# BRAZIL

## Fifth National Report to the CBD

Picture: NGO Deixe Viver

**January 2015**

# Fifth National Report to the Convention on Biological Diversity

# BRAZIL

**Federative Republic of Brazil**
**President**
DILMA ROUSSEFF

**Vice-President**
MICHEL TEMER

**Ministry of the Environment**
**Minister**
IZABELLA MÔNICA VIEIRA TEIXEIRA

**Executive Secretariat**
**Secretary**
FRANCISCO GAETANI

**Secretariat of Biodiversity and Forests**
**Secretary**
ROBERTO BRANDÃO CAVALCANTI

**Department of Biodiversity Conservation**
**Director**
CARLOS ALBERTO DE MATTOS SCARAMUZZA

Ministry of the Environment - MMA
Center for Information and Documentation Luís Eduardo Magalhães – CID Ambiental
SEPN 505 – Bloco B – Edifício Marie Prendi Cruz – Térreo – Asa Norte
Brasília/DF – CEP: 70730-542
Tel.: +55 61 2028-2184 / Fax: +55 61 2028-1980 / e-mail: cid@mma.gov.br

**MINISTRY OF THE ENVIRONMENT**
**Secretariat of Biodiversity and Forests**

# Fifth National Report to the Convention on Biological Diversity

# BRAZIL

Brasília
2015

**Coