently being implemented. The Fund's resources will originate exclusively from donations, with an estimated potential income of US$ 1 billion for its first year, to be managed by BNDES. At least 80% of the Fund's investments are earmarked to the Amazon Region, and up to 20% can be invested in deforestation monitoring and control systems for other Brazilian biomes and other tropical countries. In 2009 the first round of projects were approved to receive support from this fund.

e) *Atlantic Forest Restoration Fund*: Created in 2006 by Law 11428 to finance environmental restoration and scientific research projects within the Atlantic Forest region. The regulation of this law is still pending approval of the National Congress for the Fund to become effective. Resources for this Fund will come from the federal budget, donations, income from asset investments, and other monies earmarked to the Fund by specific legislation. Projects financed by this Fund can benefit both public and private lands and should be executed by governmental agencies, public academic institutions and conservation or research NGOs.

f) *Fund for the Defense of Collective Rights (FDD)*: Created in 1985 by Law 7347 and regulated by Decree 1306 of November 9, 1994, this Fund is linked to the Ministry of Justice and has the purpose of funding remedies to damages caused to the environment, to the consumer, to assets and rights of artistic, aesthetic, historical, touristic or scenic value, and to other collective interests. The Fund is managed by the FDD Federal Management Council, composed by seven governmental representatives and three representatives of the civil society. Resources originate from fines applied by the Economic Defense Management Council (CADE) and from Consumer's Defense fines, as well as from donations. Its 2007 budget was R$43 million (approximately US$25 million).

g) *MCT Sectoral Funds*: The Ministry of Science and Technology (MCT) implemented, since 1999, several Science and Technology Development Support Funds, replenished with industry income fees and natural resource use fees, and governed by mixed representation Management Committees. These Funds are a mechanism to strengthen and enhance the national science and technology system. Some of these funds support activities that collaborate more directly with CBD objectives, such as the Water Resources Sectoral Fund, Biotechnology Sectoral Fund, Agribusiness Sectoral Fund, Amazon Sectoral Fund, Energy Sectoral Fund, and Oil Sectoral Fund.

State and municipal environmental funds

i) *Environmental Fund of the Federal District (FUNAM-DF)*: Created in 1989 by District Law 041 and regulated by Decree 15895/94, this Fund has the objective of supporting programs and projects for the implementation of the Federal District's environmental policy and to promote civil society's participation in the solution of environmental issues. The Fund is managed by the Administrative Council of the Environmental Fund of the Federal District (CAF) and receives resources from the Federal District's budget; contributions and subventions from other governmental agencies; revenue from agreements and contracts; donations; taxes, fines and compensations; and other monies earmarked to FUNAM-DF.

ii) *Piauí State Environment, Science and Technology, and Urban Development Fund (FEMAM-PI)*: Created in 1987 by State Law 4115 to finance projects related to environmental conservation, scientific and technological development, and urban development, prepared and proposed by state and municipal agencies; costs related to projects under the State Secretariat for the Environment, Science and Technology and Urban Development; and projects for the dissemination or internalization of technologies relevant to these three themes. The State Secretariat for the Environment and Water Resources is in charge of the Fund's financial management and the Technical Management Chamber is in charge of its technical management. Resources originate from the state budget, fees and compensations, revenue from services provided by the State Secretariat, donations, and revenue from fiscal incentives, among other monies.

iii) *Ceará State Fund for Environmental Management (FEMA)*: Created in 2004 by Complementary Law 48 to support the implementation of environmental policies, plans, programs and projects, and the enhancement of environmental management in the state. The Fund is managed by the FEMA Management Council, which is presided by the Environmental Ombudsman Secretary.

iv) *Santa Catarina Special Fund for Environmental Protection (FEPEMA-SC)*: This state Fund was created in 1980 by Law 5793 and had its regulation revised by Decree 4726 of September 21, 2006. It has a socio-environmental focus and is linked to the State Secretariat for Sustainable Economic Development (SDS). The Fund's objective is to support the development and implementation of programs and projects for the conservation, recuperation and enhancement of environmental quality in the state of Santa Catarina Its resources originate from environmental crime fines (70%) and other sources.

v) Rio de Janeiro State Fund for Environmental Conservation and Urban Development (FECAM/RJ): Created in 1986 by Law 1060 to address the financial requirements of projects and programs for the implementation of the State Environmental Control Policy. The Fund receives 5% of the oil royalties due to the state, and revenue from environmental fees. The 2007 budget was R$290 million (approximately US$170 million).

vi) *Goiás State Environmental Fund (FEMA/GO)*: Created in 1995 by Law 12603 and regulated by Complementary Law 20/96 to support environmental programs, projects and research, as well as public policies for sustainable environmental development. FEMA/GO receives an annual budget of approximately R$4 million (approximately US$2.4 million).

vii) *Campo Grande Municipal Environmental Fund (FMMA/Campo Grande/MS)*: The Fund was created in 1999 by the Municipality of Campo Grande, in Mato Grosso do Sul state, by Law 3612, altered by Law 4237 of 01 December 2004, and regulated by Decrees 7884 of 30 July 1999 and 9122 of 06 January 2005. The Fund applies resources from the municipal budget, fees and fines and other sources in the implementation of environmental programs and projects. It is managed by the Municipal Secretariat for the Environment and Sustainable Development (SEMADES) with the collaboration of the Municipal Environmental Council (CMMA).

viii) *Porto Velho Municipal Environmental Fund (FMMA/Porto Velho/RO)*: Created in 2001 by the Municipality of Porto Velho in the state of Roraima, by Complementary Law 119 and regulated by Decree 8622 of 05 July 2002. The Fund has a R$60,000 (approximately US$35,300) annual budget, applied by the Municipal Council for Environmental Defense (COMDEMA) in environmental projects.

ix) *São Paulo Special Fund for the Environment and Sustainable Development (FEMA/São Paulo)*: Created in 2001 by the municipality of São Paulo, in São Paulo state, by Law 13155, and regulated by Decree 41713 of February 25, 2002 to support plans, programs and projects for the sustainable use of natural resources, environmental education, and for environmental control and enforcement. It is managed by the FEMA Council (CONFEMA), composed by representatives of the Municipal Environmental and Sustainable Development Council, and environmental NGOs.

x) *Aracaju Municipal Socio-environmental Fund (FMMA/Aracaju/SE)*: Created in 2001 by the municipality of Aracaju in the state of Sergipe, by Law 2941 to promote urban development, focusing in the urbanization of precarious settlements and environmental education. Target population is composed by communities located in risk-prone areas or in areas with environmental conflict, such as mangroves and coastal dunes. The Fund is managed by the Urban Development and Environment Council (CONDURB). In 2006, the municipal budget earmarked R$350,000 (approximately US$206,000) to the Fund.

Several other municipal environmental funds have already been created and are in the process of being regulated or implemented, or are at various stages of the creation process.

Incentives

Brazil also has mechanisms to provide tax incentives to individuals or municipalities in exchange of environmental conservation:

A) *Green VAT (ICMS Ecológico)*: The Green VAT allows municipalities to receive additional financial resources from the Merchandise Circulation and Services Tax (ICMS) in those states that have legally defined environmental criteria for sharing part of the portion owe to the municipality according to constitutional provision. This system is foreseen in item II of Article 158 of the Federal Constitution, which gives the states the right to legislate over up to ¼ of the percentage of the ICMS owe to the municipalities. Paraná was the first state to make use of this constitutional right, approving specific legislation in 1991. The state of Acre has already approved its Green VAT legislation, which is currently being regulated. Rio de Janeiro has also approved legislation, which should enter into force in 2009, and Goiás approved a state constitutional amendment creating the Green Vat, currently being regulated. A total of 13 of the 26 Brazilian states (plus the Federal District) currently have legislation on the Green VAT, listed in Table II-3 below, and 10 other developed Green VAT bills, currently being evaluated.

Table II-3: Brazilian states with legislation on the Green VAT and amounts transferred to "green" municipalities in 2008.

State	Year of creation	Environmental criteria		Amount in R$ (US$1= R$1.7)
		Biodiversity (%)	Other (%)	
Paraná (PR)	1991	2.5	2.5	115,795,725.00
São Paulo (SP)	1993	0.5	0	72,235,558.75
Minas Gerais (MG)	1995	0.5	0.5	42,545,117.50
Rondônia (RO)	1996	5	-	16,658,825.00
Amapá (AP)	1996	1.4	-	1,007,538.00
Rio Grande do Sul (RS)	1998	7.0	-	0
Mato Grosso (MT)	2001	5	2	39,456,662.50
Mato Grosso do Sul (MS)	2001	5	-	37,622,475.00
Pernambuco (PE)	2001	1	5	72,961,545.00
Tocantins (TO)	2002	3.5	9.5	23,473,937.50
Acre (AC)	2004	20	-	21,466,200.00
Rio de Janeiro (RJ)	2007	5	-	92,531,087.50
Goiás (GO)	2007	5	-	58,732,775.00
Total transferred in 2006	-	-	-	**594,487,446.75**

Source: MMA, 2008

B) *Private Reserves of the Natural Heritage (RPPN)*: Private land owners that voluntarily designate a portion of or the entire property to permanent biodiversity conservation receive a significant reduction in their rural land property tax. Such designation must be registered in the property's deed in perpetuity and remains unchanged even if the land changes ownership. For an area to be declared an RPPN the owner is required to sign a term of commitment with the relevant federal, state or municipal environmental agency, which verifies the existence of public interest in the area's preservation. It is estimated that there are currently a total of 973 federal and state RPPNs in Brazil, covering approximately 7,055 km^2.

C) *Payment for environmental services*: The municipality of Extrema, in the state of Minas Gerais, is pioneering since 2007 a system of payment for environmental services through the Water Producer Project, where rural producers receive financial compensation for conserving springs and water catchment areas. The Espírito Santo state initiated a similar system in 2009.

Several other initiatives involving the maintenance or recuperation of native vegetation for compensating carbon emissions, REDD and water conservation are also being developed throughout the country, but still as isolated initiatives not yet reflected in public policies. Examples of these initiatives are: (i) Oasis – water catchment areas protection project in São Paulo state managed by NGO FBPN; (ii) Carbon sequestration project through avoided deforestation and reforestation in Guaraqueçaba (Paraná state), managed by NGO SPVS; (iii) Adopt-an-Araucaria-Forest program in Paraná state, managed by SPVS; and (iv) São Paulo state discussion to create a fund or other financial mechanisms to support the recuperation of riparian forests and water conservation.

A bill on payment for environmental services, prepared by the Ministry of the Environment, is currently being appreciated by the National Congress. This bill institutes the National Environmental Services Policies, creates the Federal Program of Payment for

Environmental Services, and establishes the ways and means for the Program's control and financing, among other provisions. Six other bills on payment for environmental services are being analyzed together with the bill proposed by the Ministry of the Environment. Both the environmental and the agricultural sectors are very interested in the approval of a final bill based on the seven proposals, which is expected to occur in 2010. The Ministry of the Environment is currently performing the internal procedures to create a working group which will develop the regulation of the law on payment for environmental services once it is approved by Congress.

In addition to the initiatives to certify sustainable timber and non-timber forest products (see section 1.4.4), there is also the Seal of Origin granted by the "Atlantic Forest Market" Program of the Atlantic Forest Biosphere Reserve (RBMA)[105], which has the main objective of conserving the Atlantic Forest through the promotion and consolidation of sustainable markets. It is granted to producers who work effectively for the construction and management of their social, economic and environmental sustainability, who implement effective environmental management, and who respect the cultural heritage. This certification is granted through the Participatory Warranty System, integrated to the RBMA management system.

2.5.2. Donor funds

a) *FUNBIO - Brazilian Biodiversity Fund*: In 1996 the federal government created FUNBIO, a private fund initially capitalized with a US$20 million donation from the Global Environmental Facility to finance biodiversity conservation and sustainable use projects. Since its creation, FUNBIO has been complementing these initial resources with donations and partnerships with public and private agencies. FUNBIO is also responsible for the management of specific conservation funds, as listed below. FUNBIO is governed by a decision-making Council and operates through an Executive Secretariat, an Executive Committee, and six Technical Commissions.

b) *FAP – Protected Areas Fund*, under the Amazon Protected Areas Project (ARPA): In 2004 FUNBIO became the manager of this Fund, created specifically to support the long-term management costs of protected areas in the Amazon. The number and total area of protected areas in the Amazon has increased significantly under the GEF-supported ARPA project, which also receives financial resources from the Brazilian and German governments and WWF, and is currently initiating its second phase. By the end of ARPA's first phase (2009) FAP was capitalized at US$40.5 million and should raise an additional US$80.0 million by the end of its second phase.

c) *Atlantic Forest Conservation Fund (AFCoF)*: This Fund was created by a two-million Euros donation of the German Ministry of the Environment for the conservation of the Atlantic Forest as a global initiative for climate change mitigation, and is managed by FUNBIO. The donation, originated from Germany's sale of carbon credits, financed until April 2009 conservation actions in public and private protected areas and projects for the sustainable use of biodiversity, among other initiatives in the Atlantic Forest.

[105] www.rbma.org.br/mercadomataatlantica

2.5.3. Other government expenditure and program funding

In 2009, the governmental budget allocated R$3,532,621,461 (approximately US$2.08 billion) for federal environmental agencies, only 2% of which from sources other than the national treasury. The Ministry of the Environment and its executing agencies implement this budget through 16 programs in the federal Multi-Year Plan (PPA) and other initiatives not included in the PPA that contribute to the achievement of CBD objectives. Two of these programs are implemented through the Secretariat of Biodiversity and Forests, CBD focal point in Brazil: the Conservation and Sustainable Use of Biodiversity and Genetic Resources Program; and the Conservation, Management and Sustainable Use of Agrobiodiversity Program. In addition to these, several other programs listed in the PPA are implemented by various ministries and contain actions related to: sustainable rural production with agro-forestry systems; local sustainable development with emphasis on family production and sustainable use of natural resources; biofuels research and production; renewable energy; and territorial ordering and regularization (which assists with contention of deforestation and facilitates vegetation cover monitoring). Table II-4 below lists the main federal programs that contribute, in various degrees, to CBD implementation and relates each program to the CBD article(s) to which the program contributes.

Table II-4: Main federal programs that contribute to the achievement of CBD goals (2009).

Program (n° in the PPA or no n° = other initiative)	Responsible Agency	CBD Article
Conservation and Sustainable Use of Biodiversity and Genetic Resources (0508)	MMA	6, 8 (d, f-h), 9, 10, 12, 15
Conservation, Management and Sustainable Use of Agrobiodiversity (1426)	MMA	8 (l), 10, 12
Program to Combat Desertification (1080)	MMA	6, 8 (d, f, l), 10
Conservation and Recuperation of Brazilian Biomes (1332)	MMA	6, 8 (a-f, l), 10, 11
Traditional Communities (1145)	MMA	8 (j), 10
Environmental Education for Sustainable Societies (0052)	MMA	13
National Forests Program (0506)	MMA	8 (a-c, f), 10, 12
Deforestation and Fire Prevention and Control – FLORESCER Program (0503)	MMA	14
Conservation of Watersheds – PROBACIAS Program (1107)	MMA/ANA	6, 11
Revitalization of Vulnerable and Environmentally Degraded Watersheds (1305)	MMA	8 (f), 13, 14
Sustainable Fisheries Resources (0104)	MMA	10, 14
National Ecological-Economic Zoning (0512)	MMA	6
Environmental Quality (1346)	MMA	6, 14
Urban Solid Waste (8007)	MMA	14
Agenda 21 (1102)	MMA	6
Management of Environmental Policy Implementation (0511)	MMA	6, 18
Management of Water Resources Policy Implementation (0497)	MMA	6
National Climate Change Plan	MMA	6, 12, 13
Brazilian Program to Eliminate the Production and Consuming of Substances that Destroy the Ozone Layer	MMA	6, 13
National Air Quality Control Program – PRONAR and Program to Control Air Pollution by Vehicles – PROCONVE	MMA	6, 12, 13

Urban Environmental Management in Environmentally Vulnerable Areas	MMA/MCT	6, 11, 13
National Program for Underground Waters	MMA	6, 7, 13, 14
Sustainable Amazon Program – PAS	MMA	6, 8, 10, 13, 14
Action Plan to Prevent and Control Deforestation in the Amazon - PPCDAM	MMA	6, 7, 10, 13, 14
Amazon Protected Areas Program – ARPA	MMA	8, 13
Ecological Corridors Project	MMA	8, 9, 13
National Plan to Promote Socio-biodiversity Production Chains	MMA / MDA / MDS	6, 8, 10, 12, 13, 15, 19
Other Governmental Programs that partially contribute to CBD implementation		
Program (n° in the PPA or no n° = other initiative)	**Responsible Agency**	**CBD Article**
Science, Technology and Innovation Applied to Natural Resources (1122)	MCT	6, 7, 12, 17, 19
Science, Technology and Innovation for the Industrial, Technological and Export Trade Policies (PITCE) (1388)	MCT	12, 16, 19
Meteorology and Climate Change (1421)	MCT	12, 14
Promotion of Research and the Scientific and Technological Development (0461)	MCT	6, 7, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20
Agro-energy Development (1409)	MAPA	6, 10, 11, 17, 18
Sustainable Development of Agribusiness (1442)	MAPA	6, 10, 13, 16
Sustainable Development of the Cocoa Production Regions (0362)	MAPA	6, 10, 13, 16
Sanitary Safety in Agriculture and Livestock (0357)	MAPA	6, 13, 14
Research and Development for Agribusiness Competitiveness and Sustainability	MAPA	6, 11, 12, 14, 15, 16
Agriculture and Livestock Plan 2009-2010	MAPA	6, 13, 14, 16, 21
Integrated Production Program: PIF and SAPI	MAPA	6, 14, 16
Proantar (0472)	MD	6, 7, 12, 14, 17, 18, 22
Marine Resources (0474)	MD	6, 7, 10, 11, 12, 14
Integrated and Sustainable Development of the Semi-Arid Region (CONVIVER – "coexist") (1047)	MI	10
Sustainable Development of Settlement Projects	MDA	10
Sustainable Development of Rural Territories (1334)	MDA	6, 10
Sustainable Development of Agribusiness	MDA	10
Family Agriculture – PRONAF (0351)	MDA	6, 10, 11, 14, 16, 21
Technical Assistance and Rural Extension in Family Agriculture (1427)	MDA	6, 11, 12, 13, 14
Sustainable Development of Fisheries (1342)	MPA	6, 10, 13
Sustainable Development of Aquaculture (1343)	MPA	6, 10, 13
National Program for Medicinal Plants and Phytotherapics	MS	6, 10, 12, 13, 19
Renewable Alternative Energy (1044)	MME	6
Mining and Sustainable Development (0391)	MME	6, 14
Energy Efficiency (1046)	MME	6, 13
Biodiesel	MME	6, 10, 12
National ProÁgua ("*ProWater*")	ANA	6
GEF Amazonas	ANA	6, 10, 13
National Underground Waters Agenda	ANA	6, 7, 12
PRODES – Program to De-pollute Watersheds	ANA	6, 11, 20
Water Producer	ANA	6, 10, 11, 13, 20
National Program to Assess Water Quality	ANA	6, 7, 12
Water Resources Plan	ANA	6, 10, 13
Cultural Identity and Diversity –Plural Brazil (1355)	MinC	8 (j) and related provisions

Indigenous Peoples Protection and Promotion	MJ	8 (j) and related provisions
Quilombola Brazil (1336)	SEPPIR	8 (j) and related provisions

Source: Federal Multi-Year Plan 2008-2011 – http://www.sigplan.gov.br
Abbreviations: MMA = Ministry of the Environment; ANA = National Water Agency; MDS = Ministry of Social Development; MCT = Ministry of Science and Technology; MAPA = Ministry of Agriculture Livestock and Provision; MD = Ministry of Defense; MI = Ministry of National Integration; MDA = Ministry of Agrarian Development; MPA = Ministry of Fisheries and Aquaculture; MS = Ministry of Health; MinC = Ministry of Culture; MME = Ministry of Mines and Energy; MJ = Ministry of Justice; SEPPIR = Special Secretariat of Racial Equality Promotion Policies.

2.5.4. Funding to implement NBSAP Priority Actions

All listed funding sources collaborate to the implementation of NBSAP and CBD objectives, even though none was created specifically to this end. Nevertheless, some funds are provided to projects tailored to implement the Brazilian NBSAP, such as PROBIO and PROBIO II, and the National Strategy Project, as mentioned in the sections above.

2.5.5. Private sector initiatives

In Brazil, the private sector is demonstrating a gradually increasing concern regarding environmental sustainability, although for the most part, this sector still perceives environmental requirements as obstacles rather then a necessity. Nevertheless, numerous voluntary initiatives contributing to environmentally sustainable development, providing incentives to environmental sustainability, and to environmental and biodiversity conservation are being implemented by the private sector throughout the country. Some of these initiatives are presented below.

Sustainable agriculture

Moratorium on Soybean from Amazon Deforestation: To reconcile economic development and socio-environmental conservation in the Amazon biome, in 24 July 2006 the members of the Brazilian Association of the Vegetable Oil Industry (ABIOVE) and the Brazilian Association of Cereal Exporters (ANEC) declared a commitment not to commercialize any soybean originating from areas in the Amazon biome deforested after that date. This unprecedented initiative became known as "moratorium on soybean" and had an original duration of two years, renewed in 2008 with support from the Ministry of the Environment. This initiative supports the responsible and sustainable use of Brazilian natural resources and, since its onset, the sector has been working with NGOs to develop and implement a governance structure with operating rules for the Amazon biome and to demand from the government the definition, application and compliance of public policies on land use in the region (ecological-economic zoning). The initiative monitors soybean production in the Amazon biome with satellite images.

Responsible Soybean Roundtable (RTRS): This is an international initiative initiated in 2006 to promote the use and sustainable growth of soybean production through the commitment of the main stakeholders of the soybean value chain according to a global standard of responsible production (http://www.responsiblesoy.org). In Brazil, the June 2010 General Assembly of the Roundtable approved its main criteria, among which

Principle 4 focuses the Environmental Responsibility, under which Criteria 4.4 and 4.5 directly address biodiversity conservation. Criterion 4.4 foresees the identification of areas of high conservation value, where soy cultivation would not be allowed. While the necessary mapping is not completed (deadline for completion is 2012), the identification of such areas should follow the official governmental maps connected to the CBD (e.g. the Map of Priority Areas for Biodiversity Conservation and Sustainable Use).

Pro-sustainable Food Initiative (IPAS): Initiated by the Sadia food industry in 2007 inspired by the Sustainable Food Laboratory, of which it is a member, IPAS brings together Bunge, Carrefour, Klabin, Nestlé and Sadia, as well as NGOs The Nature Conservancy and Organics Brasil, and the academic institutions Pensa/FEA-USP and Industrial Marketing School. The objective is to promote economic, social and environmental sustainability in the food production chain, with the commitment to evaluate the food system and discuss new strategies to ensure sustainability in the food production chain in the Americas and in Europe. IPAS working groups focus on five major themes: farms, consumer, supplier, whole chain, and waste of food.

Gourmet Coffee: The Brazilian Special Coffees Association (BSCA) seeks to offer high quality coffee to the consumers and includes among its practices, full compliance with the Brazilian environmental legislation with the preservation of native forests, particularly along water courses, locating the coffee plantation next to the forest to provide habitat continuity, and applying sustainable and ecologically correct production practices. These practices also involve the protection of water resources and recycling solid and liquid waste. BSCA provides certification to ensure product quality, following strict quality standards and quality control practices.

Integrated Production in Brazil: Answering to market requirements, Brazilian fruit producers initiated in 1999 conversations with the Ministry of Agriculture (MAPA) to institute public policies to adequate production practices in the country to market requirements, providing certification and traceability to Brazilian produce. MAPA initiated the promotion of integrated production practices in 2000 with fruit producers, with the PROFRUTA Program. The first integrated fruit production (PIF) projects supported by a MAPA-CNPq (National Scientific and Technological Development Council) partnership involve multidisciplinary teams for technological support, including the development of technical rules for production, (seeking the rational use of agrochemicals; and water, soil, environmental and culture/produce monitoring) and the implementation of a record system for all production steps to allow traceability. The integrated production practices are based in a systemic approach that initiates with integrated pest management and evolves to the integration of specific processes along the production chain. Brazil has thus developed a Legal Framework for Integrated Production Practices, currently still limited to fruit production. Producers complying with the integrated fruit production practices are certified and receive a numeric code as a traceability warranty. MAPA is currently gradually implementing a similar system for integrated agriculture-livestock production (SAPI) and is working on the standardization of the system for the entire country.

Sustainable beef: In December 2009 the Brazilian Supermarket Association (ABRAS) launched its Certification Program for Responsible Bovine Production. The Program will

provide impartial and independent control to ensure to the Brazilian consumer that the beef sold by supermarkets participating in the Program originates from farms that are compliant with the legislation and committed to end deforestation. The Program intends control the origin of the beef consumed in the country and establishes social and environmental sustainability criteria to certify producers of sustainable beef. ABRAS signed cooperation agreements with ministries and other governmental agencies for collaborative work under the certification program. At least 20 large supermarket chains such as Carrefour, Walmart and Pão de Açúcar, as well as large cold storage plants have already joined the Program and ABRAS will encourage its other over 70 thousand member companies to join the initiative. The Brazilian government is developing a cattle traceability program which complements this private sector initiative.

Forest sector

Brazilian Forest Stewardship Council (FSC): This non-profit NGO was created in 1998 to represent FSC in Brazil and is comprised by environmental NGOs and forest sector industries. Its mission is to disseminate and facilitate good forestry practices in Brazil according to principles and criteria that bring together ecological safeguards, social benefits and economic viability. The institution provides technical support to the sector on forest certification, provides certification to forest products and training to certified producers, among other related activities (http://www.fsc.org.br).

Forest Certification Program – IMAFLORA: This Program represents in Brazil the SmartWood Program of the Rainforest Alliance. Through this partnership, IMAFLORA evaluates forest ventures that apply for FSC certification. Its mission is to promote changes in the forest and agriculture sectors to achieve the conservation and sustainable use of natural resources and to promote social benefits. IMAFLORA also develops work related to sustainable use protected areas to ensure the conservation of natural resources, by supporting the creation and management of protected areas, the continuing residence of traditional communities, and to ensure the provision of environmental goods and services to society.

Natura Certification Program: The Natura cosmetic company created this program in 2008 to integrate groups of family rural producers and traditional communities in the Natura business chain, generating income and promoting local organization. Its objective is to promote sustainable agriculture and resource management through three types of certification: organic product, sustainable forest product, and sustainable agriculture product, according, respectively, to the criteria of the Instituto Biodinâmico, Forest Stewardship Council and Sustainable Agriculture Network. This program ensures that the raw materials used in the cosmetic production are sustainably extracted or produced, and provide social benefits to communities. In 2008, 54% of Natura's plant-origin raw materials were certified.

Tok Stok's Certified Timber Program: The furniture company Tok Stok initiated its Certified Timber Program in 1999 to create awareness among employees and suppliers, and to call market's attention to the importance of this type of product, testing and promoting its commercial viability. Timber for products in this Program is certified by FSC. Through

this Program, the company intends to gradually develop new lines of certified products that are economically viable and that can be offered at a competitive price.

The Pact for the Restoration of the Atlantic Forest: Numerous NGOs, state governments and federal agencies are signatories of this Pact, which intends to restore 15 million hectares of Atlantic Forest by 2050, according to annual plans approved by the Pact's Coordination Council. The objective of the Pact is to integrate the efforts and resources of its Parties to generate biodiversity conservation results; generate jobs and income within the production chain of forest restoration, maintenance, valuation and payment for environmental services; and legal compliance of agriculture and livestock activities in the 17 states containing Atlantic Forest. The Pact was created in view of the history of degradation in this biome and its high degree of fragmentation, which significantly reduces the possibility of preserving natural cycles, gene flow and continuous provision of forest environmental services without large-scale restoration projects. The Pact's mission is to coordinate public and private institutions, governments, businesses and land owners, to achieve its restoration objectives.

The Murici Pact: Created by eight environmental organizations in 2004, this Pact aims at the integrated planning and implementation of conservation actions targeted at the Atlantic Forest of the Northeastern coast. This Pact resulted in the creation of a new NGO, the Association for the Protection of the Northeastern Atlantic Forest (*Associação para a Proteção da Mata Altântica do Nordeste* - AMANE), to implement the Pact. Its mission is to protect and restore the Northeastern Atlantic Forest through biodiversity conservation and the development of socio-environmental benefits. Participating organizations: Fundação SOS Mata Atlântica, Centro de Pesquisas Ambientais do Nordeste – CEPAN, Sociedade Nordestina de Ecologia – SNE, Instituto Amigos da Reserva da Biosfera da Mata Atlântica – IA RBMA, Conservação Internacional (CI-Brasil), The Nature Conservancy – TNC, Birdlife International through the Sociedade para a Conservação das Aves do Brasil – SAVE Brasil, and WWF-Brasil.

The Pact for Forest Valuation and for Ending Deforestation in the Amazon: In October 2007, nine NGOs [106] published this Pact, where they propose the establishment of a commitment among several governmental and civil society sectors to implement urgent necessary measures to ensure the conservation of the Amazon Forest. The Pact proposes to end deforestation in the Amazon in seven years, through the adoption of a reduction benchmarks regime, to be achieved through the implementation of public policies. The Pact also proposes several financial mechanisms to make its goal possible, such as REDD and the establishment of specific Funds.

Sustainable Amazonas Foundation (FAS): The FAS was instituted in December 2007 by the Amazonas state government and Bradesco – a private bank, with initial donations totaling R$40 million (approximately US$23.5 million). These resources were invested in long-term funds, and only the profits will be invested in the supported programs. Coca-cola

[106] The NGOs signing this document are: Instituto Socioambiental, Greenpeace, Instituto Centro Vida, Instituto de Pesquisa Ambiental da Amazônia, The Nature Conservancy, Conservation International, Amigos da Terra – Amazônia Brasileira, Imazon, and WWF-Brazil.

joined FAS in 2009 as a supporting associate, with a R$20 million (approximately US$11.8 million) donation. The objective of FAS is to promote sustainable development and environmental conservation (including commercialization of carbon credits), and to improve life quality of communities living in the forest. Programs supported by FAS include the Forest Grant to Families (BFF), Forest Income Grant (BFR), Social Forest Grant (BFS), and Forest Grant to Associations (BFA), among others. FAS currently holds partnerships with Marriott and Yamamay (an Italian enterprise) for specific projects. Operational partners include the Amazonas State Secretariat for the Environment and Sustainable Development (SDS), State Secretariat of Education (SEDUC), Amazonas State Institute for Environmental Protection (IPAAM), Sustainable Development Agency (ADS), Amazonas Development Institute (IDAM), Health Vigilance Foundation (FVS), Bradesco Asset Management (BRAM), Brain & Company, PricewaterhouseCoopers, the DD&L law office, ETEL Interiores, Ecolog, Mil Madeireiras, and municipal governments.

Greenpeace Program "Amazon Friendly Town": Created in 2003, this Program intends to assist in creating market conditions for sustainable timber produced in the Amazon forest. Its objective is to transform municipal procurement into environmental policy, supporting the creation of municipal legislation to cease all municipal acquisition of illegal Amazon timber and timber originating from criminal deforestation in the Amazon. This Program is targeted at all Brazilian municipalities, through voluntary participation.

Recycling

There are numerous private initiatives related to recycling in Brazil, originating from large corporations, small companies or businesses, or from social organizations. Examples of these initiatives are listed below.

Setor Reciclagem [107]: This site is a communication channel specialized in recycling information for business people, entrepreneurs, and researchers on the recycling theme. It includes, classifies and stores information collected from the internet, exclusive articles, and press releases, among other information and user contributions on the recycling theme. The site is a social responsibility initiative of the communications company Criatura, which created and maintains the site. Criatura is a creation studio that produces EcoMarketing solutions. The site exists since 2001, at first functioning as a support to a magazine with the same name and later evolving to respond to user demand. The site also includes an advertisement section for recycled products and handcrafts produced with recycled materials.

National Institute for Processing Empty Containers (inpEV): Over 30 industries that produce or deal with agricultural or medical chemicals or similar materials have created this Institute in 2002 to manage the final destination of empty containers of phytosanitary products in Brazil; support and provide guidance to industries, distributors and rural producers on the compliance with legal responsibilities; promote education, environmental protection awareness and human health awareness; and to support the technological development of chemical containers.

[107] http://www.setorreciclagem.com.br

ANAP: The paper recycling NGO ANAP (*Associação Nacional dos Aparistas de Papel*) was created in 1981 in São Paulo, congregating at the national scale those businesses dedicated to the commercialization of paper scraps. ANAP acquires paper scraps from industries, households and other sources, classifying the types of scraps that can be sold to paper industries and other recycling agents. In 2007, the recuperation rate for paper in Brazil was 45%[108].

Brazilian Association of Paper Recycling Industries (ABIRP): ABIRP has the objective of uniting paper industries to seek fiscal, economical, technological, social and other benefits to the sector. Industries producing various types of recycled paper are members of this association.

Corporate Commitment to Recycling (CEMPRE): This business-based non-profit NGO is dedicated to promoting waste recycling under the integrated solid waste management concept. Founded in 1992, CEMPRE is maintained by over 25 large private companies of various sectors, such as supermarkets, food producers, mining companies, retailers, etc.[109] CEMPRE works to create awareness in society about the importance of waste reduction, reutilization and recycling through publications, technical research, workshops and databases. Awareness programs are particularly directed at opinion-makers, such as mayors, business CEOs, members of academia and NGOs. Its mission is to promote the concept of Municipal Integrated Solid Waste Management, promote post-consumption recycling, and to disseminate the three 'R' (Reduce, Reuse, Recycle) through environmental education.

Waste collectors associations: There are numerous waste collectors ("*catadores*") associations in Brazil, assisted or not by other NGOs or governmental agencies, which seek to improve income and social insertion of groups of people who pick through garbage seeking the financial value of recyclables.

Sustainable tourism

Brazilian Association of Ecotourism and Adventure Tourism Companies (ABETA): This Association was created in 2003 as a result of the mobilization of ecotourism entrepreneurs seeking to strengthen this sector in the country and to offer safe and responsible activities to tourists, as well as to promote the concept of minimum impact on the natural environment. There are currently 240 associates from 24 states and 12 formalized regional commissions.

Hospitality Institute: Over 30 national and international institutions with a role on education, employment, culture, environment and tourism created this non-profit private institute of public interest in 1997 to promote education and hospitality aiming at the adoption of best practices in sustainable tourism and to contribute to social inclusion and sustainable development. The Institute is committed to develop the tourism sector as a means to promote social and economic development, and to increase the value of cultural diversity and biodiversity conservation. The Institute created technical standards to certify

[108] http://www.anap.org.br/osetor.asp
[109] http://www.cempre.org.br/cempre_institucional.php

tourism businesses (including adventure tourism) and workers, which are currently a reference for quality in the Brazilian tourism sector.

Brazilian Network of Mutually Supportive and Community Tourism (TuriSol): This network of small community-based tourism initiatives located in traditional or local communities with environmentally sustainable economic activities (artisanal fisheries communities, indigenous communities, traditional regional crafts producers, rural family producers of organic produce, etc.) was created in 2003, at first with support of the French Embassy in Brazil and later from the Ministry of the Environment. The network has the objective of strengthening community-based tourism in Brazil, with traditional sustainable production practices, cultural aspects and preserved environment as the main attraction for tourists.

Luggage Project: The "*Projeto Bagagem*" was created in 2001 by seven NGOs and other supporting partners to contribute to community strengthening through community tourism. The project is developed in areas where nature is the main attraction factor, and intends to benefit primarily the local communities through direct involvement and income generation with fair distribution of financial resources. The planned tours respect regional conservation rules and seek to minimize environmental impacts as much as possible.

Environmental criteria for credit concession

Equator Principles: Some of the banks which are part of this agreement (e.g., ABN Amro, Citigroup) are present in Brazil. These principles involve the adoption, by financial institutions, of minimum environmental and social responsibility criteria for credit concession to large ventures in tropical countries. These criteria involve the project's environmental impact on vegetation and wildlife, required monetary compensation to affected communities, protection of indigenous communities, and prohibition of financing child or slave labor. High and medium risk projects are required to prepare an environmental assessment indicating how the project will reduce environmental and social risks.

BNDES environmental directives: BNDES is the national bank for economic and social development, which holds the socio-environmental development as a strategic directive for the bank's financing policy, under the principle that environmental preservation, conservation and recuperation are essential for humankind. Thus, BNDES seeks to constantly enhance the environmental analysis criteria for projects requesting credit, offering financial support to ventures resulting in sustainable development benefits. BNDES is also responsible for managing the Amazon Fund and a fund for the Atlantic Forest. The bank has four financing lines directed at environmental projects: (i) support to environmental investments (waste management, water resources, recycling, reforestation, clean energy, etc.); (ii) forest BNDES (reforestation, sustainable use, conservation of forests); (iii) PROESCO - energy efficiency (energy saving technology, renewable fuels, etc.); and (iv) forest compensation (to promote compliance of rural properties with the Forest Code, preserving native forests).

Climate change

Climate Protection Pact: In 2007, the national oil company Petrobrás, the Votorantim corporation, Greenpeace and WWF Brasil joined to promote the adoption, in the short term, of actions in Brazil to ensure the continuity of economic development while contributing to the reduction of greenhouse gases emission. Actions proposed by the Pact involve aspects such as a clean energy matrix, technological innovation, introduction of sustainable consumption habits, and the creation of political, legal and economic mechanisms for the establishment of a proactive and constructive climate agenda in the country.

Corporate sustainability

Brazilian Ecoefficiency Network: Various large corporations created this network in 2001 with the objective to reduce consumption of supplies and energy; reduce dispersion of toxic substances; intensify recycling; maximize the sustainable use of renewable resources; increase durability of products; and add value to goods and services. The initiative arose from the compulsory energy rationing in 2001 as a result of prolonged drought, evolving to the creation of an Ecoefficiency Program in participating corporations. This concept suggests a significant connection between resource efficiency (leading to productivity and profit) and environmental responsibility, reducing economic costs and environmental impacts.

Natura cosmetic company: As an environmentally responsible corporation, Natura manages its activities to identify environmental impacts, minimizing negative impacts and enhancing positive impacts. The company also seeks ecoefficiency in all steps of its production chain, promoting the valuation of biodiversity and its social responsibility, and neutralizing carbon emissions. Natura's environmental directives are: responsibility regarding future generations; environmental education; managing environmental impacts and the life cycle of products and services; and minimizing inflow and outflow of materials and resources.

O Boticário cosmetic company: O Boticário bases its work on solid values of respect to human beings and to the environment. It is committed to promote human rights, eradication of child labor, fair trade, nature conservation and to fulfill the Millennium Goals. The company complies fully with the environmental legislation and, whenever possible, goes one step further; takes into account its entire cycle of activities to seek efficient resource use minimizing environmental risks and impacts; and ensures the necessary funds to fulfill its established environmental goals. Additionally, O Boticário funds environmental projects such as selective waste collection (recycling) campaigns; 3Rs education campaigns (reduce, reuse, recycle); Kaizen Eco-income generation, a pilot project on environmental costs management; and bio-awareness, encouraging consumers to return empty containers to the stores. Furthermore, the company maintains a foundation for nature protection (*Fundação O Boticário de Proteção à Natureza*), which is nationally and internationally recognized for its effective results in biodiversity conservation in the southern Atlantic Forest, capacity-building for conservation, and for its financial and technical support to conservation and research projects throughout the country.

Petrobrás: Since 2006 the national oil company Petrobrás has developed a biodiversity management system through its Corporate Standard for Managing Potential Impacts on Biodiversity, which foresees criteria and procedures for managing such impacts in the areas of influence of the company's operations, through the systematic assessment of risks and impacts to biodiversity and recuperation of impacted ecosystems, among other actions. Environmental recuperation actions include recuperation and sustainable use of water resources; recuperation and conservation of coastal, marine and freshwater species and habitats; carbon fixation through the recuperation of degraded areas and conservation of natural forests and other habitats. The company also invests in environmental projects throughout the country, and in the strengthening of environmental organization networks integrating NGOs, government and the private sector through partnerships. Examples of conservation projects receiving long-term support from Petrobrás are: humpback whale project; marine turtle (TAMAR) project; marine manatee project; right whale project; spinning dolphin project; co-management of the Arraial do Cabo marine extractive reserve; gallery forest project; environmental recuperation through agro-forestry; and landscape restoration and conservation of water resources and threatened species in the Atlantic Forest.

Faber-Castell: Global leader in wooden pencils made of reforested timber, this is one of the oldest industrial groups in the world. Since its foundation in 1761 in Germany, the company has invested in respect for collaborators, consumers, communities and the environment. In Brazil, the company owns 9,600 hectares of forests, 6,300 of which are managed. The company develops the Animalis and the Arboris projects aiming respectively at fauna and flora knowledge and conservation. Faber-Castell's forest plantations are managed to prevent forest pests.

Wal-Mart: Wal-Mart Brazil launched its sustainability pact, through which the company agrees with its suppliers on commitments such as for sustainable development in the Amazon, reduction of packaging, and development of sustainable production chains.

Environmental sustainability certification: In Belo Horizonte, the highly industrialized capital of Minas Gerais state, the Belo Horizonte Municipal Environmental Council (COMAM) created in 2009 a program to certify registered public and private environmentally sustainable ventures located in the municipality. The program is managed by the Municipal Secretariat for the Environment and approved ventures receive an Environmental Sustainability Seal and are listed in COMAM's Cadastre of Ventures Certified for Environmental Sustainability. Among other sustainability criteria, COMAM recommends the use of flexible fuel vehicles; annual emissions inspection for all vehicles; taking into account environmental, social and economic sustainability criteria in procurement procedures, including energy and economic efficiency; and selective solid waste disposal, separating and providing proper final destination to recyclables.

FIEMG – Industry's contribution to the 2010 Target: The Federation of Industries of Minas Gerais State (FIEMG) has been mobilizing industries since 2004 to contribute towards the state's 2010 Target, which is to restore environmental quality to Rio das Velhas, an important and highly impacted river in Minas Gerais. The role of industries in the achievement of this target is widely disseminated by FIEMG, which uses its

communication means to encourage industries to comply fully with environmental legislation and to adopt reduced impact production practices such as reducing water use and reusing water, recycling, etc. FIEMG is also researching and compiling sustainable procedures adopted by industries in Minas Gerais state that are contributing to the achievement of this 2010 Target, such as the substitution of plastic bags; collection of used vegetable oils; treatment of used waters and reduced water use; controlling effluent emissions; recuperation of riparian forests; plant's water treatment systems for reutilizing water in production processes; environmental awareness programs for employees and school students; and reutilization of textile industry byproducts in agriculture. FIEMG provides guidance and specific capacity building courses on environmental sustainability practices to industries in the state, including courses on how to meet the criteria of the State Environment Foundation's Clean Production Index.

Other initiatives

Partnership CNI and MMA: In September 2010 the Ministry of the Environment (MMA) signed a Technical Cooperation Agreement with the National Confederation of Industries (CNI). This agreement is one of the means of engagement of the Brazilian industrial sector in the implementation of the objectives of the Convention on Biological Diversity and involves cooperation in areas such as: the translation of publications; communication and dissemination of information related to the areas identified in the agreement; exchange of information and data relevant for this cooperation; development, promotion and inventory of documentation on good practices; increasing international access to data, information and experiences from Brazilian and international partners; and the organization of events in Brazil and abroad. To celebrate the International Year of Biodiversity (2010), CNI became an official party in Brazil to the German initiative Business and Biodiversity (BBI). The project is executed by the technical cooperation agency GTZ and has the objective of disseminating and promoting the exchange of experiences among corporations that use natural resources responsibly, through an electronic site translated into Portuguese (http://www.business-and-biodiversity.de/). To-date, CNI is the only federation of industries in the world to join BBI.

Brazilian Corporate Council for Sustainable Development – CEBDS: CEBDS was created in 1997 by a coalition of the largest and most important corporate groups in Brazil, which jointly represent approximately 40% of the national GDP. Its main objective is to create the necessary conditions in the corporate environment and in the other sectors of society to make viable the harmonious relationship among these three dimensions of sustainability: economic, social and environmental. CEBDS is organizing in 2010 meetings to discuss, with environmental experts and businessmen, the issues related to business and biodiversity, particularly the issues that will be discussed during COP-10, such as the July 2010 meeting of its Thematic Chamber on Biodiversity and Technology, and the August 2010 workshop on Biodiversity and the New Economy, with the participation of numerous corporations, during which the commitment of Brazilian corporations to measure their impacts on biodiversity was announced, which CEBDS intends to present at COP-10 in Nagoya (www.cebds.org.br).

Instituto LIFE: This Brazilian NGO was created in 2009 as a joint initiative by the organizations Fundación Avina, Fundação O Boticário de Proteção à Natureza (FBPN), POSIGRAF, and Sociedade de Pesquisa em Vida Selvagem e Educação Ambiental (SPVS). The mission of Instituto LIFE (*Lasting Initiative for Earth*) is to recognize and add value to the private and public institutions that develop actions to favor biodiversity conservation. LIFE Certification is a pro-biodiversity certification with specific rules, which specify the procedures to obtain the certification, and the criteria and evidences to comply with audit requirements. The certification is currently at the experimental phase and final definition of applicable criteria (www.institutolife.org.br).

2.5.6. Challenges

Much progress was achieved in the implementation of NBSAP and CBD objectives, as described throughout this report. Nevertheless, Brazil still faces important challenges for a more efficient and thorough implementation of biodiversity conservation objectives, as discussed below.

NBSAP Action Plan: The fact that the NBSAP is a broad set of instruments rather than a consolidated document presents a challenge to the clear definition of priority NBSAP actions and targets. The Action Plan for NBSAP implementation also requires the definition of responsibilities for priority actions and of the funding sources, for a more effective implementation.

Brazilian targets and indicators: As discussed in section 2.4.1, Brazil developed a set of 51 national biodiversity targets for 2010, which are closely linked to the global 2010 biodiversity targets. However, some of the targets identified in this first effort would be better classified as actions and directives, and some lack measurable indicators. One of the first challenges to achieve an efficient implementation of CBD and NBSAP objectives is a detailed revision and reorganization of this list of national biodiversity targets, with the identification of measurable indicators for each target. The revised list should also include clear definition of responsibilities for target monitoring and funding sources, to allow an enhanced monitoring of progress toward each target.

The revised list of biodiversity targets would also provide a solid basis from which to estimate the necessary institutional collaboration, as well as the financial and installed capacity needs to monitor and achieve the national targets.

Funding and capacity: Once the NBSAP Action Plan and the list of National Biodiversity Targets are revised and well defined, it will be possible to define funding and capacity needs and priorities, allowing in turn the enhanced implementation of NBSAP objectives.

Climate Change: Brazil is playing a leading role in many aspects related to climate change issues, including its early commitment to reduce carbon emissions, the development of scenarios and studies, the Climate Change Plan and legislation, reforestation projects for carbon credits, and an active role in international technical debates, among other initiatives. The national effort to mitigate and adapt to climate change effects would nevertheless

benefit from a better integration between actors working on these issues and actors working on NBSAP/CBD issues.

Mainstreaming: The mainstreaming of biodiversity issues across sectors remains one of the greatest challenges. The National Biodiversity Commission (CONABIO) is part of the effort to facilitate the dialogue with other sectors and increase awareness on the importance of biodiversity conservation, but the penetration of biodiversity issues discussed by the Commission into sectors through their representatives is much less effective than originally expected.

The PROBIO II project (National Biodiversity Mainstreaming and Institutional Consolidation Project), currently under implementation, is one of the main instruments to put in practice the integration of biodiversity issues in other sectors. The project involves 10 governmental agencies of the environmental, health, agriculture, and science and technology sectors, each with biodiversity-related objectives funded through the project.

As demonstrated in the previous sections, individual and often isolated initiatives of the private sector are increasing, but there is still a long process ahead to root environmental and biological issues into other sectors. The financial sector, for example, has already adopted some environmental criteria for specific lines of credit, but the challenge remains to provide adequate training to professionals on the front line of credit concession, providing them with the information and instruments necessary for providing guidance to clients and for decision making.

Awareness raising: Biodiversity related issues are still mostly seen as distant from the reality of the general public. The Ministry of the Environment is currently discussing a proposal for the development of an encompassing National Strategy for Environmental Communication and Education which, when implemented, should increase public support and participation in the implementation of CBD objectives.

Capacity and continuity: Environmental agencies at all three levels (federal, state and municipal) and including the Ministry of the Environment, face serious challenges regarding the contracting and maintenance of permanent technical staff in adequate numbers to efficiently and effectively carry out their missions. This chronic lack of staff and turnover of temporary staff results in the lack of continuity for important long-term actions and seriously delay the implementation of programs and projects, and even prevent the on-time delivery of commitments such as periodic national reports to international conventions. Environmental and biodiversity conservation would greatly benefit from a well staffed and continuous institutional structure. Stronger investment for adequately staffing these agencies and in the enhancement of the career program for environmental analysts, focused on environmental and biodiversity specialists, would contribute to fill the gap and halt the constant turnover and evasion of good professionals.

Biodiversity information systems: Brazil developed and maintains various important biodiversity-related information systems, such as the Authorization and Biodiversity Information System (SISBIO), BIOTA Environmental Information System (SinBiota – FAPESP), and Species Link (on scientific collections), as well as specific databases for

groups of taxa such as for marine turtles, fished species, among others. However, not all existing systems converse with one another, which presents difficulties to achieve information integration and exchange, as well as easy access. The Ministry of the Environment is currently mapping all existing systems connected to federal institutions, such as environmental agencies connected to the Ministry of the Environment, the Ministry of Science and Technology, universities and research centers, among others, and promoting discussions among hosting institutions to define ways to integrate these systems. The second step towards the integration of these systems will be to make them compatible, allowing information sharing and access. The government is also studying the development of a Virtual Biodiversity Institute to act as a central platform to access information on biodiversity and to support a network of specialists, among other functions.

Lower-level NBSAPs: There are still only a few isolated efforts to develop and implement state and municipal BSAPs, such as the São Paulo and Curitiba municipal BSAPs. Of the 5,561 Brazilian municipalities, 78% have some governmental structure for the environment (a 10% advancement in comparison to 2005), and only 47.6% count with Municipal Environmental Councils, 13% of which created between 2005 and 2008[110]. In 2002, only 148 municipalities earmarked a portion of their budget to the environment. These data indicate that, even though important progress is happening, the decentralization of the National Biodiversity Strategy is still a challenge requiring stronger commitment from state and municipal governments and capacity building investments from the federal level.

South-South collaboration: Brazil organized two regional meetings for South American countries: one in 2003 on the status of National Biodiversity Strategies, and a workshop in 2008 on capacity building for NBSAPs and biodiversity mainstreaming. However, south-south collaboration is still very limited. International agreements exist and are in force to allow collaboration among countries in South America in the environmental sector, although this is usually not the focus of the agreements. Brazil participates in three of these agreements: Mercosul, which is primarily a market/economy mechanism, under which environmental issues still have limited space. The Organization of the Treaty for the Conservation of the Amazon (OTCA) limits its work to the international Amazon Region and, even though its focus is Amazon conservation, it does not have a structured long term agenda for the environment. The Comunidade Sul-Americana de Nações (CASA), signed in 2004, is a political agreement among South American countries to integrate actions of the political, social, economic, environmental and infrastructure sectors among countries, but environmental issues are not yet present in the agenda. None of these agreements is focused in environmental issues and there is also no regional treaty or agency in South America for the environment, and no supporting mechanism for collaboration in this sector.

In Brazil, the Ministry of Foreign Affairs hosts the Brazilian Cooperation Agency (ABC). Its small team supports initial contacts between Brazil and other countries and assists in the coordination of specific international projects, but its limited budget does not allow continued support for international collaboration.

[110] 2008 data from: http://mma.gov.br/sitio/index.php?ido=conteudo.monta&idEstrutura=76

Environmental agencies are notoriously understaffed in most South American countries resulting in overloaded technical teams, which have no time to dedicate to international collaboration. There is also very limited funding to support this type of work. The greatest limitation for stronger South-South collaboration is three-fold: the lack of a regional environmental agenda; the lack of agencies to intermediate collaborative work; and the lack of financial mechanisms to support cooperation actions, including increased and continuous installed capacity.

In the broader international arena, Brazil is involved in the Group of Likeminded Mega-diverse Countries (17 countries), with the mandate to work on common biodiversity issues and which follows several international processes and agreements (including the CBD) and is currently focusing discussion in ABS issues. Two other international agreements in which Brazil participates include, to some extent, an environmental agenda: the Agreement of the Lusophone Countries, which has a primarily cultural agenda; and the Memorandum of Understanding among the Members of the Dialogue Forum India-Brazil-South Africa, with a strategic collaboration agenda.

2.6. Effectiveness of the NBSAP

Brazil has some systems to monitor processes (e.g., executed contracts) and actions (e.g., number and size of protected areas created in a given period of time), but has not yet developed an instrument to monitor policy implementation. Therefore, Brazil's actions to implement biodiversity policies were evaluated to assess the effectiveness of NBSAP.

To support this analysis, the Ministry of the Environment supported an inventory of peer-reviewed scientific research and published papers on the implementation of the National Biodiversity Policy and its various components. Over 400 documents on this theme were identified, only 190 (46.5%) of which provided some measure of effectiveness analysis.

Effectiveness of the National Protected Areas System – SNUC

Until August 2010, Brazil had[111] 1,963 protected areas within its territory (see section 1.4.1), covering a total area of 1,539,416 km^2. Before the SNUC Law (2000) and the identification of the priority areas for biodiversity conservation and sustainable use (first published in 2004 and revised in 2007) protected areas were created opportunistically to protect specific biodiversity elements or ecosystems, or areas of scenic beauty. SNUC established the national categories of protected areas and other important policy elements to structure and regulate the national system, including the requirement of public consultations during the process to create new protected areas in most categories. Complementing this fundamental policy tool, the identification of priority areas provided crucial guidance for the strategic creation of areas to protect biodiversity, seeking to solve the unbalance of ecosystem representation within protected areas. These two instruments greatly contributed

[111] According to the official data in the National Cadastre of Protected Areas (CNUC), 743 federal, state and municipal protected areas totaling 1,293,722 km^2 already had their data validated and were listed in CNUC. The estimate presented in the text includes the state protected areas and Private Reserves of the Natural Heritage (RPPNs) that are still in the process of being included in CNUC.

to a significant increase in the effectiveness of protected areas as a mechanism to protect biodiversity.

The recent creation, in 2007, of the Chico Mendes Institute for Biodiversity Conservation (ICMBio), which can be considered a result of the National Biodiversity Policy, was also intended to increase SNUC effectiveness and, as a federal agency exclusively focused on biodiversity, represented an important step for biodiversity conservation in Brazil. ICMBio is responsible for all actions related to federal protected areas (creation, land tenure regularization, management, monitoring, protection and enforcement, among other actions), in addition to biodiversity conservation actions and environmental education programs, among other biodiversity related actions. As a new agency, ICMBio completed the definition of its internal structure and processes in 2009 and the true impact of its creation can not yet be fully assessed.

Studies[112] demonstrate that the establishment of protected areas is an effective instrument to contain the uncontrolled land occupation and the predatory use of natural resources, and is considered as the most viable alternative for *in situ* biodiversity conservation. There are still, however, some aspects that hinder the effectiveness of protected areas, such as insufficient institutional, technical, financial, and operational capacity of ICMBio; unclear land tenure status of areas identified for protected area creation; unbalanced ecosystem representation in protected areas due to historical reasons of the conservation process; and persisting conflicts between communities within protected areas and communities located in buffer zones when the relationship of these communities with their surrounding environment was not taken into account in the creation of specific protected areas.

Social participation in SNUC effectiveness occurs at different levels. SNUC determines that public consultations must be held during the process to create most protected areas under consideration, and sustainable use protected areas under the Extractive Reserve (RESEX) and Sustainable Development Reserve (RDS) categories are only created as a response to the request of the interested community. Additionally, all protected areas under public management should have a participatory management or advisory committee, which should include representatives of local communities. Local communities are requested to actively participate in the development of management plans for sustainable use protected areas and should be at least consulted during the preparation of management plans for integral protection areas. Nevertheless, there is much room for increasing and enhancing social participation in the participatory management of protected areas. Lima (2008)

[112] Barbosa, A.G., 2008. As Estratégias de Conservação da Biodiversidade na Chapada dos Veadeiros: Conflitos e Oportunidades [*The biodiversity conservation strategies at the Chapada dos Veadeiros: conflicts and opportunities*]. Universidade de Brasília, 128 pp. (Masters Thesis, Post-graduate program of the Sustainable Development Center of the Universidade de Brasília).
Lima, A., 2008. Aplicação de Geoprocessamento da Análise da Representatividade do Sistema de Unidades de Conservação no Estado do Mato Grosso [*Geoprocessing application of the representativity analysis of the Mato Grosso protected areas system*]. Instituto Nacional de Pesquisas Espaciais, 154 pp. (Masters Thesis, Post-graduate course on Remote Sensing, INPE, São José dos Campos)
Behling, G.M., 2007. Refletindo o Processo de Criação da APA da Lagoa Verde Pelo Olhar da Educação Ambiental. [*Analysis of the process to create the Lagoa Verde environmental protection area with an environmental education focus*] Fundação Universidade Federal do Rio Grande, 129 pp. (Masters Thesis, Post-graduate program on Environmental Education, Universidade Federal do Rio Grande).

suggests some general principles to improve this participatory management: (i) establish shared responsibilities seeking better protection for the protected area; (ii) establish a good relationship with the surrounding communities; (iii) motivate community participation; (iv) understand and respect local culture; (v) improve the quality and efficiency of protected area management; and (vi) ensure access to information.

Various studies demonstrate the importance of Conservation Units (protected areas under SNUC), particularly in the Amazon, for regional development. A successful experience is the management of pirarucu (*Arapaima gigas*) at the Mamirauá Sustainable Development Reserve. With the application of sustainable management practices to replace predatory fishing, the income obtained by fishermen at a portion of the reserve with the capture of pirarucu increased from R$ 10,800 (approximately US$ 6,350) in 1999 to R$ 162,500 (approximately US$ 95,600) in 2005. This improved income was accompanied by a more than four times increase in the fish stock. Another successful example is the organization of family production at the Chico Mendes Extractive Reserve, which made viable the obtention of environmental certification, allowing the insertion of extractive products in the European market, particularly the Brazil nut. This increased the income of extractive workers by 30%.[113]

The effectiveness of federal protected area management was evaluated by IBAMA, in collaboration with WWF-Brazil, in a first comprehensive effort in 2006, through the Rapid Assessment and Prioritization of Protected Area Management method (RAPPAM)[114]. The study included 84.48% of the existing federal protected areas in 2006 and its results represented an important step towards the improvement of protected area management, providing a baseline scenario to which periodic assessments can be compared. Results indicated that 13% of the 246 assessed protected areas presented high management effectiveness, 36% presented average effectiveness, and 51% presented low effectiveness, with little variation among protection categories. RAPPAM Brazil assessed numerous aspects grouped under seven indicators: biological importance, socio-economic importance, planning, resources, processes, and results. Easy access to the areas due to insufficient protection, monitoring and enforcement facilitates the occurrence of illegal activities and represented one of the main causes of protected area vulnerability, particularly for sustainable use areas. The most critical and frequent threats identified were illegal hunting, the presence of alien invasive species, external influences, and the negative impacts of the presence of human population.

Additionally, RAPPAM Brazil identified that impacts related to irregular fishing activities are a major concern of managers of ecological stations, biological reserves, extractive reserves and sustainable development reserves. Urban sprawl is the main source of concern for managers of environmental protection areas, areas of relevant ecological interest,

[113] Gurgel, H.C. *et al*., 2009. Unidades de conservação e o falso dilema entre conservação e desenvolvimento. [*Protected areas and the false dilemma between conservation and development.*] Boletim Regional Urbano e Ambiental, IPEA: Brasília, dezembro de 2009.

[114] RAPPAM Brasil, 2007: IBAMA e WWF-Brasil, 2007. Efetividade de Gestão das Unidades de Conservação Federais do Brasil [*Management Effectiveness of Federal Protected Areas in Brazil*]. http://assets.wwfbr.panda.org/downloads/efetividade_de_gestao_das_unidades_de_conservacao_federais_do_brasil.pdf

extractive reserves and sustainable development reserves; while the land use change is the main concern for managers of national parks, wildlife reserves, environmental protection areas and areas of relevant ecological interest. Managers identified as an extremely critical impact, common to all analyzed parameters at the highest intensity, the illegal timber extraction in national forests, and infrastructure works and inadequate waste disposal in environmental protection areas and areas of relevant ecological interest.

Regarding management itself, aspects related to the specific objectives of protected areas included in their planning represent a positive contribution to the effectiveness of areas under all evaluated categories. Human and financial resources, as well as issues related to the development of research, evaluation and monitoring severely affect the entire protected areas system; while management planning, infrastructure and results are seriously deficient in four of the five assessed groups of categories (with a total of 9 categories). As all groups of parameters receiving low assessment values were common to at least four groups of protected area categories, RAPPAM Brazil 2006 concluded that the problems related to the management of federal protected areas are systemic. This assessment will be repeated in 2010.

RAPPAM Brazil also evaluated SNUC's system design, the policies related to protected areas and the existing political context. Under system design, RAPPAM Brazil assessed the effectiveness of the system's management, verifying if the protection objectives and the objectives of species, ecosystems and local culture conservation are being met. The design effectiveness was found to be average (47%) with a positive note to the pertinence of the system's management categories of protected areas, whose purposes address the principles of biodiversity conservation and sustainable use of natural resources. One of the least positive aspects of system design is the inadequate protection of vulnerable species, including poor connectivity among protected areas, as species conservation may require the maintenance of migratory patterns and breeding and feeding areas among existing fragments. Ecosystem integrity also received a low effectiveness classification, indicating the need to include a greater variety of natural processes and landscape patterns in the national protected areas system.

The RAPPAM report also pointed out that there was little commitment to the protection of a viable network of protected areas, and research on biological diversity was insufficient, as was the gap analysis to identify inadequately protected species. Additionally, this assessment identified the need to invest in capacity building programs, in the improvement of the monitoring of protected areas management and of the strategies for maintaining the sustainability of natural resources and for the development of traditional communities, as well as in a better organizational structure for SNUC management. To mitigate these systemic challenges, RAPPAM Brazil recommended stronger inter-sectoral coordination and strategic planning to achieve effective biodiversity conservation through a national protected areas system. To address these deficiencies, since 2006 the Ministry of the Environment developed the National Protected Areas Plan (PNAP) and began implementation of some initiatives for integrated territorial management, such as ecological corridors and networks of protected areas (see chapter 1). The creation of ICMBio seeks to improve SNUC management and enhance the research effort and protection of endangered

species, as well as the improvement of sustainable use practices in and around protected areas.

In 2007, the Ministry of the Environment published a first analysis of the financial gap of the National Protected Areas System, which was revised in 2009[115]. This assessment addressed SNUC institutional and legal aspects, as well as the costs of protected areas, necessary investments, and current and potential financial sources. The study pointed out that the large number of protected areas already created reflects a considerable effort toward biodiversity conservation; however, there are still three major challenges to be faced:

1. The total area protected in each biome is still insufficient for the conservation of its biodiversity according to the minimum criterion of 10% of each biome under integral protection. Although the number and extension of protected areas has increased since the time of this study (2009), the 10% target was not yet achieved for all biomes and there is still strong discrepancy among biomes: for example, while the Amazon biome has 27.10% of its area under protection, the Pampas biome and the Coastal and Marine biome have not yet reached 4% under official protection (considering the official data in the National Cadastre of Protected Areas and the Private Reserves of the Natural Heritage and remaining state protected areas still not in the Cadastre; see section 1.4.1).

2. Many of the existing protected areas were not yet implemented with the necessary structure. Since 2009, continuing governmental efforts are being applied to improve this situation, particularly in the Amazon through the ARPA project, in the Cerrado through the Cerrado GEF project, and in the Caatinga through Caatinga GEF project (see chapter 1). Nevertheless, given the large number, extension and geographical distribution of Brazilian protected areas, the effort still required to implement the entire National Protected Areas System is considerable.

3. SNUC effectiveness requires among other actions, the enhancement of instruments such as the completion and dynamic use of the National Cadastre of Protected Areas (CNUC), and the development of financial governance for the system. The National Protected Areas Plan (PNAP) determines the preparation of a financial sustainability plan for terrestrial protected areas by 2010 and for marine protected areas by 2012.

The government is applying notable efforts for expanding SNUC. However, the federal government still grants one of the smallest budgets among all ministries to the Ministry of the Environment (MMA), corresponding to only 0.12% of the federal budget in 2008. Comparing MMA's 2008 budget with the average of the seven previous years (Table II-5) its executed budget invested in SNUC increased 6.83%, while the total geographical area covered by federal protected areas increased 78.46% in the same period.

[115] MMA, 2009. Pilares para a Sustentabilidade Financeira do Sistema Nacional de Unidades de Conservação. [*Pilars for the Financial Sustainability of the National Protected Areas System*] 2ª Edição atualizada e ampliada. Ministério do Meio Ambiente / Secretaria de Biodiversidade e Florestas / Departamento de Áreas Protegidas. Brasília. Série Áreas Protegidas do Brasil, nº 7, 72pp.

Table II-5: Evolution of the portion of the federal budget invested in environmental management

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008
US$ billion*	0.79	0.90	0.85	0.71	0.82	0.80	0.88	0.95	0.90

*Approximate values calculated with a US$1 = R$1.7 exchange rate. Values were corrected for inflation rates.
Source: Integrated Financial Management System of the Federal Government (SIAFI).

The federal protected areas have five basic sources of financial resources: (i) effective revenue (federal budget; federal multi-year plan; earmarked ICMBio budget; earmarked IBAMA budget; earmarked MMA budget; earmarked SFB budget); (ii) environmental compensation; (iii) international financial resources through cooperation projects; (iv) gate fees; and (v) other sources (service concessions within protected areas – restaurants, trails, etc.; direct donations; environmental fines; among others). The 2009 financial sustainability study also listed some potential sources, such as: (a) payment for environmental services (currently represented by a few incipient initiatives); (b) Amazon Protected Areas Fund (FAP), which is still being capitalized; (c) forest concessions (still at its early stages); (d) extractive activities; (e) bioprospection; (f) management partnerships; and (g) indirect financial mechanisms such as the green VAT (*ICMS ecológico*) and the Fund for the Defense of Collective Rights.

The key issues identified by the 2009 SNUC financial sustainability assessment were:

1. Lack of data on federal, state and municipal protected areas: basic information is mostly unavailable and other information, although available, is not organized. Overcoming this deficiency is fundamental for effective SNUC planning, management and financial sustainability.

2. Deficit of field staff: current total field staff at federal protected areas corresponds to mere 1% of the minimum necessary personnel. For an effective and lasting protected area management for the federal areas created up until 2009 it would be necessary to hire at least 6,500 people for field assistant positions.

3. Consolidation of environmental funds: an increase was verified in the implementation of environmental funds. However, in general, the various potential income sources to finance SNUC are poorly explored or managed, as is the case of the environmental compensation.

4. Potential and expectations related to tourism in protected areas: tourism activities have the potential to generate important financial income to protected areas, but requires infrastructure and staff to provide quality services to visitors while generating minimum environmental impact. The study recommends that investment priority should be given to those national parks with current significant visitors flow.

5. Payment for environmental services provided by protected areas: this is a significant gap in terms of income generation for SNUC support. This potential source lacks direct regulation mechanisms and market instruments.

6. Review of the administrative and financial management models of the federal protected areas system: along the previous four decades, the protected areas management system was submitted to various administration and institutional changes. These frequent modifications of administrative procedures and staff rotation seriously affect management continuity at the protected area level, but can represent a necessary adaptation phase, which should be consolidated in the coming years.

Effectiveness of biodiversity conservation in protected areas: the study on the effectiveness of protected areas (RAPPAM Brazil 2007) evidenced the lack of actions to monitor biodiversity inside these areas. This is mostly due to the lack of staff available to perform these tasks. The lack of systematic and periodic data on fauna and flora within protected areas prevents an adequate assessment of the effectiveness of Brazilian protected areas as instruments for biodiversity conservation. Studies on this effectiveness are also rare. Nevertheless, regardless of imperfect protection and enforcement and other previously mentioned SNUC challenges, it is unquestionable that the creation of protected areas provides some measure of protection to natural habitats and therefore to biodiversity.

ICMBio is currently (2010) preparing guidelines on biodiversity data collection and monitoring, which will be distributed to protected area managers for implementation. A study by Mesquita[116] assessed the effectiveness of conservation management at four Private Reserves of the Natural Heritage (RPPN) in the Atlantic Forest biome: Estação Vera Cruz (60.69 km^2 in Bahia state); Fazenda Bom Retiro (5.54 km^2 in Rio de Janeiro state); Reserva Natural Salto Morato (17.16 km^2 in Paraná state); and Ecoparque de Una (3.83 km^2 in Bahia state). A fifth reserve, Reserva Natural Serra das Almas (61.46 km^2 in Ceará state, Caatinga biome) All reserves, even those with more than 10 km^2, are affected by the fragmentation of surrounding areas, where at least 50% of their limits suffer border effects from agriculture, livestock and deforestation. These reserves play a fundamental role in the preservation of some species such as lion tamarins, some bird species and other small and medium-size animals, but are not large enough to significantly contribute to the conservation of long ranging species such as jaguars. Not all private reserves have enough availability of financial resources and staff to carry out biodiversity monitoring activities. Nevertheless, the Salto Morato and Serra das Almas reserves, for example, both owned and managed by environmental NGOs, strive to become models for ecosystem and biodiversity conservation and, through partnerships and grants, provide incentives for the development of biodiversity research and monitoring within their limits, demonstrating the effectiveness of conservation measures and providing guidance to management enhancement.

Effectiveness of species conservation

The Action Plans for species conservation developed and implemented under ICMBio's coordination (see section 1.4.6) function as pacts among various institutional actors based on the identified threats to a species or group of species, to establish commitments,

[116] Mesquita, C.A.B. 2002. Efetividade de Manejo de Áreas Protegidas: quatro estudos de caso em reservas particulares do patrimônio natural [*Effectiveness of Protected Area Management: four case studies on private reserves of the natural heritage*]. http://www.unifap.br/ppgbio/ppgbio2007/Mesquita.pdf Accessed in July 2009.

responsibilities, deadlines and indicators for enhanced species conservation for a 5 to 10-year period. With the previous species conservation strategy, each plan focused on a single species and few species were contemplated. This resulted in high costs directed at only a few of the threatened species. Nevertheless, important results were obtained, such as with the Golden Lion Tamarin Action Plan, which led to a remarkable increase of the wild and captive population, rescuing the species from a near-extinction status to a reasonably stable situation: the conservation strategy for this species now focuses on reforestation and reconstitution of habitat connectivity.

To improve effectiveness of the species conservation strategy, starting in 2009 ICMBio redesigned the Action Plans strategy to increase effectiveness, adopting an approach based on vegetation type, watershed, geographical aspects or threat. With the new design, each plan focuses a group of biologically similar species and may include a specific ecosystem as a focus area (e.g., island reptile species).

Currently, only 29 (5%) of the 627 threatened animal species (419 vertebrate species and 208 invertebrate species) are addressed by conservation Action Plans. By the end of 2010, 19 new Action Plans should be completed based on the new approach, increasing the proportion of threatened species addressed by Action Plans to 25%. ICMBio's target is to include all threatened vertebrate species in conservation Action Plans by 2014. ICMBio currently supports the implementation of Action Plans involving 17 species through 22 projects executed by its research centers. New resources are expected in 2011 to increase this support.

ICMBio is discussing the ways and means to overcome the main difficulties to implement these plans, which are:

1. Obtaining the active involvement of those actors who interfere, either positively or negatively, in the conservation of the target species.

2. Lack of information organization: there is a lack of detailed studies focusing on the analysis of threat factors affecting species conservation. Such studies are necessary to allow the development of realistic, viable and operational action plans. The collection and organization of this information is a responsibility of official federal and state agencies.

3. Lack of a monitoring instrument to follow the implementation of actions proposed by the Action Plans for species conservation.

To resolve these difficulties, ICMBio is planning capacity building actions directed at actors involved in Action Plan development and implementation, as means to enhance actor involvement and action monitoring. ICMBio is also preparing a methodology guide for the development, implementation and assessment of action plans, highlighting the need for obtaining the agreement and collaboration of the various actors on the conservation process; defining clear and realistic targets; and clearly defining deadlines, costs and indicators for target achievement. To address the lack of organized information, ICMBio defined the methodology to incorporate to the next revision cycle of the official list of threatened

species an assessment of the conservation status and the detailed description of threats affecting each species.

Water resources management

Brazil has a significant legal framework for water resources management (see section 1.2.1), which is complemented by a shared management design for water use management, through participatory watershed management committees. There are currently 159 watershed committees in Brazil, in addition to 8 interstate committees, acting with various degrees of effectiveness. Watershed committees play an important role in the implementation of mechanisms such as payments for water use, implemented in two regional watersheds (Paraíba do Sul; and Piracicaba, Capivari and Jundiaí), where the totality of collected fees revert to projects approved by both watershed committees. These committees are also instrumental to the implementation of the Water Producer Program [*Programa Produtor de Água*] in rural areas holding headwaters or ground water recharge areas, where the payment for water environmental services is applied.

Nevertheless, further improvements such as better coordination among policy implementation mechanisms and agencies would contribute to improve effectiveness of water resource management and provide a stronger conservation-oriented focus. Pizella (2006)[117] assessed the sustainability of Brazilian environmental and water policies and suggested some actions to improve their effectiveness, such as:

- Revise the quality standards for substances for which current acceptable values are not compatible with domestic use or a healthy environment for aquatic biodiversity;
- Establish progressive benchmarks for environmental improvement of aquatic ecosystems in instruments such as Water Resources Plans and classification systems;
- Create means to provide technical support to water management agencies on planning actions for water quality improvement (including biodiversity conservation actions) and monitoring of water quality;
- Provide stronger legal, technical and financial support to watershed committees;
- Support the creation of watershed agencies for local water management;
- Coordinate all instruments of the Water Resources Policy to improve efficiency of water management;
- Create a database containing environmental information on aquatic ecosystems: hydromorphology, soils, relief, biodiversity, and ecorregional physical and chemical characteristics;
- Adopt an ecosystem approach to the classification of surface water bodies instead of considering solely the liquid environment. Add physical, chemical and biological criteria to the classification system;

[117] Pizzela, D.G. 2006. Análise da Sustentabilidade Ambiental do Sistema de Classificação das Águas Doces Superficiais [*Environmental sustainability analysis of the surface freshwaters classification system*]. Universidade de São Paulo, 2006. 172 p. (Masters thesis, Masters course on Environmental Engineering Sciences, Universidade de São Paulo - São Carlos).

- Adopt the concept of reference sites for monitoring environmental quality, rather than classifying water quality exclusively in relation to its intended use, allowing an actual assessment of the ecosystem.

Biodiversity information systematization and dissemination

Brazil has created and is enhancing several systems and databases with biodiversity information, mostly managed by agencies connected to the Ministry of the Environment (MMA). In October 2009, MMA promoted a workshop with its affiliated environmental agencies and the Ministry of Science and Technology, to compile a diagnosis of the existing biodiversity databases and information systems, initiating a discussion on possible means to integrate all existing systems. Workshop participants discussed various aspects related to the management of biodiversity information, such as the means for institutions to share biodiversity information; the policy regulating the provision of information by institutions; lack of regular data updating for existing systems and databases; financial sustainability; compilation of historical data; standardization of future data collection and input; among other aspects.

Currently, the existing databases and information systems are mostly directed to specific actions such as environmental licensing, or specific projects or departments within the managing institutions, with varying degrees of accessibility to the public. Examples are the Biota/FAPESP Environmental Information System (SinBiota – www.sinbiota.cria.org.br) managed by FAPESP; and the Biodiversity Authorization and Information System (SISBIO – http://www.icmbio.gov.br/sisbio/) managed by ICMBio, among various other systems.

The MMA is leading the process to develop a central virtual facilitating mechanism to make possible the integration of all existing biodiversity databases and information systems (see section 2.5.6). This integration will greatly improve access to biodiversity information in the country and should provide the means to increase the quantity and quality of available data.

Biodiversity for development

Brazilian biodiversity has been used for large-scale business ventures since the time of its colonization by Portugal, beginning perhaps with the intensive cut and export of pau-brasil (*Caesalpinia echinata*) for the commercialization of timber and pigment, driving the species to endangered status. The forestry sector (timber, cellulose, rubber) has arguably been the main focus of large-scale biodiversity-based operations for the longest period of time and, until recently, a mostly unsustainable activity from the environmental point of view. Since the time of the first publication of the Forest Code (1934), Brazilian environmental legislation has evolved significantly and, although illegal activities are still significant despite greater monitoring and control efforts, most legal large-scale forestry activities are working to comply with stricter conservation rules. In 2008, the national primary forest production reached R$12.75 billions (approximately or US$7.5 billions). Of this total, 69.3% (approximately US$5.2 billions) originated from silviculture (planted

forests) and 30.7% (approximately US$2.3 billions) from extractive activities (26.0% from timber extraction 4.7% from non-timber products)[118].

In addition to rubber, many other non-timber forest products for food, arts, furniture and other uses (such as straws, reeds, leaves, fibers, seeds, resins, essential oils) are exploited for economic purposes but production scales varies significantly and species and/or environmental sustainability is not yet ensured for all products. Such products are mostly produced by traditional and rural communities, often comprising an important (if not the only) source of income and life quality improvement. The productive chains currently being developed in the Manaus and Belém (Amazon Region) Industrial District, for example, connect and coordinate extractive activities in forest communities with urban economic sectors, small and medium-size processing industries, local research and technological support institutions, and other sectors addressed by these activities[119].

The vast plant biodiversity in the Brazilian territory has also been used for the development of pharmaceutical and cosmetic products since colonial times, and millennia before that by indigenous peoples. These uses, however, remained at a smaller scale until the mid-20th century, when larger-scale companies took greater notice of the potential value of this biological heritage and large-scale Brazilian biodiversity-based companies arose in these sectors. The Natura cosmetic company is the largest biodiversity-based company in the sector (18.9% of the cosmetic sector), with the 2008 net revenue reaching approximately US$ 2.1 billions and strong environmental commitment and sustainability principles and targets (http://scf.natura.net/Conteudo/Default.aspx?MenuStructure=5&MenuItem=12). Another example is Ybios (www.ybios.com.br), a Brazilian company resulting from a joint venture among Natura Inovação e Tecnologia, Centroflora, and Orsa Florestal, and focused on the development of new biodiversity-based technologies, product prototypes, and innovative concepts, with actions directed at the cosmetic, human and animal health, and food sectors. In the Amazon state and Region, the plant extracts production sectors have leveraged the expansion of the cosmetics and phytotherapics production chain, currently leading the 4th place in the exports table of the Manaus Industrial District, with revenue over US$ 106 millions[120].

Technological development for the biodiversity-based industry has seen increasing efforts being applied in the past several years to support biodiversity-based development and biotechnology ventures with technological innovations. The Amazon Region production chains, for example, receive significant technical support from the National Amazon Region Research Institute (INPA), CBA, EMBRAPA, Emílio Goeldi Museum (MPEG), and Federal University of Pará (UFPA). The Brazilian biotechnology market,

[118] http://www.ibge.gov.br/home/estatistica/economia/pevs/2008/comentario.pdf

[119] Miguel, L.M. 2007. Uso sustentável da biodiversidade na Amazônia brasileira: experiências atuais e perspectivas das bioindústrias de cosméticos e fitoterápicos [*Sustainable use of biodiversity in the Brazilian Amazon: current experiences and prospects of the cosmetic and phytotherapic bioindustries*]. Masters thesis, Post-graduate Human Geography Program, Geography Dept. of the São Paulo University. 171 pp.

[120] Miguel, L.M. 2007. Uso sustentável da biodiversidade na Amazônia brasileira: experiências atuais e perspectivas das bioindústrias de cosméticos e fitoterápicos [*Sustainable use of biodiversity in the Brazilian Amazon: current experiences and prospects of the cosmetic and phytotherapic bioindustries*]. Masters thesis, Post-graduate Human Geography Program, Geography Dept. of the São Paulo University. 171 pp.

encompassing the various economic sectors and all categories of biodiversity-based industrial products, corresponds to approximately 2.8% of the national GDP and counts with the participation of approximately 120 biotechnology-based companies[121].

Plant foods based on Brazilian biodiversity (fruits, greens, legumes, grains, roots, nuts) are still underexploited by the agricultural sector. With a few exceptions, most products have mainly regional markets or are produced for export, and companies such as EMBRAPA recently began to test and explore possible products based on Brazilian biodiversity (see section 1.2.3). The fisheries sector, however (see section 1.2.1), as in the case of the forestry sector, only recently has began to develop and implement mechanisms to recover and maintain the much damaged sustainability of resources exploited by sector activities.

The Brazilian government and companies are also strongly investing in biofuels (ethanol and biodiesel) and technology for adapted engines. These fuels and new technology should reduce CO_2 emissions from vehicles, but continuing efforts are necessary to reduce the use of fire in sugar cane plantations for ethanol production to enhance contribution to the reduction of greenhouse gases emissions. Biodiesel production is also based on non-native biodiversity (palm oil, soybeans and colza). An analysis of the impact of biofuels production on biodiversity did not differ significantly from impacts caused by the expansion of agriculture directed at food production: possible negative impacts include loss of habitat, increase of alien invasive species and increase in the use of agricultural chemicals; while a positive impact would be the reduction of CO_2 emissions, hindering the negative effects of climate change on biodiversity.

Implementation of environmental legislation

Brazil has developed and put in place a strong policy framework for the environment and biodiversity conservation, and is working to constantly enhance and add to these instruments according to emerging needs and increased knowledge. However, the country's infrastructure and installed capacity to execute legislation and enforce compliance require significant political will and financial investments to keep pace with the policy advancements (see section 2.5.7).

Considering the political and economic scenario that influenced Brazilian environmental policy, there are four primary challenges for its implementation[122]: the first is to deal with the heterogeneity of actors involved in the national environmental policy (governmental agencies, social organizations, the production sector, the scientific community, labor unions, and international agencies). The second main challenge is defining the ways and means to incorporate this diversity of actors in the processes of policy development and implementation; and the third is to ensure the incorporation of the environmental policy in

[121] Costa, V.M. (org.) 2007. Tendências recentes na Amazônia: os sistemas produtivos emergentes [*Recent trends in the Amazon: the emerging production systems*]. *In*: Dimensões humanas do experimento de grande escala da biosfera – atmosfera da Amazônia. Coleção Ciência Ambiental, São Paulo: EDUSP 2007.

[122] Silverwood-Cope, K.O., 2005. Evolução recente da política ambiental no Brasil: uma análise a partir do Plano Plurianual 2000/2003 [*Recent evolution of environmental policy in Brazil: an analysis base don the 2000-2003 Multi-year Plan*]. Masters thesis to the post-graduate program on Political Sciences, Universidade de Brasília, 93 pp.

all sectoral policies. Finally, the fourth challenge is to maintain coherence at the various levels of environmental policy development and implementation: local, state, regional, national, continental, and global.

2.7. Progress in respect of COP 8 matters

2.7.1. Indigenous and local communities (Article 8(j) – Decision VIII/5)

Documentation and protection of traditional knowledge and practices

The Provisional Measure 2.186-16/01 established, among other aspects, the rights of indigenous and traditional communities to protect traditional knowledge, and created the Management Council for Genetic Resources (CGEN) under the Ministry of the Environment. This Provisional Measure also determined that CGEN should establish the criteria for the creation of databases for recording information related to traditional knowledge associated to biodiversity (genetic resources). Given the delays[123] in the process of transforming the Provisional Measure in Law, since 2003 CGEN has been publishing Resolutions to regulate the Provisional Measure in regards to previous consent, contracts for the use of genetic resources, and benefit sharing, but has not yet defined criteria for the documentation of traditional knowledge. To address this latter theme, CGEN initiated in 2004 a consultation process with indigenous and traditional communities to discuss the various aspects related to the documentation of traditional knowledge.

In November 2006 the CGEN conducted a broader workshop with indigenous and traditional communities to assess their willingness to have their traditional knowledge and practices documented and to discuss ways of recording this information. The event was organized by an Organization Committee[124] composed by five traditional communities' organizations and five governmental agencies, and gathered approximately 40 representatives of indigenous, quilombola and various other traditional communities.

The idea of recording this information was not immediately accepted, but representatives committed themselves to take the proposal back to their communities to discuss the issue. An important aspect raised during the 2006 workshop is that knowledge and practices are dynamic, and the idea of a static record is not understood or accepted. Additionally, the Provisional Measure addresses traditional knowledge associated to genetic resources (biodiversity) rather than traditional knowledge as a whole, segmenting a body of knowledge that is not understood by these communities as something that can be subdivided. Another important challenge is to devise means to adequately ensure the currently recognized rights of indigenous peoples and traditional communities in those cases involving the use of associated traditional knowledge already published (in books,

[123] In 2003, CGEN prepared and presented a Bill based on Provisional Measure 2.186-16/01, which is since then being analyzed by the President's Office. The Bill still needs to be evaluated by the National Congress.
[124] NGOs: Articulação Pacari; Instituto Indígena Brasileiro para Propriedade Intelectual (INBRAPI); Cooperativa Ecológica das Mulheres Extrativistas do Marajó (CEMEM); and Associação Cultural de Preservação do Patrimônio Bantu (ACBANTU). Government: DPG/MMA; MinC/IPHAN; Fundação Palmares; FUNAI; and Ministry of Health.

catalogues, research articles, etc.) or broadly disseminated. If on one hand the publication of traditional knowledge may contribute to avoid the private appropriation of this information, on the other hand it raises the issue of how to control who accesses this information and for what purposes.

Results of the workshop recommended that traditional communities and indigenous peoples should receive qualifying training to improve their capacity to participate in the discussions/consultations on documentation of associated traditional knowledge and the Provisional Measure as a whole; and that further discussions on documentation are necessary, including broader participation of traditional and indigenous communities and regional discussions. For the time being, to protect traditional knowledge CGEN opted to negotiate access to genetic resources and associated traditional knowledge on a case-by-case basis, following the criteria and rules established by its Resolutions on the implementation of Provisional Measure 2.186-16/01.

Nevertheless, various initiatives were undertaken (either before or after discussion on this theme was initiated) by the government, NGOs, indigenous and traditional communities, and research institutions to document associated traditional knowledge. Examples are: the Cerrado Popular Pharmacopoeia[125]; Traditional Knowledge and Biodiversity in Brazil[126]; Forest Encyclopedia – the Upper Juruá: traditional practices and knowledge[127]; Kusiwa Art: Wajãpi Body Painting and Graphical Art[128]; Encyclopedia of the Indigenous Peoples in Brazil[129]; The Art of Weaving of Brazilian Indigenous Peoples[130]; The Makú – hunting people of northwestern Amazon[131]; and Indigenous Peoples of the Black Waters[132]; among many other publications.

Additionally, Brazil recently began implementing the denomination of origin and geographical origin instruments to protect traditional products. The first products to receive the registration for geographical origin were coffee from the Serrado Mineiro (MG), wine from Vale do Vinhedo and beef from Campanha Gaúcha (RS), and cachaça from Parati (RJ). Other candidate products requesting this recognition are the cheese of the Canastra region (MG) and rice from the north of Rio Grande do Sul.

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[125] Articulação Pacari (org.), 2009. Farmacopéia Popular do Cerrado. 347 pp. www.pacari.org.br

[126] Diegues, A.C. and Arruda, R.S.V. (org), 2001. Saberes Tradicionais e Biodiversidade no Brasil. Brasília: MMA, Série Biodiversidade, nº 4. São Paulo: USP. http://www.usp.br/nupaub/artigos.html

[127] Cunha, M.C. and Almeida, M.B. (org.), 2002. Enciclopédia da Floresta – O Alto Juruá: Práticas e Conhecimentos das Populações. São Paulo: Companhia das Letras.

[128] IPHAN, 2000. O Registro do Patrimônio Imaterial: Dossiê final das atividades da Comissão e do Grupo de Trabalho Patrimônio Imaterial (Dossiê IPHAN 2). Brasília. http://portal.iphan.gov.br/portal/montarDetalheConteudo.do?id=12568&sigla=Institucional&retorno=detalheInstitucional

[129] http://pib.socioambiental.org/pt

[130] Ribeiro, B.G., 1985. A arte do trançado dos índios do Brasil: um estudo taxonômico. Museu Paraense Emílio Goeldi, Belém – 185 pp.

[131] Silverwood-Cope, P.L., 1990. Os Makú: povo caçador do noroeste da Amazônia. Editora Universidade de Brasília, DF – 205 pp.

[132] Ribeiro, B.G., 1995. Os índios das águas pretas. Editora da Universidade de São Paulo, SP – 270 pp.

Collaboration with the working groups on Article 8j

Brazil participated in the 6th meeting of the Open Ended Ad Hoc Working Group on Article 8j and Related Provisions (November 2009) in Montreal, Canada, and will continue to contribute to the discussions to further implementation of Article 8j.

2.7.2. Marine and coastal – deep seabed (Decision VIII/21)

Activities within Brazilian jurisdiction with possible impacts on deep seabed ecosystem and species:

Oil: Brazil conducts extensive oil prospection and extraction activities along its coast. To better guide the licensing processes for oil activities, Brazil identified its priority areas for marine and coastal conservation (see chapter 1).

Predatory fishing: Brazil implemented in 2006 the Fishing Vessel Satellite Tracking Program (PREPS) as a measure to prevent IUU (irregular, unreported and uncontrolled fishing) by vessels over 15 meters within its jurisdictional waters. The program is coordinated by the Ministry of Fisheries in collaboration with IBAMA and the Brazilian Navy. The Ministry of the Environment and the Ministry of Fisheries are also conducting joint activities of shared management and fisheries ordering to contain these actions and allow fish stocks to rise and reach sustainable levels.

Research on genetic resources of the deep seabed:

In 2008 the Ministry of Science and Technology created the BioMar Program for the research and use of marine genetic resources. In 2009 this Ministry published a call for proposals for research on the sustainable use of the marine biotechnological potential of coastal and marine ecosystems under Brazil's jurisdiction and areas of national interest, to encourage the biotechnological prospection of marine organisms. This call for proposals is still being processed and intends to identify molecules and genetic material with potential economic use within the Brazilian EEZ, including in deep seabed ecosystems.

Cooperation with international organizations:

Brazil has actively participated in the *ad hoc* discussion groups of the CBD on the ecological criteria and biogeographical classification systems for marine areas in need of protection (Açores, 2007); and the Ottawa expert workshop on scientific and technical guidance on the use of biogeographical classification systems and identification of marine areas beyond national jurisdiction in need of protection (Ottawa; 2009).

Brazil and Africa initiated South-South collaboration through the Brazil-Africa Transatlantic Commission, which presented in January 2010 the data collected during its first expedition (October-December 2009) on board the Cruzeiro do Sul research vessel, exploring the Atlantic Ocean between Brazil, South Africa and Namibia. The highest marine concentration of CO_2 originating from human activities is located in the Atlantic Ocean. This research vessel allows the study of interactions among biological, chemical

and physical processes and their relation to climate change in the South Atlantic. The first expedition, with the Brazilian team, collected data on temperature, salinity, dissolved oxygen, chlorophyll, as well as suspended nutrients and other materials. Beginning in the second semester of 2010, in addition to the Brazil-Africa Commission activities research teams will have 80 days per year on board the Cruzeiro do Sul for marine research activities. Candidate projects will be evaluated by a managing committee with representatives from the Ministry of Science and Technology and the Brazilian Navy.

2.7.3. Marine and coastal – Integrated Marine and Coastal Area Management (Decision VIII/22)

Stakeholder participation in IMCAM:

The National Water Resources Council created in 2005 a Technical Chamber for the Integrated Management of Watersheds, Estuarine Systems and Coastal Zone, with representatives of all interested sectors: community, industry, government, transport, agriculture, NGOs, among others, which provides a venue for broad community participation in IMCAM.

The National Program for Monitoring Coral Reefs (Reef Check Brazil) is a program that monitors the health of coral reefs and their ecological integrity. Coordinated by the Federal University of Pernambuco and supported by the Ministry of the Environment, this program also counts with volunteer community participation (particularly of artisanal fishermen) to monitor fish and coral species, and to assist in the control of illegal fishing in no-take areas.[133]

The Ministry of the Environment is also supporting the creation of an effective management network for marine protected areas with the collaboration of participatory protected area councils, and is collecting and disseminating successful experiences in the use of marine protected areas as an instrument for fisheries management, with the production and dissemination of books, CDs and videos.[134]

Stakeholders also participate in the Shared Management System for the Sustainable Use of Fisheries Resources (see next section). The GEF Mangrove Project (see National IMCAM Strategy below) also foresees broad community participation in project-supported pilot activities for the sustainable use of fisheries resources and environmental monitoring in mangroves, as well as in the identification and testing of sustainable production practices as alternative income sources.

Institutional structures for IMCAM

Brazil has a National Coastal Management Plan since 1988, but its regulation was only approved in 2004. The Plan is implemented through the National Coastal Management Program (GERCO), within the Ministry of the Environment. GERCO has the main

[133] Wilkinson, C., ed. Status of the Coral Reefs in the World: 2008. Brasília, MMA 2010.
[134] Brazil, MMA, 2007. Aquatic Protected Areas as Fisheries Management Tools. Biodiversity Series n^{o} 4.

objective of planning and organizing, in an integrated and participatory manner, the socioeconomic activities in the coastal zone.

Since 2001 the Ministry of the Environment also implements the Coastal Project (*Projeto ORLA*), which works on enhancing the ordering of land use in coastal areas through public-private interaction, seeking the sustainable use of natural resources and rational land use in the coastal zone. To-date, the project has already provided training courses on integrated coastal and marine management to 58 municipalities in 14 coastal states. In 2008, this project published the Macro Diagnosis of the Coastal and Marine Zone (see chapter 1).

In 2009, the government created the Ministry of Fisheries and Aquaculture and instituted the Shared Management System for the Sustainable Use of Fisheries Resources, jointly coordinated by the new Ministry and the Ministry of the Environment. This System is composed by representatives of the government and the fisheries sector (artisanal and industrial fisheries), and has the objective of assisting in the development of rules and zoning for the fisheries sector, aiming at the sustainable use of fisheries resources.

National IMCAM strategy

Brazil has not yet developed a national IMCAM strategy. However, the US$20 million GEF-supported Mangrove Project (2008-2013) has a national scale and is organized in five priority mosaics of important mangroves. The project will strengthen protected areas covering these habitats and compile or develop innovative models for the sustainable use of mangroves, in addition to monitoring deforestation and biodiversity through fauna and fauna indicators. At the conclusion of this project, Brazil will develop a national strategy for mangrove conservation.

Review of domestic IMCAM legislation

The National Policy for Marine Resources (PNRM), approved in 2005, is implemented through Sectoral Plans which are updated every four years by the Inter-ministerial Commission for Marine Resources (CIRM), composed by various ministries and other federal agencies. The current Sectoral Plan for Marine Resources (PSRM) was prepared for the 2008-2011 period and has eight specific objectives: (i) defend the Brazilian national and international political-strategic marine interests; (ii) promote the socio-economic development based on the sustainable use of marine resources; (iii) recover the culture of traditional communities and disseminate the marine culture in Brazil; (iv) ensure the good quality of the marine environment; (v) reduce the vulnerability of marine environments to and the risks of extreme climatic events and climate change; (vi) strengthen the marine business value chain, represented by the generation of knowledge, development of technologies, and innovation in products and services; (vii) enhance the strategic partnerships with agencies responsible for controlling natural disasters at the national, state and municipal levels, with the purpose of reducing vulnerability to extreme events; and (viii) increase strategic partnerships to enhance instruments that can contribute to the regional development of the coastal zone in coordination with the National Regional Development Policy.

The 2008-2011 PSRM also lists 13 strategic actions: (1) Management of the PSRM, coordinated by the Brazilian Navy – SECIRM; (2) Oceanographic and climate monitoring – MOC-GOOS/Brasil, coordinated by the Brazilian Navy – DHN; (3) Research on climate and oceanography in the Tropical and South Atlantic and Antartica, coordinated by the Ministry of Science and Technology; (4) Logistics support to the research programs in the Tropical and South Atlantic – Logmar, coordinated by the Brazilian Navy – SECIRM; (5) Scientific research in the São Pedro and São Paulo Archipelago, coordinated by the Brazilian Navy – SECIRM; (6) Scientific research at the Trindade Island – Protrindade, coordinated by the Brazilian Navy – EMA; (7) National infrastructure for marine research – Inframar, coordinated by the Brazilian Navy – SECIRM; (8) Biotechnology of marine organisms – Biomar, coordinated by the Ministry of Science and Technology; (9) Assessment of the mineral potential of the continental shelf under Brazilian jurisdiction and oceanic areas – Remplac, jointly coordinated by the Ministry of Mines and Energy and the Ministry of the Environment; (10) Aquaculture and fisheries – Aquipesca, coordinated by the Special Secretariat for Aquaculture and Fisheries – SEAP/PR; (11) Assessment of the sustainable potential and monitoring of the live marine resources – Revimar, coordinated by the Ministry of the Environment – IBAMA and ICMBio; (12) Enforcement of the fisheries activities, coordinated by the Ministry of the Environment – IBAMA; and (13) Consolidation and increase the number of Research and Post-Graduate Groups on Marine Sciences – PPG-Mar, coordinated by the Ministry of Education – MEC.

International and regional IMCAM instruments

The National Wetlands Committee (CNZU) was reactivated within the Ministry of the Environment, and proposed the creation of specific participatory technical chambers for two coastal ecosystems: mangroves and coral reefs. The creation of these technical chambers is currently undergoing a legal approval process.

In 2006, during COP 8, Brazil joined the International Coral Reef Initiative (ICRI), and is participating actively in discussions under all international and regional agreements to which the country is party.

Raising awareness

The Fishing Vessel Satellite Tracking Program (PREPS), in addition to preventing IUU, also functions to raise awareness on the importance of the sustainable use of fisheries resources. Additionally, the Ministry of the Environment has been investing in awareness raising campaigns, such as the campaign for responsible conduct in reef environments (active since 2001); the campaign for responsible conduct on beaches, initiated in 2009; and the campaign for informed consumption of seafood, which initiated in 2009 focusing on lobster species, and will continue in 2010 with a stronger focus on marine shrimp and freshwater *pirarucu*.

2.7.4. **Protected Areas** (Decision VIII/24)

Increasing the effective protection and management of marine and inland water ecosystems

Brazil has currently only 3.14% of its coastal and marine area (including the territorial sea and the Exclusive Economic Zone) in coastal and marine protected areas (0.88% in federal protected areas and 2.26% in state protected areas) and is applying efforts to achieve 10% under protection by 2012. The policy framework for the creation of these protected areas was established in 2006, and the National Biodiversity Commission published a Resolution requesting the inclusion of additional 10% of the EEZ under strict protection or as no-take zones (see section 1.4). Processes to create additional marine and coastal protected areas were initiated in 2009 and new areas are expected to be created by the end of 2012.

While the government strives to ensure stronger protection, educational and conservation campaigns targeting costal and marine ecosystems are being carried out under the Brazilian Coral Reefs Conservation Program to reduce impact (see section 1.2.2), and stronger measures are being applied to control illegal fishing (see section 2.7.3).

National protected-area financing roundtables

To inform the preparation of a National Strategy for SNUC Financial Sustainability a study on the *Pillars for the Financial Sustainability of the National Protected Areas System* was published in 2007 and updated in 2009. This document is based on the analysis of new or current financing mechanisms such as public policies, fees, options for income generation, institutional arrangements, and other tools. This work was conducted by a Working Group created in 2005 to comply with the guidance of the National Protected Areas Forum and of the National Protected Areas Plan, in force since 2006.

Socio-economic values of protected-area systems

Brazil has some relevant experiences supporting the contribution of protected areas to national development. For example, the successful experience managing the pirarucu fish (*Arapaima gigas*) in the Mamirauá Sustainable Development Reserve, in the state of Amazonas. With the adoption of sustainable management techniques to substitute predatory fishing, the annual income of fishermen using a portion of the Reserve for pirarucu fishing increased from R$10,800 in 1999 to R$162,500 in 2005 (approximately US$6,350 - US$95,600). This increase comes with a more than four times increase in the fish stock of this species[135].

The organization of the production of the families living in the Chico Mendes Extractive Reserve allowed them to obtain an environmental certification for their product. This

[135] Viana, J.P et al., 2007. Manejo comunitário do pirarucu *Arapaima gigas* na Reserva de Desenvolvimento Sustentável Mamirauá – Amazonas, Brasil. In: Prates, A.P. e Blanc, D. (org.) Áreas Aquáticas Protegidas como Instrumento de Gestão Pesqueira. *Série Áreas Protegidas do Brasil, 4*. Brasília: Ministério do Meio Ambiente. Available at: <http://www.mma.gov.br/estruturas/sbf2008_dap/_publicacao/149_publicacao26022009041759.pdf>

generated an important competitive advantage, allowing the insertion of extractive products, particularly the Brazil nut, in the European market[136]. Maciel and Rydon (2008)[137] point out that the *per capita* income of the extractive workers living in that Reserve increased by 30% after the certification of the Brazil nut.

Another interesting form of validating sustainable activities is to assess the duration of impacts caused by various types of natural resource use. Non-sustainable timber exploitation in the Amazon, for example, generates a cycle known as "boom-and-bust". This cycle usually starts with economic expansion in the short term, followed by increased municipal Human Development Index (HDI) during the first years of timber exploitation. This first stage of increase is followed by only a few years at the top of this economic activity and HDI. This apex is typically followed by economic and HDI decline when natural resources and soil fertility are exhausted. After this short-lived improvement in the economic and social situation, indicators tend to decrease back to the levels before the unsustainable timber activity began. However, at this second stage, the municipality is much poorer in natural resources[138]. The sustainable forest management allowed in many protected areas in Brazil, on the other hand, promotes the gradual increase of municipal income, remaining as a more advantageous income-generating and development-inducing activity in the long term[139].

Sustainable forest management is in many cases economically superior to the unsustainable timber exploitation. Arima and Barreto (2002[140]) point out that, of the five National Forests they assessed, four presented lower costs for sustainable timber production than the production costs in private forests. Within this context, Souza (2005)[141] argues that if the forest concession target of reaching 13 million hectares of public forests in the next 10 years is achieved, legal forest management may generate an income bordering R$ 7 billions (approximately US$ 4.1 billions), in addition to R$ 1.9 billion (approximately US$ 1.1 billion) in taxes per year and up to 140 thousand new jobs.

Despite these examples of successful cases, such initiatives are still isolated. The broader dissemination of successful sustainable practices requires higher financial investment in the effective structuring of protected areas. Currently, the Brazilian protected areas system is very heterogeneous, with some very well structured parks and reserves and on the other end

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[136] Globo Amazônia, 2008. Castanha-do-Pará garante sustento de coletores no Acre. *Notícias no Tapajós.com*, December 18, 2008. Available at: <http://notapajos.globo.com/lernoticias.asp?id=22728>.

[137] Maciel, R.C.G. and Rydon, B.P. 2008. Produção de castanha-do-Brasil certificada na Resex Chico Mendes: impactos e avaliações. In: *SOBER – XLVI Congresso Brasileiro de Economia, Administração e Sociologia Rural*. Avaliable at: <http://www.sober.org.br/palestra/9/615.pdf>.

[138] Rodrigues et al., 2009. Boom-and-Bust Development Patterns Across the Amazon Deforestation Frontier. *Science*, v.324, June 2009.

[139] Schneider et al., 2002. Sustainable Amazon: limitations and opportunities for rural development. *Partnership Series, N^{o} 1*. Brasília: The World Bank and Imazon.

[140] Arima, E. and Barreto, P. 2002. Rentabilidade da produção de madeira em terras públicas e privadas na região de cinco florestas nacionais da Amazônia. Brasília: Ministério do Meio Ambiente. Avaliable at: <http://www.imazon.org.br/downloads/index.asp?categ=2>.

[141] Souza, O.B., 2005. A polêmica do Projeto de Lei da Gestão de Florestas Públicas. *Notícias Instituto Socioambiental*, April 05, 2005. Avaliable at: <http://www.socioambiental.org/nsa/detalhe?id=1959>.

of the scale some protected areas that do not have the necessary infrastructure to function properly.

More studies are also necessary on the potential economic uses of protected areas, allowing them to function as income and job generators for local communities, in addition to conserving important ecosystems and biodiversity. To conduct this analysis, the Ministry of the Environment is developing, in partnership with the World Conservation Monitoring Center (UNEP-WCMW) a study to evaluate SNUC's contribution to the national economy. This project has the objective of developing, testing, publishing and disseminating a methodology to assess the contribution of protected areas to local and national economy. It is expected that the results of this study will serve as an instrument for debating the issue of protected area sustainability and for sensitizing other governmental sectors and the general public regarding the importance of protected areas. This study is a component of the SNUC Financial Sustainability Strategy and receives support from GFA and GTZ (Germany), and IPEA (Brazilian government), as well as financial support from the UK Department for Environment, Food and Rural Affairs (DEFRA).

Meeting the costs to effectively and sustainably implement and manage national protected-area systems

Brazil has not yet developed a formal financial plan to ensure the effective and sustainable implementation and management of the national protected areas system. Nevertheless, the cost for maintaining these areas was estimated and a diversity of potential and existing national sources was inventoried (see below and section 2.5).

According to estimates of the Ministry of the Environment, the necessary annual running costs for maintaining the entire Brazilian system of protected areas in adequate operational conditions would be around R$543 millions (approximately US$319 millions) for the federal system and R$361 millions (approximately US$212 millions) for the state systems. Additionally, a R$611 millions (approximately US$359 millions) investment is needed to put in place the necessary infrastructure in federal protected areas. The necessary infrastructure investment for the state protected areas systems is even larger, bordering R$1.2 billion (approximately US$706 millions).

The amounts available in the federal and state budgets for protected areas have been significantly below the estimated necessary amounts. In 2008, the federal protected areas received only R$316 millions from the federal budget. Additionally, the rapid expansion of the total area under protection in the country is not being followed by an increased budget. For example, from 2001 to 2008 the Ministry of the Environment's budget earmarked for federal protected areas increased by 16.35% while these areas increased geographically by 78.46%[142].

[142] MMA – Ministry of the Environment, 2009. Pilares para a Sustentabilidade Financeira do Sistema de Unidades de Conservação. Série Áreas Protegidas, 7. Brasília: MMA. Available at: http://www.mma.gov.br/estruturas/sbf2008_dap/_publicacao/149_publicacao06112009092144.pdf

Brazil established the legal requirement of environmental compensation payments to impacting economic activities and infrastructure works, while in most countries such compensation is voluntary. Paid compensations are directed to a protected area or group of protected areas connected to the impacted ecosystem. This mechanism is being implemented, but still operating in a small scale, while in the expectation of the legal resolution of pending issues.

The Ministry of the Environment[143] is studying a combination of potential funding sources to fill the existing budget gap, such as the Protected Areas Fund (FAP) and revenue from forest concessions, payments for environmental services (e.g., water services provided by protected areas), bioprospection, and extractive activities; in addition to management partnerships and indirect financial mechanisms. These potential funding sources can contribute significantly to the sustainability of the protected areas system but depend, among other factors, on the political prioritization and the development of institutional capacity.

FAP: The Protected Areas Fund is an endowment fund established to ensure the financial sustainability of protected areas in the Amazon Region in the long term. Its role is to complement the governmental budget for these areas and to provide agility and autonomy to the use of the resources, while minimizing the management costs of the protected areas. Support from this source is earmarked for recurrent costs associated to protection activities, operation of the protected areas and maintenance of management councils. In 2009, FAP balance was US$24,386,855 in a foreign account and R$3,340,509 (approximately US$ 1,965,005) in a national account. Fundraising for FAP is planned to continue until 2016 under the GEF-supported Amazon Protected Areas Project, by the end of which the total FAP balance is expected to be enough to ensure long term support to Amazon protected areas.

Forest concessions: The federal government placed high priority to the concession process for public forest management. Significant income (around R$ 187 millions annually; or approximately US$ 110 millions) is expected to be generated by this mechanism within 10 years, but the concessions have not yet been effectively implemented. It is, however, important to note that the vast majority of areas foreseen for forest concessions is located outside protected areas, in the form of unoccupied public lands. Therefore, of the total expected amount, the protected area system should receive approximately R$ 31 millions in 10 years (approximately US$ 18 millions) for concessions within National Forests (FLONAs).

Payment for environmental services: In 2000, the Protected Areas System (SNUC) Law instituted the financial contribution to protected areas paid by water distribution and energy generation companies, or by other companies using water supplied by protected areas. This is a potential source of income for protected areas, but requires regulation of the law for its future application. Additionally, the National Water Resources Policy - PNRH (1997) instituted the payment to rural land owners (including Private Reserves of the Natural Heritage - RPPN, a SNUC category of protected areas) for water production services,

[143] http://www.mma.gov.br/estruturas/sbf2008_dap/_publicacao/149_publicacao06112009092144.pdf

which is treated differently by each state: some invest accrued resources in the agriculture sectors, some in a water resources fund, others have approved legal instruments on the theme but are not yet applying them, and others have not yet developed legal instruments on this theme. Nevertheless, all resources originating from payment for water production or conservation services are invested within the same watershed. A bill ruling on payment for environmental services including and beyond water production is expected to be approved in 2010 (see section 2.5.1).

Bioprospection: The use of genetic resources is an important potential source of income for the protected areas system. To-date, however, this source has not yet generated income at a significant scale for protected areas. The first case of authorization for bioprospection occurred in the Rio Iratapuru State Rural Sustainable Development Reserve, in the state of Amapá, granted to the Natura cosmetic company in partnership with the Rio Iratapuru extractive community, in 2004. In the international arena, agreements between businesses and government for bioprospection in protected areas follow various models and their adoption is slow. In some cases, the agreement includes the payment of a fixed fee for the right to conduct research inside a protected area, where part of the fee would revert to the same protected area, to the relevant environmental agency, or to the regulatory agency for prospection, or the prospector would provide technical services or technologies to the protected area's management. Income generated by the use of biodiversity, particularly in the case of pharmaceutical and cosmetic companies, is promising, although the mechanisms for the application of this potential source still require further development.

Extractive activities: Extractive activities in sustainable use protected areas do not yet comprise a reliable financial source for the consolidation of these areas, as the economic activities are restricted and the generated income is small and integrally directed to improving the living conditions of the extractive workers. One exception to this scenario is the Mamirauá State Sustainable Development Reserve, in Tefé (Amazonas state), where part of the resources generated by the economic activities revert to the maintenance of the protected area.

Management partnerships: Partnerships between government and society for protected area management may generate additional resources. With the shared management instrument, all or part of the management activities of the protected area are assigned to a non-government association or organization with the necessary technical capacity. Brazil has some such partnerships that can be characterized as co-management. This is an alternative to overcome deficiencies faced by public agencies in the management of protected areas, such as the lack of staff and small budgets. These partnerships are usually formalized through a service provision contract, or through task delegation of total management delegation regimes. In general, such partnerships require a case-by-case solution, where the protected area administrator seeks practical and viable solutions to involve those interested in supporting the National Protected Areas System (SNUC).

Indirect financial mechanisms: Some mechanisms may contribute to SNUC consolidation, both through the generation of resources and to promote the incorporation of protected areas in the territorial planning and regularization processes, especially in states and municipalities. Examples of these sources are the Fund for the Protection of Common

Rights and the Green VAT (*ICMS ecológico*). Through the Green VAT, municipalities holding protected areas can access additional resources from the state budget. Eligibility criteria are defined by state laws and municipalities are not necessarily required to invest the resources in their protected areas. Thus, this mechanism functions as an incentive for municipalities to hold protected areas, but it cannot be considered as a source directed at protected areas financing.

Institutional strengthening and improved governance of protected-areas management authorities including those of indigenous and local communities

The SNUC Law foresees the promotion of discussion among environmental agencies and agencies dealing with indigenous affairs on the directives to be adopted for the resolution of eventual overlap between protected areas and indigenous lands. One of the initiatives to comply with this legal requirement was the creation, in 2009, of an Inter-ministerial Working Group composed by indigenous peoples' representatives, FUNAI, MMA, ICMBio, IBAMA, representatives of civil society as observers and technical assistants, and SFB and the Ministry of Defense as permanent guests. This Working Group has the primary objective of discussing the National Policy for Environmental Management in Indigenous Lands, which addresses the geographical overlap issue among other themes. This Policy, currently under elaboration, should strengthen the initiatives by indigenous peoples for the conservation and sustainable use of biodiversity and natural resources, and provide the opportunity for integrating indigenous lands with the regional dynamics.

To avoid future overlap issues between protected areas and indigenous lands, the Working Group is discussing mechanisms to increase the effective participation of indigenous peoples in public consultations for the creation of protected areas that may affect their territories. Additionally, the group is debating whether to maintain or change the category of existing protected areas that currently overlap with indigenous lands.

Effective participation and respect for the rights of indigenous and local communities

The required procedures to create protected areas under any category are defined in the SNUC Law and include public consultation (with a few exceptions[144]), respect for the rights of traditional and indigenous populations, resettlement procedures, and conflict resolution, among other guidance. Even though the law does not require holding public consultations for the creation of Biological Reserves and Ecological Stations, the Ministry of the Environment and ICMBio have been complying with this procedure in the process of creating all federal protected areas. The Brazilian government believes that public consultations constitute an important democratic mechanism for protected area governance and legitimacy.

[144] Public consultations are not required for the creation of Private Reserves of the Natural Heritage, given the private property status; and for Biological Reserves and Ecological Stations, given their high biodiversity value.

Consideration of biodiversity conservation in the national development strategies, including Poverty Reduction Strategies, with a view to maximizing the mobilization of funding for the implementation of the program of work on protected areas

In the last 20 years Brazil has invested tremendous efforts in the direct conservation of habitats, reaching by 2010 a total of 310 federal protected area and an estimated 621 state protected areas[145], 689 municipal protected areas[146], and approximately 1,440 private protected areas[147]. These areas cover a total of approximately 1,539,416 km^2, which corresponds to 17.42% of the national continental area and 3.14% of the Brazilian coastal and marine area. From 2003 to 2008, Brazil was responsible for the creation of 74% of all protected areas created around the world, corresponding to 703,864 km^2 (Jenkins and Joppa, 2009)[148]. However, the funding available for protected areas has not increased in the same proportion.

An important initiative involving protected areas was the launching, in 2008, of the Tourism in Parks Program, with the objective of promoting tourism as a means to enhance local economy and to promote the generation of income and employment for local communities located around these areas. The preparatory studies that supported the development of this Program identified 25 National Parks as priority areas. The Program is currently in different stages of implementation in six of these priority areas: some still at the preliminary planning and consolidation phase, while other areas are at an advanced stage of visitation structuring. The implementation of this Program, through a partnership among the Ministry of the Environment, ICMBio, the Ministry of Tourism, and EMBRATUR should provide incentives for tourism in protected areas, valuing the Brazilian natural and cultural heritage, assisting in the strengthening of local economies, and contributing for poverty reduction.

Brazil does not have a consolidated development policy, but rather a number of policies that direct national development. The most consolidated political instrument is the Federal Multi-Year Plan (PPA), which briefly describes all governmental programs executed by federal level agencies and their executing bodies. The PPA is prepared every four years and overlaps with the following term of the federal government. Biodiversity is included in many of these programs, but is not crosscutting through all sectors. Brazil has not yet satisfactorily included biodiversity conservation as a crosscutting theme in national development policies.

Nevertheless, Brazil is innovating in social policies for poverty reduction, with instruments such as family school grants (*Bolsa Família*) and the Zero Hunger Program (*Fome Zero*). Other programs directed at food acquisition and small producers contribute in varying degrees to the conservation of biodiversity and agrobiodiversity. For example, the Program to Support the Production and Commercialization of Extractive Products (PAE),

[145] Estimated from information on the National Registry of Protected Areas and information provided by state environmental agencies and NGOs.
[146] Munic 2008. http://www.ibge.gov.br/home/presidencia/noticias/noticia_vizualiza.php?id.noticia=1286&id_pagina=1
[147] Data obtained from the estimate provided by the MMA Department of Protected Areas in 2010.
[148] Jenkins N.C. and Joppa L. Expansion of the global terrestrial protected area system. *Biological Conservation*, v. 142, n.10, 2009. Available at: <http://dx.doi.org/10.1016/j.biocon.2009.04.016>.

coordinated by the Ministry of the Environment, seeks to value traditional knowledge and promote sustainable extractive practices through various actions including technical assistance and insertion of products from extractive activities in the market. This program included seven products from socio-biodiversity production (assai fruit, babassu, rubber, Brazil nut, carnauba, pequi, and piassava) in the Minimum Price Program, contributing to the economic sustainability of these activities and providing an incentive to local communities. The government also established an agreement with the National Supply Company (CONAB) whereby this agency gives priority to local producers in their food acquisitions for schools and hospitals, rather than national suppliers, providing an important tool for the creation of a specific market for small family producers, which in general apply production practices that are somewhat more favorable to biodiversity than those used by large producers (although CONAB still does not apply sustainability criteria for food procurement). On a different initiative, the Ministry of Planning established in 2010 (Normative Ruling 1, of 19 January 2010) the requisite of environmental sustainability criteria for the origin of goods and products acquired by public agencies, as well as for contracted works and services.

2.7.5. Impact Assessment

Taking into account biodiversity-inclusive strategic environmental assessment in the context of the implementation of paragraph 1 (b) of Article 14 of the Convention

Brazil established since 1986 the requirement of Environmental Impact Assessment and Environmental Impact Report (EIA/RIMA) for the environmental licensing of any activity that results in modifications of the natural environment, such as infrastructure works; charcoal production; urban planning projects; commercial timber extraction; landfills; energy production; oil extraction; and industrial districts, among various other impacting activities[149]. Additionally, since its first published version (2004), the Map of Priority Areas for the Conservation and Sustainable Use of Brazilian Biodiversity has been applied by all licensing agencies (National Oil Agency – ANP; energy agencies, etc.) as a criterion for environmental licensing. The environmental impact assessment processes connected to environmental licensing also use the endangered species lists, which have been published since 1968, at smaller intervals in the last few decades. A new element increasingly adopted in the last few years, although not yet systematically applied, is the use of regional strategic environmental assessments for the planning and environmental licensing of large infrastructure works, such as the assessment of watersheds for the construction of hydroelectric dams.

Application of the voluntary guidelines on biodiversity-inclusive environmental impact assessment in the context of the implementation of paragraph 1 (a) of Article 14 of the Convention

Brazil internalized these voluntary guidelines through CONABIO Resolution 1 of 2007, as a recommendation to agencies involved in environmental licensing. However, the rules for environmental licensing are decided by CONAMA, and this theme has not yet been

[149] CONAMA Resolution 001, of 23 January 1986. http://www.mma.gov.br/port/conama/legiabre.cfm?codlegi=23

addressed by this Council. The Ministry of the Environment is working with the Secretariat for Water Resources to obtain a resolution of the National Water Resources Council to include biodiversity criteria in the National Water Resources Policy, which will reflect in the concession for water use. With this proposal, MMA intends to include three criteria: mapping of aquatic ecoregions; definition of ecological flow, to determine the minimum acceptable water flow for dams and water concession cases to maintain biological processes; and ecosystem approach. It is expected that the National Water Resources Council will evaluate this proposal in 2010.

2.7.6. Plant Conservation

Brazil included plant conservation targets in the National 2010 Biodiversity Targets and designated the Rio de Janeiro Botanical Garden (JBRJ) as the national focal point for the Strategy for Plant Conservation. Within JBRJ, the GEF-supported PROBIO II Project created the National Center for Plant Conservation and this same project supported, in its first phase, some projects for the conservation of threatened plant species (see Chapter 1). To update instruments for plant conservation, the national list of threatened plant species was updated in 2008 and the updated Catalogue of Brazilian Flora was published in 2010.

Additionally, the Ministry of the Environment promoted various studies to systematize information on plants of potential economic interest, and issued several publications on native plants, such as the Brazilian Plants with Significant Carotenoid Content, the Cerrado Pharmacopoeia, and the Catalogue of Cerrado Flora, providing incentives to effectively execute the potential for sustainable use of Brazilian flora and cultivated plants.

CHAPTER 3

MAINSTREAMING OF BIODIVERSITY CONSIDERATIONS

3.1. Overview of current status

The environment and biodiversity issues have been gradually gaining a central position in the national and international arenas with the growing global debate on the sustainability of development processes. Since the 1992 Rio Conference, the discussion on the impacts of human activities on the environment and the consequent loss of biodiversity has gained global importance, establishing a new basis for negotiation and collaboration among countries, and mobilizing society. Since then, themes such as climate change, biodiversity protection and sustainable development have become permanent items in the global and Brazilian environmental agenda. The sustainability challenge for development involves multiple governmental and private sectors as well as various social segments, each with a specific framework of public policies.[150]

In Brazil, most discussions on strategic environmental issues occur during the processes for environmental licensing, and evidence the need for a broader adoption and application of strategic and integrated environmental assessments, with an ecosystem approach. Requirements from international and multilateral funding agencies, such as IBRD and IDB, also increase the demand for the use of these tools, particularly when financing infrastructure and economic development programs. Thus, the debate on strategic environmental assessment is primarily centered in sectoral programs (such as tourism, energy and transports) and in development planning, as in the federal Multi-Year Plan.

These discussions, as well as the various governmental and private sector initiatives listed below and in section 2.5.5, contribute to gradually incorporate biodiversity considerations into plans, programs and actions of various economic sectors, although this integration is not yet formalized in the vast majority of sectoral policies and require considerable debate and efforts to consistently reflect in more sustainable policies and practices.

There is currently no practical instrument to measure the degree of biodiversity integration into the various sectors, although it is worth mentioning that the federal 2008-2011 Multi-Year Plan includes 26 programs that contribute to the achievement of CBD goals (see section 2.5.3) and numerous other programs implemented by various ministries that contain actions which contribute to reducing developmental impact on biodiversity. The previous Multi-Year Plan (2004-2007) included 61 programs interfacing with biodiversity themes.

The section below briefly describes the main governmental initiatives and some initiatives of the private sector (see also section 2.5.5) to mainstream biodiversity considerations into

[150] Teixeira, I.M.V., 2008. O uso da Avaliação Ambiental Estratégica no planejamento de blocos para exploração e produção de petróleo e gás no Brasil: uma proposta [The use of Strategic Environmental Assessment for planning blocks of areas for oil and gas prospection and production]. PhD dissertation, COPPE/UFRJ, Rio de Janeiro, 308pp.

economic sectors, the main actors involved in the initiatives, and measurable results, when available. Additionally, this chapter discusses the application of the Ecosystem Approach and Strategic Environmental Assessment in the country.

3.2. Initiatives to integrate biodiversity considerations across sectors

One of the most important aspects of the current line of action adopted by the Ministry of the Environment (MMA) is the diversification of actions to consolidate sustainable development in Brazil. Since 2008, MMA has been implementing a strategy to increase its interlocution and intervention capacity within the governmental sectors and with the private sector, building a complex network of relations to allow an unprecedented frontal role of MMA in the national political, cultural and socio-economic arenas.

This strategy contributes to the CBD recommendations regarding the mainstreaming of biodiversity considerations across sectors and is in line with the growing global perception of the transversal aspect of environmental issues. In particular, MMA's strategy to promote the dialogue and collaboration with the various economic sectors deserve special notice, seeking to ensure, as much as possible, the environmental sustainability of the current national process of economic growth. The lines of action adopted by the Ministry involve the primary, secondary and tertiary sectors of Brazilian economy through multi-sectoral pacts and punctual economic interventions (see below), which promoted an extremely dynamic interface for the consolidation of sustainable development principles.

MMA and other governmental initiatives: multi-sectoral agreements and economic interventions

Primary sector

1. Agriculture

Moratorium on Soybean from Amazon Deforestation – ABIOVE and ANEC: In 2008 the MMA, the Brazilian Association of Plant Oils (ABIOVE), the National Association of Cereal Exporters (ANEC), and associated companies renewed for an extra year the Term of Commitment signed in 2006 for the non-commercialization of soybeans originating from deforested areas of the Amazon Biome (see section 2.5.5). The renewed agreement includes commitments on the MMA side, such as the development of the Ecological-Economic Zoning of priority areas for soybean production, as counterpart to the private sector commitments.

2. Extractive activities

Sustainability of the extractive products chain: In partnership with the National Supply Company (CONAB – a public agency connected to the Ministry of Agriculture), MMA developed studies to support the definition, by the National Monetary Council (CMN), of minimum prices for some products from extractive activities. This initiative is part of a policy to support the commercialization of these products and enhance the self-sustainability capacity of traditional communities. Provisional Measure 432, of 27 May

2008, established minimum prices for nine products: Brazil nut, andiroba, copaiba, buriti, rubber, piassava, carnauba, pequi, and assai. MMA supported training workshops in 2009 with communities at Extractive Reserves to disseminate these minimum prices. This initiative involved private sector institutions such as Instituto Ethos and the Brazilian Sustainable Development Council, as well as community representatives, which discussed with MMA the creation of new production chains and the strengthening of existing ones. In June 2009, MMA and the Ministry of Agrarian Development instituted the National Plan for Promoting Production Chains from Socio-biodiversity.

Leaf Collectors and Vegeflora: The Chico Mendes Institute for Biodiversity Conservation (ICMBio), under MMA, mediated a partnership between a leaf collectors' cooperative and Vegeflora Extrações do Nordeste Ltda., a company specialized in plant extracts for the chemical-pharmaceutical sector, to ensure the sustainable management of jaborandi and better conditions for the extractive activities. Under the negotiated agreement, the company provides the adequate equipment and infrastructure for the extractive activities and buys the entire production for a given period of time, while leaf collectors follow the sustainability rules established by the management plan.

3. Mining

Mining Pact – Vale do Rio Doce: The MMA and the Vale do Rio Doce mining company signed Terms of Commitment through which the company agrees to sell ore and services exclusively to clients that prove the legal origin of timber and charcoal used in their production processes. Under the agreement, the MMA committed to support and promote the Ecological-Economic Zoning of several biomes and implement the rural property registry and environmental licensing in partnership with state environmental agencies.

4. Livestock

"Pirate Ox" Operation: This operation was launched in 2008 by MMA to confiscate livestock raised in rural properties under irregular land tenure situation in states of the Amazon Region. At the end of five months, results of this operation included the farmer's initiative to remove 30,000 cattle that had been illegally released into the Terra do Meio Ecological Station (Pará state), after MMA confiscated 3,300 cattle at Lourilândia Farm. The confiscated animals were auctioned, and proceeds were directed to programs of the Ministry of Social Development, such as the "zero hunger" program, and to the health care of indigenous communities. In parallel, MMA provided incentives to aquaculture as an alternative income-generating activity for the region, under an agreement with Banco da Amazônia and Banco do Brasil, for the creation of credit lines for this activity.

BNDES and small cattle raisers in the Amazon: A partnership between MMA and the National Economic and Social Development Bank (BNDES) ensured the availability of a credit line to finance projects for the modernization and legal compliance of small and medium-sized cattle raisers in the Amazon Biome supplying beef to large cold storage plants. This credit line fits the "anchor company" model, by which the largest company in the production chain warrants the debt of the small suppliers: as co-responsible for eventual environmental crimes committed by its suppliers, the cold storage plant has greater interest

in ensuring the legal compliance of the production chain; and on the other side, the small producers which previously did not have the necessary means to comply with the legislation now gain access to cheap credit to modernize production and regularize the legal situation of their activities.

Legal Meat Campaign: The Federal Public Ministry (MPF), together with the Brazilian Institute for Consumer Rights (IDEC) and Repórter Brasil (a communications NGO) initiated in 2010 a campaign to promote consumer awareness regarding the origin of meat sold in the country. The campaign invites consumers to request from supermarkets and other stores information on the origin of meat products, verifying if the production process involved deforestation of the Amazon, slave labor or money laundering (www.carnelegal.mpf.gov.br).

5. Fisheries

Environmental sustainability: To minimize the impacts from fisheries activities, the Ministry of the Environment develops joint actions with the Ministry of Fisheries and Aquaculture (MPA) directed at environmental sustainability through the monitoring and regularization of fisheries and aquaculture activities, as well as through the establishment of criteria and standards for the implementation of fisheries and aquaculture projects.

6. Health

Brazilian Olympic Games on Health and Environment (Olimpíada Brasileira de Saúde e Meio Ambiente): The Oswaldo Cruz Foundation (FIOCRUZ), in partnership with the Brazilian Association of Post-Graduate Studies on Collective Health (ABRASCO), created this prize in 2001, directed at students of the last year of middle and high school of private and public schools. The objective is to provide incentives to the development of projects that can contribute to the dissemination of new concepts on the environment and health, and to the improvement of environmental and health conditions. This prize seeks to promote the development of integrated approaches to health and environment and to recognize the work of schools and teachers developing innovative pedagogical activities, granting prizes to projects and their authors. The prizes to be granted are defined by a National Council.

Secondary Sector

1. Industry

Timber Pact: The MMA, the Association of the Timber Export Industries of Pará State (AIMEX), and the Industries Federation of Pará State (FIEPA) signed, on September 18, 2008 the Pact for the Legal and Sustainable Timber. Under this agreement, the federated industries commit not to purchase timber originating from illegally deforested areas and to increase the traceability of their raw materials up to the other end of important production chains, such as furniture. On its turn, the MMA assisted the sector to find solutions for bottlenecks hindering industrial investments in the region through three lines of action: (i) streamlining the environmental regularization of suppliers and community producers; (ii)

editing technical rules with the rules and procedures for enforcement actions; and (iii) increasing the targets of the forest concession plan, which presented the initial proposal of bidding 2 million hectares of forest in 2009, only 66,000 of which can be effectively explored.

Industry Pact – FIESP: MMA and the São Paulo Federation of Industries signed a protocol of intentions whereby the forest-based industries of São Paulo state would only acquire raw products – and especially timber – from legal suppliers, to combat illegal deforestation and extraction in the Amazon Forest and other regions. Through this agreement, the São Paulo industries agreed to acquire certified timber only, with the accompanying Document of Forest Origin (DOF), and to include information on the origin of the raw materials in the fiscal documents for commercialization, thus enlisting the final consumer in the enforcement process. Under this agreement, the MMA committed to work towards increasing the offer of certified products, streamlining the environmental licensing procedures for managed forests.

"Vesuvius Operation": Launched in 2008 in the region of Pernambuco state known as "Charcoal Polygon", this Operation destroyed hundreds of illegal ovens for charcoal production, which supplied the iron industries of Minas Gerais and Espírito Santo states. With support from IBAMA, the military police, the federal police, and the highway patrol, the Operation estimated that, for each full oven, approximately 15 trees were cut from Caatinga vegetation, which is extremely serious considering that over 45% of this biome were already deforested.

Substitution of Refrigerators: In 2009, the Ministry of the Environment, in collaboration with the Ministry of Mines and Energy and the Ministry of Social Development, prepared a project of high positive impact on the Brazilian environment and economy: the substitution of 10 million refrigerators in 10 years. The project will use funds from energy taxes to subsidize the gradual substitution of CFC-based refrigerators produced before 2001. The project also foresees the logistics for the adequate disposal of the old refrigerators, which will have support from the German Technical Assistance (GTZ) through the donation of equipment for recycling obsolete refrigerators.

2. Construction sector

Timber Pact – Caixa Econômica Federal: Until 2007, 97% of the total timber consumed in Brazil was not certified. To change this scenario, MMA and IBAMA established a partnership with the Caixa Econômica Federal (CEF - a federal bank), through which CEF will require proof of legal origin for timber used by construction companies and real estate companies providing services to CEF. This initiative resulted in enormous impact on the production chain, since in 2008 alone CEF invested approximately US$ 9 billions in the construction of 350,000 homes, for which 78% of the timber used in the catwalks and supporting structures came from the Amazon Region. Through another agreement between CEF and MMA, CEF agreed to offer special financing opportunities to borrowers of the "my house, my life" program that decide to install solar energy panels on their new homes.

CFCA and the Environmental Compensation Fund: To provide greater transparency to the management of the Environmental Compensation Fund, MMA created the Federal Environmental Compensation Chamber (CFCA) as a dispute resolution panel for the definition of payments owed by entrepreneurs as compensation for environmental impacts of their operations. Composed by representatives[151] of the civil society, ABEMA, ANAMA, CNI, Headmasters Council of Brazilian Universities, and the Brazilian NGO Forum, the CFCA also has the responsibility of establishing guidelines for the investment of the Fund's resources in the enhancement of protected area management.

Bioconstruction: A partnership among MMA, the National Institute for Agrarian Reform (INCRA) and the Senate TV offered in 2008 a capacity-building course on bioconstruction directed at 40 families of a rural settlement located in one of the largest islands of the Parnaíba River Delta, in Maranhão state. The project allowed the construction of low-cost low environmental impact homes, using local materials and architectonic techniques adequate for the regional climate, and valued solutions suggested by the community. As a result from this action, MMA published the Bioconstruction Manual, available at the link http://www.mma.gov.br/proecotur .

Tertiary Sector

1. Science and Technology

SBPC and the Protected Areas: On August 5, 2008, the MMA presented to the Brazilian Society for the Progress of Science (SBPC) a proposal for facilitating the conduction of research projects inside federal protected areas. The proposal was transformed into an Administrative Ruling, and restructured the Biodiversity Authorization and Information System (SISBIO) and granted to ICMBio the power of transferring to scientific institutions the responsibility for approving research projects within protected areas following the execution of Terms of Responsibility.

2. Commerce

"Bag is a Bore" Campaign: MMA launched this campaign in June 2009 with the objective of raising public awareness and promote the avoidance, whenever possible, of the use of plastic bags in commercial establishments, promoting the use of reusable bags. The campaign was supported by various private companies such as Carrefour, Wal-Mart, CPFL Energia, Tim, Vivo, and Kimberly-Clark, among other businesses. Currently, Brazil consumes approximately 12 billion plastic bags per month (66 bags per person), according to data from the Brazilian Supermarket Association (ABRAS).

Beef Pact – ABRAS: With MMA support, the Brazilian Supermarket Association (ABRAS) launched in December 2009 the project for the Responsible Production Certification for the Beef Production Chain. The objective of this initiative is to promote the environmental,

[151] ABEMA is the Brazilian Association of State Environmental Agencies; ANAMA is the National Association of Municipal Environmental Agencies; CNI is the National Industries Council.

economic and social sustainability of the sector's companies, as well as to control the origin of beef consumed by Brazilians. ABRAS will promote the adhesion to this program by all companies of the beef supply chain. The certification process is independent and identifies actions for environmental protection, respect to the consumer, and respect to the social, health and labor issues.

3. Education

Virtual community for the young: The MMA, the Ministry of Education and the Telefônica company signed in 2008 an agreement for the creation of a virtual community directed at the environmental education of the young public. The community is hosted at the Educarede site: http://www.educarede.org.br/educa/index.cfm?id_comunidade=114 . This is a broad forum for environmental discussions directed at children and youth, and an important vehicle for the dissemination of events such as the 3rd National Youth Conference on the Environment – global climate change, held in April 2009, and the International Youth Conference – Let's Take Care of the Planet, held in Brasília from June 5-10, 2010.

4. Bank and Administrative Services

Environmental criteria for rural credit concession in the Amazon: A partnership between MMA and the National Monetary Council (CMN) ensured the inclusion of environmental criteria for the concession of credit to agricultural and livestock activities in the Amazon Region. Adopted since July 2008, this measure is in force for public and private financial institutions, conditioning the credit concession to the presentation, by producers, of the Rural Real Estate Registry Certificate (CCIR), the environmental license of the rural property, declaration of non-existence of legal impediments to the economic use of illegally deforested areas, and the commitment to comply with recommendations and restrictions established by the Ecological-Economic Zoning.

Bank Pact – FEBRABAN: In April 2008, MMA and the Brazilian Federation of Banks (FEBRABAN) signed a Protocol of Intentions, through which the private banks adopt socio-environmental principles and directives for the approval of credit to companies. These latter will be required to prove their commitment to respect human and labor rights, preserve biodiversity, value local cultures, and contribute to poverty and inequality reduction. This Protocol of Socio-environmental Intentions is part of the Green Protocol, signed with public and private banks in 1995 and revised in 2008.

5. Tourism

Ecotourism in National Parks: In 2008, the MMA and the Ministry of Tourism made a joint investment of approximately US$16.5 millions into the recuperation of the visitation structure of the national parks, to promote in increase in the visitation to these areas, reinforcing ecotourism and contributing to the economic sustainability of these protected areas. During implementation, the program identified the need to broaden this investment, including 25 of the 64 existing national parks, and attracted the interest of national and international investors, leading MMA to define precise rules for investments and donations,

strategies to manage visitation, and visitor's behavior rules. In October 2008 the EBX corporate group established a partnership with MMA and ICMBio, donating approximately US$ 7 millions to the maintenance of three national parks. In September 2009, the Vale do Rio Doce mining company announced the investment of approximately US$ 1.2 millions in the preservation of the open area of the Rio de Janeiro Botanical Garden.

6. General initiatives for the economic sectors

LIFE Certification: MMA supported the NGO initiative for the adoption, in Brazil, of the LIFE (Lasting Initiative for Earth) seal as a new certification option for the private sector. This certification recognizes corporate initiatives for biodiversity protection of any organization of the private sector, regardless of size.

In addition to the initiatives listed above, in September 2008 the Ministry of the Environment began implementation of a GEF-funded project (National Biodiversity Mainstreaming and Institutional Consolidation Project - PROBIO II), specifically designed to mainstream biodiversity considerations across sectors. PROBIO II involves five ministries and five connected agencies and research institutions of three different sectors: the Ministry of the Environment; Ministry of Agriculture Livestock and Supply (MAPA); Ministry of Agrarian Development (MDA); Ministry of Health (MS); Ministry of Science and Technology (MCT); Oswaldo Cruz Foundation (FIOCRUZ); Brazilian Institute for the Environment and Renewable Natural Resources (IBAMA); Rio de Janeiro Botanical Garden (JBRJ); Brazilian Agricultural Research Corporation (EMBRAPA); and the Brazilian Network of Botanical Gardens (RBJB). The project is implemented through three main components: mainstreaming biodiversity in the public sector; mainstreaming biodiversity in the private sector; and generation of biodiversity information for policy-making.

Additionally, at the policy level, the Ministry of the Environment and the Ministry of Culture prepared the inter-ministerial administrative ruling n^{o} 8, of February 9, 2010, establishing an inter-ministerial working group to define actions and programs under both Ministries for the implementation of a cultural policy for the valuation and conservation of cultural and biological diversity for sustainable development.

Private sector initiatives

As listed in section 2.5.5, numerous voluntary initiatives of the private sector contribute to the integration of environmental and biodiversity issues in production sectors through environmentally sustainable development, providing incentives to environmental sustainability, and to environmental and biodiversity conservation. These initiatives are being implemented by the private sector throughout the country and involve sustainable agriculture, the forest sector, recycling, sustainable tourism, environmental criteria for credit concession, climate change, and corporate environmental sustainability, among other themes.

Environmental awards

The private sector also created several environmental awards directed at biodiversity conservation, climate change and reforestation. Some of these are listed below.

Época Climate Change Award: Created in 2008, this annual award is an initiative of the Época magazine, published by the Globo publishers. Only large corporations and banks are eligible and award winners are those with the most advanced environmental policies to reduce emissions of greenhouse gases. Winners receive the title of Leading Corporation on Climate Change.

Exame Sustainability Guide: First published in 2007, this initiative of the Exame magazine (Abril publishers) lists the ranking of medium and large corporations that implement good practices on corporate responsibility in the country. The objective is to demonstrate, through the publication of information, analyses, concepts and examples, that long-term profit will not be achieved without proper management of impacts on the environment and on society. The Exame Sustainability Guide is the new version of Exame's Good Corporate Citizenship Guide, published from 1999 to 2006.

Brazil Environmental Award: This annual award is an initiative of the JB publishers through its printed newspaper Gazeta Mercantil, the magazine Forbes Brasil, and the online news JB Ecológico. Since 2006, this award distributes trophies symbolizing the ideal harmony between humankind and the environment. Corporations, marketing agencies, as well as municipal, state and federal agencies that created innovative actions directed at environmental preservation with positive impacts on communities are eligible to this award. The best actions are selected among 12 categories: air; water; fauna and flora; environmental education; waste; energy efficiency; ecotourism; municipal environmental projects; state environmental projects; federal environmental projects; social communication on the environment; and environment awareness campaigns.

Super-Ecology Award: Created in 2002, this annual award is an initiative of the Superinteressante magazine (Abril publishers), with six categories: water, air, soil, fauna, flora, and communities. These categories are repeated in three classes: government, NGOs, and corporations. Eligible entities are NGOs, governmental agencies, academic institutions, and corporations with a nature conservation and recuperation focus. Winners receive a trophy and feature articles published in a special edition of the Superinteressante magazine.

Ford Motor Company Award on Environmental Conservation: Created in 1997, this annual award is a joint initiative of Ford and Conservation International do Brasil. Environmental organizations, governmental agencies, private companies, universities and research institutions, and individuals are eligible to this award, within five categories: Individual Achievement Award; Conservation Business Award; Science and Human Resources Training Award; Conservation Initiative of the Year Award; and Environmental Education Award. This award intends to encourage projects directed at nature and biodiversity protection, as well as projects related to the sustainable use of natural resources in Brazil. Award winners in each category receive R$20,000 (approximately US$11,800).

Frederico Menezes Veiga Award: This annual award was created in 1974 by the Brazilian Agricultural Research Company (EMBRAPA) to recognize two researchers per year (one from EMBRAPA and one from outside) who contributed to the generation of agroecological technologies connected to productivity and environment. Eligible participants are researchers who develop work on agriculture or related fields indicated by a list of research institutions. The award has two categories: production activity and environmental protection. Winners receive a work of art, a diploma and a pecuniary prize of R$98,440.10 (approximately US$ 57,900).

José Pedro de Araujo Award: This annual award was created in 2000 by the José Pedro de Araujo Foundation to support projects aimed at encouraging research for the discovery or use of therapeutic resources based on the Brazilian flora. Eligible participants are individuals or institutions conducting research on this theme, notably scientists and researchers. Winners receive a pecuniary prize at the value determined by the Foundation's Managing Council.

Young Scientist Award: Created in 1981, this annual award is a joint initiative of the National Science and Technology Development Council (CNPq), the Gerdau corporation, and the Roberto Marinho Foundation (FRM). Students and researchers throughout Brazil are eligible to this award, which aims to encourage research, reveal new talents, and invest in students and professionals that seek alternative solutions to Brazilian issues. The award has five categories: bachelor degree, undergraduate student, high school student, advisor, and institutional merit. According to the category, 1st, 2nd and 3rd place winners receive computer equipment or pecuniary prizes of various amounts. Considered by the scientific community as one of the most important awards of its kind in Latin America, this award is handed to winners by the President of Brazil. One of the most important results of this initiative is the finding that the vast majority of winners of the Young Scientist Award continues and consolidates research careers at universities or research institutions. Award themes are selected annually among those of distinct importance to scientific and technological development and of noted relevance to the Brazilian population.

Expressão Ecology Award: This annual prize limited to the southern region of the country was created in 1993 by the Expressão publishers to disseminate the efforts of companies and institutions to reduce the environmental impacts of pollution and to contribute to natural resource conservation and development of environmental awareness. Companies, institutions, NGOs, and class labor organizations of the three southern states are eligible to this award. The award has 20 categories: pollution control; environmental management; conservation of production materials and water; rational use of production materials and energy; rational use of production materials and mineral resources; forest management; agriculture and livestock; recuperation of degraded areas; risk and environmental disasters prevention programs; class labor organizations; conservation of natural resources; recycling; wildlife conservation; environmental education; ecological marketing; technological innovation; environmental control technology; socio-environmental technologies; animal welfare; and tourism and life quality. Winners in all categories receive trophies.

Muriqui Award: Created in 1993 by the National Bureau of the Atlantic Forest Biosphere Reserve this annual award has the objective of encouraging actions that contribute to

biodiversity conservation, support and disseminate traditional and scientific knowledge, and promote sustainable development in the Atlantic Forest region. Individuals and national or international governmental and private institutions recognized by their activities to benefit the Atlantic Forest are eligible to this award. Two awards are granted annually, one for individual achievement and one for governmental or private institutional achievement. The prize is a diploma and a small bronze statue of a muriqui (*Brachyteles arachnoides*), the largest primate of the American continent, which is an endangered endemic species of the Atlantic Forest and symbol of the Atlantic Forest Biosphere Reserve.

Report on Atlantic Forest Biodiversity Award: Created in 2001, this annual award is an initiative of the Alliance for the Conservation of the Atlantic Forest, formed by a partnership between Conservation International and SOS Mata Atlântica Foundation. All reporters of printed and television press resident in Brazil, employed or free-lancer are eligible to this award. The award intends to support environmental reporting in Brazil, promote the production of reports on Atlantic Forest biodiversity, and recognize the professional excellence of environmental reporters. The award has two categories: printed press and television. Winners receive a free trip to an international press conference or any other significant conservation event.

Atlantic Forest Motivational Award to Municipal Initiatives: Created in 1995, this annual award is a joint initiative of the National Association of Municipal Environmental Agencies (ANAMMA), the National Bureau of the Atlantic Forest Biosphere Reserve, and the SOS Mata Atlântica Foundation. Municipal governments that develop programs, projects or practices on the conservation and sustainable use of natural resources are eligible to this award. With four categories – public policy, protected areas, management and sustainable use of natural resources, and Recomposition/restoration of vegetation cover – this award has the objective of disseminating and valuing programs, projects and practices for the conservation and sustainable use of natural resources developed by municipalities within the Atlantic Forest domain. Winners receive a trophy and a pecuniary prize of R$5,000 (approximately US$ 2,900).

Professor Samuel Benchimol Amazon Award: Created in 2004, this annual award is a joint initiative of the Ministry of Development, Industry and External Trade (MDIC); National Confederation of Industries (CNI); and the Pró-Amazônia, composed by the Industry Federations of the Amazon Region, Amazônia Bank, Superintendence of the Tax Free Zone of Manaus (SUFRAMA), Research Support Foundation of the Amazonas State (FAPEAM), Federal Engineering Architecture and Agronomy Council (CONFEA), and the Brazilian Service to Support Micro and Small Companies (SEBRAE). Corporate and labor institutions; national or international universities and research institutions; credit and financing institutions (including multilaterals); governmental and private institutions devoted to sustainable development in the Amazon; and regional, national or international development agencies are eligible to this award. With three categories – economic and technological aspects, social aspects, and environmental aspects – this award has the objective of promoting the consideration of economic, environmental and social prospects for the sustainable development of the Amazon Region; fostering a permanent interaction among the governmental, private, academic and social sectors of the Amazon Region; and identifying, assessing, selecting and disseminating projects of corporate interest, as well as

investment opportunities to potential financing agents. Winners in each category receive pecuniary prizes varying from R$15,000 to R$65,000 (approximately US$ 8,800 to US$ 38,200).

José Márcio Ayres Award to Young Naturalists: Created in 2004 by Conservation International do Brasil and the Emílio Goeldi Museum, this annual award recognizes and supports the scientific vocation for research on Amazon biodiversity among students of the Pará state. Only students regularly attending public or private schools (middle school and high school) in Pará state are eligible to this award. The award has two categories: middle school, with team work; and high school, with individual work. Winners receive a diploma, publications, and pecuniary prizes varying from R$1,000 to R$3,000 (approximately US$ 590 to US$ 1,770). Teachers functioning as advisors to winning students receive a computer and a certificate, and the schools of winning students receive a kit of publications.

FIESP Environmental Merit Award: Created in 1995, this annual award is an initiative of the São Paulo State Federation of Industries (FIESP) to distinguish the industrial, extractive, manufacturing or agroindustrial corporation that stands out in the implementation of environmental projects with significant results in the improvement of environmental quality. This award seeks to demonstrate to the São Paulo population the concern and efforts applied by industries in the state to enhance environmental quality. Only industrial corporations of any size established in São Paulo state are eligible to this award, which has two categories: micro and small industries, and medium and large industries. Winning industries receive a trophy, the FIESP Environmental Merit Seal, and broad dissemination of the granted award through the FIESP communication means.

CREA Goiás Environmental Award: Created in 2001 by the Regional Engineering Architecture and agronomy Council of Goiás (CREA-GO), this annual award has the objective of recognizing individuals or institutions that developed, implemented or collaborated with actions for environmental preservation, recuperation, defense and/or conservation in the state of Goiás. Professionals, labor organizations, learning establishments, NGOs, governmental agencies, and communication companies are eligible to this award. The award has eight categories: architecture, urbanism, water treatment, geology and mines, agronomic production, rural environment, environmental education, and press (printed press, radio and television). Winners receive a trophy shaped as a seriema (*Cariama cristata*), which is a long-legged bird characteristic of the biome covering Goiás state (the Cerrado), and have their work published by the Council.

ECO Award: Created in 1982, this was a pioneering initiative of the American Chamber of Commerce in São Paulo. Private corporations and businesses of any size, and business associations and foundations of the entire country are eligible, and do not need to be affiliated to AmCham. The award recognizes the best practices in sustainable corporate management in Brazil contributing simultaneously to the business' economic success, to building a fairer and prosperous society, and to the conservation of the environment in Brazil. From 1982 to 1988 recognition was granted to project independent of category. From 1989 to 2004 social projects were awarded within the categories of education, culture, environment, health, and community participation. From 2005 to 2007, two lines were established: corporate and corporate social responsibility practices; the second being

subdivided into five categories – internal public, environment, suppliers, consumers and clients, and community. Winning corporations receive a trophy. Since its creation, the ECO Award was granted to 117 winning projects and over US$2.8 billions were invested in the five areas considered by the award.

Environmental Brazil Award: Created in 2005 by the American Chamber of Commerce (AMCHAM), this annual award has the objective of encouraging and recognizing the merit of environmental preservation projects and environmentally responsible practices developed by corporations active in Brazil. Only corporations with environmental projects already closed or at the final phase of implementation are eligible. The award has six categories: environmental education, forests, water management, solid waste management, clean development mechanism, and press articles on sustainable development. Winners receive a trophy, a diploma, and a free weekend at a resort in Bahia state for two people and free air ticket. Winning projects are published in the Brazilian Business magazine and at the AMCHAM website.

von Martius Sustainability Award: Created in 2000, this annual award is an initiative of the Brazil-Germany Chamber of Commerce and Industry to reward projects that value actions directed at the sustainable development of various communities, which can function and replicable examples to the various geo-economic scenarios of the country. The award was also created to disseminate and reinforce Germany's commitment, and the commitment of Germany-based industries installed in Brazil, with sustainable development. Companies, NGOs, individuals, and governmental institutions throughout Brazil, affiliated or not to the Brazil-Germany Chamber of Commerce, and developing initiatives and projects within the three award categories (humanity, technology, and nature) are eligible to this award. The best initiatives/projects in each category receive a trophy and a diploma. Winning projects are summarized and disseminated in Portuguese and German in the BrasilAlemanha magazine published by the Chamber.

Goldman Environment Award: Created in 1990, this award is an initiative of the Goldman Environmental Foundation, granted each year to six defendants of the environment in each of the six geographical areas: Africa, Asia, Europe, Islands and Island States, and the Americas. Only community leaders facing governmental and corporate interests and working to protect the environment and improve life quality of their communities are eligible to this award. The award has the objective of rewarding people who are globally and regionally recognized for a significant contribution to environmental protection and sustainable management of natural resources. Winners receive a US$125,000 prize.

BRAMEX Environment Award: Created in 2003 by the Brazil-Mexico Industry and Tourism Chamber of Commerce, this annual award recognizes the merit of corporate initiatives that develop and implement clean development mechanisms, reducing the environmental impact caused by production activity and promoting environmental responsibility among employees, as well as initiatives by individuals or civil society organizations that promote economic, social and cultural development with environmental responsibility. The award has three categories: community, innovation, and environment. Winners receive a trophy, a certificate and an Environmental Responsibility Seal, and may receive a pecuniary prize.

LIF Award (Liberty, Equality, Fraternity) of the France-Brazil Chamber of Commerce: Created in 2002 by the France-Brazil Chamber of Commerce, this annual award has the objective of promoting, throughout the country, social projects developed by private companies and non-profit institutions affiliated or not to the Chamber. The award has five categories: health support to communities; education support to communities; culture support to communities; environment preservation; and small institutions or NGOs. Winners receive a trophy and a pecuniary prize of R$5,000 (approximately US$2,900).

Innovation in Sustainability Award: created in 2008 as a joint initiative of the Ethos Institute of Corporations and Social Responsibility and USAID, this award has the objective of supporting successful innovative sustainability initiatives of community associations, social entrepreneurs, research institutes, micro and small corporations, NGOs, and universities that can be enhanced and/or replicated. The award has five categories: development of value chain; education, environment, health, and information technology. Winning initiatives receive free registration in the International Conference of Corporations and Social Responsibility of the Ethos Institute and a R$60,000 (approximately US$35,300) prize to be invested in the enhancement and/or replication of the initiative.

3.3. Application of the Ecosystem Approach

The Ecosystem Approach is still a very new theme in Brazil. Nevertheless, some agencies have initiated work to include principles of this approach into their assessment, planning and licensing processes.

Through its Secretariat for Water Resources and Urban Environment and in partnership with the National Water Agency (ANA) and The Nature Conservancy, the Ministry of the Environment is currently promoting workshops on the ecosystem approach applied to water resources management[152]. This initiative is in agreement with the National Water Resources Plan (PNRH) where it seeks to develop and consolidate the ecosystem approach in the context of water resources management, strengthening its coordination with environmental management and providing better information to the decision making processes related to water quantity and quality in the country. Three workshops were already conducted, discussing issues related to environmental water flow and aquatic ecoregions. These workshops had the objective of defining a standard methodology for smaller areas, where a more detailed planning process can be applied, which incorporate biodiversity considerations (environmental water flow and aquatic ecoregions) into the processes to license water use. These workshops address a need identified since 2005 by ANA[153] for the development of procedures for the definition of ecological water flow as part of strategic environmental assessments, and the consolidation of a conceptual and methodological framework necessary for the development of directives and classification systems for aquatic environments, strengthening the integration among environmental and water resources policies.

[152] http://pnrh.cnrh-srh.gov.br
[153] ANA, 2005. Nota Técnica nº 158/2005/SOC. Vazões Ecológicas [Ecological water flow], 31pp.

ANA is also developing pilot projects to test the strategic environmental assessment tool, applying it for instance in the Water Resources Strategic Plan for the Tocantins-Araguaia Watershed, published in 2009. ANA also concluded in 2006 the Strategic Action Plan for the Upper Paraguai River Watershed, which applied the ecosystem approach, with the objective of assessing user conflicts and mitigation or compensation actions for socio-environmental impacts of energy infrastructure investments.

The Chico Mendes Institute for Biodiversity Conservation (ICMBio) is also integrating the ecosystem approach into its revised species conservation strategies, using this tool to assess threat distribution and composition affecting focus groups of species, which are defined based on biological similarities and/or shared ecosystems (see also section 2.6). ICMBio is also developing strategies for the conservation management of protected areas corridors and mosaics. Additionally, MMA implements a complementary pilot Ecological Corridors Project (see section 1.4.3), and is currently developing a document with guidance on instruments for territorial conservation planning and management (ecological corridors, mosaics of protected areas, and Biosphere Reserves).

3.4. Environmental Impact Assessments

Environmental impact assessments are a legal requirement in Brazil since 1986 for the licensing processes of economic or infrastructure activities that result in impacts on or modifications of the natural environment (see section 2.7.5). Along the past decade, licensing processes under the responsibility of various governmental agencies have been gradually incorporating biodiversity considerations as decision criteria, such as the national Map of Priority Areas for Biodiversity Conservation and Sustainable Use and endangered species lists. However, the process of officially incorporating these criteria into the institutional procedures of governmental agencies is still in its early stages.

The Brazilian Institute for the Environment and Renewable Natural Resources – IBAMA, for example, created in 2009 several working groups to prepare the incorporation of biodiversity considerations into standard Terms of Reference to guide the preparation of environmental impact assessments and reports (EIA/RIMA), including as part of the guidelines the requirement for information on landscape ecology (ecological processes and landscape modeling) and specific biodiversity issues, among other aspects. Additionally, standard Terms of Reference that take biodiversity considerations into account are also being prepared as environmental requirement guidelines to be observed by licensed impacting operations. The working groups are preparing specific Terms of Reference for each biome or biome group: aquatic environments; Atlantic Forest and Pampas; Pantanal, Cerrado and Caatinga; and Amazon Biome. Up to the first quarter of 2010, these working groups had produced two technical notes to support the preparation of standard terms of reference: one for linear infrastructure works, such as energy transmission lines, roads, railroads and ducts; and one for punctual large-scale operations, such as mining and hydroelectric dams.

EIA as a preventive legal requirement contributes to improve coordination among governmental agencies of different sectors, by exposing potential conflicts among public policies or the non-compliance of economic or development sectors with environmental

policies. The negotiations among sectors to resolve such potential conflicts are part of the decision making process to define the environmental and political viability (or non viability) of a project. Examples of this in Brazil are common in the infrastructure sector, particularly regarding electric energy generation and the production of oil and natural gas. During the 1980s and 1990s, multilateral funding agencies placed strong pressure on the electric energy sector, pushing for the development of environmental impact assessments for proposed projects. The investments in capacity building, the creation of environmental units within public agencies of the energy sector, and the methodological advancements for inventories including environmental aspects illustrate the changes resulting from the formal adoption of EIA in Brazil[154].

The need for an environmental impact assessment to be carried out prior to initiating electric energy generation projects created a new inter-institutional interlocution process between the Ministry of the Environment and the Ministry of Mines and Energy, characterized by the establishment of the Strategic Nucleus for Socio-environmental Management (NESA), and by the inter-institutional relations with the Energy Research Company (EPE) and the National Electric Energy Agency (ANEEL), as well as by the environmental units created within the companies of the Eletrobrás Group.

In general, Sectoral processes for planning development projects have been influenced by EIA requirements, particularly regarding the environmental viability of proposed projects, where sectors tend to seek projects that are more environmentally-friendly[155]. The easier access currently provided to environmental information on development projects is also an important aspect facilitated by the introduction of EIA in Brazil, which contributes to improving environmental governance and establishes the importance of preventive planning.

However, 20 years after its adoption, the application of environmental impact assessments is not yet fully playing its role in decision making, as an instrument that incorporates environmental aspects to economic, social and technological variables to inform planning processes (see Table III-1 below). The general understanding of EIA among economic sectors relegates its preventive characteristic to the background, placing greater importance on EIA as an instrument to obtain the necessary environmental license for a project. As a consequence, environmental studies prepared for EIA are often below the technical quality standards expected to adequately support decision making processes.[156] This scenario clearly indicates that, although Brazil achieved important progress, there is still much to be

[154] Teixeira, I.M.V., 2008. O Uso da Avaliação Ambiental Estratégica no Planejamento da Oferta de Blocos para Exploração de Petróleo e Gás Natural no Brasil: Uma Proposta. [*The use of strategic environmental assessment for planning the offer of area blocks for oil and natural gas production in Brazil: a proposal.*] Rio de Janeiro: Federal University of Rio de Janeiro, COPPE, PhD dissertation.

[155] Sánchez, L.E., 2006. Avaliação de impacto ambiental e seu papel na gestão de empreendimentos. [*Environmental impact assessment and its role in venture management.*] In: Vilela Jr., A. and Demajorovic, J. (Orgs.), Modelos e ferramentas de gestão ambiental: desafios e perspectivas para as organizações. [Models and tools for environmental management: challenges and prospects for organizations] São Paulo, SENAC.

[156] Verocai, I., 2006. O licenciamento ambiental em outros países. [*Environmental licensing in other countries*]. Presentation at the workshop "20 years of environmental licensing in Brazil", coordinated by the Ministry of the Environment, São Paulo.

accomplished regarding the adequate adoption of EIA in the country as an effective instrument for sustainable development. IBAMA's initiative to develop standard terms of reference for environmental assessments should contribute to improve this scenario in the near future.

Table III-1: Main deficiencies of the application of environmental impact assessments in Brazil

Aspects	Main deficiencies
Rules and procedures	Lack of adequate regulations: environmental quality standards, criteria for EIA studies evaluation and revision, specific environmental assessment procedures for each economic sector. Lack of adequate integration of procedures: Procedures for environmental assessment and environmental licensing disconnected to the proposed project's planning context and not harmonized with other environmental management instruments, particularly environmental monitoring and audit. Lack of updated procedures: There is a lack of revision and adjustment of environmental assessment procedures in face of the current demand on natural resources by the new investment dynamics in the country.
Institutional	The fragility of environmental institutions, which face issues related to human, technical and financial resources to enforce compliance with EIA requirements and environmental licensing requirements. The overlap of responsibilities and lack of coordination among institutions responsible for other instruments that integrate the licensing process; i.e. water use grants and deforestation licenses.
Technical	The low technical quality of terms of reference for environmental studies and, as a consequence, of the studies themselves; the insufficient installed capacity for prior detection of possible environmental impacts; the inefficiency of social communication and participation procedures. The lack of verification of compliance with preconditions established by granted environmental licenses and of continuous assessment of impact mitigation; the failure to consider cumulative impacts and effects synergy.
Legal	Decision making on licensing made by judicial bodies.

Source: Teixeira, I.M.V., 2008. O Uso da Avaliação Ambiental Estratégica no Planejamento da Oferta de Blocos para Exploração de Petróleo e Gás Natural no Brasil: Uma Proposta. [*The use of strategic environmental assessment for planning the offer of area blocks for oil and natural gas production in Brazil: a proposal.*] Rio de Janeiro: Federal University of Rio de Janeiro, COPPE, PhD dissertation.

Strategic Environmental Assessment (SEA)

Brazil has not yet developed legal instruments to require the use of strategic environmental assessments for public policies, plans and programs. The National Biodiversity Policy appoints the SEA as a priority procedure for the prevention, monitoring, assessment and mitigation of impacts in biodiversity, working as an instrument to integrate the Ecological-Economic Zoning and environmental licensing procedures; however, this policy does not indicates the means to establish this integration. Nevertheless, changes implemented by the federal government since the 1990's to modernize the government structure and stabilize the national economy created a favorable environment in the country for the adoption of SEA. Under this scenario, the country's development context and infrastructure investments gained new dimensions motivated by economic development, reformulated policies, adoption of better structured planning processes, and the opening of the national

market to international investors[157]. The sustainability approach to development introduced by the Rio 1992 Conference also contributed significantly to this new political context, while the environmental requirements of multilateral financing agencies for development operations pushed the advancement of sectoral initiatives to adopt SEA practices.

The last few years saw a multiplication of the initiatives involving strategic environmental assessments: oil and gas extraction on the southern Bahia coast; implementation of a mining and iron park bordering the Pantanal; a plan for using the remaining hydropower potential of Minas Gerais state; and the construction of a beltway around São Paulo are some examples of these initiatives (see Table III-2). It is important to note the voluntary characteristic of these initiatives in the application of the strategic environmental assessment tool, as this procedure did not follow any legal requirement, in contrast to the legally required environmental impact assessment and report (EIA/RIMA). Rather, the assessment was applied as a planning tool for large landscapes or watersheds.[158] Such initiatives are still punctual and voluntary, but there is a growing movement of governmental agencies dealing with licensing procedures to establish standard procedures and integrate this type of assessment into their assessment, planning and licensing procedures, as seen below.

Table III-2: Examples of Strategic Environmental Assessment experiences in Brazil from 1999 to 2007.

Project	Sector	Year	Executed by	Technical Information
Araguaia-Tocantins Watershed	Electric Energy	2002	CEPEL – Eletrobrás	Developed a methodology for planning processes for hydroelectric power generation, with a case study focusing the Araguaia and Tocantins Rivers watershed.
Indicative Plan 2003-2012	Electric Energy	2002	CEPEL COPPE	Assessed the environmental viability of the Plan according to sustainability criteria, considering 3 levels of analyses: projects, group of projects, and the entire Plan.
Madeira River Complex	Electric Energy	2005	FURNAS	Assessed the long term environmental impacts (significant changes to designate changes in regional processes), as well as physical and institutional impacts associated to the implementation and operation of the hydroelectric power complex of the Madeira River, and the sustainability of the resulting development.
Camamu-Almada Watershed (2002-2003)-BA	Oil (upstream)	2002	Company Consortium	Provided information to the planning process for prospection and extraction investments in 5 designated areas, giving special consideration to cumulative environmental impacts of possible projects, and provided guidance to the environmental licensing processes of the possible investment options.
COMPERJ strategic environmental assessment	Oil	2007	Petrobras	Assessed the potential socio-environmental effects of the implementation of the Rio de Janeiro Oil and Chemical Complex and its synergies with

[157] Teixeira, I.M.V., 2008. O Uso da Avaliação Ambiental Estratégica no Planejamento da Oferta de Blocos para Exploração de Petróleo e Gás Natural no Brasil: Uma Proposta. [*The use of strategic environmental assessment for planning the offer of area blocks for oil and natural gas production in Brazil: a proposal.*] Rio de Janeiro: Federal University of Rio de Janeiro, COPPE, PhD dissertation.

[158] Sánchez, L.E., 2010. Avaliação ambiental estratégica e sua aplicação no Brasil [Strategic environmental assessment and its application in Brazil]. "Presentation at the Rumos da Avaliação Ambiental Estratégica no Brasil" workshop. http://www.iea.usp.br/iea/aaeartigo.pdf

				other project in the same region, such as the Metropolitan Arc and PLANGÁS.
PRODETUR- SUL (2004)	Tourism	2004	BID – MTur	Analyzed the socio-environmental impacts, impact monitoring and control measures, and recommendations for the Program's environmental management (programmatic strategic environmental assessment).
Integrated Sustainable Tourism Development Plan for the North Coast	Tourism	2006	MTur	The strategic environmental assessment supported the planning process for tourism development in the North Coast (Ceará, Piauí and Maranhão states), based on the assessment of the environmental implications associated to the tourism development options being discussed among the Ministry of Tourism and the states.
RODOANEL-SP (São Paulo Beltway)	Transports	2004	CONSEMA DER-SP	Environmental viability x Environmental impact assessment Gathered information for the licensing process and identification of possible conflicts.
Minas Gerais Highway Program	Transports	2006	Minas Gerais State Government	Assessed the environmental implications of the Minas Gerais Highway Program.
Strategic Environmental Assessment in the Federal Multi-Year Plan	Planning	2002 2006	Ministry of Planning	Assessed the use of the strategic environmental assessment as a supporting tool for strategic decision-making in the planning process for the country's development, considering the integrated assessment of the territory and environmental implications of projects located close to other investments.

Source: Teixeira, I.M.V., 2008. O uso da Avaliação Ambiental Estratégica no planejamento de blocos para exploração e produção de petróleo e gás no Brasil: uma proposta [The use of Strategic Environmental Assessment for planning blocks of areas for oil and gas prospection and production]. PhD dissertation, COPPE/UFRJ, Rio de Janeiro, 308pp.

The growing demand for multiple water uses, particularly for the generation of electric energy, has been a common reason for social and inter-sectoral conflicts. The enhancement of technical instruments that can contribute to the negotiation and resolution of these conflicts is being sought through the adoption of the Integrated Environmental Assessment of watersheds, an integrated analysis of a group of future infrastructure investments (hydroelectric dams) to define the hierarchy for river and watershed sections based on environmental fragility or potential uses.

In early 2010, the Ministry of the Environment initiated, in collaboration with the University of Santa Maria and the Pampa Federal University, the Integrated Environmental Assessment of the Uruguai River watershed[159], to plan the new energy infrastructure investments in the watershed. The assessment will inform future decisions and the licensing processes for the expansion of the hydroelectric energy generation plants in the watershed, considering criteria for environmentally sustainable socio-economic development. This study represents an innovation for Brazil because it incorporates environmental variables early during the preparation phase of energy production plans and programs, rather than postponing the consideration of environmental impacts to much later, at the environmental licensing phase.

[159] http://www.clicerechim.com.br/27-11-2008_editoria_mariza_01.htm

Additionally, the President's Office developed, with the Ministry of the Environment and the Ministry of National Integration, the Sustainable Amazon Plan (PAS – *Plano Amazônia Sustentável*). This regional assessment and long term plan proposes guidelines to conciliate economic development with the sustainable use of natural resources, adding value to the socio-cultural and ecological diversity and reducing regional social inequalities. PAS was developed with contributions from the nine Amazonian states (Acre, Amapá, Amazonas, Maranhão, Mato Grosso, Pará, Rondônia, Roraima, and Tocantins) and public consultations involving approximately 6,000 people in the Brazilian Amazon Region. The main directives of the plan include the valuation of the regional socio-cultural and environmental diversity; promoting the use of already deforested areas and combating illegal deforestation; ensuring the territorial rights of traditional peoples; expanding the regional infrastructure; and promoting the shared management of public policies, among other guidelines. Examples of policies and actions being implemented under these guidelines are: Regional Sustainable Development Plan for the Area of Influence of Highway BR163; operations to combat illegal deforestation and land grabbing; Sustainable Territorial Development of the Marajó Archipelago (Pará); creation of a mosaic of protected areas around BR163 and the Terra do Meio region; and actions of the Citizenship Territory Program.

Other agencies are also adopting the approach of strategic environmental assessments, such as the Minas Gerais State Secretariat for the Environment and Sustainable Development (SEMAD)[160], which promotes Strategic Environmental Assessments in the implementation of sectoral public policies that generate impacts on the environment, with the objective of establishing long term governmental actions. Public participation is an important element of these assessments, which SEMAD ensures through the State Environmental Policy Council (COPAM), Sectoral Councils, and Watershed Committees. To-date, two Strategic Environmental Assessments were concluded: one in the energy sector (hydroelectric power) and one in the transport sector (highways). Both resulted in a decisions matrix that influenced a series of projects and programs in these two sectors. The energy sector assessment, for example, evidenced the need for the state to diversify its energy matrix and invest strongly in alternative energy sources in order not to overwhelm its hydroelectric sources. This conclusion let the state to invest approximately US$ 125 millions into the acquisition of wind power generation plants in Ceará state. The next challenge is to strengthen social participation in strategic environmental assessments, particularly private sector participation, and strengthen the use of this tool by the state environmental system and the sectoral secretariats in the decision-making processes. Three new assessments are being prepared for the sanitation, agribusiness and mining sectors.

The Ministry of the Environment and the Ministry of Planning Budget and Administration collaborated to develop, in 2009, the Guidelines for Strategic Environmental Assessment, with contributions from several governmental and academic institutions. These guidelines explain how SEA should be integrated to the development of policies, plans and programs, based on the process to develop the federal Multi-Year Plan.

[160] http://www.semad.mg.gov.br/avaliacao-ambiental-estrategica)

3.5. Achievements

As discussed in the previous sections, the mainstreaming of biodiversity into economic sectors is still at the initial stages and will require continuous effort and strong investments, particularly from the side of the public environmental agencies. Although ministries of various sectors plan and implement actions causing direct and indirect impacts on biodiversity (either positive or negative), there is no defined institutional border clearly indicating where the action of one agency ends and the action of another begins, despite the clearly defined missions and responsibilities in the statute of each agency. If this absence of borders can be positive on one hand, allowing wide spread conservation and biodiversity-related actions, or even facilitating the mainstreaming of biodiversity considerations, on the other hand it leads to action overlaps and a reasonable amount of lack of coordination among the decision-making levels of these institutions. Nevertheless, as mentioned in the previous sections and in Chapter 2, important initiatives exist for the mainstreaming of biodiversity considerations, both within the public sector and the private sector, with results that are not always measurable but are nonetheless perceived as positive attitude changes and evolving policies.

Even though environmental impact assessments have been part of Brazilian procedures for environmental licensing since 1986, stronger biodiversity considerations have only recently been included. These criteria are in the process of being officially incorporated into legal requirements, with several licensing agencies investing efforts into the development of technical definitions and new standard procedures. The use of strategic environmental assessments tends to increase gradually, motivated by the environmental licensing processes.

The Ecosystem Approach is new to Brazil. Initiatives to apply this tool are still punctual and its incorporation into required procedures needs further discussion, as well as the definition of methodologies and national protocols. Nevertheless, some governmental sectors are investing efforts to include principles of this approach into their planning and implementation processes, such as the water sector.

CHAPTER 4

CONCLUSIONS

4.1. Progress towards the 2010 Target

As discussed in section 2.4.1, Brazil's set of 51 national biodiversity targets for 2010, developed under a broad participatory process, is even more ambitious than the global targets (all of which are addressed by the national targets), which created an overwhelming challenge to the country. To improve and better measure the national progress toward these biodiversity targets it is necessary to refine the set of National Biodiversity Targets – reorganizing and improving differentiation among targets, directives and actions to define an enhanced and streamlined set of measurable targets and indicators linked to clearly identified mechanisms of implementation and monitoring.

Nevertheless, notable progress was obtained for a number of national targets (see section 4.1.1 below), although it is not yet possible to demonstrate precise quantitative progress for several targets.

4.1.1. National targets:

Progress obtained in the achievement of the national 2010 Biodiversity Targets (Table IV-1) is not homogeneous across targets and, as the development of an encompassing monitoring system with clear indicators has not yet been developed, measurement of progress is often qualitative and based on indirect indicators.

Table IV-1: Progress towards the National 2010 Biodiversity Targets

Target nº	National 2010 Biodiversity Target	Progress toward target	Status
Component 1 – Knowledge on biodiversity (focal area A of CBD's GSPC)			
1.1	An expanded and accessible list of formally described species of Brazilian plants and vertebrates, and of invertebrates and micro-organisms, these possibly selectively developed, in the form of permanent databases.	The most recent encompassing list of existing information on Brazilian biodiversity is the 2006 publication "Assessment of Existing Knowledge on Brazilian Biodiversity". In addition to punctual inventory initiatives by several actors, the Ministry of Science and Technology (MCT) initiated the development of a broadly accessible database – the Virtual Biodiversity Information Network – which should take a few years to become available. Several species catalogues have been published in recent years[161], such as: Check List of the Freshwater Fishes of South and Central America, which counted with significant participation of Brazilian specialists; Catalogue of Brazilian Marine and Freshwater Fish 2008; Catalogue of Brazilian Marine Fish; Catalogue of Brazilian Terrestrial Mollusks; and Catalogue of Crustacea of Brazil. Furthermore, several catalogues were published on specific insect groups, such as termites, ants, Neotropical bees (UFPR), Lepidoptera, Diptera, among others. The Brazilian Societies of	

[161] See Annex 2.

		Herpetology, Ornithology, and Mammalogy also maintain updated lists of Brazilian species. Additionally, Brazil published in May 2010 the National Checklist of Brazilian Flora, with over 40,000 plant and fungi species (http://floradobrasil.jbrj.gov.br/2010/). Annex 2 presents over 200 lists and catalogues of species under all phyla, which address all or part of the Brazilian species in each phylum.	
1.2	National Taxonomy Program established, aiming at a 50% increase in scientific records with an emphasis on new species descriptions.	The National Taxonomy Program (PROTAX) is already implementing a few actions, but is still being consolidated. Two important initiatives of the Brazilian government through the Coordination for Professional Improvement of Higher Education Graduates - CAPES, Ministry of Science and Technology - MCT and the Management and Strategic Studies Center - CGEE, both initiated in 2005, contribute to this target: the Modernization of Biological Collections (mid-term progress to be assessed by the end of 2010); and the National Program for Capacity Building in Taxonomy (PROTAX), with the objective of increasing installed capacity by 46% in seven years (by 2012). A new public bid of R$ 18 million (approximately US$ 10.6 million) was published in the third quarter of 2010, for a three year period. Additionally, MCT[162] currently supports three programs that contribute to increase scientific records on Brazilian biodiversity and to modernize scientific collections: the Biodiversity Research Program (PPBio); the National Program on Molecular Identification of Biodiversity (BR-BoL); and the National System of Biodiversity and Ecosystem Information (SIBBr). Furthermore, MCT also provides support to regional research networks with the objective of increasing biodiversity knowledge and sustainable use, such as the Northeast Biotechnology Network - RENORBIO in the semi-arid region, Biodiversity and Biotechnology Network of the Legal Amazon - BIONORTE in the Amazon region, Pro-Centro-Oeste Network of Post-Graduation Research and Innovation – Pro-Centro-Oeste for the Cerrado and Pantanal, and Science and Technology Network for the Conservation and Sustainable Use of the Cerrado - ComCerrado and the Pantanal Research Center to integrate the country's scientific and technological capacity.	
1.3	Virtual Brazilian Biodiversity Institute created and the expansion of the Biodiversity Research Program (PPBio) from the Amazon and the Caatinga to the remaining biomes in order to increase availability of information on biodiversity.	The Virtual Brazilian Biodiversity Institute has not yet been created, although the collection protocols and the data policy of the Biodiversity Research Program (PPBio) are already being published and the discussions on national biodiversity information systems and networks were initiated. The CENBAM (Center of Integrated Amazonian Biodiversity Studies) is one of the 122 new and already operational National Virtual Science and Technology Institutes approved by the Ministry of Science and Technology (MCT/CNPq) in 2008 and has the objective of integrating biological research in the Amazon into efficient networks of scientific-technological production. Eight of these Institutes are directed to biodiversity. Regional databases exist, e.g. the Biodiversity Research Program of Western Amazon and the Research Program on the Characterization, Conservation and Sustainable Use of São Paulo Biodiversity - Biota/FAPESP, both of which	

[162] Inter-ministerial Communication n° 094/MCT to the Ministry of the Environment, of June 2, 2010.

		make biodiversity data available to the country. The Ministry of Science and Technology has recently obtained GEF endorsement for the National Ecosystem and Biodiversity Information System – SIBBr, with a US$ 28 million budget for five years. In 2010, PPBio's focus was expanded by MCT, in partnership with the Rio de Janeiro Botanical Garden and Rio de Janeiro Federal University, to two other biomes (http://www.mct.gov.br/index.php/content/view/7913.html) through the PROBIO II Project: the Atlantic Forest and the Cerrado. Additionally, MCT created the National Institute of the Semi-Arid, based in Campina Grande/PB and the National Research Institute of the Pantanal, currently under construction in Cuiabá/MT.	
Component 2 – Biodiversity conservation (CBD focal areas 1 and IV)			
2.1	At least 30% of the Amazon biome and 10% of the remaining biomes and the coastal and marine zone effectively conserved through protected areas within the National Protected Areas System (SNUC).	The Brazilian government invested intensive efforts since 2002 into the achievement of this target. Although very significant progress was obtained, target achievement is uneven among biomes: 90.33% of the target in the Amazon (27.10% of the biome); 73.31% in the Caatinga (7.33% of the biome); 84.27% in the Cerrado (8.43% of the biome); 89.91% in the Atlantic Forest (8.99% of the biome); 47,92% in the Pantanal (4,79% of the biome); 34.97% in the Pampas (3.50% of the biome); and 31,37% in the Coastal and Marine zone (3,14% of the biome, which includes the territorial sea and the Exclusive Economic Zone. Note: ¾ of the protected areas are located on the coastal zone).	
2.2	Protection of biodiversity guaranteed in at least 2/3 of the Priority Areas for Biodiversity by means of SNUC Protected Areas, Indigenous Lands, and *Quilombola* Territories.	The latest revision (2007) indicates 2,684 Priority Areas for biodiversity protection in the country. Protected areas exist in 1,123 (41%) of these Priority Areas, and all 522 Indigenous Lands are considered Priority Areas (by themselves or as part of a larger priority polygon) for biodiversity conservation and sustainable use. Five national consultation processes were carried out involving 1,200 representatives of indigenous peoples to develop the National Policy for Territorial and Environmental Management in Indigenous Lands (PNGATI). The institution of the PNGATI through a governmental decree is expected to occur in 2010. Additionally, the GEF-supported Indigenous Project (*GEF Indígena*, US$ 36 million) is currently in its initial phase, under coordination of the federal government and representatives of indigenous peoples. This project will involve 30 indigenous lands and foresees actions for the effective conservation of a representative sample of Brazilian forest ecosystems in indigenous lands, increasing the value of these lands as conservation areas. The Quilombola Territories are not yet precisely mapped to allow comparison with Priority Areas.	
2.3	Temporary or permanent no-fishing zones, to protect fish stocks and integrated with protected areas, comprising 10% of the marine zone.	Up to early 2010, only 1.57% of the marine zone (including the Exclusive Economic Zone) was under official protection, with ¾ of the protected areas located on the coastal zone and the area inside full protection protected areas corresponding to only 0.12% of the marine zone. However, given the large extension of the Brazilian coast, this percentage (1.57%) corresponds to 54,389 km^2. Additionally, Brazil has adopted since 1984 the practice of "*defeso*", meaning temporary suspension of fishing activities for specific targeted species during their reproductive period and recruitment and growth periods.	

		This practice was established by law in 1967, but specific legislation for each benefitted species has been developed since 1984. A total of 19 species benefit from the *defeso* (8 crustaceans and 11 fish species). For freshwater species, Brazil determined the temporary suspension of fishing activities during reproductive migrations in the 10 main watersheds in the country. The National Protected Areas Plan (PNAP) foresees the definition of no-take zones inside or outside protected areas as one of the components of a representative system of protected areas. This fisheries management instrument is generally applied by the 18 federal marine Extractive Reserves (RESEX) in strategic portions of their areas, as well as by the marine Environmental Protection Areas. There is also a growing trend to create marine protected areas at the state level, which may contain permanent of temporary no-take zones, or zones where specific fishing activities are disallowed.	
2.4	All species officially recognized as threatened with extinction in Brazil as object of action plans and active advisory groups.	The current lists of threatened species indicate 627 animal species and 472 plant species. Existing conservation action plans address only 5% of the threatened animal species, but with the new plans currently under preparation by ICMBio this percentage should increase to 25% by the end of 2010. ICMBio plans to develop Action Plans for all threatened animal species by 2014. The efforts related to plant species are still incipient, but the National Center for Plant Conservation (the CNCFlora at JBRJ), created in 2009, has 12 Action Plans for threatened plant species (addressing 4.3% of threatened species) already prepared or under preparation. Other seven Plans are scheduled to be prepared in 2010 and CNCFlora estimates that a total of 20 Action Plans will be concluded by the end of 2010. Additionally, ICMBio is preparing a Conservation Action Plan for 33 species of *sempre-vivas*[163]. Twelve of these plans have already been published, and there are also ongoing efforts directed to the threatened Cactaceae species. Brazil is also developing a system for the management of its threatened plant species. This system will allow the assessment of the threat status of all species included in the List of Brazilian Flora, which should be concluded by 2012.	
2.5	100% of threatened species effectively conserved in protected areas.	Data presented by the Rio de Janeiro Botanical Garden in the 2006 workshop for the definition of national targets indicated that 54% of the threatened plant species (2005 list) occurred inside protected areas. As data on the geographical distribution for flora species is deemed precarious, additional studies are necessary to better quantify target achievement for threatened plant species. NGO Biodiversitas released in 2010 an assessment of animal species based on the IUCN's AZE methodology. A subgroup of 181 threatened species from 197 critically endangered or endangered species with restrictive geographical distribution was selected as the focus of the analysis in Brazil, excluding sea mammals and sea fishes. The study (BAZE) concluded that 32 of these 181 species are present in protected areas and developed recommendations to enhance the protection of these species. Additionally, according to the Red Book for Brazilian Fauna (2008), 403 (64%) of the 627 animal species officially listed as threatened were already recorded	

[163] Dried herbaceous ornamental plants.

		as present in protected areas: 47 of the 78 aquatic invertebrates; 67 of the 130 terrestrial invertebrates; 61 of the 154 fish species; 58 of the 69 mammals; 144 of the 160 birds; 16 of the 20 reptiles; and 10 of the 16 amphibians. However, additional studies are necessary to determine the degree of protection being provided by these protected areas to these threatened species.	
2.6	25% reduction in the annual rate of increase of threatened species of fauna on the National List and de-listing of 25% of species currently on the National List.	Since 1968 Brazil periodically publishes the national list of threatened animal species (1968; 1973; 1989; and 2003/2004). However, as methodologies are constantly enhanced, each list was prepared differently and cannot be directly compared with the previous ones. Additionally, the number of assessed taxa and threatened species also changes as knowledge on species distribution and population, and ecosystems increases. The most recent information (the 2008 Red Book of Brazilian Fauna[164]) was prepared by 282 experts based on extensive data, when available, on various aspects of each target species, such as the species' biology, ecology, demography, geographical distribution, threat, and conservation efforts. Specific analyses are only possible when individual taxonomic groups are compared across historical lists. One such analysis[165] compared the number of Brazilian species on the 2004 and the 2006 IUCN lists and found that the number of listed Brazilian threatened species reduced 2% for mammals; increased 4% for birds; increased 15% for amphibians; increased 28% for fish; increased 1% for plants; and remained unchanged for reptiles, mollusks, and other invertebrates; resulting in a total 4% increase in the number of threatened species. Additionally, the 2008 Red Data Book compared the status of bird and mammal species: of the 44 assessed species in the 4 previous lists, 29 (64%) remained listed for 35 years, indicating that the causes of their threatened status persist until present. Despite this fact, 14 species (30%) were de-listed by the 2003/2004 assessment. It was also noted that the average rate of permanence on the list was higher for mammals (91.7%) than for birds (79.2%), indicating that the threat factors affecting these species are more permanent for mammals than for birds. Nevertheless, the Actions Plans under preparation should contribute in the coming years to improve this target (see Target 2.6) and existing long term conservation projects (developed along the last 20-30 years) have significantly improved the status of selected species. Examples are the golden lion tamarin, marine turtles (except the leatherback turtle), humpback whales, right whales, Amazonian freshwater turtles, wooly spider monkeys, among others.	
2.7	A preliminary national-level assessment of the conservation status of all known plant and vertebrate species and a selective assessment of	Brazil updated in 2003/2004 the list of threatened animal species (which was reorganized and supplemented in 2008 with additional information on each species, resulting in the Red Book of Brazilian Threatened Fauna)[166] and the list of	

[164] Machado, A.B.M.; Drummond, G.M.; Paglia, A.P. (Eds.). 2008. Livro vermelho da fauna brasileira ameaçada de extinção [*Red Data Book of the Brazilian Threatened Fauna*] – Volume I e II. Brasília, DF: MMA; Belo Horizonte, MG: Fundação Biodiversitas.
[165] Grativol. A. 2006. Tendências de perda de diversidade genética no Brasil [*Trends of the loss of genetic diversity in Brazil*]. Apresentação no Seminário para Definição das Metas Nacionais de Biodiversidade para 2010. Brasília, 2006.
[166] Machado, A.B.M., Drummond, G.M., Paglia, A.P. (Eds.) 2008. Livro vermelho da fauna brasileira ameaçada de extinção. Brasília, DF: MMA; Belo Horizonte, MG: Fundação Biodiversitas.

	invertebrate species.	threatened plants in 2008. The Red Book of Threatened Plants is in its initial preparation phase. The review of both lists assessed as many species as possible and, during this process, 2,130 pre-selected animal species and 5,312 plant species were assessed before the end of the process to define the current lists of threatened species. Limited comparative analyses were carried out on historical lists of threatened species (see target 2.6). However, this represents a selective assessment of the threatened and/or best known species and the country is still far from assessing all known species. New updates are being prepared by ICMBio (fauna) and CNCFlora/JBRJ (flora). ICMBio will assess all known animal species occurring in Brazil or, when data is insufficient or unavailable, at least all endemic species. This assessment will initiate with species currently listed as threatened, and intends to assess all 8,000 vertebrate species by 2014. Additionally, ICMBio established collaboration with IUCN to initiate regional assessments of select animal species groups. First results are expected to be available by the end of 2010. The CNCFlora intends to assess the risk of extinction of all vascular species of the Brazilian flora (approximately 32,000 species) by 2012, based on a system currently under development and on the criteria and categories established by IUCN.	
2.8	60% of threatened plant species conserved in *ex situ* collections and 10% of threatened plant species included in recovery and restoration programs.	The Brazilian botanical gardens, under the Brazilian Action Plan for Botanical Gardens, designed according to GSPC, commit to maintain in their collections species of the region/biome where the garden is located, with special emphasis to threatened species. Approximately 18% of Brazilian threatened plant species are currently conserved *ex situ* in Botanical Gardens. The Rio de Janeiro Botanical Garden (JBRJ), for example, developed some initiatives to increase *ex-situ* collections (see section 1.4.6) and currently conserves 49 threatened species in its arboretum and greenhouses, and develops conservation and research projects for select groups of species. The National Center for Plant Conservation (CNCFlora) is responsible to assess the degree of achievement of this target. However, it is important to remember that conservation in botanical gardens rarely works with populations large enough to allow the continued evolution of a target species, which is essential for recuperation and restoration programs. The minimum population size to maintain evolutionary viability without the loss of rare alleles in the short and long term is, respectively, of 50 and 1,000 specimens, while botanical gardens rarely work with more than 5 plants of the same threatened species for logistical and economic reasons. In addition to these efforts, EMBRAPA carries out collection and *ex situ* conservation actions in environmentally impacted areas, which include punctual actions involving threatened plant species. EMBRAPA and other institutions also carry out important work for the conservation of plant species in gene banks, although this is an effort directed at agricultural biodiversity and which, even with the eventual inclusion of threatened agricultural species, also faces difficulties to keep collections large enough to maintain the evolutionary viability of species (see target 2.10). Thus, there are on-going efforts for *ex situ* conservation, although the actual geographical and intra-specific scope of these efforts is not yet fully known.	

2.9	60% of migratory species are the object of action plans and 30% of these have conservation programs implemented.	Brazil has not yet carried out a complete inventory of all migratory species present in the country. Data are available on migratory birds and fish, but focus up to now was primarily given to endangered species. There are incipient initiatives under IBAMA and ICMBio on the development and implementation of Action Plans for some threatened migratory birds such as albatrosses and petrels, and initial studies for an Action Plan for overexploited fish species, still at the early contracting phase. Of the 446 migratory species listed by the Convention of Migratory Species, 51 occur in Brazil. Of these, 24 are also present in the National List of Threatened Species. ICMBio is focusing initial efforts in addressing the threatened species and has already developed Action Plans for 5 of these (*Diomedea chlororhynchos [Thalassarche chlororhynchos]; Diomedea exulans; Diomedea melanophris [Thalassarche melanophris]; Macronectes giganteus*, and *Procellaria aequinoctialis*). Action Plans for 12 other threatened species (*Balaenoptera musculus; Balaenoptera physalus; Caretta caretta; Chelonia mydas; Dermochelys coriácea; Eretmochelys imbricata; Eubalaena australis; Lepidochelys olivacea; Megaptera novaeangliae; Physeter macrocephalus; Pontoporia blainvillei;* and *Trichechus inunguis*) are under preparation. Additionally, two long term conservation programs exist in Brazil for sea turtles (since 1980) and humpback whales (since 1987, now also addressing other cetacean species), with significant success (www.tamar.org.br and www.baleiajubarte.org.br).	
2.10	70% of the genetic diversity of socio-economically valuable cultivated or exploited wild plant species and associated indigenous and local knowledge maintained.	Current institutional strategies to conserve this genetic diversity are all *ex situ*, although a fair portion of the genetic diversity of cultivated plants is conserved *on farm*, and that of plants exploited by extractive activities is conserved both *on farm* and *in situ*. The Ministry of the Environment is initiating the contracting of studies to map the universe of existing cultivated species and varieties (including wild relatives and land races), and to assess how much of this diversity is actually conserved *in situ*, *on farm* and *ex situ*. Results are expected to be available by 2011. EMBRAPA carries out important work in the consolidation of the National Platform of Genetic Resources (http://plataformarg.cenargen.embrapa.br/pnrg), which is composed by 4 large networks: Plant Network; Animal Network; Microorganisms Network; and Integration of Genetic Resources Networks. This work targets the integrated management of genetic resources at the national level. EMBRAPA also maintains Active Germoplasma Banks with over 170,000 accesses for cereals; foraging species; leafy greens; oil and fiber producers; legumes; fruit species; medicinal plants; ornamental plants; forest species, palm trees; industrial species; roots; and tubers. Additionally, EMBRAPA maintains other 107,000 accesses in a long term gene bank (base collection), and other banks/collections maintain over 3,000 accesses. The combined efforts of EMBRAPA and other institutions have increased both *ex-situ* collections and *in-situ* conservation of plants relevant for agrobiodiversity over the last 10 years (see section 1.2.3). The *in-situ* conservation of traditional varieties has also improved over this period, with governmental action to officially demarcate indigenous lands (all Brazilian indigenous peoples practice traditional agriculture). It is estimated that 50% of the most important species cultivated at the national scale are maintained *ex*	

		situ, including land races and non-native varieties. Of the land races varieties, the pineapple, peanut and cassava varieties are maintained at over 70% *ex situ* or *on farm*, although each of these is represented by small samples. Maintenance of the main varieties cultivated at the regional and local scale is estimated at below 30%. However, further analysis of existing and non-compiled data on the conservation status of species cultivated at the national, regional and local levels is necessary to better quantify target achievement, as well as more encompassing sampling and analyses, especially considering the continental size of the country. Whenever traditional communities and indigenous peoples actively use an agricultural species, the associated traditional knowledge is being maintained and can be expanded. However, the mapping of locations where this is occurring was not yet carried out. Thus, there are on-going efforts for *ex situ* conservation, although the actual geographical and intra-specific scope of these efforts is not yet fully known.	
2.11	50% of priority species under the Plants for the Future Project conserved *in situ* and on-farm.	This project, coordinated by MMA, identified approximately 600 species of the Brazilian flora as plants with current and potential economic value: the Plants for the Future. A great number of these species is cultivated by local and traditional communities, many grown in sustainable use protected areas, and by indigenous peoples in demarcated indigenous lands. The federal government also provides incentives for the cultivation of land races through the Agrobiodiversity Management and Dissemination Centers - CIMAs Program, and promotes family agriculture (which tends to include traditional varieties of some of the species of the Plants for the Future Project) through the several governmental programs for food acquisition (Minimum Price; Socio-biodiversity Products; Family Agriculture – PRONAF; etc.). The Plants of the Future project supported regional actions to disseminate the selected species and promote their use. Each geopolitical region is encouraged to promote the species identified in the 11 species use groups defined by the project (food; fruit; medicinal; aromatic; ornamental; oleaginous; timber; honey producers; fiber; foraging, and toxic/biocide), totaling at least 40 species per region. The number of priority species maintained in *ex situ* collections to begin plant breeding and dissemination efforts is still small, given the recent conclusion of the reports identifying the relevant species, and is essentially restricted to those species whose potential had been previously identified. In the North region, for example, at least 10% of the priority species are present in *ex situ* collections and 5% are being improved. At the same time, almost all priority species are commonly used by traditional communities and indigenous peoples, and as such their *on farm* conservation occurs naturally.	
2.12	60% of the genetic diversity of Brazilian wild relatives of cultivated plant species of the ten priority genera effectively conserved *in situ* and/or *ex situ*.	Wild relatives of some priority crops, as well as small samples of some wild populations of priority cultivated species are conserved *ex situ*. One example is the peanut, for which most of the wild relatives have at least one access that is conserved *ex situ* at EMBRAPA. The peach palm, however, is an example of the difficulty to conserve this type of material *ex situ*, as the species has thousands of wild populations occurring throughout one third of the Amazon Basin, including along the deforestation arch crossing the	

		southern portion of the Brazilian Amazon, and the emerging agribusiness involving peach palm heart-of-palm is not yet organized to support the species' conservation. Consequently, only 8 accesses of 2 populations are conserved in a gene bank, which has uncertain future. Wild relatives of other important crops are also being inventoried, such as: pineapple, peppers and sweet peppers, potato, sweet potato, cashew, and passion fruit. Passion fruit, for example, is well represented, as many of its wild relatives are potential ornamental plants and are present in *ex situ* collections to assess this potential. Genetic material originating from some representative areas of the geographical distribution of these species is well conserved in some of the Brazilian research institutions. A large number of wild relatives of cultivated species is also conserved *in situ* at protected areas and indigenous lands, as well as through EMBRAPA pilot initiatives (specific projects and gene banks). However, further analysis is necessary to better define the status of target achievement. In addition to the 10 priority genera, other 2 are being studied: sweet potato and tomato.	
2.13	Capacity of ecosystems within Priority Areas for Biodiversity to deliver goods and services maintained or increased.	The total area under official protection increased significantly in Brazil, including in Priority Areas (see targets 2.1 and 2.2), and there was a decrease in deforestation and fire occurrences. The analysis of the status of the Priority Areas for Biodiversity was initiated in 2010 by IBAMA through its new monitoring system. Results are expected to be available by the end of 2010. A 2010 study[167] assessed the protection of natural vegetation provided by the Brazilian Forest Code, and observed that the Permanent Preservation Areas (APPs) and Legal Reserves (RLs) inside private properties cover, respectively, 12% and 30% of the national territory which, combined, correspond to twice the area under official protection (protected areas under the National Protected Areas System - SNUC). However, 42% of the APPs present illegal deforestation, as well as 16.5% of the RLs. Additionally, 3% of the officially protected areas and indigenous lands also suffered illegal deforestation. The effectiveness of legal protection varies with geographical regions and biomes. Available data for the Cerrado, Caatinga, Pantanal e Pampa[168] biomes from the Project of Satellite Monitoring of the Deforestation in Brazilian Biomes (PMDBBS[169]), overlapped with the map of Priority Areas for Biodiversity, assisted in the definition of a preliminary estimate[170] of the degree of achievement of this target. Priority Areas of the Cerrado still maintain, on average, 65.9% of their original vegetation cover. However, there is large variation among them, with areas presenting the highest degree of deforestation located in the south of the biome, while the best conserved areas are located in the north. The extent of	

[167] Sparovek, G. *et al.* 2010 (in press). Brazilian agriculture and environmental legislation: status and future challenges. *Environ. Sci. Technol*., manuscript accepted June 30, 2010.
[168] Monitoring data for the Amazon and Atlantic Forest biomes were not accessible at the time of this analysis.
[169] Monitoring project implemented through the partnership MMA, IBAMA and UNDP: http://www.mma.gov.br/sitio/index.php?ido=conteudo.monta&idEstrutura=72&idConteudo=7422&idMenu=7508
[170] de Lima, M.G., in prep. *Estimativa de remanescentes em áreas prioritárias para a conservação: o caso do Cerrado, Caatinga., Pantanal e Pampa*.

		remaining vegetation in these Cerrado Priority Areas varies from 0.3% to 100%. Priority Areas in the Pampas biome maintain on average 63.3% of their original vegetation cover, varying from 7.0% to 100%. In the Caatinga, the average remaining vegetation cover is 70.5%, varying from 4.2% to 100%. Priority Areas in the Pantanal present the highest average of remaining vegetation cover of the biomes included in this analysis (89.7%), suggesting better maintenance of the vegetation, but all Priority Areas in this biome suffered some measure of deforestation, with the extent of original vegetation cover varying from 28.0% to 99.9%.	
2.14	Significant increase in actions to support *on-farm* conservation of the components of agro-biodiversity that ensure maintenance of sustainable livelihoods, local food security and health care, especially for local communities and indigenous peoples.	Several initiatives are being carried out by the Ministry of Agrarian Development, Ministry of Agriculture, EMBRAPA, and the Ministry of the Environment, to support the development of such actions. A significant number of traditional communities and family farmers already conserve numerous species significant for agrobiodiversity, also stimulated by national policies and the federal programs[171] to acquire produce from these producers for public schools and hospitals and to ensure minimum prices for these products (over R$ 45 million – approximately US$ 26.5 million were already invested in these two programs, benefitting 30,000 families of traditional peoples and communities); and to promote cultivation of traditional varieties (CIMAS). Additionally, various initiatives involving NGOs and social movements or organizations (Small Farmers Movement; CONTAG; Ecovida Network; Cerrado Network, etc.) contribute to *on-farm* conservation. The government supported 1,300 projects of extractive communities for the use and conservation of socio-biodiversity products, benefitting close to 80,000 families and investing R$ 55 million (approximately US$ 32.4 million). There is also an on-going governmental initiative that provides direct support to indigenous peoples through project portfolios, and has already supported 448 projects managed by indigenous organizations, providing direct benefits to approximately 20,000 families and investing the total amount of R$ 65 million (approximately US$ 38.2 million). However, additional inventories and data collection are needed, as well as further analysis to better define status of target achievement.	
Component 3 – Sustainable use of biodiversity components (CBD focal area II)			
3.1	30% of non-timber plant products obtained from sustainably managed sources.	The government has invested significantly during the past 5+ years in the creation of Extractive Reserves and in the support for the sustainable management and production of non-timber forest products, as well as in the development and implementation of policies and TA programs to assist	

[171] National Policy for the Sustainable Development of Traditional Peoples and Communities; National Regional Development Policy (PNDR); Territories of Citizenship Program; National Program for Strengthening Family Agriculture (PRONAF); Program for the Acquisition of Food Produced by Family Agriculture (PAA); Policy on Minimum Price Warranty; Program to Support the Commercialization of Products from Extractive Activities (PAE); Permanent Working Group for Local Production Schemes; Demonstration Projects of Sustainable Production (PDA/PPG7); Agrobiodiversity Program; Program to Support Ecotourism and Environmental Sustainability of Tourism (ProEcotur); National Policy for Environmental Management in Indigenous Lands (PNGATI); Law 11.947/2009, on the use of resources from the National Fund for Student Development (FNDE) for the acquisition of school lunch.

		in the economic sustainability of these activities, e.g. through the National Policy on Medicinal Plants and Phytotherapics (2006) and the National Plan for Promoting Socio-biodiversity Product Chains (instituted in 2009). The latter has, among its objectives, the development of good practices for the management of 20 non-timber forest products. This objective is currently fulfilled at 30%. According to 2009 IBGE data, six products represent 90.6% of the current non-timber plant products production: babassu nuts; assai fruit; piassava fiber; mate; carnauba (wax, powder, fiber); and Brazil nut. The current first phase of the 2007 National Plan focuses primarily on the Brazil nut and babassu production chains, given their high socioeconomic and environmental relevance: together, they benefit about 500,000 people and generate an annual income of approximately US$94 million. The other eight production chains supported by the Plan are: assai and rubber in the Amazon; carnauba and umbu in the Caatinga; pequi, baru and mangaba in the Cerrado; and piassava in the Atlantic Forest. A Management Committee and the minimum price were established for each of these products. Only 22% of the projects supported by the Secretariat of Extractive Activities and Sustainable Rural Development include plant management plans, fishing plans, and environmental license. The Secretariat disseminates its programs and good practices in fairs such as the annual National Fair of Family Agriculture and the ExpoSustentat, as well as international fairs such as BioFach in Germany. It is estimated that three of the 10 target production chains (Brazil nut, babassu and assai) are sustainably managed, but not necessarily in the entire country. In 2008, 158 Community Management Plans and 522 small-scale Individual management Plans were mapped in the Brazilian Amazon, all approved. Of the projects supported by the Ministry of the Environment, it is estimated that 40% follow formally prepared management plans and the remainder apply traditional resource use practices. Available data are not currently structured in a way to allow proper assessment of the degree of environmental sustainability of the target production chains. Additional data collection and further analysis are necessary to define status of target achievement.	
3.2	Recovery of at least 30% of main fish stocks through participative management and capture control.	Brazil created a few protected areas with no-take zones, continues the monitoring and enforcement of fisheries production, and increased efforts for the satellite monitoring of larger fishing vessels. The Ministry of the Environment also published in 2004 a Normative Ruling listing threatened and overexploited aquatic invertebrate species and fish species and required the elaboration and implementation of recovery plans. However, reports on capture effort indicate that fish stocks continue to decline. Although marine fisheries contribute to 63% of the total annual fish production in the country, at least 80% of these resources are currently overexploited or fully exploited (REVIZEE, 2006). Nevertheless, there are examples of local projects that have recovered fish stocks at the local scale: e.g., pirarucu (*Arapaima gigas*) at the Mamirauá Reserve (Amazon) with MCT support; ProVárzea Project in the Amazon; selected fish species at the Costa dos Corais Environmental	

		Protection Area (PE/AL); Marine Extractive Reserves along the Brazilian coast; among a few other initiatives[172]. There are also state initiatives to protect fish stocks, such as the creation in 2008, by the state of São Paulo, of three Marine Environmental Protection Areas. The entire protected areas are being managed by advisory councils and have already produced results with the definition of zones where the use of bottom pair trawl is not allowed.	
3.3	40% of the area in the Amazon under forest management plans certified.	In 2004, the Amazon had 3,278,721 hectares under forest management, 39.4% of which was certified (1,292,118 hectares). By 2010, the area under certified forest management doubled but, as the total area under forest management increased by 315%, the proportion decreased: 10,341,455 hectares being managed, 25% of which certified (2,638,551 hectares). Nevertheless, this 25% proportion translates into a target achievement according to the current managed area reaching just a little beyond 50%.[173] During the past several years, there was an increase in the number of activities with voluntary certification, both granted by Cerflor (the Brazilian Forest Certification Program[174]) and by international systems such as the Forest Stewardship Council (FSC).	
3.4	80% of Extractive Reserves and Sustainable Development Reserves benefit from sustainable management of fauna and flora species important for food or economically, with management plans prepared and implemented.	As of August 2010 Brazil had 59 federal Extractive Reserves (RESEX) and 1 federal Sustainable Development Reserve (RDS). Management plans were developed and are under implementation in only 3 of these protected areas, and under development for 50 other areas. Of the latter, 15 should be completed by early 2011. By late 2011, 45% of the targeted species should have management plans under implementation. The schedule for preparation of management plans for the remaining 6 areas was not defined yet. Brazil also has 28 state Extractive Reserves and 28 state Sustainable Development Reserves. Of these state protected areas, 3 RESEX and 16 RDS are already included in the National Cadastre of Protected Areas, none of which have management plans.	
3.5	80% reduction in unsustainable consumption of fauna and flora resources in sustainable development protected areas.	The preparation and implementation of management plans for this category of protected areas, as well as increased monitoring and enforcement should significantly reduce the unsustainable use of living resources. However, as most protected areas under this category have not yet completed preparation of their management plans and monitoring of PAs is still deficient, existing information is insufficient to define status of target achievement.	**?**
3.6	No species of wild fauna or flora endangered by international trade in accordance with CITES provisions.	Legislation was put in force to prevent illegal international trade of Brazilian wild fauna and flora, but in practice illegal trade continues to occur. Nevertheless, the current monitoring system for legal trade works well, reports are produced and the entire process is monitored by IBAMA, which is responsible for analyzing and issuing CITES permits. Since 2006, an online service to process CITES permits was established by IBAMA. In 2009, IBAMA issued 98 export permits for flora, almost entirely for cultivated orchids. Although governmental action to combat illegal	

[172] Ministry of the Environment, Brazil. 2007. Aquatic Protected Areas as Fisheries Management Tools. Protected Areas of Brazil Series n° 4, 267pp.
[173] Ministry of the Environment, Brazil, 2010. Brazilian Forest Service. Information provided by the Executive Manager.
[174] http://www.inmetro.gov.br/qualidade/cerflor.asp

		international trade has increased and become more effective (see target 3.7) animal species continue to be threatened by illegal international trade. Nevertheless, to standardize procedures and streamline the evaluation of export and import requests for specimens, biological material, fauna products and sub-products, the Brazilian government adopted through IBAMA the SISCITES online system[175]. Access to SISCITES requires previous Registration in the Federal Technical Cadastre as Brazilian or alien wildlife importer or exporter. From 2002 to 2009, IBAMA received 4,207 calls reporting illegal commercialization or transport of wild fauna and 2,250 calls reporting illegal transportation of forest products (note: the proportions of these activities connected to international and national trade are not known). The number of calls reporting these illegal activities was very reduced in 2002 (11 and 13, respectively), and increased significantly in the following years, peaking at 923 and 412 in 2006 and falling about 50% by 2009, which is still significantly higher than 2002 numbers (see target 3.7 for more information on reporting calls).	
3.7	Significant reduction in illegal trade in fauna and flora species within Brazil.	The commercial hunting of wildlife is illegal since 1967 in Brazil, according to the Wildlife Protection Code. Additionally, legislation was put in force to prevent illegal trade of Brazilian wild fauna and flora and a non-quantified reduction did occur, but illegal trade continues to occur. Educational campaigns by IBAMA as well as special law enforcement and apprehension actions carried out by the Federal Police have increased, and stricter rules were also put in place for the transport of plants and animals at ports and airports. There was also an increase in the number of collaborative actions carried out by NGOs such as the National Network to Combat Illegal Wildlife Trade - RENCTAS. However, illegal wildlife trade is also connected to other illegal activities such as drugs, weapons and precious stones, which involve organized crime. Although the special operations carried out by the Federal Police have successfully dismantled various schemes, many organized groups still exist and the reduction in illegal wildlife trade is still estimated as relatively small. Anti-trade campaigns were launched at the main international airports in 2006, 2007 and 2008, and other campaigns have been happening since then, both at airports and through the television. Operations of the Federal Police apprehended 22,682 animals in 2002; 800 in 2003; 537 in 2004; 415 in 2005; and 230 in 2006. Animals were not among the main apprehensions in 2007 and 2008. The Wildlife Rescue Centers – CETAS/IBAMA distributed throughout the country received on average, from 2002 to 2008, 35,350 apprehended animals of the Brazilian fauna, with a peak of 53,482 animals in 2003. This number presented a sharp increase in 2009, reaching 89,250 animals. From 2002 to 2009, the percent of animals that were released back into the wild varied from the minimum of 22% in 2002 to the maximum of 62% in 2004. The remaining apprehended animals were moved to zoos, breeding facilities, scientific research projects, or did not survive. Additionally, IBAMA created the SISFAUNA (for wildlife) and SISPASS (for birds) systems to better monitor national breeding, trade and transport of Brazilian wildlife.	

[175] http://www.ibama.gov.br/fauna-silvestre/areas-tematicas/exp-imp-cites/

		IBAMA created an ombudsman service (*Linha Verde*) to receive calls reporting on illegal activities related to the environment and biodiversity (illegal hunting; capture of wildlife; wildlife in captivity; illegal trade and transport of wildlife or forest products; killing of wildlife; illegal fishing; illegal trade of fauna, flora or fish products and sub-products; environmental pollution; deforestation; fire; and introduction of alien fauna). From 2002 to 2009 IBAMA received 48,128 calls reporting illegal activities, 27,895 of which (58%) on illegal activities directly related to wild fauna or flora. The number of reporting calls was very low in 2002 (total of 185), presenting an extraordinary increase to 4,099 reporting calls in the following year and peaking at 9,825 calls in 2007. Although the number of calls has fallen since then, it is still significantly higher than in 2002 (5,651 calls in 2009). Of the total 48,128 reporting calls received from 2002 to 2009, 46% had a complete solution; 28% were partially resolved; and no action was taken for 26%. During this period, 14% of the reporting calls (6,717) related directly to activities potentially connected to biopiracy (trade and transportation of wild animals, fish or plants, or their products and sub-products). RENCTAS published in 2001 the fist National Report on Illegal Wildlife Trade, the most complete document on the theme including trade routes and analyses of trade actions. The greatest difficulty for monitoring this theme is the lack of standard records among the various responsible agencies, which remains a challenge today. In 2001, RENCTAS estimated that Brazil participated with 5% to 15% of the global illegal wildlife trade.	
3.8	80% increase in innovation and added value for new biodiversity-based products.	One of the targets of the National Plan to Promote the Socio-biodiversity Production Chains (2009) intends to add value to sustainable products from extractive activities. For that, a Network of 40 community ventures was formed and has been receiving training, support for the development of business plans, and for the establishment of partnerships with the private sector. Approximately 70% of the projects supported by the Ministry of the Environment involved adding value to biodiversity-based products. The Ministry of the Environment, the Ministry of Science and Technology, and other agencies, as well as NGOs, are investing significantly in the sustainable use of Brazilian biodiversity and in value-added production chains for biodiversity-based products, but statistics are not available to quantify status of target achievement (see target 3.1). From 2003 to 2009 the MMA's Department of Extractive Activities invested[176] the equivalent to approximately US$6.5 million in sustainable development projects for indigenous peoples and traditional communities (socio-biodiversity production chains). Examples of the initiatives (products and innovations) under the National Policy on Sustainable Development of Indigenous Peoples and Traditional Communities are: ecological charcoal; pequi – *Caryocar brasiliensis* (and other native fruits) liquor; latex-based plant leather and forest cloth made with native cotton from the Kaxinawa People; in addition to community-made cosmetics, jams, sweets and crafts; specific machinery to break baru	

[176] MMA, 2010. Balanço 2009. Internal report, 32 pp.

		(*Dypterix alata*) and babassu (*Orbignya phalerata*) nuts; among other initiatives.[177] Cooperatives and Producer Associations are also investing in adding value to sustainable biodiversity-based products, such as the Cooperative of Oyster Producers in Cananéia (São Paulo). Biodiversity-based products with added value are advertised at dissemination events such as ExpoSustentat Latin America (2005 to 2009), with emphasis to biojewels; basketry; wood and ecological (plant-based) leather handcrafts; and cosmetics, among other items.[178] Additionally, the Ministry of Agriculture Livestock and Supply (MAPA) and Ministry of Agrarian Development (MDA) develop initiatives that add value to biodiversity-based products, such as Origin Denomination; Integrated Agricultural Production with certification of products; and capacity-building programs such as promotion to Local Production Systems (APL) and the Rural Technical Assistance to extractive workers on sustainable use of biodiversity (which qualifies extractive workers to PRONAF assistance), among other initiatives.	
3.9	80% increase in new sustainable uses of biodiversity in medicine and foods leading to marketable products.	Numerous new biodiversity-based phytotherapics and foods have become available in the past several years. In Brazil, plant-based medicines represent approximately 7% of the pharmaceutical market, corresponding to US$400 million per year and close to 100,000 jobs[179]. Numerous native plants used by traditional medicine were officially recognized by the federal government in 1926 with their inclusion in the publication Brazilian Pharmacopoeia (FBRAS), which is revised and updated from time to time. The most recent revision started in 2008 and is still ongoing. Updated information is available at the ANVISA webpage[180]. There are at least 10 plant species with registered patents as phytotherapics recorded at the National Institute of Industrial Property (INPI) and at least 50 Brazilian phytotherapic products available in the market but not patented[181]. Several companies produce and sell numerous plant-based products such as plant extracts, oils and other products as foods or raw material for phytotherapics and cosmetics[182], and investments in this sector are increasing. Brazil developed in 2005 the National Policy on Medicinal Plants and Phytotherapics with the objective of ensuring to the Brazilian people safe access to and the rational use of medicinal plants and phytotherapics, promoting the sustainable use of biodiversity, development of the production chain and development of the Brazilian pharmaceutical industry. This policy establishes criteria for the cultivation, research and testing of medicinal plants and products.	

[177] http://www.redecerrado.org.br/
[178] http://www.otca.org.br/salaandesamazonia/index.php?option=com_content&task=view&id=72
[179] Bolzani, VS, 2005. In: Carlini, E., Rodrigues. E. **Plantas Medicinais do Brasil**: o Pesquisador Brasileiro Consegue Estudá-las? *Revista Fitos* 1(2): 8-18.
[180] http://www.anvisa.gov.br/hotsite/farmacopeia/index.htm
[181] http://www.redetec.org.br/inventabrasil/yfitote.htm
[182] Examples: Beraca Ingredients (https://www.zeusquimica.pt/uploads/gc/Beraca.pdf); Amazônia Empório (www.amazoniaemporio.com); Loja Virtual da Terra (https://www.rumo.com.br/sisterna/ListaProdutos.asp); Chemyunion (http://www.chemyunion.com.br); Seiva Brazilis (http://seivabrazilis.com.br); Inovam Brasil (http://www.inovam.com.br/index.htm).

		Additionally, numerous biodiversity-based food products are becoming increasingly available in Brazilian markets, such as fruit pulp, juices, ice cream, deserts, flours, seasoning, nuts, etc. Although numerous requests for research and use of biodiversity for a variety of products continue to be submitted, authorization to develop these projects are still limited, due to requirements of the legislation on access and benefit sharing. Efforts are being undertaken to update the legislation. It is also worth mentioning that Brazil has seen a very significant increase in the development and commercialization of biodiversity-based cosmetic products in recent years, by small and large enterprises (e.g. Natura).	
3.10	Significant increase in detection, control and repression of bio-piracy.	Control actions have increased and become more efficient in ports and airports (see target 3.7). IBAMA also provides annual biopiracy combat training to airport and port staff since 2004, targeting approximately 50 participants per course among INFRAERO staff, IBAMA environmental enforcers, Federal Police, Brazilian Navy, FUNAI staff, and ABIN agents. The Federal Police carried out 12 special operations to combat wildlife traffic and biopiracy in 2004; 10 in 2005; 6 in 2006; 10 in 2007; and 24 in 2008. Additionally, IBAMA carried out 32 special operations to combat wildlife traffic in 2003; 26 in 2004; 57 in 2005; 105 in 2006; and 134 in 2007. The IBAMA ombudsman service (*Linha Verde*) received, from 2002 to 2009, 24,632 calls reporting activities related to illegal trade and transportation of wildlife, forest products or fauna, flora or fisheries sub-products; as well as illegal hunting and wildlife capture or captivity. This is equivalent to 51% of the total number of calls received in the period reporting illegal activities connected to the environment or biodiversity. Of these 24,632 calls, 44% were completely resolved, 25% received partial solution, and no action was taken regarding the other 31%. One of the purposes of the establishment of the National Network of Molecular Identification of Biodiversity (BR-BoL), of the Ministry of Science and Technology, is to facilitate the identification of apprehended specimens of the wild fauna and flora. The biodiversity “bar codes” have already been used to solve cases of smuggling of Brazilian biodiversity samples to other countries, and shows great potential for its broader application through the enforcement systems. In June 2007, the Provisional Ruling 2186-16, of August 21, 2001, had its article 30 regulated, defining the remedies applicable to behavior and attitudes harmful to the genetic heritage or to the associated traditional knowledge. In 2005, MMA initiated a series of training workshops specifically designed to inform and sensitize the traditional peoples and communities on the illegal access to traditional knowledge associated to genetic resources and to the genetic heritage, as well as to introduce them to the legal means of protecting these material and non-material assets. Between 2005 and 2009, MMA carried out over 40 training workshops, reaching over 1,700 representatives of traditional peoples and local communities.	
3.11	Significant increase of investment in studies, projects and research on sustainable use of biodiversity.	Governmental investments on studies, projects and research on the sustainable use of biodiversity have increased in the past several years, but data is not systematized to allow	

		quantification of the amounts invested along time. The Society Population and Nature Institute (ISPN) carried out an inventory of investments in biodiversity projects in Brazil after the Rio Eco 92 Conference. Results of this study indicated that 27 of the 40 assessed funding sources invested in biodiversity studies, projects and research in the 1985 – 1996 period, during which the number of funded projects doubled, and the amounts invested increased four times at the end of the period in comparison to 1985. No other similar inventories were carried out since then. Nevertheless, numerous records indicate this increase, as shown below. The number of researchers in the Amazon Region increased 81% between 2004 and 2008 (from approximately 5,900 to approximately 8,900), and the number of research groups increased 127%. The investment in research and development grants increased substantially the qualification, attraction and the establishment of qualified personnel in the region. Additionally, the federal government promoted the regionalization and decentralization of research and scientific and technological development in the country, increasing the number of virtual National Science and Technological Institutes (INCT) from 17 in 2003 to 122 in 2010, 8 of which focusing on biodiversity research. INCTs currently exist in 17 out of the 27 Brazilian states: Amazonas, Pará, Mato Grosso, Distrito Federal, Paraná, Santa Catarina, Rio Grande do Sul, São Paulo, Rio de Janeiro, Minas Gerais, Bahia, Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Sergipe, and Piauí. Furthermore, EMBRAPA currently has 45 research centers to transfer agricultural and livestock technologies. Three of these centers were established in 2009 to seek sustainable technological solutions along the agricultural frontier: EMBRAPA Mato Grosso (in Mato Grosso state); EMBRAPA Fisheries Aquaculture and Agricultural Systems (in Tocantins state); and EMBRAPA Cocais Region and Floodplains (in Maranhão state).[183] The National Biodiversity Fund – FUNBIO supported 62 projects on biodiversity themes in 17 states along its first 10 years of existence (from 1996 to 2005), investing a total of US$10.7 million.[184] Numerous other projects implemented since 2002 included support to activities involving the sustainable use of biodiversity or sustainable production practices, such as PROBIO; GEF Cerrado; PROACRE; Biodiversity and Genetic Resources Conservation and Sustainable Use Program; Agrobiodiversity Conservation, Management and Sustainable Use Program; Biodiversity Research Program (PPBio/MCT); Northeast Biodiversity Network (RENORBIO); among various other projects and initiatives. The Ministry of Science and Technology (MCT) invested in the past few years over R$ 510 million (approximately US$ 300 million), in addition to a GEF grant of US$ 29 million, in 49 still on-going initiatives related to all of the 2010 Global Biodiversity Target components.	

[183] Office of the President, 2010. http://wikicoi.planalto.gov.br/coi/Caderno_Destaques/Destaque_marco10.pdf Caderno Destaques, ano III, nº 1, mar/abr de 2010. Secretaria de Comunicação Social da Presidência da República. Accessed in June 2010.
[184] FUNBIO, 2005. Management Report 1996-2005.

3.12	80% increase in the number of patents deriving from components of biodiversity.	According to recent statistics from the World Intellectual Property Organization (WIPO)[185], the number of patent requests annually deposited in the world is approximately 1.5 million, from which over 0.5 million patents may result. It is estimated that the number of patent documents published up to know since the beginning of times is approximately 50 million. However, the number of inventions created based on these requests is much smaller, as each invention is patented in various countries. Existing data is not systematized in a way to allow historical analyses and proper quantification of target achievement, due to the outstanding delay of several years in the analysis of patent requests. Going against the international average, which recorded a 4.5% decrease in 2009, Brazil saw in the same year a 1.6% increase in patent requests through the international system PCT, reaching 480 requests; however, the percentage of biodiversity-related patent requests was not quantified. Since 2000, the Brazilian requests for patents registered abroad increased 169%. The continuation of this increase is one of the main targets of the Production Development Policy (PDP) of the federal government.[186] The types of search allowed by the INPI information system, comprised of the EPOQUE and SINPI, to obtain relevant data for this target are limited to individual searches through specific biodiversity components. The analysis of a sample of records at the National Institute of Industrial Property – INPI indicated that, from 2002 to 2008, 812 patent requests were presented related to Brazilian biodiversity: 106 connected to one animal (*Bothrops jararaca*) and the remaining 706 connected to 14 plants. Regarding this sample, there was an increase of over 100% in the number of patent requests from 2002 (77 requests) to 2008 (178 requests); however, this increase refers to only a portion of the biodiversity components. Of the 812 requests, 195 were presented by Brazilians (individuals or companies). Given the 18 months confidentiality requirement for patent requests, the 2009 and 2010 data were not included in this analysis. An additional search on important species of the Brazilian fauna and flora found other 36 patent publications related to animal species (15 requested by Brazilians) and 202 related to plant species (6 requested by Brazilians). It is important to note that the data obtained by these searches do not represent 100% of the existing data, as the search fields only verify the title and abstract of the patent publications, which may not contain the scientific names that were searched. A 2005 study[187] assessing all biodiversity-related patents recorded in INPI until 2003 indicated that, from a set of 278 Brazilian plants, 186 (67%) were object of at least one patent request or registered patent. The use of these 186 plants resulted in other 738 new patent requests. Of these 738 granted or requested patents, 89.3% are related to medicinal products and 10.7% to other uses such as food supplements, insect repellents, etc. These records indicate that 94.2% of these patents were requests by foreign	

[185] HTTP://www.wipo.int/patentscope/en/data/patent_information.html#P7_55
[186] http://www.inpi.gov.br/noticias
[187] http://www.forumdeinovacao-sc.org.br/wp-content/uploads/2009/12/Maria-Celeste-Emerick.pdf

		proponents and 5.8% by national proponents. A different 2009 study[188] inventoried registered patents in Europe (www.espacenet.com) and in the United States (www.uspto.gov/patft/index.html) involving Brazilian plants, requested within the last 20 years. A total of 74 records were found, most of which (70%) were requested by Japanese corporations. The main Brazilian plants for which product patents were granted are: copaiba (*Copaifera duckei*); jaborandi (*Pilocarpus sp.*); guaco (*Mikania glomerata*); ipecacuanha (*Hybanthus arenarius*); jurubeba (*Solanum absconditum*); carqueja (*Baccharis altimontana*); catuaba (*Secondatia sp.*); carapiá (*Dorstenia sp.*); and cipó caboclo (*Davilla rugosa*). The Ministry of Science and Technology (MCT), through the National Institute of Amazon Research (INPA), deposited 19 patent requests with the National Institute of Industrial Property (INPI), one of which already granted, all related to biodiversity products or processes (bioactive molecules, domestication methods, management, and conservation or recuperation of environmental assets). At the end of 2007 MCT also deposited other eight international patent requests, one of which should result in 10 biodiversity-based odontological products. Additionally, the Pantanal Research Center is developing a bio-insecticide to combat the *Aedes aegypti* mosquito, which transmits the dengue fever.	
3.13	Support of the Commission for Coordination of Ecological and Economic Zoning for the preparation and conclusion of ecological and economic zoning plans for at least 50% of Brazilian states.	According to MMA records, EEZs were prepared and are at different implementation phases in approximately 50% of the Brazilian states (Acre, Amazonas, Distrito Federal, Espírito Santo, Goiás, Maranhão, Minas Gerais, Mato Grosso do Sul, Mato Grosso, Paraná, Rio de Janeiro, Rondônia, Roraima), and were at least initiated in all the other states, some as macro-zoning or partial zoning initiatives. Additionally, various regional and watershed EEZs were already prepared or are under preparation, as well as EEZs for coastal sections.	
Component 4 – Monitoring, assessment, prevention and mitigation of impacts on biodiversity (CBD focal area III)			
4.1	100% reduction in the rate of deforestation in the Atlantic Forest biome, 75% in the Amazon biome and 50% in remaining biomes.	Brazil reached a 75% decrease in the deforestation rate of the Amazon in 2009 as compared to 2004; and 76.9% in the Atlantic Forest by 2008 as compared to 2000. As annual deforestation rate data is not yet available for the other biomes, only punctual comparisons can be made. These data indicate that from 2002 to 2008 4.17% of the Cerrado, 2.01% of the Caatinga, and 2.82% of the Pantanal were deforested. Data on the Pampas biome were published in July 2010, indicating that 1.2% of the biome was deforested between 2002 and 2008. However, UNEP recently published[189] an Atlas of mangroves and revealed that these habitats continue to disappear at a rate four times higher than the terrestrial forests in the entire world. These data point out the relevance of addressing these habitats specifically during the next revision of the national biodiversity targets.	
4.2	Overall reduction of 25% in the number of fires (heat sources) in	The total percent reduction of the number of heat sources in 2009 as compared to 2002[190] was 75.35% in the Amazon;	

[188] CARVALHO, P.L. de, 2009. A proteção da biodiversidade brasileira: o caso das plantas medicinais. Hypertext: http://www.infobibos.com/Artigos/2009_2/Biodiversidade/index.htm

[189] http://www.estadao.com.br/noticias/vidae,pnuma-lanca-atlas-sobre-manguezais,580633,0.htm

[190] http://www.dpi.inpe.br/proarco/bdqueimadas

	each biome.	74.56% in the Atlantic Forest; 72.16% in the Cerrado; 55.56% in the Pampas; 52.34% in the Pantanal; and 46.68% in the Caatinga. This translates into a national reduction average of 70.30%, well above the National 2010 Target, which aimed at a reduction of 25% in fire occurrences in each biome by 2010, as compared to 2002. This target was fully reached in all biomes, being surpassed in approximately 100% in the Caatinga, Pantanal and Pampas biomes, and approximately 200% in the Amazon, Cerrado and Atlantic Forest. INPE's long term monitoring program combined with governmental programs to promote alternative production practices that forego the use of fire, and to combat illegal fire use in the Amazon (PROARCO and PREVFOGO), have significantly contributed to this outstanding reduction. It should be noted, however, that this reduction was not linear through time, and that increase or decrease of human pressure as the main source of fire occurrences still vary with external factors such as market pressure/crisis, climate changes (rainfall, temperature variations), etc.[191]	
4.3	Creation and consolidation of a systematic and standardized nation-wide biodiversity monitoring network.	A comprehensive and coordinated biodiversity monitoring system was not yet developed. However, standardized deforestation (improved in 2010) and fire monitoring systems are operational for all biomes, complementing the INPE satellite monitoring of the Legal Amazon (since 1988) and the Atlantic Forest monitoring by SOS Mata Atlântica and INPE (since 1985) (see section 1.3.3). Additionally, there are other non-integrated and punctual biodiversity monitoring systems operating for coral reefs, threatened species, harvested fish species, and forest inventories.	
4.4	Action plans for prevention and control prepared for all species listed under the National Assessment of Alien Invasive Species.	Inventory efforts have been carried out for alien invasive species in 2004 and 2005 under PROBIO, generating national reports[192] on alien invasive species affecting: Terrestrial Habitats; Inland Waters; the Brazilian Marine Habitat (published in 2008); Production Systems (agriculture, livestock and silviculture); and Human Health, but no national scale action plan for prevention and control was yet prepared. Nevertheless, CONABIO approved in 2009 its Resolution n°.5 on the development of a national strategy for the control of invasive species. Punctual state and local initiatives exist for the control of specific species such as *Achatina fulica* (giant African snail), which infests the entire country (except the semi-arid). The Espírito Santo state combats since 2007 the invasive plant species present in its protected areas, such as *Acacia mangium* and various grasses[193]. The PROBIO project (1996-2006) funded 6 projects to combat invasive species: wild buffalo in the Vale do Guaporé Biological Reserve (Rondônia); yellow elder *Tecoma stans* in Paraná; *Gomphrena elegans* in Bonito (Mato Grosso do Sul); algarroba (*Prosopis juliflora*) in the northeast; monitoring plan for freshwater invasive species; and lizard (*Tupinambis merianae*). Paraná is the only state which developed and is implementing a state level Plan for the Control of Alien Invasive Species, targeting the European wild boar (*Sus scrofa scrofa*); the	

[191] http://www.obt.inpe.br/deter/

[192] Brazil published in 2008 the book "Marine Alien Invasive Species in Brazil". Other publications are being prepared based on the other reports listed under this target.

[193] http://www.institutohorus.org.br/pr_controle_iema_es.htm

		European hare (*Lepus europaeus*); common marmosets (*Callithrix penicillata* and *C. jacchus*); African bee (*Apis mellifera*); catfish (*Ictalurus punctatus*); giant Malaysian shrimp (*Macrobrachium rosenbergii*); tilapias; African catfish (*Clarias gariepinus*); black bass (*Micropterus salmonoides*); bull frog (*Lithobates catesbeianus*); hydroid (*Cordylophora caspia*); freshwater mussel (*Corbicula fluminea*); and golden mussel (*Limnoperna fortunei*). Other local or state initiatives exist, mostly in the Southeast region of the country.	
4.5	Management plans implemented for the control of at least 25 of the principal invasive exotic species that threaten ecosystems, habitats or species in Brazil.	Limited advance was obtained so far, with punctual state and local initiatives being implemented. The 2005 diagnosis of current and potential alien invasive species carried out under PROBIO (see chapter 1 and target 4.4) identified 179 terrestrial invasive species; 180 freshwater invasive species; 58 marine invasive species; 50 current and 104 potential invasive species in the agricultural landscape; and 98 invasive species that affect human health. Initiatives implemented up to now to combat invasive species address at least 25 species (see target 4.4), but at local or state level rather than at the national scale. There are also punctual studies on Brazilian species that are alien invasive species in different biomes, such as the marmoset *Callithrix spp.* from the Cerrado and Caatinga, which is an invasive species in the Atlantic Forest.[194] Additionally, ICMBio implements three projects to control or eradicate invasive species, involving invasive plants in two officially protected areas and allochthonous primates in different biomes.	
4.6	50% of sources of water and soil pollution and their impacts on biodiversity controlled.	Monitoring efforts by ANA, SRHU and Ministry of Cities have increased: it is estimated that 50% of the point source of water and soil pollution are currently monitored. Sewage collection has increased from 43.3% of Brazilian municipalities in 1989 to 52.2% in 2000, but only one third of these municipalities provide sewage treatment services. Although progress at the national scale was small, some states have placed significant efforts at the local scale (major cities) that contribute to this target, such as Minas Gerais state: the metropolitan region of Belo Horizonte (3rd largest city in Brazil) had 12% of sewage treatment in 2000 and reached 97% treatment of collected wastewaters by 2010[195]. Sewage collection services by state have two cases with the best rates (>70%): São Paulo and the Federal District. Three states have the second best rates (from 40.1% to 70%): Minas Gerais, Rio de Janeiro and Paraná; while four states have the worse rates (<10%): Rondônia, Pará, Amapá and Piauí. Of the remaining states, 8 collect between 20.1% and 40% of the produced wastewaters; and 10 collect between 10.1% and 20%.[196] Solid waste: the 2007 diagnosis carried out by the National Sanitation System – SNIS indicates that 98.8% of the assessed municipalities offer regular solid waste collection services. The amount of daily collected waste is on average	

[194] Morais Jr., M.M., 2010. Os sagüis (*Callithrix spp*., ERXLEBEN, 1777) exóticos invasores na bacia do Rio São João, Rio de Janeiro: biologia populacional e padrão de distribuição em uma paisagem fragmentada [The alien invasive marmosets (*Callithrix spp*., ERXLEBEN, 1777) in the São João River Watershed, in Rio de Janeiro: population biology and distribution pattern in a fragmented landscape]. PhD Thesis, State University of the North of Rio de Janeiro - UENF.
[195] http://www.ibge.gov.br e COPASA 2010.
[196] SNIS, 2008. Diagnóstico dos Serviços de Água e Esgotos. [Diagnosis of Water and Sewage Services].

		around 0.71 kg/person in the smaller towns (up to 30,000 inhabitants) and 1.17 kg/person in cities with population over three million. However, the study revealed that almost 22 million tons of the collected waste were disposed improperly in dumps or landfills with inadequate environmental protection.[197] Agriculture: Brazil is still the main destination of agricultural chemicals banned in various countries. The use of these chemicals is still allowed according to controlled commercialization and application criteria. Brazil imported 1.84 thousand tons of agricultural chemicals in 2008. This volume increased 29% in 2009 reaching 2.37 thousand tons. In 2009, one million tons of agricultural chemicals were applied to food cultures in the country, representing 5 kg of these substances per Brazilian person.[198]	
4.7	Support to bio-geographic studies to include the predictability of species occurrence associated with potential climate changes using Geographic Information Systems.	Work related to this target is still very incipient, with no good mapping of existing activities currently available. Nevertheless, EMBRAPA develops an important initiative, through which researchers prepared future scenarios of the occurrence of agricultural crops such as soybean, wheat, corn, rice, coffee, apple and sugar cane associated with climate change. The results are being used to guide the genetic improvement of cultivated species for enhanced tolerance to excessive or reduced rainfall. The climate change theme was included in EMBRAPA's Research Macro-program 1 – Major National Challenges in Agriculture. Research lines under this program are: future scenarios; pests and diseases; production systems; and genetic adaptation. Another large scale initiative is the monitoring of coral reefs to control coral health and assess the effects of global climate changes. This initiative is coordinated by the Coral Reefs Institute (IRCOS) and the Federal University of Pernambuco (UFPE) with funds from the Ministry of the Environment, and works in partnership with research institutions and other institutions.[199] Other initiatives are worth mentioning: Geoma/MCT, LBA/MCT, and Biota FAPESP. The three initiatives include species distribution as one of the focus themes, including climate approaches.	
Component 5 – Access to genetic resources, associated traditional knowledge and benefit sharing (CBD focal areas V and VI)			
5.1	All public policies relevant to traditional knowledge implemented in accordance with Article 8(j) of the CBD.	Several important policies were developed (see section 1.2.4 and a summary below) and some, such as the policy on access and benefit sharing, are still under discussion. However, implementation is only partially quantified. The major legal instrument related to access and benefit sharing is the Provisional Ruling 2186-16/2001, which established the ABS rules and measures to protect traditional knowledge associated to the genetic heritage,	

[197] MINISTÉRIO DAS CIDADES, 2009. **Secretaria Nacional de Informações sobre Saneamento Sistema Nacional de Informações sobre Saneamento: diagnóstico do manejo de resíduos sólidos urbanos – 2007**. Brasília: MCIDADES.SNSA, 262 p (Parte 1 – Texto Visão Geral da Prestação de Serviços). http://www.snis.gov.br/ . And: ABRELPE - Associação Brasileira de Empresas de Limpeza Pública e Resíduos Especiais. Panorama dos resíduos sólidos no Brasil - 2009. Maio de 2010. 210p. http://www.abrelpe.org.br/panorama_2009.php. Both accessed in June 2010.

[198] ANVISA, 2009. Relatório aponta para uso indiscriminado de agrotóxicos no Brasil. http://portal.anvisa.gov.br/wps/wcm/connect/d214350042f576d489399f536d6308db/RELAT%C3%93RIO+DO+PARA+2009.pdf?MOD=AJPERES

[199] Office of the President. Caderno Destaques, ano III, nº 1, mar/abr 2010. Secretaria de Comunicação Social da Presidência da República. http://wikicoi.planalto.gov.br/coi/Caderno_Destaques/Destaque_marco10.pdf

		and also created the Genetic Heritage Management Council – CGEN, which is the national authority responsible for authorizing access to genetic resources and associated traditional knowledge. This legal instrument was only partially regulated since 2001, and discussions on the final text of a permanent law are still ongoing. Other important components of the relevant legal framework are mostly related to traditional and small scale agriculture[200]: The National Policy for the Sustainable Development of Traditional Peoples and Communities (Decree 6047) was approved in 2007, underlining the importance of recognizing, valuing and respecting the country's socio-environmental diversity. The Citizenship Territories Program was created in 2008 to integrate governmental actions supporting the improvement of the life quality, access to goods and public services, and the social and economic inclusion of populations living far from urban centers. The National Program to Strengthen Family Agriculture – PRONAF, established in 1996 (Decree 1946), is increasing significantly the volume of resources and credit lines available to small producers. Since 2003 the program initiated special credit lines such as Forestry PRONAF; Agroecology PRONAF; Coexisting PRONAF targeting the semi-arid region; and the Eco PRONAF. These new lines responded to an old request from the production sector and allowed credit access to diversified production systems. The Program for the Acquisition of Food Products from Family Agriculture – PAA initiated in 2003 under the coordination of the Ministry of Social Development, and intends to direct resources to indigenous peoples; quilombolas; artisanal fishermen; traditional communities; and family agriculture producers. Complementing the PAA, in 2008 the government created the Policy to Warrant Minimum Prices, which currently includes ten plant species explored by extractive workers: assai (*Euterpe longibracteata*); rubber (*Hevea brasiliensis*); babassu (*Orbignya phalerata*); Brazil nut (*Bertholletia excelsa*); carnauba (*Copernicia prunifera*); pequi (*Caryocar brasiliensis*); piassava (*Ruizodendron ovale*); baru (*Dipteryx alata*); umbu (*Spondias tuberosa*); and mangaba (*Hancornia speciosa*). This Policy falls under the Program to Support the Commercialization of Products from Extractive Activities – PAE, and is complemented by the Family Agriculture Insurance (SEAF) and the Harvest Insurance. Since 2006, the Program to Warrant Minimum Prices for Family Agriculture Products – PGPAF protects these producers from market variations, currently targeting 35 crops including babassu, assai, rubber, pequi, rice, coffee, beans and milk. The Ministry of Industry and Trade holds a Permanent Working Group for Local Production Arrangements, which identifies opportunities and provides support to the development of market and commercialization strategies. The Demonstration Projects Subprogram – PDA implemented by the Ministry of the Environment since 1996 with international support is also an important	

[200] Office of the President. Caderno Destaques, ano III, nº 1, mar/abr 2010. Secretaria de Comunicação Social da Presidência da República. http://wikicoi.planalto.gov.br/coi/Caderno_Destaques/Destaque_marco10.pdf

		instrument to support innovative management practices for natural resources in the Amazon and Atlantic Forest. The Indigenous Portfolio was established in 2004 through a partnership between the Ministry of the Environment and the Ministry of Social Development to support projects at indigenous communities to promote sustainable development and food safety. The Agrobiodiversity Program (2008) addresses the conservation, management and sustainable use of agrobiodiversity and is implemented by the Ministry of the Environment in partnership with the Ministry of Agrarian Development; Ministry of Social Development; National Supply Company – CONAB; and the Brazilian Agricultural Research Company – EMBRAPA. The Program to Support Ecotourism and Environmental Sustainability of Tourism – ProEcotur is implemented by the Ministry of the Environment in partnership with the Ministry of Tourism, operating a portfolio of community-based tourism projects. Law 11974 (Nourishment in Schools) determines that starting in January 2010, at least 30% of food products for students must be acquired from family agriculture producers. The Ministry of Agrarian Development – MDA, Ministry of the Environment – MMA and Ministry of Social Development – MDS created in 2009 the National Plan to Promote Sociobiodiversity Production Chains. The National Policy of Medicinal Plants and Phytotherapics (2006) established the directives and priorities for ensuring the safe and rational use of these products in the country. Implementation of the National Program of Environmental Management in Indigenous Lands – PNGATI initiated in 2009 (http://sites.google.com/site/pngati/). The Brazil Quilombola Program (PBQ) ensures access of quilombolas (traditional communities of African origin) to basic goods and services such as health, education, housing, electricity, and the right to land. In 2009, the program created the Quilombola Seal to value the artisanal production of traditional communities and improve its commercialization potential. The Office of the President reports positive results from the implementation of these policies: PRONAF granted US$ 28.8 billion to family and traditional communities' producers from 2002 to 2009, through 10.6 million contracts. During the last seven years, the government invested US$ 1.3 billion in Rural Technical Assistance (ATER), benefitting over 2.3 million families by 2010 (by 2003 this total was approximately 291,000 families). Over 796,000 family producers have already participated in the PAA during the last seven years, with a US$ 1.6 billion governmental investment. Over 600,000 family producers were befitted by SEAF, with on average 100,000 producers receiving harvest insurance per year, and annual total payments of US$ 200 million since 2004. The Harvest Insurance program paid over US$ 65 million to 553 agricultural producers of the semi-arid region during the 2008/2009 harvest. In 2008, the minimum prices for products from extractive activities benefitted 4,720 workers, paying US$ 1 million to compensate market prices below the minimum price.	
5.2	Knowledge, innovations and practices of indigenous peoples and	Significant progress was obtained in the demarcation of Indigenous Lands (almost 19 million hectares were	

	traditional communities protected.	registered as 81 Indigenous Lands in 2009) providing official protection of these areas and, to a certain extent, protection of indigenous culture, biodiversity, agrobiodiversity and practices. Additionally, there was a significant increase in the number of Extractive Reserves (RESEX), increasing protection of traditional communities and their practices: in 2000 there were 17 RESEX; since then 6 were created in 2001; 7 in 2002; 4 in 2004; 9 in 2005; 8 in 2006; 2 in 2007; 3 in 2008; and 3 in 2009. Additionally, 9 other RESEX should be created in 2010. A relevant initiative is the Mamirauá Sustainable Development Institute, maintained by the Ministry of Science and Technology in the Amazon, which has the objective of developing a protected area model in large tropical forest areas in which, through participatory management, the maintenance of biodiversity is sought, as well as the maintenance of its ecological and evolution processes, combined with the enhancement of the life quality of traditional populations. Indigenous and traditional culture is legally protected, and numerous relevant legal instruments were developed to contribute to this protection (see section 1.2.4 and target 5.1). However, the need remains to develop specific legislation establishing a system for the protection of the knowledge, innovations and practices, taking into account their peculiarities: means of transmission, collective and dynamic characteristics. Such instruments are still in the early stages of discussion with indigenous and traditional peoples.	
5.3	100% of scientific and general publications deriving from access to traditional knowledge identify the origin of the traditional knowledge.	Several publications derived from projects and activities involving the access to traditional knowledge associated to biodiversity identify the origin of the information, as required by the Provisional Ruling 2186-16 of 2001. Although this is currently the only instrument to ensure the obtention of new previous informed consent from traditional communities and new benefit sharing when their knowledge is used for other purposes, the lack of regulation for the access to traditional knowledge through secondary sources (books, publications and databases) is a disincentive to complying with the rules. Additionally, the total number of publications issued before 2001, when the legislation was put in force, is immense, which increases the difficulty to collect data to define the degree of target achievement. Note: this target is closely linked to the recording of traditional knowledge, but should not be misunderstood. Many local communities record their knowledge as a means of protecting this knowledge, but the efficacy of this practice is questioned by other communities, which fear that their knowledge might be used without their consent. In 2006, a consultation to the communities on this theme carried out by MMA revealed that the communities need to be better informed about the advantages and disadvantages of the different means to protect their knowledge.	**?**
5.4	100% of cases of access to traditional knowledge include prior informed consent, obligatory sharing of knowledge generated and sharing of benefits with knowledge holders.	The Provisional Ruling 2186-16 of 2001 is currently in force (see target 5.3 and section 1.2.4) to establish criteria for access and benefit sharing, including informed prior consent. However, not all articles of the Provisional Ruling have already been regulated, which hinders the application and compliance with the legislation. An example of this is the lack of regulation for access activities that initiated or ended after the legislation was put in force. In the	

		meantime, approximately 100 processes are suspended, pending the definition of the specific rules for each case. Debates on a final text for permanent legislation on this theme are still ongoing. The only benefit-sharing contract that was completed and approved by CGEN (the national authority) was proposed by the Rio de Janeiro Federal University and involves Quilombola communities from Oriximiná, in Pará state. The research will involve the access to community knowledge on plants that cure lung and nervous system diseases. The benefit sharing contract was signed between the university and an association representing the Quilombola communities. The CGEN Executive Secretariat also holds other processes containing contracts for benefit sharing which were already signed between the parties, but without the approval and agreement of CGEN, as they result from access activities that were initiated or concluded after the Provisional Ruling was put in force, and are therefore suspended, pending the definition of rules. From 2002 to 2009 the Genetic Heritage Department / Genetic Heritage Management Council – DPG/CGEN authorized 44 scientific research proposals involving associated traditional knowledge, 7 of which also involving access to genetic resources. In 2009 DPG/CGEN received other 62 requests for scientific research involving associated traditional knowledge, 16 of which also involving access to genetic resources.[201]	
5.5	Access and benefit sharing legislation, consistent with the CBD, approved by the National Congress and implemented and 100% of access and shipment activities conform to national legislation.	The Provisional Ruling 2052, published in June 2000 and later transformed into Provisional Ruling 2186-16/2000 after several re-editions, is still the main Brazilian legal instrument regulating access and shipment of genetic heritage, as well as the access to associated traditional knowledge and benefit sharing resulting from this access. In addition to these rules, the Provisional Ruling created the Genetic Heritage Management Council – CGEN, which is the national authority in charge of authorizing activities involving access and shipment of genetic resources, as well as of regulating the legislation. The Executive Secretariat of CGEN is established in the Genetic Heritage Department of the Ministry of the Environment. Since its publication, the Provisional Ruling had some of its articles regulated through decrees: Decree 3945 of September 2001 regulated articles 10, 11, 12, 14, 15, 16, 18 and 19; Decree 5459 of June 7, 2005 regulated Article 30; and Decree 6915 of July 2009 regulates article 33 of the Provisional Ruling. However, the regulation of the remaining articles is still being discussed by CGEN. Debates and public consultations to define a final text for legislation on this theme initiated with the Provisional Ruling and are still ongoing (see also targets 5.3 and 5.4).	
5.6	Benefits resulting from commercial utilization of genetic resources effectively shared fairly and equitably in support of biodiversity conservation.	The rules for benefit-sharing were defined by Provisional Ruling 2186-16/2001. However, as the rules for complying with the legislation are complex and difficult to implement, benefit sharing is still incipient. Since 2002, when CGEN became operational, 25 contracts for benefit sharing were agreed to and signed. In 2006, the Brazilian Association of Technological Research Institutions – ABIPTI was hired to carry out a diagnosis for the definition of benefit sharing procedures in	

[201] DPG/MMA: Management Reports 2002 – 2009.

		production chains involving Brazilian biodiversity, as well as the payment levels for benefits. This work was concluded in 2009 and the final technical report described the seven production chains of the seven species selected by DPG as the basis for defining the levels of benefit sharing, given the economic importance of their products and possible industrial uses. For at least 5 of the 7 species the report also included a list of priority criteria for calculating the value of each product among other information on each production chain, and for 2 priority species a methodology was proposed to calculate benefit sharing based on actual data from existing production and commercialization chains. In 2007, CGEN agreed to four benefit sharing contracts. These contracts, related to bioprospection projects involving access to genetic resources from public lands, were signed between the federal government and four universities (Federal University of Minas Gerais – UFMG; Federal University of Santa Catarina – UFSC; Federal University of Paraíba – UFPB; and the Chemistry Institute of the University of São Paulo – IQ/USP). However, as these are bioprospection projects with no immediate commercial use foreseen, the provision for benefit sharing in these contracts indicates that benefit sharing will only occur when the economic potential is identified. The Department of Genetic Heritage – DPG/MMA also negotiated with the Federal University of Rio de Janeiro a contract to implement the system to disseminate the legislation and manage the access and benefit sharing activities related to genetic heritage and/or associated traditional knowledge, as well as to assist in the identification of non-authorized access. The system recorded over 250 projects and products potentially involving access activities for bioprospection or technological development purposes. In 2008 the Genetic Heritage Management Council – CGEN evaluated and agreed to two benefit sharing contracts, both referring to a bioprospection project involving access to genetic heritage originating from private property and to associated traditional knowledge from traditional communities. Both contracts were signed by the Federal University of Amazonas – UFAM. At least two states have proposed state legislation on the rights and duties related to access to genetic resources and associated traditional knowledge: Acre (Law 1235/1997) and Amapá (Law 0388/1997). However, these legal instruments have not yet been regulated and are not in force. Some benefit sharing contracts negotiated before the current suspension are implementing benefit sharing, such as contracts between traditional communities and the Natura cosmetic company; however, the paid benefit values are considered classified information at the company's request. In 2009, Natura used 31 certified active ingredients from organic or sustainable agriculture, or forest management, five more than in 2008. All research projects for new active ingredients from biodiversity were submitted by Natura to CGEN and are currently pending evaluation and approval.[202]	

[202] Natura Management Reports 2007 – 2009.

5.7	100% of applications for patents on inventions of products or processes deriving from access to genetic resources and associated traditional knowledge include identification of origin and proof of authorized access.	In 2007 the National Genetic Resources Council - CGEN (presided by MMA and w/ 19 governmental agencies, including the National Institute of Industrial Property – INPI) issued a Resolution determining that patent requests should necessarily include information on the origin of the genetic resource being used and proof of authorized access. This Resolution resulted in the development of a second Resolution by INPI to ensure compliance with the CGEN Resolution. Furthermore, new Resolutions determined that, as of April 30, 2009 patent requests involving access to genetic resources where this access occurred at the time or after the publication of Provisional Ruling 2186-16/2000 are also required to present information on resource origin and authorized access. When this information is not provided at the time when the request is presented, it is requested during the analysis of the request. Given a serious deficit in staff numbers, there is an outstanding delay of several years in the analysis of patent requests deposited with INPI: the institution is currently analyzing requests presented in 2000. As the information provided at the time of request presentation is only verified when the request is analyzed, information to assess the degree of target achievement is not available.	**?**
5.8	Sharing of benefits in accordance with the International Treaty on Plant Genetic Resources for Food and Agriculture implemented in Brazil.	The Treaty foresees as benefit sharing the facilitation of access to genetic resources for food and agriculture (particularly through its Multilateral System); the exchange of information; the transfer of technologies; capacity building; and the sharing of benefits (financial or non-financial) from the commercialization of Annex 1 resources accessed through its Multilateral System. The Multilateral System intends to facilitate the interchange of genetic resources listed in the Treaty's Annex 1. Brazil is actively participating of the Multilateral System created by the Treaty, making available public Annex 1 genetic resources present in the country and accessing the System, implementing benefit sharing according to the Treaty's rules.[203] Brazil also provides, through its various programs and projects for agrobiodiversity conservation and to support sustainable production (see target 5.1 and section 1.2.3), information exchange and capacity building opportunities (rural technical assistance, including the transfer of technologies) to rural producers, focusing particularly on traditional communities, indigenous peoples and family rural producers. Additionally, the Brazilian Agricultural Research Company – EMBRAPA is also transferring agricultural technologies to other countries in Latin America and Africa (see target 7.3). Within the country, the civil society has an important role in the *on farm* conservation of agrobiodiversity and in the promotion of its sustainable use, as well as in the exchange of genetic resources among rural producers, both within and among communities. The work of rural social organizations is highly relevant in this sense, such as the Small Farmers Movement and the National Confederation of Agriculture Workers - CONTAG, as well as NGOs such as the Seeds Networks, Ecovida Network, and Cerrado Network, among many other organizations. Additionally, the Brazilian government also supports the exchange and dissemination	

[203] Information on this target provided in July 2010 by the Ministry of the Environment through its Secretariat of Biodiversity and Forests.

		of land races and other traditional crops through its Dissemination Centers of Agro-biodiversity Management – CIMAs.	
Component 6 – Education, public awareness, information and outreach on biodiversity (focal area D of CBD's GSPC)			
6.1	Inclusion of the importance of biological diversity and the need for its conservation, sustainable use and benefit sharing in communication, education and public awareness programs.	Numerous initiatives exist in various sectors, including the education sector. The most encompassing current initiative is the development of the National Program for Environmental Communication and Education – ProNEA, by the Ministry of the Environment (MMA) in partnership with the Ministry of Education. In addition to implementing education actions, ProNEA is a reference framework to governmental and non-governmental organizations for the planning and implementation of environmental education actions. The Program's strategic actions include the training of trainers as well as radio, television and face-to-face education actions, and publications, among other actions.[204] ProNEA is the result of and a contributor to the Education Collective, which is a group of institutions implementing continuous, permanent and participatory education and capacity building actions in environmental education, promoting the coordination of institutions and public policies, and discussing socio-environmental issues. Additionally, MMA coordinates permanent campaigns on conscious behavior in natural environments (terrestrial environment, reef environment, beaches and marine environment). Education initiatives along the years are gradually increasing awareness of environmental issues among Brazilian people. Historical data based on public opinion polls had a baseline established in 1992 with the poll "What do Brazilians think about Ecology?" This poll was repeated before relevant events: in 1992 (Rio-92); 1997 (Rio+5); 2002 (Rio+10); and 2006 (COP-8). These successive polls indicated that awareness of the country's environmental and ecological issues increased gradually along the researched period. WWF-Brasil also carried out a public opinion poll in 2000, which indicated that the meaning of "biodiversity" was poorly understood in the Amazon Region, despite its globally recognized biodiversity richness and value. Only technicians originally from other regions, scientists and religious leaders were able to use the biodiversity concept properly. In 2010, 94% of Brazilian consumers interviewed by the Union for Ethical BioTrade – UEBT had already heard about biodiversity and most were capable of defining the term correctly. This represented a significant difference to similar polls carried out by UEBT in the USA and Europe, where the rate was 64%. According to this poll, the Brazilian consumers received the higher grades in all questions related to biodiversity and sustainable development.	
6.2	Increased access to high quality information on conservation, sustainable use and sharing of benefits of biodiversity.	Access was increased, particularly through numerous printed and electronic publications produced by the Ministry of the Environment (over 70 publications), other environmental agencies and NGOs. However, dissemination of the publications and of their availability is limited. Additionally, available data is insufficient to	

[204] http://www.mma.gov.br/sitio/index.php?ido=conteudo.monta&idEstrutura=20&idConteudo=9447&idMenu=10165

		quantify this increase.	
6.3	Establishment and strengthening of action networks for the conservation, sustainable use and sharing of benefits of biodiversity.	Although no integrated governmental action network was yet developed, various regional initiatives are investing efforts into the establishment and strengthening of conservation, sustainable use, and monitoring networks. Regional conservation and sustainable use NGOs and non-governmental networks exist in all Brazilian biomes, such as GTA in the Amazon; Rede Cerrado; ASA in the Caatinga; Rede Pantanal; SOS Mata Atlântica; Seeds networks; Pampas Network; etc. Deforestation and fire (heat source) monitoring is operational for the entire country, through regional partnerships between the government (Ministry of the Environment and IBAMA) and other governmental and non-governmental organizations (INPE, SOS Mata Atlântica). The government also established in 2010 a network to monitor forest management concessions, involving the Brazilian Forest Service – SFB, the Brazilian Institute for the Environment and Renewable Resources – IBAMA, and Chico Mendes Institute for Biodiversity Conservation – ICMBio[205]. Additionally, the Brazilian Agricultural Research Company – EMBRAPA coordinates a network of gene banks focusing on agrobiodiversity; and the Rio de Janeiro Botanical Garden – JBRJ coordinates the National Network of Botanical Gardens, which contributes to research and *ex situ* conservation of the Brazilian flora.	
Component 7 – Increased legal and institutional capacity for biodiversity management (CBD focal area VII)			
7.1	New and additional financial resources, from public and private, domestic and international sources obtained and available for use in Brazil making possible the effective implementation of its commitments to the CBD programs of work, in accordance with Article 20.	New and additional resources were obtained by Brazil for biodiversity conservation and sustainable use and several environmental funds were created (see section 2.5), but available data is not compiled in a measurable way over time to quantify status of target achievement. The National Research and Development Council – CNPq developed 28 projects through bilateral international collaboration from 2004 to 2009, involving Germany; Chile; Costa Rica; Slovenia; Spain; USA; France; Mexico; Portugal; and Uruguay. Examples of new and additional resources obtained are: GEF Mangrove; GEF Cerrado; GEF Caatinga; PROBIO II; five project through UNDP; Revitalization of the São Francisco River; Amazon Protected Areas Project (ARPA); Highway 319/163; Jalapão Corridor (JICA); Norwegian and German resources for the Atlantic Forest; among other projects and funds. Brazil established funding mechanisms with: the Global Environment Facility – GEF; the World Bank – IBRD; UNDP; UNEP; UNESCO; FAO; IUCN; EU; the National Bank for Economic and Social Development – BNDES; Institut de Recherche pour le Développement – IRD (France); the Organization of the Amazon Cooperation Treaty – OTCA; JICA; Banco da Amazônia – BASA; Brazilian Biodiversity Fund – FUNBIO; and Brazilian Cooperation Agency – ABC.[206] The Ministry of Science and Technology, through the Federal Multi-year Plan and the mobilization of resources	

[205] http://noticias.ambientebrasil.com.br/clipping/2010/06/30/56879-servico-florestal-apresenta-sistema-de-monitoramento-das-concessoes-florestais.html

[206] Ministério no Meio Ambiente, 2004. Estratégias Nacionais de Biodiversidade na América do Sul: Perspectivas para a Cooperação Regional. MMA/Diretoria do Programa Nacional de Conservação da Biodiversidade – DCBio – Brasília, 288p.

		from the National Fund for Scientific and Technological Development (FNDCT), is increasingly investing in biodiversity-related themes. In 2010, investments on biodiversity research totaled over R$ 50 million (approximately US$ 29.4 million). Eight of the 122 National Science and Technology Institutes are dedicated to biodiversity research. One of the MCT strategies is to mobilize resources from the Research Support Foundations in the states through jointly funded public bids, which further increases the investments for complying with Article 20 of the CBD.	
7.2	Implementation of initiatives that promote the transfer to Brazil of environmentally sustainable technologies developed in other countries for the effective implementation of the CBD programs of work, in accordance with Article 20, paragraph 4 and Article 16.	Brazil has currently 16 multilateral technical cooperation agreements to transfer technologies to Brazil: International Development Bank – IDB; UN Food and Agriculture Organization – FAO; UN Center for Human Settlements – HABITAT; Inter-American Institute for Cooperation in Agriculture – IICA; Organization of the American States – OEA; Organization of Ibero-American States for Education Science and Culture – OEI; International Tropical Timber Organization – ITTO; International Labour Organization – ILO; World Meteorological Organization – WMO; World Intellectual Property Organization – WIPO; Pan-American Health Organization – PAHO; UN Development Program – UNDP; UN Office on Drugs and Crime – UNODC; UNESCO; UN Industrial Development Office – UNIDO; and European Union – EU. Projects are being implemented in the following sectors: environment; agriculture; industry; health; social development; public administration; energy; transportation; education; and urban planning.[207] Additionally, Brazil has bilateral technical cooperation agreements with eight countries: Germany; Canada; Spain; France; Italy; Japan; the Netherlands; and the United Kingdom.[208] Bilateral cooperation supports projects and actions in the Amazon and Atlantic Forest; actions related to the forestry sector, management of the urban and industrial environment, and capacity building; technical capacity building related to tourism, agriculture and environment; training, expert visits, donation of equipments, small projects, research cooperation and training provided to other countries; and development studies..[209] In 2000 Brazil had 201 international cooperation initiatives (activities and projects), 29.4% of which connected to the environment. In the three other assessed years, even though the number of initiatives varied with a growing trend (160 in 2003; 239 in 2006; and 349 in 2009), the percentage of initiatives connected to the environment remained around 10% (10.6% in 2003; 9.6% in 2006; and 10.3% in 2009).	
7.3	Promotion of the exchange and transfer of environmentally sustainable technologies between developing countries for the effective implementation of the CBD programs of work, in accordance with Article 20, paragraph 4 and Article 16.	In December 2003, the Ministry of the Environment hosted an international meeting to identify biodiversity themes for cooperation among South American countries. The meeting involved the national biodiversity strategies focal points of Brazil, Argentina, Bolivia, Chile, Colombia, Ecuador, French Guiana, Paraguay, Peru, Uruguay, and Surinam. The meeting identified the main progress obtained in the implementation of NBS in these countries since 1998 and identified the following themes and priority actions to guide	

[207] http://www.abc.gov.br/projetos/cooperacaoRecebidaMultilateralSetoresBeneficiados.asp
[208] http://www.abc.gov.br/projetos/cooperacaoRecebidaBilateralSetoresBeneficiados.asp
[209] http://www.abc.gov.br/projetos/cooperacaoRecebidaBilateralCarteiraProjetos.asp

		cooperation actions for CBD implementation in South America: biodiversity knowledge; biodiversity conservation; sustainable use of biodiversity components; impact monitoring, assessment, prevention and mitigation; access to genetic resources and associated traditional knowledge, and benefit sharing; biodiversity education, public awareness, information and dissemination; among other themes. Established legal and political instruments related to biodiversity themes exist among South American countries that facilitate the implementation of actions proposed by the meeting.[210] Brazil implements various initiatives involving the transfer of technologies to other developing countries, such as: the National Institute for Spatial Research – INPE facilitates free access to satellite images from CIBERS for Latin American and African countries. The Brazilian Agricultural Research Company – EMBRAPA has been transferring agricultural technologies to Latin American and African countries through its virtual laboratories in the USA, Europe (France and Netherlands), Asia and Africa (Ghana, Mozambique, Mali, and Senegal), as well as in Venezuela and Panamá. The Oswaldo Cruz Foundation – FIOCRUZ implements projects in Africa on tropical medicine[211]. It is important to note that, as information on technology transfer is not readily available, this is not an exhaustive list of Brazilian initiatives. The Brazilian bilateral South-South technical cooperation focuses on the following sectors: agriculture (including crop production and food safety); technical capacity building; education; justice; sports; health; environment; information technology; prevention of labor-related injuries; urban development; biofuels; aerial transportation; tourism; and, more recently, culture, foreign trade, and human rights. Brazil maintains technical cooperation with South America (Argentina, Bolivia, Chile, Colombia, Ecuador, Guiana, Paraguay, Surinam, Uruguay, and Venezuela); Central America (Costa Rica); Caribbean (Haiti); and Asia (Afghanistan, Kazakhstan, Timor-Leste, and Uzbekistan). Additionally, triangular technical cooperation is maintained among Brazil, India and South Africa on: science and technology; information technology; health; transportation and tourism; energy; economic growth with social equity; and a Fund to Combat Poverty and Hunger. The Brazilian Cooperation Agency – ABC developed the Managerial Information System for Project Monitoring (SIGAP) to organize information related to the international cooperation projects and support strategic decision making.[212]	

* indicates insignificant or no progress; indicates not achieved, but with some progress; indicates not achieved, but with important progress; indicates significant progress; indicates a fully achieved target; and **"?"** indicates insufficient information to reach a conclusion on achievement status.

Pressure

[210] Ministério no Meio Ambiente, 2004. Estratégias Nacionais de Biodiversidade na América do Sul: Perspectivas para a Cooperação Regional. MMA/Diretoria do Programa Nacional de Conservação da Biodiversidade – DCBio – Brasília, 288p.
[211] http://www.abc.gov.br/projetos/cooperacaoPrestadaAfricaCotton4.asp
[212] http://www.abc.gov.br/sigap/

Pressure from unsustainable biodiversity use remains high for the fisheries sector, particularly in the coastal and marine zones. Additionally, market demand for biodiversity-based non-timber products (e.g., food, cosmetics, phytotherapics) has increased and, as Brazil has not yet developed an efficient system for monitoring biodiversity use, it is reasonable to estimate that, despite some progress, pressure from unsustainable use remains high. This type of pressure also impacts on issues related to access and benefit sharing of genetic resources and related traditional knowledge, which remain unresolved despite the tremendous effort still being invested by the federal government to develop and implement adequate ABS policies. Brazil has also not yet developed policies and systems for the control and monitoring of invasive species, which currently represent a major threat to biodiversity in the country. Furthermore, although very significant progress was already achieved in the control of forest fires and deforestation, these pressures are still considered priorities for the sustained implementation of adequate responses.

State

The state of Amazon conservation has significantly improved in the last eight years in response to strong policies and improved monitoring and control actions. Deforestation and fire occurrences decreased, and the number and extension of protected areas increased tremendously. There was also notable increase of protected areas in the Atlantic Forest biome, combined with a strong decrease in deforestation. Additionally, legislation put in place in 2001 and 2006 prevented further management and degradation of primary forests and forest fragments containing endangered species, which is allowing the natural recuperation of these areas. Even though comparative qualitative studies have not yet been conducted, the ecological improvement of forests is visible, and it is reasonable to estimate that the state of biodiversity in the Atlantic Forest biome has improved. Deforestation continues to advance in the Cerrado and Caatinga biomes (4.17% and 2.0% additional deforestation of the biome, respectively, in 2008 as compared to 2002). However, as continuous vegetation monitoring data were not available prior to 2008 for these biomes, it is not yet possible to provide a quantified trend analysis of deforestation activities. Nevertheless, even though over 70% of the protected areas target was achieved to-date for the Cerrado and the Caatinga, their conservation state is still threatened by the advancing agricultural frontier and predatory charcoal production, among other threats. Data on vegetation monitoring are not yet available for the Pantanal biome, which reached only 47.92% of its protected area target. The Pampas biome is the least protected of the terrestrial biomes and invasive species are a cause of concern for its habitats. Lastly, given its vast extension, the Marine biome is still much below its 10% protection target, but progress is being made. However, overexploitation of fisheries resources, high levels of mangrove degradation and offshore oil operations are of concern.

Responses

The volume and quality of responses to pressures and threats to biodiversity have significantly increased in Brazil, particularly in the last eight years. Significant efforts are being invested in a variety of responses (see below) which achieved commendable though

unequal progress. Nevertheless, it is important to note that the current level of response is not yet sufficient to significantly improve biodiversity status in Brazil.

Monitoring: Brazil significantly improved and broadened its environmental monitoring activities, now covering all biomes. The vegetation cover (deforestation and fragments) and fire occurrences are now constantly monitored per biome. Brazil also monitors alterations suffered by coral reefs since 2001. Information systems and databases have also increased in number and volume of information, but still need improved interconnection and accessibility.

Direct protection: The creation and strengthening of protected areas presented a remarkable increase, but mostly because of the Amazon, where the larger areas and the greater number of areas were created. Despite the extraordinary effort to increase the number of protected areas in Brazil, the national target was not yet achieved in any of the biomes. Three biomes (Pantanal, Pampas and Marine) are still below 50% of target achievement for protected areas. Brazil is also advancing in the preparation and implementation of species action plans for the conservation of single or groups of species, giving priority to endangered species at this initial phase.

Conservation of genetic resources: Important progress was obtained for the on farm, *in situ* and *ex situ* conservation of genetic resources, particularly of agricultural crops. Significant efforts are being applied to expand inventories and mapping of native and land race varieties cultivated in traditional systems and by family producers as a first step to ensure conservation of Brazilian agro-biodiversity. Existing gene banks maintain varied and extensive collections, and other initiatives such as CIMAs (Dissemination Centers of Agro-biodiversity Management), seed networks and seed fairs, in addition to several governmental food acquisition programs, provide incentives for the on farm conservation of traditional varieties.

Sustainable use: The sustainable use of biodiversity is receiving incentives from governmental programs and actions, such as the creation and strengthening of Extractive Reserves and the establishment of minimum prices for socio-biodiversity products, among other initiatives. Sustainable and organic agriculture are also notably growing in Brazil, but their proportion to the entire national agricultural production is still small. Certification programs also provide incentives for sustainable and organic production, as well as for more environmentally and socially sustainable practices in conventional production. Watershed Committees are also punctually collaborating to local and regional environmental conservation and recuperation to achieve sustainable water supply and use. Further efforts are needed to better quantify and monitor progress related to the sustainable use of biodiversity and environmental services.

Policy development: Brazil has developed and put in force a strong Provisional Ruling on ABS, which remains the principal instrument for the protection of indigenous and traditional knowledge and practices since 2000, while discussions on the final text for the permanent legal instrument are not concluded. Several legal instruments were also put in force as incentives for sustainable agricultural production (acquisition programs, minimum price).

4.1.2. Incorporation of targets into relevant strategies, plans and programs

The Ministry of the Environment (MMA) and its connected agencies, and the Ministry of Science and Technology (MCT) are the main governmental agencies incorporating the national and global biodiversity targets and, therefore, the agencies that contribute the most to their achievement.

The PROBIO II project (see section 2.5.7), implemented under MMA coordination, is an important initiative to incorporate biodiversity targets into other sectors, but other initiatives are mostly punctual. Stronger efforts are necessary to further incorporate biodiversity targets into relevant strategies, plans and programs of most sectors, particularly economic sectors.

4.1.3. Progress made toward the 2010 global target

As the national 2010 biodiversity targets address all global targets, the country's progress towards CBD's 2010 Target was already indicated in section 4.1.1. The advances corresponding to the global targets are presented again in Table IV-2 below. Please refer to Table IV-2 in section 4.1.1 above for more detailed information.

Table IV-2: Progress made by Brazil toward the CBD 2010 Target.

Global goals and targets	Corresponding Brazilian targets	Progress achieved
Protect the components of biodiversity		
Goal 1: Promote the conservation of the biological diversity of ecosystems, habitats and biomes		
Target 1.1: At least 10% of each of the world's ecological regions effectively conserved.	2.1; 2.3	Brazil is the country that created the greater number and extension of protected areas in the world in the past four years. By mid-2010, 27.10% of the Brazilian Amazon biome was officially protected, as were 7.33% of the Caatinga; 8.43% of the Cerrado; 8.99% of the Atlantic Forest; 4.79% of the Pantanal; 3.50% of the Pampas; and 3.14% of the Brazilian Coastal and Marine zone (including the territorial sea and the Exclusive Economic Zone). Contributing to the protection of the coastal, marine and freshwater ecological regions and their biodiversity, Brazil has adopted since 1984 the practice of "*defeso*", meaning temporary suspension of fishing activities for specific targeted species during their reproductive period. Additionally, the National Protected Areas Plan (PNAP) foresees the use of no-take zones inside and outside protected areas (under SNUC) as a component of a representative system of protected areas. This practice is already being applied by various marine protected areas of sustainable use.
Target 1.2: Areas of particular importance to biodiversity protected.	2.2, 3.13	The latest revision (2007) indicated 2,684 Priority Areas for biodiversity protection in the country (in addition to the 522 indigenous lands). Protected areas exist in 1,123 (41%) of these Priority Areas. Brazil is developing, in consultation with indigenous peoples, the National Environmental Management Policy for Indigenous Lands (PNGATI) and initiated the implementation of the GEF-supported Indigenous Project, which foresees actions for the effective conservation of a representative sample of the Brazilian forest ecosystems in Indigenous Lands, increasing the importance of these lands as conservation areas.

Goal 2. Promote the conservation of species diversity		
Target 2.1: Restore, maintain, or reduce the decline of populations of species of selected taxonomic groups.	2.4, 2.5, 2.8, 2.9, 3.2	The current lists of threatened species indicate 627 threatened animal species and 472 threatened plant species. Existing conservation action plans address only 5% of the threatened animal species (including some threatened migratory species), but with the new plans currently under preparation this percentage should increase to 25% by the end of 2010. Long term conservation programs for selected species such as the lion tamarins, humpback whales, and sea turtles presented significant positive results in the protection and recuperation of wild populations. Regarding fish stocks targeted by fisheries activities, however, Brazil is still far from recovering stocks and from achieving sustainable levels of use. There are currently 12 conservation action plans for endangered plant species and it is estimated that a total of 20 of these plans will be completed by the end of 2010. Approximately 20% of the threatened plant species are currently conserved *ex situ* in botanical gardens and gene banks maintain over 170,000 accesses of cereals, foraging plants, medicinal plants, ornamental plants, forest species, palm trees, industrial species, roots and tubers. Data presented by the Rio de Janeiro Botanical Garden in the 2006 workshop for the definition of national targets indicated that 54% of the threatened plant species (2005 list) exist inside protected areas. According to the Red Book for Brazilian Fauna (2008), 403 (64%) of the 627 animal species officially listed as threatened were already recorded as present in protected areas.
Target 2.2: Status of threatened species improved.	2.6, 2.7	A comparison of the number of Brazilian species in the 2004 and the 2006 IUCN threatened animal species lists indicated that the number of Brazilian threatened species reduced 2% for mammals; increased 4% for birds; increased 15% for amphibians; increased 28% for fish; increased 1% for plants; and remained unchanged for reptiles, mollusks, and other invertebrates; resulting in a total 4% increase in the number of threatened species. Existing conservation action plans and long-term conservation programs, as well as conservation actions plans under preparation should improve the status of threatened animal species in the medium and long term. The Brazilian lists of threatened plant species were published in 1968 (listing 13 species); 1973 (14 species); 1992 (107 species); and 2008 (472 species). The taxonomy of Brazilian plants was revised for the preparation of the updated Catalogue of Brazilian Flora (published in 2010), which should assist in the next revision of the list of threatened plant species.
Goal 3. Promote the conservation of genetic diversity		
Target 3.1: Genetic diversity of crops, livestock, and of harvested species of trees, fish and wildlife and other valuable species conserved, and associated indigenous and local knowledge maintained.	2.10, 2.11, 2.12	The Ministry of the Environment is initiating the hiring process for studies to map the existing universe of cultivated species and varieties (including wild relatives and land races), and to assess the degree to which this diversity is actually conserved *in situ*, *on farm* and *ex situ*. The joint efforts carried out by EMBRAPA and other institutions have increased *ex-situ* collections of plants relevant for agrobiodiversity. The *in situ* conservation of traditional varieties has also improved in the last 10 years in response to various governmental initiatives. Inventories of important crop species and their wild relatives have been conducted, particularly through the Plants for the Future project. The extraordinary increase in the number and extension of protected areas, as well as the recent effort to regularize indigenous lands also contributed to the *in situ* conservation of traditional varieties and their wild relatives, as well as harvested species of fauna and flora, and the maintenance of the associated traditional knowledge.

		Whenever traditional communities and indigenous peoples actively use an agricultural species, the associated traditional knowledge is being maintained and can be expanded. However, the mapping of locations where this is occurring was not yet carried out. Indigenous and traditional culture is legally protected. However, the need remains to develop more specific legislation and procedures to protect specific knowledge, innovations and practices. Such instruments are still being discussed with indigenous and traditional peoples.
Promote sustainable use		
Goal 4. Promote sustainable use and consumption		
Target 4.1: Biodiversity-based products derived from sources that are sustainably managed, and production areas managed consistent with the conservation of biodiversity.	3.1, 3.3, 3.4, 3.11, 6.3	The government has invested significantly during the past 5+ years in the creation of Extractive Reserves and in the support for the sustainable management and production of non-timber forest products, as well as in the development and implementation of policies and TA programs to assist in the economic sustainability of these activities. Brazil is currently developing or has already concluded management plans for 53 of its 60 federal Extractive Reserves and Sustainable Development Reserve. Additionally, Brazil reached 25% of the area under forest management in the Amazon Region producing certified timber. Investments in studies, projects and research on the sustainable use of biodiversity have also increased significantly in the past several years, as well as the investments and number of research centers seeking sustainable technological solutions for agricultural and livestock production. Brazil also counts with regional networks for the conservation and sustainable use of biodiversity and agrobiodiversity.
Target 4.2. Unsustainable consumption, of biological resources, or that impacts upon biodiversity, reduced.	3.5; 6.1	Brazil is currently investing heavily in the preparation and implementation of management plans for sustainable use protected areas, as well as increased monitoring and enforcement, which should significantly reduce the unsustainable use of living resources in these protected areas in the medium and long term. There are also numerous initiatives in various sectors contributing to environmental education and social sensitization on themes related to the environment, biodiversity and sustainable use, including awareness-raising on the harmful effects of unsustainable consumption and the importance of environmentally-friendly attitudes and habits. Additionally, Brazil is investing efforts in the mainstreaming of biodiversity considerations across sectors (see Chapter 3), although results from these efforts are still insufficient.
Target 4.3: No species of wild flora or fauna endangered by international trade.	3.6, 3.7, 3.10	Legislation was put in force to prevent illegal national and international trade of Brazilian wild fauna and flora, but in practice illegal trade continues to occur. Nevertheless, control and enforcement actions have increased and become more efficient in ports and airports. Partnerships have been built between IBAMA and the Federal Police to increase the efficiency of these actions. National anti-trade campaigns have been recently implemented and smaller campaigns are periodically conducted. Additionally, the National Network for the Molecular Identification of Biodiversity (BR-BoL) has as one of its objectives to facilitate the identification of apprehended specimens of the wild fauna and flora, assisting in the solution of smuggling cases involving samples of the Brazilian biodiversity. MMA also carries out since 2005 training workshops to inform and sensitize traditional peoples and communities on the illegal access to traditional knowledge associated to genetic resources

		and illegal access to the genetic heritage. To improve the monitoring and operation of legal international trade, IBAMA has developed on-line systems and electronic databases.
Address threats to biodiversity		
Goal 5. Pressures from habitat loss, land use change and degradation, and unsustainable water use, reduced		
Target 5.1. Rate of loss and degradation of natural habitats decreased.	4.1, 4.2	Brazil reached a 75% decrease in the deforestation rate of the Amazon in 2009 as compared to 2004; and 76.9% in the Atlantic Forest by 2008 as compared to 2000. Brazil improved and expanded its deforestation monitoring systems which, starting in 2009/2010, cover all biomes and have built a baseline to allow future comparisons and the definition of trends. Additionally, Brazil obtained a national reduction average of 70.30% in the number of heat sources in 2009 as compared to 2002, well above the National 2010 Target, which aimed at a reduction of 25% in fire occurrences in each biome by 2010, as compared to 2002.
Goal 6. Control threats from invasive alien species		
Target 6.1. Pathways for major potential alien invasive species controlled.	4.4	National inventory efforts have been carried out for alien invasive species (affecting terrestrial habitats, inland waters, marine habitats, agricultural production systems, and human health), but no action plan for prevention and control was yet prepared.
Target 6. 2. Management plans in place for major alien species that threaten ecosystems, habitats or species.	4.5	Very limited progress was obtained to-date in Brazil, with the implementation of state and local initiatives focusing selected alien species.
Goal 7. Address challenges to biodiversity from climate change, and pollution		
Target 7.1. Maintain and enhance resilience of the components of biodiversity to adapt to climate change.	4.7	Brazil has two large-scale initiatives related to this target: one to study the effects of climate change in agricultural production and the other in coral reefs. Nevertheless, increased habitat conservation and the initiatives to improve knowledge and *ex situ*/*in situ* conservation of traditional crops and their wild relatives may also be considered as part of the Brazilian contribution to this target.
Target 7.2. Reduce pollution and its impacts on biodiversity.	4.6	Efforts to monitor water quality have increased in Brazil, as well as investments in wastewater collection and treatment services. More investments are needed to reach satisfactory levels of pollution reduction from domestic and industrial discharges. Adequate disposal of solid waste is also still insufficient in the country. Even though Brazil is still the main destination of agricultural chemicals banned in various countries, there are numerous initiatives encouraging the adoption of more sustainable agricultural practices.
Maintain goods and services from biodiversity to support human well-being		
Goal 8. Maintain capacity of ecosystems to deliver goods and services and support livelihoods		
Target 8.1. Capacity of ecosystems to deliver goods and services maintained.	2.13	The total area under protection increased significantly in Brazil, including in Priority Areas for Biodiversity Conservation and Sustainable Use (see targets 2.1 and 2.2), and there was a decrease in deforestation and fire occurrences. The analysis of the status of the Priority Areas for Biodiversity was initiated in 2010 by IBAMA through its new monitoring system. Results are expected to be available by the end of 2010. The total area in private lands corresponding to Permanent Preservation Areas (APPs) and Legal Reserves (RLs), the preservation of which is required by law, covers more than two times the area covered by officially protected areas. However, 42% of APPs and 16.5% of RLs present illegal deforestation, as

		do 3% of the protected areas and indigenous lands. An analysis of the remaining vegetation cover inside Priority Areas for Biodiversity in the 4 biomes for which data was available obtained a proxy estimate of the maintenance of the capacity of Brazilian ecosystems to deliver goods and services, indicating that these areas maintain, on average, the following percentages of original vegetation cover: 65.9% in the Cerrado; 63.3% in the Pampas; 70.5% in the Caatinga; and 89.7% in the Pantanal.
Target 8.2. Biological resources that support sustainable livelihoods, local food security and health care, especially of poor people maintained.	2.14	Several initiatives are being carried out by the Brazilian government to support the *on farm* conservation of economically and socially important agrobiodiversity. A significant number of traditional communities and family farmers already conserve numerous species significant for agrobiodiversity, also stimulated by national policies and federal programs Additionally, various initiatives involving NGOs and social movements or organizations contribute to *on farm* conservation.
Protect traditional knowledge, innovations and practices		
Goal 9 Maintain socio-cultural diversity of indigenous and local communities		
Target 9.1. Protect traditional knowledge, innovations and practices.	5.1, 5.2	Several important policies were developed (see section 1.2.4 and national targets 5.1 and 5.2 in section 4.1.1) and are being implemented at various rates. The main legal instrument on access and benefit sharing is being only partially implemented and its revision is still being discussed. Significant progress was obtained in the demarcation of Indigenous Lands, increasing the protection of these areas and, to a certain extent, the protection of indigenous culture, biodiversity, agrobiodiversity and practices. Additionally, there was a significant increase in the number of Extractive Reserves (RESEX), increasing protection of traditional communities and their practices.
Target 9.2. Protect the rights of indigenous and local communities over their traditional knowledge, innovations and practices, including their rights to benefit-sharing.	5.3, 5.4	Indigenous and traditional culture and rights are legally protected. However, the need remains to develop more specific legislation and procedures to protect specific knowledge, innovations and practices. Several publications that disseminate traditional knowledge identify the origin of the information, as required by national legislation in force. In parallel, there is an ongoing debate to define whether the identification of the origin of traditional knowledge actually protects or exposes this knowledge. The Provisional Ruling 2186-16 of 2001 is currently in force (see national target 5.3 in section 4.1.1; and section 1.2.4) to establish criteria for access and benefit sharing, including prior consent, while the final policy instrument is not finalized. However, not all articles of the Provisional Ruling were regulated, which halted existing and proposed benefit-sharing projects. Debates on a final text for permanent legislation on this theme are still ongoing.
Ensure the fair and equitable sharing of benefits arising out of the use of genetic resources		
Goal 10. Ensure the fair and equitable sharing of benefits arising out of the use of genetic resources		
Target 10.1. All access to genetic resources is in line with the Convention on Biological Diversity and its relevant provisions.	5.5, 5.7	The Provisional Ruling 2186-16 of 2001 is currently in force (see national target 5.3 and section 1.2.4) to establish criteria for access and benefit sharing, including informed prior consent. However, not all articles of the Provisional Ruling have already been regulated, which hinders the application and compliance with the legislation. Debates on a final text for legislation on this theme are still ongoing (see Global Target 9.2 above).
Target 10.2. Benefits arising from the commercial and other utilization of genetic	5.6, 5.8	The rules for benefit-sharing were defined by Provisional Ruling 2186-16/2001. Some benefit-sharing under old contracts is occurring, but most initiatives are pending the definition of specific rules for each case.

resources shared in a fair and equitable way with the countries providing such resources in line with the Convention on Biological Diversity and its relevant provisions.		In 2006, a study was contracted to carry out a diagnosis for the definition of benefit sharing procedures in production chains involving Brazilian biodiversity, as well as the payment levels for benefits. This work was concluded in 2009, but the information provided is still insufficient to define national standards for benefit sharing procedures. Some contracts are implementing benefit sharing; however, the paid benefit values are considered classified information at the company's request.
Ensure provision of adequate resources		
Goal 11: Parties have improved financial, human, scientific, technical and technological capacity to implement the Convention		
Target 11.1. New and additional financial resources are transferred to developing country Parties, to allow for the effective implementation of their commitments under the Convention, in accordance with Article 20.	7.1	New and additional resources were obtained by Brazil for biodiversity conservation and sustainable use and several environmental funds were created (see section 2.5), but available data is not compiled in a measurable way over time. Brazil established financing mechanisms with various international, bilateral, multilateral, and national agencies for biodiversity and environmental actions and projects. Numerous on-going projects in the country receive GEF funds and/or other international resources. Additionally, Brazilian research agencies (CNPq, MCT) also develop various projects through international collaboration. (See national target 7.1)
Target 11.2. Technology is transferred to developing country Parties, to allow for the effective implementation of their commitments under the Convention, in accordance with its Article 20, paragraph 4.	7.2, 7.3	Brazil maintains various agreements for environment-related technology transfer to and from other countries, involving both developed and developing nations (see national targets 7.2 and 7.3 in section 4.1.1).

4.1.4. Major obstacles encountered and lessons learned

Section 2.5.6 lists the major challenges encountered by Brazil to achieve satisfactory implementation of the CBD objectives. These are related to: monitoring progress towards national and global targets; mainstreaming of biodiversity considerations across sectors; the NBSAP as a set of instruments versus a single consolidated document; national biodiversity targets and indicators; funding, capacity and continuity for CDB implementation; integration with climate change initiatives and policies; awareness raising; biodiversity information systems; lower level NBSAPs; and South-South collaboration.

Of these, the following may be considered the most challenging:

Monitoring progress towards the achievement of national biodiversity targets: Data is unavailable for some targets and the relevant information available for most targets is not easily accessible or sufficiently systematized. As a result, monitoring target achievement is difficult for most targets and currently impossible for some. Concerted efforts and significant resource investment must be applied to obtain coherent and measurable biodiversity indicators and to develop a feasible monitoring system to track and improve the effectiveness of responses to pressures on biodiversity. An enhanced and integrated

biodiversity information system will also significantly contribute to overcome this challenge.

Biodiversity mainstreaming: Reducing pressure on biodiversity depends largely on the success of integrating biodiversity considerations into the various economic sectors. Brazil is still at the early stages of this process, which requires strong political support in favor of biodiversity and much greater resource investment on inter-sectoral coordination and capacity building on biodiversity and sustainable development issues to be achieved.

Capacity and continuity: Environmental and biodiversity conservation in Brazil would greatly benefit from a well staffed and continuous institutional structure. Stronger investment for adequately staffing environmental agencies at the three levels of government and in the enhancement of the career program for environmental analysts, focused on environmental and biodiversity specialists, would contribute to fill the gap and halt the constant turnover and evasion of good professionals.

4.1.5. Future priorities after 2010

Future Brazilian priorities for biodiversity will be defined after COP-10, when the national biodiversity targets for 2010 will be revised and updated according the international targets for 2020 and the progress obtained to-date, and actions to strengthen the national mechanisms for implementation will be identified. The national targets that presented little progress up to 2010 should receive more attention for a better future performance, such as the targets related to the restoration of fish stocks; control of invasive species; and access and benefit sharing resulting from the use of biodiversity and associated traditional knowledge.

As a contribution to the process for the definition of priority actions to strengthen mechanisms for implementation and monitoring, the difficulties encountered during CBD implementation and in the achievement of national biodiversity targets (discussed in sections 2.5.6 and 4.1.4) suggest that the following items should be considered for future priorities:

- Review of the national biodiversity targets.
- Development of biodiversity monitoring systems, in addition to the existing vegetation cover monitoring systems.
- Enhancement of databases on natural resources managed by public institutions through training, frequent updates of equipment and contents, and systematic strengthening of institutional relations, allowing the integration of primary information sources and existing databases.
- Periodic systematization and dissemination of indicators related to biodiversity knowledge and conservation under SINIMA – the National Environmental Information System, establishing standards among institutional monitoring processes with targets and indicators (CDB, ILAC, ODM, IDS/IBGE, among others).

- Stronger investments in the enhancement of the integration of biodiversity concerns into policies, programs and actions of the various sectors.
- Improvement of the qualification of environmental staff and increase the number of technical staff in governmental agencies to increase the installed capacity to develop, implement and monitor the environmental policies and fulfill the country's national and international commitments related to biodiversity and the environment.

4.2. Implementation of the Strategic Plan of the Convention

Through the implementation of its NBSAP and National Biodiversity Targets, Brazil contributed in different degrees to the implementation of the goals and objectives of the Strategic Plan of the Convention, as discussed below. Detailed information on achievements related to the national goals is provided in section 4.1.1 and the main challenges and obstacles encountered are presented in section 4.1.4 above and section 2.5.6.

Goal 1: The Convention is fulfilling its leadership role in international biodiversity issues.
The NBSAP is setting the Brazilian biodiversity agenda and the country is actively participating in the implementation of all relevant international instruments of which the country is Party[213]. As the same institutions/representatives function as focal points to several of these instruments, Brazil is contributing where possible and relevant, to the integration of the various instruments. Brazil created the necessary institutional structures to implement the Cartagena Protocol but implementation needs enhancement through stricter compliance with certain aspects of the relevant national legislation. However, at the regional level, Brazil provided limited contribution to collaboration for the implementation of the Convention in South America.

Goal 2: Parties have improved financial, human, scientific, technical, and technological capacity to implement the Convention.
Ensuring that environmental agencies have the adequate number of qualified staff to implement the NBSAP and the Convention remains a challenge for Brazil. Although the governmental environment sector still struggles with limited human and financial resources, Brazil is improving its scientific, technical and technological capacity to support biodiversity conservation and sustainable use. Brazil is also implementing important projects and programs for the transfer of technology, both to and from Brazil, in collaboration with developed and developing countries.

Goal 3: National biodiversity strategies and action plans and the integration of biodiversity concerns into relevant sectors serve as an effective framework for the implementation of the objectives of the Convention.
Brazil has a strong legal framework for the environment composed of various legal instruments, which comprise the country's NBSAP. Implementation and compliance with these instruments are reasonably effective and improving. Nevertheless, their effectiveness could benefit significantly from better integration among the various environmental policies and instruments. Brazil developed and is implementing the regulatory legal framework for

[213] Examples are the UNFCCC; the Ramsar Convention; IWC; DOALOS; ICCAT; ATCM; ICRI; FAO's Fisheries and Forest working groups; among various other instruments and forums.

the implementation of the Cartagena Protocol, including the creation of the National Technical Biosafety Commission. All these instruments supported the country's significant progress towards achieving the national biodiversity targets (see section 4.1.1), contributing to several global targets (see section 4.1.3). However, despite some progress, Brazil still faces important challenges to effectively integrate biodiversity concerns into other sectors, particularly the production and economic sectors.

Goal 4: There is a better understanding of the importance of biodiversity and of the Convention, and this has led to broader engagement across society in implementation.
Various Brazilian sectors implement numerous initiatives related to environmental education and awareness raising on the importance of biodiversity and its conservation and sustainable use. Although the governmental effort to develop a national and integrated strategy for environmental education and communication is recent, important progress was obtained, as shown by public opinion surveys (see section 1.5). In the last 10 years Brazil succeeded in transforming the general ideas and attitudes towards biodiversity and environment conservation, previously associated to the caricature of ecologists' discourse disregarded by the general public and politicians as nonsense exaggerations, into relevant themes in political speeches and important, familiar themes to the general public. This transformation was gradually achieved through a combination of governmental and non-governmental efforts, and as a reflex of global attitude changes and pressure in support of conservation. Governmental initiatives are also contributing to enhance the involvement of indigenous and traditional communities in biodiversity and agrobiodiversity conservation and sustainable use. However, even though these results and initiatives support the engagement in the achievement of the Convention's objectives, the general awareness and understanding of the CBD itself and other international instruments is still not widespread.

4.3. Conclusions: Overall assessment of implementation

Brazil set itself an immense challenge with the definition of 51 National Biodiversity Targets for 2010, related to the global CBD targets. A summary of the progress made towards these targets is presented in Table IV-3 below, which groups the national targets into broad themes according to the National Biodiversity Policy components and the major achievements under each theme (see section 4.1.1 for details on each target).

Table IV-3: Summary of the National Biodiversity Targets for 2010.

Themes	Modest Progress	Significant Progress
Knowledge (targets 1.1 to 1.3)	Virtual institutes.	Biodiversity catalogues. Taxonomy programs.
Ecosystem conservation (targets 2.1 to 2.3 and 2.13)	No-take zones (fisheries). Effectiveness of protected areas (under the National Protected Areas System – SNUC).	Protected areas (under SNUC). Priority areas for biodiversity. Maintenance of ecosystem services.
Conservation of threatened species (targets 2.4 to 2.9)	Action Plans. *Ex situ* conservation. Conservation status assessment. Lists of threatened species. Migratory species addressed by action plans.	Inclusion in protected areas.
Conservation of genetic	Conservation of plants with	

resources (targets 2.10 to 2.12 and 2.14)	socioeconomic value. Conservation of the Plants for the Future. *On farm* conservation of agrobiodiversity. Wild relatives of cultivated plants.	
Sustainable use / Sustainable production (targets 3.1 to 3.4 and 3.13)	Non-timber forest products from sustainably managed sources. Recovery of fish stocks. Extractive Reserves and Environmental Protection Areas with management plans.	Certified forest management plans in the Amazon. Completion of Ecologic-Economic Zoning in the states.
Sustainable use / Sustainable consumption (targets 3.5 to 3.7 and 3.10)	Reduction of the non-sustainable consumption in protected areas. Combat of illegal trade of threatened fauna and flora species in the country. Combat of biopiracy.	Control of the international trade of threatened species (CITES).
Sustainable use / Value added (targets 3.8, 3.9, 3.11 and 3.12)	Increase in innovation of and value added to biodiversity products. Increase in new biodiversity uses in medicine and diet.	Investments in research on the sustainable use of biodiversity. Number of patents granted to biodiversity-based or biodiversity-related products.
Impact monitoring (targets 4.3 and 4.7)	National biodiversity monitoring network. Forecasting climate change impacts.	Biome monitoring. Monitoring of coral reefs.
Reduction of impacts (targets 4.1, 4.2, and 4.4 to 4.6)	Alien invasive species. Water pollution. Control of impacts on the coastal and marine zone.	Deforestation (50%). Fire (100%)
Benefit sharing / Protection of rights (targets 5.1 to 5.4)	Public policies for traditional peoples and communities. Access with previous informed consent. Scientific publications with origin identification.	Demarcation of Indigenous Lands and Extractive Reserves.
Benefit sharing / Regulated access (targets 5.5 to 5.8)	New ABS legislation Implementation of the National Genetic Resources Council (CGEN). Patent requests. Implementation of the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPRFA).	
Information and sensitization (targets 6.1 to 6.3)	Education and sensitization. Access to information. Action networks.	
Institutional consolidation (targets 7.1 to 7.3)	Financial resources. Technologies transferred to Brazil.	South-South technology transfer from Brazil.

Both significant (including the full achievement of two targets) and modest advances were obtained in CBD implementation and in the achievement of National Biodiversity Targets in most target groups, as presented above. Brazil advanced less in regard to invasive species issues, recovery of fish stocks, and benefit sharing and regulated access to genetic resources; and advanced the most in themes related to habitat protection, impact monitoring, and

reducing threats from deforestation and fire. Important advances were also obtained in increasing biodiversity knowledge, including agrobiodiversity. Although not precisely quantified, more advances were obtained in the conservation of agrobiodiversity genetic resources than in the conservation of threatened wildlife and plant species, although ongoing efforts should achieve better balance in this regard. Sustainable use practices are also becoming notably more widespread and significant resources and efforts are being invested in this theme, for which more important progress is expected in the short and medium term.

Significant challenges remain for improving CBD implementation and achievement of the National Targets, as discussed in sections 2.5.6 and 4.1.4. The International Year of Biodiversity (2010) evidenced an increase in the involvement of the general public with the themes of biodiversity and environment conservation, which were previously restricted to academia and specific governmental sectors. In 2010, various sectors (NGOs, private sector, media, academia, and social movements) are organizing events related to the International Year of Biodiversity, which demonstrates an increase of the degree of biodiversity mainstreaming into other sectors. This growing involvement of society and dissemination of biodiversity-related themes should continue with the incentive of the possible approval by the UN of the proposal presented by the Japanese Government to declare 2011-2020 the International Decade of Biodiversity, to be voted in the next meeting of the Working Group on Review of Implementation of the CBD (WGRI). On the other hand, the Brazilian population is growing and strong pressures still exist to increase consumption and the expansion of economic activities (agriculture, livestock, infrastructure, etc.), as well as to accelerate development. This generates conflicts of interest related to the need to conciliate conservation and development actions.

FOURTH NATIONAL REPORT TO THE

CONVENTION ON BIOLOGICAL DIVERSITY

BRAZIL

ANNEXES

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ANNEX 1

BRAZILIAN ENVIRONMENTAL LEGISLATION

The development of the legal instruments that comprise the Brazilian legislation is initiated both by the governmental Legislative body and the Executive body, and evolves according to the most pressing social, economic, cultural or environmental demands. Legal instruments from different hierarchies are constantly added to the national legal framework, among which: Laws, Provisional Rulings, Decrees, Normative Rulings, Administrative Rulings, and Resolutions, which gradually format each sector's legislation, including the set of instruments comprising the Brazilian Environmental Legislation. International instruments such as Treaties, Agreements, Conventions, Protocols – among various other instruments that characterize an international commitment – integrate the national legal framework after being subscribed by Brazil, promulgated through a presidential decree, and approved by the National Congress through a legislative decree.

Thus, by becoming party to the Convention on Biological Diversity – CBD and moving with the global and national process of attitude change regarding the environment, which brings with it a growing demand for environmental sustainability, Brazil engaged in the adjustment of its national legal framework to harmonize it with CBD's principles and rules. To that end, the country is seeking legal and political propositions to make viable the complex issue of the protection, preservation and conservation of biological diversity, genetic resources and the environment as a whole.

Brazil possesses a broad environmental legislation framework, a sample of which is presented below, selected among the main legal instruments related to the three primary objectives of the CBD: a) Conservation of Biological Diversity; b) Sustainable Use of Biodiversity Components; and c) the Fair and Equitable Sharing of Benefits resulting for the Use of Genetic Resources.

I. LAWS

1. Lei nº 4.504, de 30 de novembro de 1964: Dispõe sobre o Estatuto da Terra e dá outras providências.

2. Lei nº 4.771, de 15 de setembro de 1965: Código Florestal - dispõe sobre a proteção das florestas e demais formas de vegetação.

3. Lei nº 5.197, de 03 de janeiro de 1967: Dispõe sobre a proteção à fauna e dá outras providências.

4. Lei nº 6.513, de 20 de dezembro de 1977: Dispõe sobre as áreas especiais e locais de interesse turístico.

5. Lei nº 6.766, de 19 de dezembro de 1979: Dispõe sobre o parcelamento do solo urbano, e dá outras providências.

6. Lei nº 6.803, de 02 de julho de 1980: Dispõe sobre as diretrizes básicas para o zoneamento industrial nas áreas críticas de poluição, e dá outras providências.

7. Lei nº 6.902, de 27 de abril de 1981: Dispõe sobre a criação de estações ecológicas, áreas de proteção ambiental e dá outras providências.

8. Lei nº 6.938, de 31 de agosto de 1981: Dispõe sobre a Política Nacional do Meio Ambiente, seus fins e mecanismos de formulação e aplicação e dá outras providências.

9. Lei nº 7.173, de 14 de dezembro de 1983: Dispõe sobre o estabelecimento e funcionamento de jardins zoológicos, e dá outras providências.

10. Lei nº 7.347, de 24 de julho de 1985: Dispõe sobre a defesa dos direitos e interesses difusos e coletivos - Disciplina a ação civil pública de responsabilidade por danos causados ao meio ambiente, ao consumidor, a bens e direitos de valor artístico, estético, histórico, turístico e paisagístico (vetado) e dá outras providências.

11. Lei nº 7.643, de 18 de dezembro de 1987: Proíbe a pesca e o molestamento dos cetáceos em águas jurisdicionais brasileiras.

12. Lei nº 7.661, de 16 de maio de 1988: Institui o Plano Nacional de Gerenciamento Costeiro e dá outras providências.

13. Lei nº 7.679, de 23 de novembro de 1988: Dispõe sobre a proibição da pesca de espécies em período de reprodução, e dá outras providências.

14. Lei nº 7.735, de 22 de fevereiro de 1989: Dispõe sobre a extinção de órgão e de entidade autárquica, cria o Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis e dá outras providências.

15. Lei nº 7.797, de 10 de julho de 1989: Cria o Fundo Nacional do Meio Ambiente e dá outras providências.

16. Lei nº 7.802, de 11 de julho de 1989: Dispõe sobre a pesquisa, a experimentação, a produção, a embalagem e rotulagem, o transporte, o armazenamento, a comercialização, a propaganda comercial, a utilização, a importação, a exportação, o destino final dos resíduos e embalagens, o registro, a classificação, o controle, a inspeção e a fiscalização de agrotóxicos, seus componentes e afins, e dá outras providências.

17. Lei nº 8.171, de 17 de janeiro de 1991: Dispõe sobre a política agrícola.

18. Lei nº 8.617, de 04 de janeiro de 1993: Dispõe sobre o mar territorial, a zona contígua, a zona econômica exclusiva e a plataforma continental brasileiros, e dá outras providências.

19. Lei nº 8.723, de 28 de outubro de 1993: Dispõe sobre a redução de emissão de poluentes por veículos automotores.

20. Lei nº 9.279, de 14 de maio de 1996: Lei de Propriedade Intelectual ou Lei de Patentes - Regula direitos e obrigações relativos à propriedade industrial.

21. Lei nº 9.393, de 19 de dezembro de 1996: Dispõe sobre o Imposto sobre a Propriedade Territorial Rural - ITR, sobre pagamento da dívida representada por Títulos da Dívida Agrária e dá outras providências.

22. Lei nº 9.433, de 08 de janeiro de 1997: Institui a Política Nacional de Recursos Hídricos, cria o Sistema Nacional de Gerenciamento de Recursos Hídricos, regulamenta o inciso XIX do art. 21 da

Constituição Federal, e altera o art. 1º da Lei nº 8.001, de 13 de março de 1990, que modificou a Lei nº 7.990, de 28 de dezembro de 1989.

23. Lei nº 9.456, de 25 de abril de 1997: Dispõe sobre a proteção de cultivares, e dá outras providências.

24. Lei nº 9.478, de 06 de agosto de 1997: Dispõe sobre a política energética nacional, as atividades relativas ao monopólio do petróleo, institui o Conselho Nacional de Política Energética e a Agência Nacional do Petróleo e dá outras providências.

25. Lei nº 9.479, de 12 de agosto de 1997: Dispõe sobre a concessão de subvenção econômica a produtores de borracha natural e dá outras providências.

26. Lei nº 9.605, de 12 de fevereiro de 1998: Lei de Crimes Ambientais - Dispõe sobre as sanções penais e administrativas derivadas de condutas e atividades lesivas ao meio ambiente, e dá outras providências.

27. Lei nº 9.795, de 27 de abril de 1999: Dispõe sobre a educação ambiental, institui a Política Nacional de Educação Ambiental, e dá outras providências.

28. Lei nº 9.966, de 28 de abril de 2000: Dispõe sobre a prevenção, o controle e a fiscalização da poluição causada por lançamento de óleo e outras substâncias nocivas ou perigosas em águas sob jurisdição nacional e dá outras providências.

29. Lei nº 9.984, de 17 de julho de 2000: Dispõe sobre a criação da Agência Nacional de Águas - ANA, entidade federal de implementação da Política Nacional de Recursos Hídricos e de Coordenação do Sistema Nacional de Gerenciamento de Recursos Hídricos.

30. Lei nº 9.985, de 18 de julho de 2000: Regulamenta o art. 225, § 1o, incisos I, II, III e VII da Constituição Federal, institui o Sistema Nacional de Unidades de Conservação da Natureza e dá outras providências.

31. Lei nº 10.257, de 10 de julho de 2001: Estatuto da Cidade - Regulamenta os Arts. 182 e 183 da Constituição Federal, estabelece diretrizes gerais da política urbana.

32. Lei nº 10.295, de 17 de outubro de 2001: Dispõe sobre a Política Nacional de Conservação e Uso Racional de Energia.

33. Lei nº 10.308, de 20 de novembro de 2001: Dispõe sobre a seleção de locais, a construção, o licenciamento, a operação, a fiscalização, os custos, a indenização, a responsabilidade civil e as garantias referentes aos depósitos de rejeitos radioativos.

34. Lei nº 10.332, de 19 de dezembro de 2001: Institui mecanismo de financiamento para o Programa de Ciência e Tecnologia para o Agronegócio, para o Programa de Fomento à Pesquisa em Saúde, para o Programa Biotecnologia e Recursos Genéticos - Genoma, para o Programa de Ciência e Tecnologia para o Setor Aeronáutico e para o Programa de Inovação para Competitividade.

35. Lei 10.406, de 10 de janeiro de 2002: Novo Código Civil brasileiro: dispõe sobre o exercício do direito de propriedade de modo a preservar o meio ambiente.

36. Lei nº 10.438, de 26 de abril de 2002: Dispõe sobre a expansão da oferta de energia elétrica emergencial, recomposição tarifária extraordinária, cria o Programa de Incentivo às Fontes Alternativas de Energia Elétrica (Proinfa), a Conta de Desenvolvimento Energético (CDE), dispõe sobre a universalização do serviço público de energia elétrica, dá nova redação às Leis nº 9.427, de 26 de dezembro de 1996, nº 9.648, de 27 de maio de 1998, nº 3.890-A, de 25 de abril de 1961, nº 5.655, de 20 de maio de 1971, nº 5.899, de 05 de julho de 1973, nº 9.991, de 24 de julho de 2000 e dá outras providências.

37. Lei nº 10.638, de 06 de janeiro de 2003: Institui o Programa Permanente de Combate à Seca – PROSECA.

38. Lei nº 10.650, de 16 de abril de 2003: Dispõe sobre o acesso público aos dados e informações existentes nos órgãos e entidades integrantes do SISNAMA.

39. Lei nº 10.683, de 2003: Cria a Secretaria Especial da Aqüicultura e Pesca – SEAP.

40. Lei nº 10.711, de 05 de agosto de 2003: Dispõe sobre o Sistema Nacional de Sementes e Mudas e dá outras providências.

41. Lei nº 10.831, de 23 de dezembro de 2003: Dispõe sobre a Agricultura Orgânica.

42. Lei nº 11.097, de 13 de janeiro de 2005: Dispõe sobre a introdução do biodiesel na matriz energética brasileira.

43. Lei nº 11.105, de 24 de março de 2005: Lei de Biossegurança - Regulamenta os incisos II, IV e V do §1º do Art. 225 da Constituição Federal, estabelece normas de segurança e mecanismos de fiscalização de atividades que envolvam organismos geneticamente modificados - OGM e seus derivados, cria o Conselho Nacional de Biossegurança - CNBS, reestrutura a Comissão Técnica Nacional de Biossegurança - CTNBio, dispõe sobre a Política Nacional de Biossegurança – PNB.

44. Lei nº 11.284, de 02 de março de 2006: Dispõe sobre a gestão de florestas públicas para a produção sustentável; institui, na estrutura do Ministério do Meio Ambiente o Serviço Florestal Brasileiro - SFB; cria o Fundo Nacional de Desenvolvimento Florestal – FNDF.

45. Lei nº 11.326, de 24 de julho de 2006: Estabelece as diretrizes para a formulação da Política Nacional da Agricultura Familiar e Empreendimentos Familiares Rurais.

46. Lei nº 11.428, de 22 de dezembro de 2006: Dispõe sobre a utilização e proteção da vegetação nativa do Bioma Mata Atlântica.

47. Lei Complementar nº 124, de 3 de janeiro de 2007: Institui, na forma do art. 43 da Constituição Federal, a Superintendência do Desenvolvimento da Amazônia - SUDAM; estabelece sua composição, natureza jurídica, objetivos, área de competência e instrumentos de ação; dispõe sobre o Fundo de Desenvolvimento da Amazônia - FDA; altera a Medida Provisória nº 2.157-5, de 24 de agosto de 2001.

48. Lei nº 11.450, de 21 de março de 2007: Dispõe sobre o plantio de Organismos Geneticamente Modificados em Unidades de Conservação.

49. Lei nº 11.516, de 28 de agosto de 2007: Dispõe sobre a criação do Instituto Chico Mendes de Conservação da Biodiversidade - Instituto Chico Mendes.

50. Lei nº 11.696, de 12 de junho de 2008: Institui o Dia Nacional de Luta dos Povos Indígenas.

51. Lei nº 11.794, de 08 de outubro de 2008: Regulamenta o inciso VII do §1º do Art. 225 da Constituição Federal, estabelecendo procedimentos para o uso científico de animais.

52. Lei nº 11.828, de 20 de novembro de 2008: Dispõe sobre medidas tributárias aplicáveis às doações em espécie recebidas por instituições financeiras públicas controladas pela União e destinadas a ações de prevenção, monitoramento e combate ao desmatamento e de promoção da conservação e do uso sustentável das florestas brasileiras.

II. PROVISIONAL RULING

1. Medida Provisória - MP nº 2.186-16, de 23 de agosto de 2001: Dispõe sobre o acesso ao patrimônio genético, a proteção e o acesso ao conhecimento tradicional associado, a repartição de benefícios e o acesso à tecnologia.

III. DECREES E DECREE-LAWS

1. Decreto-Lei nº 221, de 28 de fevereiro de 1967: Código de Pesca - Dispõe sobre a proteção e estímulos à pesca, e dá outras providências.

2. Decreto-Lei nº 1.413, de 14 de agosto de 1975: Dispõe sobre o controle da poluição do meio ambiente provocada por atividades industriais.

3. Decreto nº 24.114, de 12 de abril de 1934: Aprova o Regulamento de Defesa Sanitária Vegetal.

4. Decreto nº 24.548, de 03 de julho de 1934: Estabelece regras para a importação de animais com finalidades agropecuárias.

5. Decreto nº 24.643, de 10 de julho de 1934: Decreta o Código de Águas.

6. Decreto nº 59.566, de 14 de novembro de 1966: Regulamenta as Seções I, II e III do Capítulo IV do Título III da Lei nº 4.504, de 30 de novembro de 1964, Estatuto da Terra.

7. Decreto nº 65.057, de 26 de agosto de 1969: Dispõe sobre a criação de normas para a fiscalização das expedições científicas no país.

8. Decreto nº 76.389, de 03 de outubro de 1975: Dispõe sobre as medidas de prevenção e controle da poluição industrial, e dá outras providências.

9. Decreto nº 76.623, de 17 de novembro de 1975: Regulamenta a Convenção sobre o Comércio Internacional das Espécies da Fauna e Flora Selvagens Ameaçadas de Extinção – CITES.

10. Decreto nº 2.366, de 5 de novembro de 1977: Regulamenta a lei de proteção de cultivares e também dispõe sobre o Serviço Nacional de Proteção de Cultivares – SNPC.

11. Decreto nº 79.437, de 28 de março de 1977: Promulga a Convenção Internacional sobre Responsabilidade Civil em Danos Causados por Poluição por óleo, 1969.

12. Decreto nº 81.771, de 07 de junho de 1978: Regulamenta a Lei nº 6.507, de 19 de dezembro de 1977, que dispõe sobre a inspeção e a fiscalização da produção e do comércio de sementes e mudas.

13. Decreto nº 84.017, de 21 de setembro de 1979: Regulamenta os Parques Nacionais brasileiros.

14. Decreto nº 84.410, de 22 de janeiro de 1980: Dispõe sobre a estrutura básica do Departamento Nacional de Obras Contras as Secas – DNOCS.

15. Decreto nº 86.176, de 06 de julho de 1981: Regulamenta as áreas especiais e locais de interesse turístico, e dá outras providências.

16. Decreto nº 89.336, de 31 de janeiro de 1984: Dispõe sobre as reservas ecológicas e áreas de relevante interesse ecológico, e dá outras providências.

17. Decreto nº 96.000, de 02 de maio de 1988: Dispõe sobre a realização de pesquisa e investigação científica na plataforma continental e em águas sob jurisdição brasileira, e sobre navios e aeronaves de pesquisa estrangeiros em visita aos portos ou aeroportos nacionais, em trânsito nas águas jurisdicionais brasileiras ou no espaço aéreo sobrejacente.

18. Decreto nº 96.944, de 12 de outubro de 1988: Cria o Programa de Defesa do Complexo de Ecossistemas da Amazônia Legal, e dá outras providências.

19. Decreto nº 97.507, de 13 de fevereiro de 1989: Dispõe sobre licenciamento de atividade mineral, o uso do mercúrio metálico e do cianeto em áreas de extração de outro, e dá outras providências.

20. Decreto nº 97.633, de 10 de abril de 1989: Dispõe sobre o Conselho Nacional de Proteção à Fauna - CNPF, e dá outras providências.

21. Decreto nº 97.635, de 10 de abril de 1989: Cria o Sistema Nacional de Prevenção e Combate aos Incêndios Florestais – PREVFOGO.

22. Decreto nº 98.161, de 21 de setembro de 1989: Dispõe sobre a administração do Fundo Nacional do Meio Ambiente, e dá outras providências.

23. Decreto nº 98.816, de 11 de janeiro de 1990: Regulamenta a Lei nº 7.802 de 1989 que dispõe sobre a pesquisa, a experimentação, a produção, a embalagem e rotulagem, o transporte, o armazenamento, a comercialização, a propaganda comercial, a utilização, a importação, exportação, o destino final dos resíduos e embalagens, o registro, a classificação, o controle, a inspeção e a fiscalização de agrotóxicos, seus componentes e afins e dá outras providências.

24. Decreto nº 98.830, de 15 de janeiro de 1990: Dispõe sobre a coleta, por estrangeiros, de dados e materiais científicos no Brasil, e dá outras providências.

25. Decreto nº 98.897, de 30 de janeiro de 1990: Dispõe sobre as reservas extrativistas, e dá outras providências.

26. Decreto nº 98.914, de 31 de janeiro de 1990: Dispõe sobre a instituição, no território nacional, de Reservas Particulares do Patrimônio Natural, por destinação do proprietário.

27. Decreto nº 99.274, de 6 de junho de 1990: Regulamenta a Lei nº 6.902, de 27 de abril de 1981 e a Lei nº 6.938, de 31 de agosto de 1981, que dispõem, respectivamente, sobre a criação de estações

ecológicas e áreas de proteção ambiental e sobre a Política Nacional do Meio Ambiente, e dá outras providências.

28. Decreto nº 99.540, de 21 de setembro de 1990: Institui a Comissão Coordenadora do Zoneamento Ecológico-Econômico do Território Nacional e dá outras providências.

29. Decreto nº 99.556, de 1º de outubro de 1990: Dispõe sobre a proteção das cavidades naturais subterrâneas existentes no território nacional e dá outras providências.

30. Decreto nº 99.971, de 11 de janeiro de 1991: Cria Comissão Especial para promover a revisão das normas e critérios relativos à demarcação e proteção das terras indígenas.

31. Decreto nº 08, de 15 de janeiro de 1991: Promulga a Convenção sobre Assistência no Caso de Acidente Nuclear ou Emergência Radiológica.

32. Decreto nº 09, de 15 de janeiro de 1991: Promulga a Convenção sobre Pronta Notificação de Acidente Nuclear.

33. Decreto nº 22, de 04 de fevereiro de 1991: Dispõe sobre o processo administrativo de demarcação das terras indígenas e dá outras providências.

34. Decreto nº 23, de 04 de fevereiro de 1991: Dispõe sobre as condições para a prestação de assistência à saúde das populações indígenas.

35. Decreto nº 24, de 04 de fevereiro de 1991: Dispõe sobre as ações visando a proteção do meio ambiente em terras indígenas.

36. Decreto nº 25, de 04 de fevereiro de 1991: Dispõe sobre programas e projetos para assegurar a auto-sustentação dos povos indígenas.

37. Decreto nº 26, de 04 de fevereiro de 1991: Dispõe sobre a Educação Indígena no Brasil.

38. Decreto nº 66, de 18 de março de 1991: Promulga a Convenção para a Conservação das Focas Antárticas, concluída em Londres, a 1º de junho de 1972.

39. Decreto nº 123, de 20 de maio de 1991: Aprova o Regulamento Consolidado da Comissão Nacional para Assuntos Antárticos (CONANTAR).

40. Decreto nº 318, de 31 de outubro de 1991: Promulga o novo texto da Convenção Internacional para a Proteção dos Vegetais.

41. Decreto nº 875, de 19 de julho de 1993: Promulga o texto da Convenção sobre o Controle de Movimentos Transfronteiriços de Resíduos Perigosos e seu Depósito.

42. Decreto nº 911, de 03 de setembro de 1993: Promulga a Convenção de Viena sobre Responsabilidade Civil por Danos Nucleares, de 21 de maio de 1963.

43. Decreto nº 964, de 22 de outubro de 1993: Regulamenta o Conselho Nacional da Amazônia Legal.

44. Decreto nº 966, de 27 de outubro de 1993: Aprova a Estrutura Regimental do Instituto Nacional de Colonização e Reforma Agrária INCRA, e dá outras providências.

45. Decreto nº 1.040, de 10 de janeiro de 1994: Determina aos agentes financeiros oficiais a inclusão, entre as linhas prioritárias de crédito e financiamento, dos projetos destinados à conservação e uso racional da energia e ao aumento da eficiência energética.

46. Decreto nº 1.049, de 25 de janeiro de 1994: Define normas para a implantação do Sistema de Proteção da Amazônia – SIPAM.

47. Decreto nº 1.141, de 19 de maio de 1994: Dispõe sobre as ações de proteção ambiental, saúde e apoio às atividades produtivas para as comunidades indígenas.

48. Decreto nº 1.160, de 21 de junho de 1994: Cria a Comissão Interministerial para o Desenvolvimento Sustentável - CIDES e dá outras providências.

49. Decreto nº 1.265, de 11 de outubro de 1994: Aprova a Política Marítima Nacional – PMN.

50. Decreto nº 1.298, de 27 de outubro de 1994: Aprova o Regulamento das Florestas Nacionais e dá outras providências.

51. Decreto nº 1.354, de 29 de dezembro de 1994: Institui, no âmbito do Ministério do Meio Ambiente e da Amazônia Legal, o Programa Nacional da Diversidade Biológica, e dá outras providências.

52. Decreto nº 1.520, de 12 de junho de 1995: Dispõe sobre a vinculação, competências e composição da Comissão Técnica Nacional de Biossegurança - CTNBio e dá outras providências.

53. Decreto nº 1.524, de 20 de junho de 1995: Aprova o Estatuto da Companhia de Pesquisa de Recursos Minerais – CPRM.

54. Decreto nº 1.530, de 22 de junho de 1995: Declara a entrada em vigor da Convenção das Nações Unidas sobre o Direito do Mar, concluída em Montego Bay, Jamaica, em 10 de dezembro de 1982.

55. Decreto nº 1.541, de 27 de junho de 1995: Regulamenta o Conselho Nacional da Amazônia Legal – CONAMAZ.

56. Decreto nº 1.607, de 28 de agosto de 1995: Institui a Comissão Nacional de População e Desenvolvimento.

57. Decreto nº 1.675, de 13 de outubro de 1995: Dispõe sobre o Programa de Ação Social em Saneamento - PROSEGE, e dá outras providências.

58. Decreto nº 1.694, de 13 de novembro de 1995: Cria o Sistema Nacional de Informações da Pesca e Aqüicultura - SINPESQ, e dá outras providências.

59. Decreto nº 1.695, de 13 de novembro de 1995: Regulamenta a exploração de aqüicultura em águas públicas pertencentes à União e dá outras providências.

60. Decreto nº 1.696, de 13 de novembro de 1995: Cria a Câmara de Políticas dos Recursos Naturais, do Conselho de Governo.

61. Decreto nº 1.697, de 13 de novembro de 1995: Cria o Grupo-Executivo do Setor Pesqueiro - GESPE, e dá outras providências.

62. Decreto nº 1.709, de 20 de novembro de 1995: Declara de preservação permanente as florestas e demais formas de vegetação autóctone situadas no imóvel que menciona.

63. Decreto nº 1.726, de 04 de dezembro de 1995: Institui Comissão Interministerial para sistematizar as informações sobre os corredores de transporte bioceânicos.

64. Decreto nº 1.741, de 08 de dezembro de 1995: Dispõe sobre a organização e o funcionamento da Câmara de Políticas Regionais.

65. Decreto nº 1.752, de 20 de dezembro de 1995: Dispõe sobre a vinculação, competências e composição da Comissão Técnica Nacional de Biossegurança - CTNBio, e dá outras providências.

66. Decreto nº 1.775, de 08 de janeiro de 1996: Dispõe sobre o procedimento administrativo de demarcação das terras indígenas e dá outras providências.

67. Decreto nº 1.787, de 12 de janeiro de 1996: Dispõe sobre a utilização de gás natural para fins automotivos, e dá outras providências.

68. Decreto nº 1.791, de 15 de janeiro de 1996: Institui no âmbito do Ministério da Ciência e Tecnologia, o Comitê Nacional de Pesquisas Antárticas – CONAPA.

69. Decreto nº 1.905, de 16 de maio de 1996: Promulga a Convenção sobre Zonas Úmidas de Importância Internacional, especialmente como Habitat de Aves Aquáticas, conhecida como Convenção de Ramsar, de 02 de fevereiro de 1971.

70. Decreto nº 1.922, de 05 de junho de 1996: Dispõe sobre o reconhecimento das reservas particulares do patrimônio natural, e dá outras providências.

71. Decreto nº 1.946, de 28 de junho de 1996: Cria o Programa Nacional de Fortalecimento da Agricultura Familiar - PRONAF, e dá outras providências.

72. Decreto nº 2.119, de 13 de janeiro de 1997: Dispõe sobre o Programa Piloto para a Proteção das Florestas Tropicais do Brasil e sobre a sua Comissão de Coordenação, e dá outras providências.

73. Decreto nº 2.210, de 22 de abril de 1997: Regulamenta o Decreto-Lei nº 1.809, de 7 de outubro de 1980, que instituiu o Sistema de Proteção ao Programa Nuclear Brasileiro (SEPRON), e dá outras providências.

74. Decreto nº 2.473, de 26 de janeiro de 1998: Cria o Programa Florestas Nacionais, e dá outras providências.

75. Decreto nº 2.508, de 04 de março de 1998: Promulga a Convenção Internacional para a Prevenção da Poluição Causada por Navios, concluída em Londres, em 2 de novembro de 1973, seu Protocolo, concluído em Londres, em 17 de fevereiro de 1978, suas Emendas de 1984 e seus Anexos Opcionais III, IV e V.

76. Decreto nº 2.519, de 16 de março de 1998: Promulga a Convenção sobre Diversidade Biológica, assinada no Rio de janeiro, em 5 de junho de 1992.

77. Decreto nº 2.652, de 1º de julho de 1998: Promulga a Convenção-Quadro das Nações Unidas sobre Mudança do Clima, assinada em Nova Iorque em 9 de maio de 1992.

78. Decreto nº 2.662, de 08 de julho de 1998: Dispõe sobre medidas a serem implementadas na Amazônia Legal para monitoramento, prevenção, educação ambiental e combate a incêndios florestais.

79. Decreto nº 2.679, de 17 de julho de 1998: Promulga as Emendas ao Protocolo de Montreal sobre Substâncias que Destroem a Camada de Ozônio, assinadas em Copenhague, em 25 de novembro de 1992.

80. Decreto nº 2.699, de 30 de julho de 1998: Promulga a Emenda ao Protocolo de Montreal sobre Substâncias que Destroem a Camada de Ozônio.

81. Decreto nº 2.707, de 04 de agosto de 1998: Promulga o Acordo Internacional de Madeiras Tropicais.

82. Decreto nº 2.710, de 04 de agosto de 1998: Regulamenta a Lei Complementar nº 94, de 19 de fevereiro de 1998, que autoriza o Poder Executivo a criar a Região Integrada de Desenvolvimento do Distrito Federal e Entorno - RIDE e instituir o Programa Especial de Desenvolvimento do Entorno do Distrito Federal, e dá outras providências.

83. Decreto nº 2.741, de 20 de agosto de 1998: Promulga a Convenção Internacional de Combate à Desertificação nos Países afetados por Seca Grave e/ou Desertificação, particularmente na África.

84. Decreto nº 2.742, de 20 de agosto de 1998: Promulga o Protocolo ao Tratado da Antártida sobre Proteção ao Meio Ambiente.

85. Decreto nº 2.783, de 17 de setembro de 1998: Dispõe sobre proibição de aquisição de produtos ou equipamentos que contenham ou façam uso das Substâncias que destroem a Camada de Ozônio - SDO, pelos órgãos e pelas entidades da Administração Pública Federal direta, autárquica e fundacional, e dá outras providências.

86. Decreto nº 2.840, de 10 de novembro de 1998: Estabelece normas para operação de embarcações pesqueiras nas águas sob jurisdição brasileira, e dá outras providências.

87. Decreto nº 2.869, de 09 de dezembro de 1998: Regulamenta a cessão de águas públicas para exploração de aqüicultura.

88. Decreto nº 2.870, de 10 de dezembro de 1998: Promulga a Convenção Internacional sobre Preparo, Resposta e Cooperação em caso de Poluição por Óleo.

89. Decreto nº 2.929, de 11 de janeiro de 1999: Promulga o Estatuto e o Protocolo do Centro Internacional de Engenharia Genética e Biotecnologia.

90. Decreto nº 2.956, de 03 de fevereiro de 1999: Aprova o V Plano Setorial para os Recursos do Mar (1999-2003).

91. Decreto nº 2.959, de 10 de fevereiro de 1999: Dispõe sobre medidas a serem implementadas na Amazônia Legal, para monitoramento, prevenção, educação ambiental e combate a incêndios florestais.

92. Decreto nº 3.108, de 30 de junho de 1999: Promulga o Acordo Constitutivo do Fundo para o Desenvolvimento dos Povos Indígenas da América Latina e do Caribe.

93. Decreto nº 3.109, de 30 de junho de 1999: Promulga a Convenção Internacional para a Proteção das Obtenções Vegetais.

94. Decreto nº 3.420, de 20 de abril de 2000: Dispõe sobre a criação do Programa Nacional de Florestas - PNF, e dá outras providências.

95. Decreto nº 3.520, de 21 de junho de 2000: Dispõe sobre a estrutura e o funcionamento do Conselho Nacional de Política Energética - CNPE e dá outras providências.

96. Decreto nº 3.607, de 21 de setembro de 2000: Dispõe sobre a implementação da Convenção sobre Comércio Internacional das Espécies da Flora e Fauna Selvagens em Perigo de Extinção - CITES e dá outras providências.

97. Decreto nº 3.743, de 05 de fevereiro de 2001: Regulamenta a Lei nº 6.431, de 11 de julho de 1977, que autoriza a doação de porções de terras devolutas a Municípios incluídos na região da Amazônia Legal, para os fins que especifica, e dá outras providências.

98. Decreto nº 3.842, de 13 de junho de 2001: Promulga a Convenção Interamericana para a Proteção e a Conservação das Tartarugas Marinhas.

99. Decreto nº 3.867, de 16 de julho de 2001: Regulamenta a Lei nº 9.991, de 24 de julho de 2000, que dispõe sobre a realização de investimentos em pesquisa e desenvolvimento e em eficiência energética por parte das empresas concessionárias, permissionárias e autorizadas do setor de energia elétrica, e dá outras providências.

100. Decreto nº 3.939, de 26 de setembro de 2001: Dispõe sobre a Comissão Interministerial para os Recursos do Mar (CIRM) e dá outras providências.

101. Decreto nº 3.945, de 28 de setembro de 2001: Define a composição do Conselho de Gestão do Patrimônio Genético e estabelece as normas para o seu funcionamento, mediante a regulamentação dos art. 10, 11, 12, 14, 15, 16, 18 e 19 da Medida Provisória nº 2.186-16, de 23 de agosto de 2001, que dispõe sobre o acesso ao patrimônio genético, a proteção e o acesso ao conhecimento tradicional associado, a repartição de benefícios e o acesso à tecnologia e transferência de tecnologia para sua conservação e utilização, e dá outras providências.

102. Decreto nº 3.991, de 30 de outubro de 2001: Dispõe sobre o Programa Nacional de Fortalecimento da Agricultura Familiar - PRONAF, e dá outras providências.

103. Decreto nº 4.059, de 19 de dezembro de 2001: Regulamenta a Lei nº 10.295, de 17 de outubro de 2001, que dispõe sobre a Política Nacional de Conservação e Uso Racional de Energia, e dá outras providências.

104. Decreto nº 4.074, de 04 de janeiro de 2002: Regulamenta a Lei no 7.802, de 11 de julho de 1989, que dispõe sobre a pesquisa, a experimentação, a produção, a embalagem e rotulagem, o

transporte, o armazenamento, a comercialização, a propaganda comercial, a utilização, a importação, a exportação, o destino final dos resíduos e embalagens, o registro, a classificação, o controle, a inspeção e a fiscalização de agrotóxicos, seus componentes e afins, e dá outras providências.

105. Decreto nº 4.131, de 14 de fevereiro de 2002: Dispõe sobre medidas emergenciais de redução do consumo de energia elétrica no âmbito da Administração Pública Federal.

106. Decreto nº 4.136, de 20 de fevereiro de 2002: Dispõe sobre a especificação das sanções aplicáveis às infrações às regras de prevenção, controle e fiscalização da poluição causada por lançamento de óleo e outras substâncias nocivas ou perigosas em águas sob jurisdição nacional, prevista na Lei nº 9.966, de 28 de abril de 2000, e dá outras providências.

107. Decreto nº 4.154, de 07 de março de 2002: Regulamenta a Lei no 10.332, de 19 de dezembro de 2001, na parte que institui mecanismo de financiamento para o Programa de Biotecnologia e Recursos Genéticos - Genoma, e dá outras providências.

108. Decreto nº 4.281, de 25 de junho de 2002: Regulamenta a Lei no 9.795, de 27 de abril de 1999, que institui a Política Nacional de Educação Ambiental, e dá outras providências.

109. Decreto nº 4.284, de 26 de junho de 2002: Institui o Programa Brasileiro de Ecologia Molecular para o Uso Sustentável da Biodiversidade da Amazônia - PROBEM, e dá outras providências.

110. Decreto nº 4.297, de 10 de julho de 2002: Regulamenta o art. 9o, inciso II, da Lei no 6.938, de 31 de agosto de 1981, estabelecendo critérios para o Zoneamento Ecológico-Econômico do Brasil - ZEE, e dá outras providências.

111. Decreto nº 4.326, de 08 de agosto de 2002: Institui, no âmbito do Ministério do Meio Ambiente, o Programa Áreas Protegidas da Amazônia - ARPA, e dá outras providências.

112. Decreto nº 4.339, de 22 de agosto de 2002: Institui princípios e diretrizes para a implementação da Política Nacional da Biodiversidade.

113. Decreto nº 4.361, de 05 de setembro de 2002: Promulga o Acordo para implementação das Disposições da Convenção das Nações Unidas sobre o Direito do Mar de 10 de dezembro de 1982 sobre a Conservação e Ordenamento de Populações de Peixes Transzonais e de Populações de Peixes Altamente Migratórios.

114. Decreto nº 4.411, de 07 de outubro de 2002: Dispõe sobre a atuação das Forças Armadas e da Polícia Federal nas unidades de conservação e dá outras providências.

115. Decreto nº 4.412, de 07 de outubro de 2002: Dispõe sobre a atuação das Forças Armadas e da Polícia Federal nas terras indígenas e dá outras providências.

116. Decreto nº 4.436, de 23 de outubro de 2002: Cria, no âmbito do Ministério da Saúde, a Comissão Nacional de Bioética em Saúde - CNBioética, e dá outras providências.

117. Decreto nº 4.519, de 13 de dezembro de 2002: Dispõe sobre o serviço voluntário em Unidades de Conservação Federais, e dá outras providências.

118. Decreto nº 4.581, de 27 de janeiro de 2003: Promulga a Emenda ao Anexo I e Adoção dos Anexos VIII e IX à Convenção de Basiléia sobre o Controle do Movimento Transfronteiriço de Resíduos Perigosos e seu Depósito.

119. Decreto nº 4.613, de 11 de março de 2003: Regulamenta o Conselho Nacional de Recursos Hídricos e dá outras providências.

120. Decreto nº 4.680, de 24 de abril de 2003: Regulamenta o direito à informação, assegurado pela Lei no 8.078, de 11 de setembro de 1990, quanto aos alimentos e ingredientes alimentares destinados ao consumo humano ou animal que contenham ou sejam produzidos a partir de Organismos Geneticamente Modificados, sem prejuízo do cumprimento das demais normas aplicáveis.

121. Decreto nº 4.703, de 21 de maio de 2003: Dispõe sobre o Programa Nacional da Diversidade Biológica - PRONABIO e a Comissão Nacional da Biodiversidade, e dá outras providências.

122. Decreto nº 4.704, de 21 de maio de 2003: Dispõe sobre o Programa Nacional da Diversidade Biológica - PRONABIO e a Comissão Nacional da Biodiversidade, e dá outras providências.

123. Decreto nº 4.722, de 05 de junho de 2003: Estabelece critérios para exploração da espécie *Swietenia macrophylla* King (mogno) e dá outras providências.

124. Decreto nº 4.792, de 23 de julho de 2003: Cria a Câmara de Política de Recursos Naturais, do Conselho de Governo.

125. Decreto nº 4.810, de 19 de agosto de 2003: Estabelece normas para operação de embarcações pesqueiras nas zonas brasileiras de pesca, alto mar e por meio de acordos internacionais, e dá outras providências.

126. Decreto nº 4.854, de 08 de outubro de 2003: Dispõe sobre a composição, estruturação, competências e funcionamento do Conselho Nacional de Desenvolvimento Rural Sustentável - CONDRAF e dá outras providências.

127. Decreto nº 4.871, de 06 de novembro de 2003: Dispõe sobre a instituição dos Planos de Áreas para o combate à poluição por óleo em águas sob jurisdição nacional e dá outras providências.

128. Decreto nº 4.887, de 20 de novembro de 2003: Regulamenta o procedimento para identificação, reconhecimento, delimitação, demarcação e titulação das terras ocupadas por remanescentes das comunidades dos quilombos de que trata o art. 68 do Ato das Disposições Constitucionais Transitórias.

129. Decreto nº 4.892, de 25 de novembro de 2003: Regulamenta a Lei Complementar nº 93, de 4 de fevereiro de 1998, que criou o Fundo de Terras e da Reforma Agrária, e dá outras providências.

130. Decreto nº 4.895, de 25 de novembro de 2003: Dispõe sobre a autorização de uso de espaços físicos de corpos d'água de domínio da União para fins de aqüicultura, e dá outras providências.

131. Decreto nº 5.025, de 30 de março de 2004: Regulamenta o inciso I e os §§ 1º, 2º, 3º, 4º e 5º do art. 3º da Lei nº 10.438, de 26 de abril de 2002, no que dispõem sobre o Programa de Incentivo às Fontes Alternativas de Energia Elétrica - PROINFA, primeira etapa, e dá outras providências.

132. Decreto nº 5.069, de 05 de maio de 2004: Dispõe sobre a composição, estruturação, competências e funcionamento do Conselho Nacional de Aqüicultura e Pesca - CONAPE e dá outras providências.

133. Decreto nº 5.092, de 21 de maio de 2004: Define regras para identificação de áreas prioritárias para a conservação, utilização sustentável e repartição dos benefícios da biodiversidade, no âmbito das atribuições do Ministério do Meio Ambiente.

134. Decreto nº 5.098, de 03 de junho de 2004: Dispõe sobre a criação do Plano Nacional de Prevenção, Preparação e Resposta Rápida a Emergências Ambientais com Produtos Químicos Perigosos - P2R2, e dá outras providências.

135. Decreto nº 5.153, de 23 de julho de 2004: Aprova o regulamento da Lei nº 10.711, de 5 de agosto de 2003, que dispõe sobre o Sistema Nacional de Sementes e Mudas - SNSM, e dá outras providências.

136. Decreto nº 5.160, de 28 de julho de 2004: Promulga o Acordo de Cooperação Financeira relativo aos projetos "Projetos Demonstrativos Grupo A - PD/A - Subprograma Mata Atlântica" (PN 2001.6657.9) e "Amazonian Regional Protected Áreas - ARPA" (PN 2002.6551.2), celebrado em Brasília, em 10 de junho de 2003, entre a República Federativa do Brasil e a República Federal da Alemanha.

137. Decreto nº 5.208, de 17 de setembro de 2004: Promulga o Acordo-Quadro sobre Meio Ambiente do MERCOSUL.

138. Decreto nº 5.280, de 22 de novembro de 2004: Promulga os textos das Emendas ao Protocolo de Montreal sobre Substâncias que Destroem a Camada de Ozônio, aprovadas em Montreal, em 17 de setembro de 1997, ao término da Nona Reunião das Partes e, em Pequim, em 3 de Dezembro de 1999, por ocasião da Décima Primeira Reunião das Partes.

139. Decreto nº 5.297, de 06 de dezembro de 2004: Dispõe sobre os coeficientes de redução das alíquotas da Contribuição para o PIS/PASEP e da COFINS incidentes na produção e na comercialização de biodiesel, sobre os termos e as condições para a utilização das alíquotas diferenciadas, e dá outras providências.

140. Decreto nº 5.300, de 07 de dezembro de 2004: Regulamenta a Lei nº 7.661, de 16 de maio de 1988, que institui o Plano Nacional de Gerenciamento Costeiro - PNGC, dispõe sobre regras de uso e ocupação da zona costeira e estabelece critérios de gestão da orla marítima, e dá outras providências.

141. Decreto nº 5.360, de 31 de janeiro de 2005: Promulga a Convenção sobre Procedimento de Consentimento Prévio Informado para o Comércio Internacional de certas Substâncias Químicas e Agrotóxicos Perigosos, adotada em 10 de setembro de 1998, na cidade de Roterdã.

142. Decreto nº 5.377, de 23 de fevereiro de 2005: Aprova a Política Nacional para os Recursos do Mar – PNRM.

143. Decreto nº 5.440, de 04 de maio de 2005: Estabelece definições e procedimentos sobre o controle de qualidade da água de sistemas de abastecimento e institui mecanismos e instrumentos para divulgação de informação ao consumidor sobre a qualidade da água para consumo humano.

144. Decreto nº 5.445, de 12 de maio de 2005: Promulga o Protocolo de Quioto à Convenção-Quadro das Nações Unidas sobre Mudança do Clima, aberto a assinaturas na cidade de Quioto, Japão, em 11 de dezembro de 1997, por ocasião da Terceira Conferência das Partes da Convenção-Quadro das Nações Unidas sobre Mudança do Clima.

145. Decreto nº 5.448, de 20 de maio de 2005: Regulamenta o § 1º do art. 2º da Lei nº 11.097, de 13 de janeiro de 2005, que dispõe sobre a introdução do biodiesel na matriz energética brasileira, e dá outras providências.

146. Decreto nº 5.459, de 07 de junho de 2005: Regulamenta o art. 30 da Medida Provisória nº 2.186-16, de 23 de agosto de 2001, disciplinando as sanções aplicáveis às condutas e atividades lesivas ao patrimônio genético ou ao conhecimento tradicional associado e dá outras providências.

147. Decreto nº 5.472, de 20 de junho de 2005: Promulga o texto da Convenção de Estocolmo sobre Poluentes Orgânicos Persistentes.

148. Decreto nº 5.564, de 19 de outubro de 2005: Institui o Comitê Nacional de Controle Higiênico-Sanitário de Moluscos Bivalves - CNCMB, e dá outras providências.

149. Decreto nº 5.577, de 08 de novembro de 2005: Institui, no âmbito do Ministério do Meio Ambiente, o Programa Nacional de Conservação e Uso Sustentável do Bioma Cerrado - Programa Cerrado Sustentável, e dá outras providências.

150. Decreto nº 5.591, de 22 de novembro de 2005: Regulamenta dispositivos da Lei nº 11.105, de 24 de março de 2005 (Lei de Biossegurança), que regulamenta os incisos II, IV e V do § 1º do art. 225 da Constituição, e dá outras providências.

151. Decreto nº 5.705, de 16 de fevereiro de 2006: Promulga o Protocolo de Cartagena sobre Biossegurança da Convenção sobre Diversidade Biológica.

152. Decreto nº 5.746, de 05 de abril de 2006: Regulamenta o art. 21 da Lei nº 9.985, de 18 de julho de 2000, que dispõe sobre o Sistema Nacional de Unidades de Conservação da Natureza.

153. Decreto nº 5.752, de 12 de abril de 2006: Promulga o Memorando de Entendimento entre os Governos da República Federativa do Brasil e da República do Peru sobre Cooperação em Matéria de Proteção e Vigilância da Amazônia, celebrado em Lima, em 25 de agosto de 2003.

154. Decreto nº 5.758, de 13 de abril de 2006: Institui o Plano Estratégico Nacional de Áreas Protegidas - PNAP, seus princípios, diretrizes, objetivos e estratégias, e dá outras providências.

155. Decreto nº 5.759, de 17 de abril de 2006: Promulga o texto revisto da Convenção Internacional para a Proteção dos Vegetais (CIVP).

156. Decreto nº 5.795, de 05 de junho de 2006: Dispõe sobre a composição e o funcionamento da Comissão de Gestão de Florestas Públicas, e dá outras providências.

157. Decreto nº 5.813, de 22 de junho de 2006: Aprova a Política Nacional de Plantas Medicinais e Fitoterápicos e dá outras providências.

158. Decreto nº 5.819, de 26 de junho de 2006: Promulga o Acordo de Sede entre o Governo da República Federativa do Brasil e a Organização do Tratado de Cooperação Amazônica, celebrado em Brasília, em 13 de dezembro de 2002.

159. Decreto nº 5.859, de 26 de julho de 2006: Dá nova redação aos arts. 19 e 21 do Estatuto da Companhia de Desenvolvimento dos Vales do São Francisco e do Parnaíba - CODEVASF, aprovado pelo Decreto nº 3.604, de 20 de setembro de 2000.

160. Decreto nº 5.865, de 1º de agosto de 2006: Promulga o Acordo de Cooperação para a Conservação e o Uso Sustentável da Flora e da Fauna Silvestres dos Territórios Amazônicos da República Federativa do Brasil e da República do Peru, celebrado em Lima, em 25 de agosto de 2003.

161. Decreto nº 5.875, de 15 de agosto de 2006: Adota a Recomendação nº 003, de 22 de fevereiro de 2006, do Conselho Nacional do Meio Ambiente – CONAMA.

162. Decreto nº 5.891, de 11 de setembro de 2006: Dispõe sobre a adoção de medidas destinadas à substituição, por sementes produzidas em conformidade com os ditames da Lei nº 10.711, de 5 de agosto de 2003, de grãos de soja geneticamente modificada tolerante a glifosato reservados para uso próprio pelos produtores rurais do Estado do Rio Grande do Sul e dá outras providências.

163. Decreto nº 5.935, de 19 de outubro de 2006: Promulga a Convenção Conjunta para o Gerenciamento Seguro de Combustível Nuclear Usado e dos Rejeitos Radioativos.

164. Decreto nº 5.940, de 25 de outubro de 2006: Institui a separação dos resíduos recicláveis descartados pelos órgãos e entidades da administração pública federal direta e indireta, na fonte geradora, e a sua destinação às associações e cooperativas dos catadores de materiais recicláveis, e dá outras providências.

165. Decreto nº 5.950, de 31 de outubro de 2006: Regulamenta o art. 57-A da Lei no 9.985, de 18 de julho de 2000, para estabelecer os limites para o plantio de Organismos Geneticamente Modificados nas áreas que circundam as Unidades de Conservação.

166. Decreto nº 5.962 de 14 de novembro de 2006: Promulga o Acordo entre o Governo da República Federativa do Brasil e o Governo do Reino da Tailândia sobre Cooperação Técnica em Medidas Sanitárias e Fitossanitárias.

167. Decreto nº 5.975 de 30 de novembro de 2006: dispõe sobre o manejo florestal sustentável.

168. Decreto nº 5.995, de 19 de dezembro de 2006: Institui o Sistema de Gestão do Projeto de Integração do Rio São Francisco com as Bacias Hidrográficas do Nordeste Setentrional, e dá outras providências.

169. Decreto nº 6.040, de 07 de fevereiro de 2007: Institui a Política Nacional de Desenvolvimento Sustentável dos Povos e Comunidades Tradicionais.

170. Decreto nº 6.041, de 08 de fevereiro de 2007: Institui a Política de Desenvolvimento da Biotecnologia, cria o Comitê Nacional de Biotecnologia e dá outras providências.

171. Decreto nº 6.063, de 20 de março de 2007: Regulamenta, no âmbito federal, dispositivos da Lei no 11.284, de 2 de março de 2006, que dispõe sobre a gestão de florestas públicas para a produção sustentável, e dá outras providências.

172. Decreto nº 6.065, de 21 de março de 2007: Dispõe sobre a Comissão de Coordenação das Atividades de Meteorologia, Climatologia e Hidrologia (CMCH), e dá outras providências.

173. Decreto nº 6.100, de 26 de abril de 2007: Aprova a Estrutura Regimental e o Quadro Demonstrativo dos Cargos em Comissão e das Funções Gratificadas do Instituto Chico Mendes de Conservação da Biodiversidade - Instituto Chico Mendes, e dá outras providências.

174. Decreto nº 6.261, de 20 de novembro de 2007: Dispõe sobre a gestão integrada para o desenvolvimento da Agenda Social Quilombola no âmbito do Programa Brasil Quilombola, e dá outras providências.

175. Decreto nº 6.263, de 21 de novembro de 2007: Institui o Comitê Interministerial sobre Mudança do Clima - CIM, orienta a elaboração do Plano Nacional sobre Mudança do Clima, e dá outras providências.

176. Decreto nº 6.290, de 06 de dezembro de 2007 : Institui o Plano de Desenvolvimento Regional Sustentável para a Área de Influência da Rodovia BR-163 no Trecho Cuiabá/MT - Santarém/PA - Plano BR-163 Sustentável, e dá outras providências.

177. Decreto nº 6.321, de 21 de dezembro de 2007: Dispõe sobre ações relativas à prevenção, monitoramento e controle de desmatamento no Bioma Amazônia, bem como altera e acresce dispositivos ao Decreto no 3.179, de 21 de setembro de 1999, que dispõe sobre a especificação das sanções aplicáveis às condutas e atividades lesivas ao meio ambiente, e dá outras providências.

178. Decreto nº 6.323, de 27 de dezembro de 2007: Regulamenta a Lei nº 10.831, de 23 de dezembro de 2003, que dispõe sobre a agricultura orgânica, e dá outras providências.

179. Decreto nº 6.443, de 25 de abril de 2008: Promulga o Ajuste Complementar ao Acordo Básico de Cooperação Técnica entre o Governo da República Federativa do Brasil e o Governo da República da Nicarágua para implementação do Projeto "Programa de Modernização do Setor Dendroenergético da Nicarágua".

180. Decreto nº 6.469, de 30 de maio de 2008: Adota a Recomendação nº 007, de 28 de maio de 2008, do Conselho Nacional do Meio Ambiente - CONAMA, que autoriza a redução, para fins de recomposição, da área de reserva legal, para até cinqüenta por cento, das propriedades situadas na Zona 1, conforme definido no Zoneamento Ecológico Econômico do Estado do Acre.

181. Decreto nº 6.476, de 05 de junho de 2008: Promulga o Tratado Internacional sobre Recursos Fitogenéticos para a Alimentação e a Agricultura, aprovado em Roma, em 3 de novembro de 2001, e assinado pelo Brasil em 10 de junho de 2002.

182. Decreto nº 6.478, de 09 de junho de 2008: Promulga a Convenção Internacional relativa à Intervenção em Alto-Mar em Casos de Acidentes com Poluição por Óleo, feita em Bruxelas, em 29 de novembro de 1969, e o Protocolo relativo à Intervenção em Alto-Mar em Casos de Poluição por Substâncias Outras que não Óleo, feito em Londres, em 2 de novembro de 1973.

183. Decreto nº 6.511, de 17 de julho de 2008: Promulga as emendas aos Anexos da Convenção sobre Prevenção da Poluição Marinha Causada pelo Alijamento no Mar de Resíduos e Outras Matérias.

184. Decreto nº 6.514, de 22 de julho de 2008: Dispõe sobre as infrações e sanções administrativas ao meio ambiente, estabelece o processo administrativo federal para apuração destas infrações, e dá outras providências.

185. Decreto nº 6.515, de 22 de julho de 2008: Institui, no âmbito dos Ministérios do Meio Ambiente e da Justiça, os Programas de Segurança Ambiental denominados Guarda Ambiental Nacional e Corpo de Guarda-Parques, e dá outras providências.

186. Decreto nº 6.560, de 08 de setembro de 2008: Promulga o Protocolo Complementar ao Acordo Quadro entre o Governo da República Federativa do Brasil e o Governo da República Popular da China sobre Cooperação em Aplicações Pacíficas de Ciência e Tecnologia do Espaço Exterior para a Continuidade do Desenvolvimento Conjunto de Satélites de Recursos Terrestres.

187. Decreto nº 6.565, de 15 de setembro de 2008: Dispõe sobre medidas tributárias aplicáveis às doações em espécie recebidas por instituições financeiras públicas controladas pela União e destinadas a ações de prevenção, monitoramento e combate ao desmatamento e de promoção da conservação e do uso sustentável das florestas brasileiras.

188. Decreto nº 6.620, de 29 de outubro de 2008: Dispõe sobre políticas e diretrizes para o desenvolvimento e o fomento do setor de portos e terminais portuários de competência da Secretaria Especial de Portos da Presidência da República, disciplina a concessão de portos, o arrendamento e a autorização de instalações portuárias marítimas, e dá outras providências.

189. Decreto nº 6.660, de 21 de novembro de 2008: Regulamenta dispositivos da Lei nº 11.428, de 22 de dezembro de 2006, que dispõe sobre a utilização e proteção da vegetação nativa do Bioma Mata Atlântica.

190. Decreto nº 6.665, de 26 de novembro de 2008: Promulga o Acordo de Cooperação entre o Governo da República Federativa do Brasil e o Governo da República Argelina Democrática e Popular no Campo da Proteção dos Vegetais e da Quarentena Vegetal.

191. Decreto nº 6.670, de 1º de dezembro de 2008: Promulga o Acordo de Cooperação em Matéria Sanitária Veterinária entre o Governo da República Federativa do Brasil e o Governo da República Argelina Democrática e Popular.

192. Decreto nº 6.678, de 08 de dezembro de 2008: Aprova o VII Plano Setorial para os Recursos do Mar.

193. Decreto nº 6.698, de 17 de dezembro de 2008: Declara as águas jurisdicionais marinhas brasileiras Santuário de Baleias e Golfinhos do Brasil.

194. Decreto nº 6.753, de 28 de janeiro de 2009: Promulga o Acordo para a Conservação de Albatrozes e Petréis, adotado na Cidade do Cabo.

195. Decreto nº 6.829, de 27 de abril de 2009: Regulamenta a Medida Provisória nº 458, de 10 de fevereiro de 2009, para dispor sobre a regularização fundiária das áreas urbanas situadas em terras

da União no âmbito da Amazônia Legal, definida pela Lei Complementar nº 124, de 3 de janeiro de 2007, e dá outras providências.

196. Decreto nº 6.830, de 27 de abril de 2009: Regulamenta a Medida Provisória nº 458, de 10 de fevereiro de 2009, para dispor sobre a regularização fundiária das áreas rurais situadas em terras da União arrecadadas pelo Instituto Nacional de Colonização e Reforma Agrária - INCRA, no âmbito da Amazônia Legal, definida pela Lei Complementar nº 124, de 3 de janeiro de 2007, e dá outras providências.

ANNEX 2

Checklists of Brazilian (BR) or Neotropical (NT) and Global (M) Biodiversity

Prepared by Braulio Ferreira de Souza Dias

Taxonomic Group	Recent species lists (catalogues)	Number of species *
Kingdom Prokaryotae (Monera) [includes the sub-kingdoms Archaebacteria (phyla Methanocreatices and Bacteria Halofílicas and Thermoacidofílicas) and Eubacteria (includes the phyla Aphragmabaceria, Spirochaetae, Thiopneutes, Bacteria Anaeróbicas Phototofílicas, Cyanobacteria, Chloroxybacteria, Bacteria Aeróbicas Fixadoras de Nitrogênio, Pseudomonadas, Omnibacteria, Bacteria Chemoautotróficas and Myxobacteria]	*Bacterial Nomenclature Up-to-date* (100% das espécies mundiais catalogadas) http://www.dsmz.de/bactnom/bactname.htm [1941 gêneros válidos e 10.141 espécies válidas no mundo em junho de 2010, segundo Euzéby 2010] [eram 849 gêneros e 4.314 espécies descritas no mundo em 1996 segundo Manfio 2006] Lewinsohn & Prado 2006 [estimaram que 800 a 900 espécies são conhecidas no Brasil] Forzza et al. 2010 [Cyanobacteria/ Cianophyceae: 208 espécies catalogadas para o Brasil]	10.141 (M) (800-900) (BR) 208 (BR)
Kingdom Protoctista – Protozoa [inclui os filos Actinopoda, Apicomplexa, Ciliophora, Foraminifera, Rhizopoda e Zoomastigina]	Lewinsohn & Prado 2006 [estimaram em 3060 a 4140 espécies conhecidas no Brasil (aparentemente incluindo filos de fungos filamentosos!)] Yoneda 1999. Plâncton [marinho do Brasil] [registrou 213 espécies [não listadas], sendo 15 de Ciliophora (autótrofos), 128 de Tintinnina (Ciliophora), 50 de Foraminifera (Sarcomastigophora, Sarcodina), 19 de Radiolaria (Sarcomastigophora, Sarcodina) e 1 de Rhizopoda Euglyphina ((Sarcomastigophora, Sarcodina, Tecameba)] Lansac-Tôha et al. 2007. Species richness and geographic distribution of testate amoebae (Rhizopoda) in Brazilian freshwater environments [346 spp registradas no Brasil] Godinho & Regali-Seleghim 1999 [registrou 68 espécies de Ciliophora nas águas doce do Estado de São Paulo] [não há listagem para todo o Brasil] Nota: Não foram encontrados catálogos de protozoários parasíticos.	(3.060 a 4.140) (BR) 213 (BR) 346 (BR)
Kingdom Protoctista - Algae [inclui os filos Bacillariophyta, Chlorophyta, Chrysophyta, Cryptophyta, Dinoflagellata, Euglenophyta, Eustigmatophyta, Gamophyta, Haptophyta, Phaeophyta, Rhodophyta e Xanthophyta]	Forzza et al. 2010 (100% das espécies brasileiras catalogadas)	3.287 (BR)
Kingdom Protoctista – Fungi filamentosos [inclui os filos Cnidosporidia, Labyrinthulomycota, Acrasiomycota, Myxomycota, Plasmodiophoromycota, Hyphochytridiomycota, Chytridiomycota e Oomycota]	Forzza et al. 2010 (100% das espécies brasileiras catalogadas)	421 (BR)
Kingdom Fungi [Inclui os filos de fungi senso estrito: Zygomycota, Ascomycota, Basidiomycota, Deuteromycota e Mycophycophyta]	Forzza et al. 2010 (100% das espécies brasileiras catalogadas)	3.187 (BR)
Kingdom Plantae [Inclui 31.162 de Angiospermas, 23 de Gimnospermas, 1176 de Pteridófitas e 1521 de Briófitas]	Forzza et al. 2010 (100% das espécies de plantas brasileiras catalogadas)	33.882 (BR)
Kindom Animalia – Phylo Chordata [inclui as classes: Mammalia, Aves, Reptilia, Amphibia, Osteichthyes,	(100% das espécies brasileiras catalogadas entre 1999 e 2010 por diferentes autores) Reis et al. 2006 (100% das espécies brasileiras de Mammalia* catalogadas) [*CI do Brasil 2010 (novo catálogo em preparo)]	7.663 (BR) 658 (BR) [690] (BR)

Chondrichthyes, Cyclostomata, Ascidiacea, Thaliacea, Appendicularia & Cephalochordata]	CBRO 2009 (100% das espécies brasileiras de Aves catalogadas) Bérnils 2010 (100% das espécies brasileiras de Reptilia catalogadas) Segalla 2010 (100% das espécies brasileiras de Amphibia catalogadas) Buckup & Menezes 2003 (100% das espécies brasileiras de Osteichthyes catalogadas) Buckup & Menezes 2003 (100% das espécies brasileiras de Chondrichthyes catalogadas) Buckup & Menezes 2003 (100% das espécies brasileiras de Cyclostomata catalogadas) Lotufo 2002 (100% das espécies brasileiras de Ascidiacea catalogadas) Esnal 1999 (100% das espécies de Appendicularia do Atlântico Sul catalogadas) (Rodrigues 1999) Esnal & Dalponte 1999 (100% das espécies de Thaliacea do Atlântico Sul catalogadas) (Rodrigues 1999) Rodrigues 1999 (100% das espécies brasileiras de Cephalochordata catalogadas)	1.825 (BR) 721 (BR) 877 (BR) 3.277 (BR) 155 (BR) 4 (BR) 98 (BR) 17-25 (BR) 22-27 (BR) 2 (BR)
Insecta Endopterygota [large orders]:		
Kingdom Animalia – Phylo Arthropoda **Class Insecta - Order Coleoptera** [inclui as superfamílias:	A fauna mundial inclui quatro subordens de *Coleoptera*, *Archostemata*, *Myxophaga*, *Adephaga* e *Polyphaga*, com 357.899 espécies descritas (Lawrence, 1982; Lawrence y Britton, 1991). A fauna Neotropical inclui 72.476 espécies e a fauna brasileira, 26.755 espécies (Costa 2003). Subordem Archostemata (constituido no Neotrópico por 3 familias, 4 gêneros e 5 espécies bastante raras nas coleções (Costa 2003). Vulcano e Pereira 1975 estudaram os Cupesidae.) Subordem Myxophaga (Representado no Neotrópico por 4 familias, 8 gêneros y 38 espécies (Costa 2003). Compreende coleópteros muito pequenos que vivem sempre associados a ambientes aquáticos ou semiaquáticos ou higropétricos. Reichardt publicou entre 1973 e 1976 um amplo estudio crítico da subordem e uma revisão taxonômica dos *Torridincolidae* y *Hydroscaphidae* neotropicais.) Subordem Adephaga (Na região Neotropical se encontram 7 familias, 398 gêneros e 7.117 espécies, a maior parte Carabidae (Costa 2003). Inclui várias famílias que se encontram em ambientes aquáticos ou semiaquáticos, ou associados com o folhiço ou madeira semi-descomposta em áreas florestais. Reichardt 1977 apresentou uma sinopse dos gêneros de carabídeos neotropicais e Cassola e Pearson 2001 listaram os Cincidelidae neotropicais. Benetti et al. 2003 apresentou uma sinopse dos gêneros de Hydradephaga (Dytiscidae, Gyrinidae, Haliplidae, Noteridae) brasileiros.) Subordem Polyphaga (Representado no Neotrópico por 112 famílias, 6.291 gêneros e 65.314 espécies (Costa 2003). Contém mais de 90% das espécies conhecidas de coleópteros. Lawrence y Newton (1995) reconocen 5 Series: *Staphyliniformia* Lameere, 1900; *Scarabaeiformia* Crowson, 1960; *Elateriformia* Crowson, 1960; *Bostrichiformia* Forbes, 1926 y *Cucujiformia* Lameere, 1938.) Série Staphyliniformia (com 2 superfamílias: *Hydrophiloidea* Latreille, 1802 e *Staphylinoidea* Latreille, 1802. No Neotrópico a série Staphyliformia está representada por 9 familias, 717 gêneros e 6.989 espécies. Hydrophiloidea está representada por 3 famílias, 182 gêneros e 1.413 espécies e *Staphylinoidea* por 6 famílias, 535 gêneros e 5.576 espécies (Costa 2003). Hansen 1999 catalogou os Hydrophiloidea do mundo. Hermann 2001 catalogou cerca de 40% dos Staphylinidae do mundo (tendo excluido as subfamílias Aleocharinae, Paederinae, Pselaphinae , Scaphidiinae e Scydmaeninae (mas veja Löbl 1997 para Scaphidiinae e Newton & Chandler 1989 para Pselaphinae). Série Scarabaeiformia (com apenas uma superfamilia: *Scarabaeoidea* Latreille, 1802. Esta série corresponde aos antigos *Lamellicornia*. No Neotrópico a Série *Scarabaeiformia* está representada por 10 famílias, 448 gêneros e 5.467 espécies (Costa 2003). Scholtz 1982 catalogou os Trogidae do mundo e Scholtz 1990 revisou os Trogidae da América do Sul; Paulian 1982 revisou os Ceratocanthidae da América do Sul; Howden 1985a e 1985b revisou alguns gêneros de Geotrupidae da América do Sul e Howden & Martínez, 1963 e 1978 e Martínez 1976 revisaram outros gêneros de Geotrupidae americanos; Dellacasa 1988a e 1988b catalogaram os Aegialiidae, Aphodiidae, Aulonocnemidae, Termitotrogidae (Coleoptera, Scarabaeoidea) do mundo; Maes 200x catalogou os Lucanidae do mundo; Paulsen 2008 catalogou os Lucanidae das Américas; Ocampo & Ballerio 2005 catalogaram os Hybosoridae do mundo; Hawkins 2005 catalogou os Glaphyridae das Américas; FONSECA & REYES-CASTILLO 2004 catalogaram os Passalidae do Brasil; Evans & Smith 2005 catalogaram os Melolonthinae (Scarabaeidae) das Américas; Endrödi 1985 revisou os Dynastinae (Scarabaeidae) do mundo; Halffter & Martínez 1966-68 revisaram os Canthonina (Scarabaeinae) americanos; Jameson 1997 e 2001 revisou e catalogou parte dos Rutelina (Rutelinae, Scarabaeidae); Smith 2003 catalogou os Anoplognathini (Scarabaeidae: Rutelinae) das Américas e Jameson & Hawkins 2001 catalogaram os Geniatini (Scarabaeidae: Rutelinae) das Américas; Ratcliffe & Jameson (eds.) 2001 catalogaram os Heterosternina (Coleoptera: Scarabaeidae: Rutelinae: Rutelini); Vaz de Mello 2000 listou as espécies de Scarabaeidae registradas para o Brasil; Ratcliffe & Jameson (eds.) 2001 publicaram um guia on-line para os gêneros de Scarabaeidae das Américas.) Série Elateriformia (No Neotrópico está representada por 27 famílias, 523 gêneros e 13.848 espécies que estão incluidas em 5 superfamílias: *Scirtoidea* Fleming, 1821, representada na região Neotropical por 3 famílias, 12 gêneros e 138 espécies; *Dascilloidea* Guérin-Méneville, 1843 (1834), com 2 famílias, 6 gêneros e 24 espécies; *Buprestoidea* Leach, 1815, com uma só família que inclui 115 gêneros e 3.559 espécies; *Byrrhoidea* Latreille, 1804, representada por 10 famílias, 76 gêneros e 4.320 espécies e *Elateroidea* Leach, 1815, com 11 famílias, 314 gêneros e 5.807 espécies (Costa 2003). Bellamy 2008-	72.500 (NT) 26.800 (BR) 5(NT) 38(NT) 7117(NT) [sendo 497(BR) Hydradephaga] [sendo 1132 (BR) Carabidae] [sendo 537 (NT) Cincidelidae] 65.314(NT) 6.989[NT] 5.467[NT] 13.848[NT]

	2009 catalogou os Buprestidae do mundo; Brown 1981 tratou dos gêneros aquáticos de Byrrhoidea; Spangler et al. 2001 catalogaram os Limnichidae e Lutrochidae (Byrrhoidea) do mundo; Golbach 1994 catalogou os Elateridae (Elateroidea) da Argentina e apresentou chave dos gêneros da América Central e do Sul; Costa 1975 e Costa et al. 1993 & 1994 revisaram os Pyrophorini and Heligmini (Pyrophorinae, Elateridae); Casari-Chen 1985 & 1991 revisou os Hemirhipini (Pyrophorinae, Elateridae, Elateroidea) neotropicais; Casari 1994-2008 revisou gêneros de Pyrophorinae, Agrypninae e Elaterinae (Elateridae, Elateroidea). Série Bostrichiformia (No Neotrópico está representada por 5 famílias, 117 gêneros e 839 espécies, incluídas em duas superfamílias: *Derodontoidea* LeConte, 1861, com uma só familia, um gênero e uma espécie e *Bostrichoidea* Latreille, 1802, com 4 famílias, 116 gêneros e 838 espécies (Costa 2003). Háva 2010 catalogou os Nosodendridae (Bostrichoidea) do mundo; Mroczkowski 1968 catalogou os Dermestidae (Bostrichoidea) do mundo; Borowski & Węgrzynowicz 2007 catalogaram os Bostrichidae (Bostrichoidea) do mundo. Série Cucujiformia (Na região Neotropical está representada por 61 famílias, 4.492 gêneros e 41.722 espécies, incluídas em 6 superfamilias: *Lymexyloidea* Fleming, 1821, representada por uma só família com 3 gêneros e 13 espécies; *Cleroidea* Latreille, 1802, com 3 famílias, 127 gêneros e 1.688 espécies; *Cucujoidea* Latreille, 1802 com 24 famílias, 453 gêneros e 4.689 espécies; *Tenebrionoidea* Latreille, 1802, com 23 famílias, 740 gêneros e 7.571 espécies; *Chrysomeloidea* Latreille, 1802, com 4 famílias, 1.565 gêneros e 17.682 espécies; e *Curculionoidea* Latreille, 1802, com 6 famílias, 1.112 gêneros e 10.079 espécies (Costa 2003). Pinto 1999 gêneros de Meloidae (Tenebrionoidae); Slipinski 1990 monografou os Cerylonidae (Cucujoidea) do mundo; Shockley 2008 catalogou os Alexiidae do mundo; Wheeler 1986 revisou os gêneros de Lymexylidae do mundo; Corporaal 1950 catalogou os Cleridae (Cleroidea) do mundo; Kolibáč 2005 & 2006 revisou os Trogositidae (Cleroidea) do mundo; Slipinski 1990 monografou os Cerylonidae (Cucujoidea) do mundo; Shockley 2008 catalogou os Alexiidae (Cucujoidea) do mundo; Jadwiszczak & Wegrzynowicz 2003-em preparo (4 partes) estão catalogando os Coccinellidae (Cucujoidea) do mundo; Pakaluk & Slipinski 1990 revisaram os Eupsilobiinae (Endomychidae/Cucujoidea) da América do Sul; Shockley, Tomaszewska & McHugh 2009 catalogaram os Endomychidae (Cucujoidea) do mundo; Pinto 1999 gêneros de Meloidae (Tenebrionoidae); Monné & Hovore 2006 catalogaram os Cerambycidae das Américas (Chrysomeloidea); Udayagiri et al. 1989 catalogaram os Bruchidae do mundo (Chrysomeloidea); Borowiec & Świętojańska 2008 catalogaram os Cassidinae (Chrysomelidae/Chrysomeloidea) do mundo; Vanin 1976 revisou os Belidae (Curculionoidea) da América do Sul; Wibmer & O'Brien 1986 & 1989 catalogaram os Curculionidae (Curculionoidea) da América do Sul; Wood & Bright 1987 & 1992 e Bright & Skidmore 1997 e 2002 catalogaram os Scolytidae e Platypodidae (Curculionoidea) do mundo; Sforzi, & Bartolozzi 2004 revisaram os Brentidae (Curculionoidea) do mundo).	839[NT] 41.722[NT]
Kingdom Animalia – Phylo Arthropoda **Class Insecta - Order Lepidoptera**	Heppner 1984-96 & Lamas 2004. *Atlas of Neotropical Lepidoptera, Checklist. Parts 1-6.* [published: Part 1 (Micropterigoidea-Immoidea); Part 2 (Hyblaeoidea-Pyraloidea-Tortricoidea); Part 4A (Hesperioidea-Papilionoidea); Part 4B (Drepanoidea - Bombycoidea – Sphingoidea)] [still unpublished: Part 3, Part 5 & Part 6] [~45.000 espécies estimadas – 22.521 espécies catalogadas] Brown Jr. & Freitas, 1999. Lepidoptera In: *Invertebrados terrestres* In: Joly & Bicudo (orgs.) *Biodiversidade do Estado de São Paulo, Brasil: síntese do conhecimento ao final do século XX*. [Espécies descritas e conhecidas da região Neotropical segundo Heppner (1991), modificado e atualizado por Vitor Becker] [Espécies descritas e conhecidas do Brasil estimados por Vitor Becker; Geometridae por Manoel Dias; Noctuidae e borboletas por K. Brown Jr.] [Lepidoptera (total): 51.018(NT) 26.016(BR)]: Microlepidoptera primitivos (Hepialoidea(132/101), Nepticuloidea(78/7), Incurvarioidea(58/24), Tineoidea(541/303), Gracillarioidea(221/77)) [Heppner (editor) 1984 catalogou os Hepialoidea, Nepticuloidea, Incurvarioidea, Tineoidea e Gracillarioidea neotropicais; Davis 2004 catalogou os Prototheoridae (Hepialoidea) do mundo; Davis 1989 e Davis & Stonis. 2007 revisaram os Opostegidae (Nepticuloidea) do mundo; Davis 2003 e 2006 revisou e catalogou os Arrhenophanidae (Tineoidea) do mundo; Prins & Prins 2005 catalogaram os Gracillariidae (Gracillarioidea) do mundo; Nielsen, Robinson & Wagner 2000 catalogaram os Mnesarchaeoidea e Hepialoidea do mundo] [Lacunas de catálogos + recentes: Tineoidea] Microlepidoptera diversos (Yponomeutoidea(333/143), Gelechioidea(5550/2921), Tortricoidea(1620/890), Pterophoroidea(257/123), Immoidea(3/2), Copromorphoidea(50/25)) [Becker 1984 catalogou os Gelechioidea neotropicais; Heppner (editor) 1995 catalogou os Tortricoidea neotropicais e Brown 2005 catalogou os Tortricoidea do mundo; Heppner >1998 catalogou os Urodiidae (Tortricoidea) do mundo; Heppner (editor) 1984 catalogou os Yponomeutoidea, Copromorphoidea e Immoidea neotropicais; Gaedike 1997 catalogou os Acrolepiidae (Yponomeutoidea) do mundo; Gielis 2003 catalogou os Pterophoroidea do mundo.] [Lacunas de catálogos + recentes: Gelechoidea, Yponomeutoidea e Copromorphoidea] Microlepidoptera maiores (Pyraloidea(4793/3102), Cossoidea(280/150), Sesioidea(408/220), Zygaenoidea(780/395)) [Heppner (editor) 1995 catalogou os Pyraloidea, Zygaenoidea, Sesioidea e Cossoidea neotropicais; Lamas	45.000 (NT) 51.018 (NT) 26.016 (BR) [66% catalogados a partir de 1995 e 100% catalogados a partir de 1984] 1.030(NT) 512(BR) [só 1/3 com catálogos pós 2000] [100% com catálogos a partir de 1984] 7.813(NT) 4.104(BR) [só 1/4 com catálogos pós 2002] [100% com catálogos a partir de 1984] 6.261(NT) 3.867(BR) [100% com catálogos a partir de 1995]

	1995 revisou o catálogo dos Castniidae (Sesioidea) neotropicais; Heppner >1998 catalogou os Brachodidae (Sesioidea) e os Lacturidae (Zygaenoidea) do mundo; Rodovalho & Diniz, 2010 catalogaram os Limacodidae (Zygaenoidea) do bioma Cerrado] [nenhum catálogo pós 2000!]	
	Macrolepidoptera Macromariposas (Bombycoidea(2407/1190), Noctuoidea(18281/7940), Geometroidea(9276/5115)) [Poole 1989 catalogou os Noctuidae do mundo [há alguns catálogos mais recentes para subfamílias ou tribos]; Watson & Goodger 1986 catalogaram os Arctiinae (Noctuidae) neotropicais; Ferro & Diniz 2010 catalogaram os Artiinae do bioma Cerrado; Lepesqueur & Diniz 2010 catalogaram os Notodontidae do bioma Cerrado; Fibiger 2007-2010 revisou os Micronoctuidae do mundo; Scoble 1999 catalogou os Geometridae do mundo; Heppner (editor) 1996 catalogou os Bombycoidea e Drepanoidea neotropicais; Lemaire 1978-2002 catalogou os Saturniidae das Américas; Kitching & Cadiou 2000 catalogaram os Sphingidae do mundo]	29.964(NT) 14.245(BR) [50% com catálogos a partir de 1996] [85% com catálogos a partir de 1986]
	Macrolepidoptera Borboletas (Hedyloidea(40/20), Hesperioidea(2285/1165), Papilionoidea(5086/2103)) [Lamas (ed.) 2004 catalogou os Papilionoidea e Hesperoidea neotropicais; Mielke 2005 catalogou os Hesperoidea das Américas; Scoble 1998 catalogou os Hedyloidea do mundo]	7.411(NT) 3.288(BR) [99% com catálogos a partir de 2004]
Kingdom Animalia – Phylo Arthropoda **Class Insecta - Order Hymenoptera**	[86% das espécies neotropicais catalogadas entre 2000 e 2010] Ichneumonoidea (Yu et al. 200x. *World Ichneumonoidea 2004*) Apoidea Apiformes (Moure, Urban & Melo 2007. *Catalogue of Bees in the Neotropical Region*) Chalcidoidea (Noyes 200x. *Universal Chalcidoidea Database*) [1119 spp no Brasil] Vespoidea Vespimorpha (Fernandez 2000. List of Neotropical Pompilidae; Nonveiller 1990. Catalogue of Neotropical Mutillidae and Bradynobaenidae; Richards 1978. Social Wasps of the Americas; Carpenter & Marques 2001. *Vespídeos do Brasi;* Giordani Soika 1978 & 1990. Revisione degli Eumenidi neotropicali; Arbouw 1985. World Catalogue of Tiphiinae; Genise 1985. Las Anthoboscinae Neotropicales; Genise 1992. Tiphiidae de la Argentina y paises vecinos; Argaman 1996. Generic synopsis of Scoliidae; Townes 1977. Revision of the Rhopalosomatidae;) Vespoidea Formicomorpha (Fernández & Sendoya, 2004. *List of Neotropical Ants*) Apoidea Spheciformes (Amarante 2002 e 2005, *Synonymic Catalog of the Neotropical Crabronidae and Sphecidae*) Chrysidoidea (Gordh & Mocsar 1990. *Catalog of World Bethylidae*; Olmi 1984, 1989, 1991 & 1995. *Revision of World Dryinidae*; Kimsey & Bohart 1990. *Chrysididae of the World*; Olmi 1995. *Revision of World Embolimidae*; Olmi 2004. *Revision of World Sclerogibbidae*; Azevedo 1999. *World Scolebythidae*; Roig-Alsina 1994. *Genera of Plumariidae*; Olmi et al., 2000. *Dryinidae Neotropicales*; Azevedo et al., 1999-presente. Bethylidae) Tenthredinoidea (Taeger & Blank 2006. *Electronic World Catalog of Symphyta)* Cynipoidea (Diaz et al. 2002 [sumário de várias fontes]) Platygastroidea (Loiácono & Margária 2002) Proctotrupoidea (Arias-Penna 2003) Evanioidea (Deans et al. 200x. Evanioidea Online) Ceraphronoidea (Loiácono & Margária 2002) Outros [Trigonaloidea, Stephanoidea, Siricoidea, Orussoidea, Megalodontoidea, Megalyroidea, Myrmarommatoidea, Cephoidea & Xyeloidea]	28.173 (NT) 6.601 (NT) 5.000 (NT) 4.555 (NT) 3.927 (NT) 3.141 (NT) 1.695 (NT) 1.206 (NT) 1.027 (NT) 667 (NT) 434 (NT) 375 (NT) 180 (NT) +90 (NT) 106 (NT)
Kingdom Animalia – Phylo Arthropoda **Class Insecta - Order Diptera**	Evenhuis, Pape, Pont & Thompson (editors). 2008. *Biosystematic Database of World Diptera*, Version 10.5 [o módulo "species database" ainda não está disponível ao público geral] [número de espécies conhecidas na região neotropical para cada infraordem de Diptera: Bibionomorpha [2.327spp] Culicomorpha [3.197spp] Tipulomorpha [3.242spp] Psychodomorpha [1.018spp] Stratiomyomorpha [988spp] Xylophagomorpha [28spp] Vermileomorpha [4spp] Tabanomorpha [1.243spp] Asilomorpha [2.380spp] Nemestrinomorpha [134spp] Eremoneura [1.717spp] Aschiza [3.089spp] Schizophora Acalyptratae [5.387spp] Schizophora Calyptratae [4.928spp] Papavero, N. (ed.) 1966-84. *A Catalogue of the Diptera of the Americas south of the United States*	29,783 (NT) ~10.000 (BR)
Insecta Endopterygota [small orders]:		
Reino Animalia – Filo Arthropoda **Classe Insecta – Ordem Neuroptera**	Oswald 2007. *Neuropterida Species of the World*	**xxx**
Reino Animalia – Filo Arthropoda **Classe Insecta - Ordem Trichoptera** [inclui 16 famílias]	Paprocki et al. 2004 Checklist of the Trichoptera of Brazil [378 spp listadas] Dumas et al. 2010 [cita >420 spp no Brasil]	378 (BR) [420]
Reino Animalia – Filo Arthropoda **Classe Insecta - Ordem Siphonaptera**	Linardi & Guimarães 2000. *Sifonápteros do Brasil*	60 (BR)

[inclui as superfamílias:		
Reino Animalia – Filo Arthropoda Classe Insecta – Ordem Mecoptera [só Bittacidae no Brasil]	Penny 1997 *World Checklist of Extant Mecoptera Species*	19 (BR)
Reino Animalia – Filo Arthropoda Classe Insecta – Ordem Megaloptera [famílias Sialidae e Corydalidae]	Contreras-Ramos 2007. Systematics and biogeography of Neotropical Megaloptera [73+2 espécies neotropicais]	20 (BR)
Reino Animalia – Filo Arthropoda Classe Insecta – Ordem Strepsiptera	Kathirithamby 200x. Partial List of Strepsiptera Species	9 (BR)
Reino Animalia – Filo Arthropoda Classe Insecta – Ordem Rhaphidioptera	Oswald 2007. *Neuropterida Species of the World*	0 (BR)
Insecta Exopterygota [large orders]:		
Reino Animalia – Filo Arthropoda Classe Insecta - Ordem Hemiptera (Heteroptera + Homoptera) [inclui as superfamílias:	Sternorrhyncha [includes Psylloidea, Aleyrodoidea, Aphidoidea, and Coccoidea] **[**Aleyrodoidea includes 1.556 valid species in the world in Aleyrodidae, the only included family (Mound and Halsey 1978; Martin and Mound 2007)] [Aphidoidea includes Phylloxeridae, Adelgidae, and Aphididae, with some 4.500 described species in the world (Remaudière and Remaudière 1997; Blackman and Eastop 2006)] **[**Coccoidea has about 7.300 described species in the world (Miller and Ben-Dov 2006), and 20 or more families, usually divided into two groups: Archaeococcoidea and Neococcoidea] **[**Psylloidea has more than 3.000 described species in some eight families (Hodkinson and Casson 1991; Hollis 2004; Burckhardt 2005)] Auchenorrhyncha [includes Cicadomorpha and Fulgoromorpha] [Cicadomorpha includes Cercopoidea, Cicadoidea and Membracoidea, and has approximately 35.000 described species (Cryan 2005; Dietrich 2005)] [Fulgoromorpha, the Fulgoroidea, has more than 9.000 described species, and about 20 families (O'Brien and Wilson 1985).] Coleorrhyncha [a small group of Hemiptera that comprises 13 extant genera and 25 species in the only extant family Peloridiidae (China 1962; Evans 1981)] Heteroptera [includes: Enicocephalomorpha, Dipsocoromorpha, Gerromorpha, Leptopodomorpha, Nepomorpha, Cimicomorpha, Pentatomomorpha] [Enicocephalomorpha contains approximately 450 described species (Schuh and Slater 1995), and two families: Aenictopecheidae and Enicocephalidae.] [Dipsocoromorpha includes five families (e.g., Schuh and Slater 1995).] [Gerromorpha has approximately 1900 described species in this infraorder (Andersen and Weir 2004b), with three families (Gerridae, Hermatobatidae, and Veliidae).] [Nepomorpha contains about 2000 species in eleven families (Štys and Jansson 1988; Hebsgaard et al. 2004).] [Leptopodomorpha contains four families and about 300 described species, nearly all of them in Saldidae (Schuh et al. 1987).] [Pentatomomorpha contains about 15.000 described species (Henry 1997, Schuh and Slater 1995), including the superfamilies Pentatomoidea, Coreoidea, Pyrrhocoroidea, Idiostoloidea, Lygaeoidea.] [Cimicomorpha includes the groups Reduvioidea (Reduviidae and Pachynomidae), Cimiciformes (including Joppeicidae, Microphysidae, Velocipedidae, Curaliidae and Cimicoidea), Miroidea (Miridae and Tingidae only), Naboidea]	xxx
Reino Animalia – Filo Arthropoda Classe Insecta - Ordem Orthoptera (=Ensifera + Caelifera) [inclui 9 famílias de Caelifera] [inclui x famílias de Ensifera]	Eades & Otte, 2010. *Orthoptera Species File Online. Version 2.0/4.0* [Lista 778 espécies em 245 gêneros e 9 famílias de Caelifera no Brasil, até 2010] [Lista 795 espécies em 270 gêneros e 6 famílias de Ensifera no Brasil, até 2010]	1573 (BR)
Insecta Exopterygota [small orders]:		
Reino Animalia – Filo Arthropoda Classe Insecta - Ordem Odonata [inclui 14 famílias]	Paulson 2010. South American Odonata Ramirez 201x. Odonata In: *Aquatic Biodiversity in Latin America* Souza, Costa & Oldrini 2007. Odonata. *In*: *Guia on-line: Identificação de larvas de Insetos Aquáticos do Estado de São Paulo*	800 (BR)
Reino Animalia – Filo Arthropoda Classe Insecta – Ordem Blattaria	Beccaloni 2007. *Blattodea Species File* Pellens & Grandcolas, 2008. Catalogue of Blattaria from Brazil	644 (BR)
Reino Animalia – Filo Arthropoda Classe Insecta - Ordem Thysanoptera (Terebrantia + Tubulifera)	Mound 2007. *Thysanoptera (Thrips) of the World – a checklist.* Monteiro 2002. The Thysanoptera fauna of Brazil [About 520 species, in 139 genera and six families are known from Brazil]	520 (BR)

Reino Animalia – Filo Arthropoda Classe Insecta – Ordem Psocoptera [inclui 28 famílias]	Lienhard & Smithers. 2002. *Psocoptera. World Catalogue and Bibliography* García Aldrete & Mockford 2009. List of Psocoptera from Brazil	425 (BR)
Reino Animalia – Filo Arthropoda Classe Insecta - Ordem Isoptera [inclui as famílias: Kalotermitidae, Rhinotermitidae, Serritermitidae, Termopsidae e Termitidae]	Constantino 1998. Catalog of the living termites of the New World Constantino 2010. *On-Line Termite Database* [lista 84 gêneros e 555 espécies neotropicais] Constantino & Acioli 2008 [290 spp no Brasil]	290 (BR)
Reino Animalia – Filo Arthropoda Classe Insecta – Ordem Mantodea [inclui 6 famílias: Chaeteesidae, Mantoididae, Acanthopidae, Liturgusidae, Thespidae e Mantidae]	Otte, Spearman & Stiewe, 200x. *Mantodea Species File Online* Terra 1995. Systematics of the Neotropical genera of praying mantis [267 spp no Brasil] Agudelo Rondón, Lombardo & Jantsch 2007. Checklist of the Neotropical mantids [current total of 474 species distributed in 91 genera and in 6 families; registra para o Brasil 271 spp em 68 gêneros e 6 famílias]	271 (BR)
Reino Animalia – Filo Arthropoda Classe Insecta - Ordem Ephemeroptera [inclui 10 famílias]	Salles 2009. Lista das espécies de Ephemeroptera registradas para o Brasil	213 (BR)
Reino Animalia – Filo Arthropoda Classe Insecta – Ordem Phasmida [inclui 5 famílias]	Otte & Brock 2005. *Phasmida Species File: Catalog of stick and leaf insects of the world*. Brock 200x. *Phasmida Species File Online*	201 (BR)
Reino Animalia – Filo Arthropoda Classe Insecta - Ordem Plecoptera [inclui as famílias: Perlidae e Gripopterygidae]	Froehlich 2010. Catalogue of Neotropical Plecoptera [508 espécies neotropicais] Olifiers et al. 2004 [100 spp no Brasil]	~100 (BR)
Reino Animalia – Filo Arthropoda Classe Insecta - Ordem Phthiraptera (=Anoplura + Mallophaga (=Amblycera + Ischnocera))	Durden & Musser. 1994. The sucking lice (Anoplura) of the world: A taxonomic checklist Price, Hellenthal, Palma, Johnson & Clayton. 2003. *The Chewing Lice: World Checklist and Biological Overview*	xxx
Reino Animalia – Filo Arthropoda Classe Insecta – Ordem Dermaptera	Steinmann 1989. *World Catalogue of Dermaptera* Briceno 1992. Efecto geografico en la diversidad y en la distribucion de especies del Orden Dermaptera en el Continente Americano. [A total of 289 species were included (Labiidae: 113, Forficulidae: 88, Carcinophoridae: 55, Pygidicranidae: 19, Diplatyidae: 8, Labiiduridae: 4, and Chelisochidae: 1).	xxx
Reino Animalia – Filo Arthropoda Classe Insecta – Ordem Embioptera	Ross 1999 [last updated in 2009]. *World List of Extant and Fossil Embiidina*	28 (BR)
Reino Animalia – Filo Arthropoda Classe Insecta – Ordem Zoraptera	Hubbard 1990. A Catalog of the Order Zoraptera	4 (BR)
Reino Animalia – Filo Arthropoda Classe Insecta – Ordem Grylloblatodea	Storozhenko 1986. The annotated catalogue of living Grylloblattida	0 (BR)
Reino Animalia – Filo Arthropoda Classe Insecta – Ordem Mantophasmatodea	Klass, Zompro, Kristensen & Adis 2002. Mantophasmatodea: A New Insect Order with Extant Members in the Afrotropics	0 (BR)
Hexapoda Classe Entognatha [=Insecta Apterygota]:		
Reino Animalia – Filo Arthropoda Classe Insecta – Ordem Collembola	Mari-Mutt & Bellinger 1990-2008. *A catalog of the Neotropical Collembola* [>1.200 espécies neotropicais] Abrantes et al. 2010. Synthesis of Brazilian Collembola [270 espécies no Brasil]	270 (BR)
Reino Animalia – Filo Arthropoda Classe Insecta – Ordem Protura	Szeptycki 2007. Catalogue of the World Protura	28 (BR)
Reino Animalia – Filo Arthropoda Classe Insecta – Ordem Diplura	[Diplura é uma ordem de artrópodes pertencentes à classe Entognatha. Possui aproximadamente 800 espécies.]	**xxx**
Reino Animalia – Filo Arthropoda Classe Insecta – Ordem Thysanura (=Archaeognatha & Zygentoma)		**xxx**
Reino Animalia – Filo Mollusca [inclui as classes: Gastropoda, Bivalvia, Cephalopoda, Scaphopoda, Polyplacophora e Aplacophora] [Rios 1994 reported 1574 species as follows: Aplacophora - 4 (0,3%); Polyplacophora - 24 (1,5%); Gastropoda - 1083 (68,8%); Scaphopoda - 30 (1,9%); Pelecypoda - 390 (24,8%); Cephalopoda - 43	 Simone 2006 (Gastropoda continental) Rios 1994, Leal 1991 (Gastropoda marinho) Simone 2006 (Bivalvia continental) Rios 1994 (Bivalvia marinho) Rios 1994 (Cephalopoda, marinho) Rios 1994 (Scaphopoda, marinho) Rios 1994 (Polyplacophora, marinho) Rios 1994 (Aplacophora, marinho)	2.713 (BR) 958 (BR) 1.125 (BR) 116 (BR) 410 (BR) 45 (BR) 30 (BR) 25 (BR) 4 (BR)

(2,7%)]		
Reino Animalia – Filo Nematoda Marinho: Continental:	Corbisier 1999	1280-2880 (BR) (230) xxx
Reino Animalia – Filo Platyhelminthes Classe Turbellaria Classe Eucestoda Classe	Bueno 1998	1040-2300 (BR) 350 (187 mar) xxx (200 ou 30 mar)
Reino Animalia – Filo Annelida Oligochaeta terrícolas Oligochaeta aquáticos Polychaeta (marinhos) Hirudinea (aquáticos)	 Brown & James 2007 Gavrilov 1981 Amaral et al. 2010 Christoffersen 2007-2009	1000-1100 (BR) 255 (BR) 116 (16) (BR) 750-800 (BR) 136/2 (BR)
Reino Animalia – Filo Cnidaria Classe Hydrozoa Classe Scyphozoa Classe Cubozoa Classe Staurozoa Classe Octocorallia Classe Scleractinia Classe Zoanthidea Classe Actiniaria Classe Corallimorpharia	 Migotto et al. 2002 Migotto et al. 2002 Migotto et al. 2002 Migotto et al. 2002 Castro 1990 xxx xxx xxx xxx	487 (BR) 348 (BR) 22 (BR) 3 (BR) 1 (BR) 56 (BR) 19 (BR) 5-7 (BR) 28 (BR) 4 (BR)
Reino Animalia – Filo Rotifera Classe Monogononta outros		457-467 (BR) 411 (BR)
Reino Animalia – Filo Porifera Classe Demosponiae (mar)		300-400 (BR) 250-400 (BR)
Reino Animalia – Filo Echinodermata	Tommasi 1999	329-342 (BR)
Reino Animalia – Filo Ectoprocta (Bryozoa)	Migotto & Marques 2005 (Barbosa 1970)	284-300 (BR) 175 (BR)
Reino Animalia – Filo Chaetognatha	Almeida-Prado 1961; Vega-Pérez & Liang 1999	230 (BR) (18 mar)
Reino Animalia – filos menores [inclui os filos: Placozoa, Ctenophora, Mesozoa, Nemertina, Gnathostomulida, Gastrotricha, Rotifera, Kinorhyncha, Loricifera, Acanthocephala, Entoprocta, Nematomorpha, Phoronida, Brachiopoda, Priapulida, Sipuncula, Echiura, Annelida, Tardigrada, Pentastoma, Onychophora, Pogonophora, Hemichordata]		
Pequenos filos		
Filo Gastrotricha	Forneris 1999 Marinhos: 6 ou 40 ou 69 spp!	103 (BR)
Filo Tardigrada	Assunção 1999 [Marinhos: 6 spp]	67 (BR)
Filo Acanthocephala (mar)		30-50 (BR)
Filo Nemertinea	Gibson 1995; Santos 1997 Rodrigues & Santos 1999	43 (BR)
Filo Sipuncula	Ditadi 1999c & 1998	30-40 (BR)
Filo Ctenophora	Oliveira et al. 2007	13 (BR)
Filo Nematomorpha Nectonematoidea (mar)	 Hadel & Medeiros 1999	12 (BR) (1)
Filo Onychophora	Sampaio-Costa et al. 2009. Brazilian species of Onychophora [12 spp registradas no Brasil +12 ssp não descritas no Brasil]	12 (BR)
Filo Entoprocta	Rocha 1999	10 (BR)
Filo Echiura	Ditadi 1999b & 1998	9 (BR)
Filo Hemichordata	Migotto & Marques 2005	(7)
Filo Pentastomida	Almeida & Christoffersen 1999, A cladistic approach to relationships in Pentastomida Almeida et al. 2007. Prevalence and intensity of pentastomid infection in two species of snakes from northeastern Brazil	4 (BR)

Filo Brachiopoda	Kowalewski et al. 2002 Simões et al. 2004	4 (BR)
Filo Phoronida	Migotto & Marques 2005	2-6 (BR)
Filo Kinorhyncha	Forneris 1999	1 (BR)
Filo Pogonophora	Nonato & Hadel 1999	(1)
Filo Priapulida	Ditadi 1999a	1 (BR)
Filo Placozoa	Hadel 1999a	0 (BR)
Filo Mesozoa	Hadel 1999b	0 (BR)
Filo Gnathostomulida	Hadel 1999c	0 (BR)
Filo Loricifera	Medeiros & Hadel, 1999	0 (BR)
Filo Cycliophora	Rodrigues & Hondt 1999	0 (BR)

* For some catalogues/lists it was not possible to indicate the number of species by origin.

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ANNEX 3

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ANNEX 4

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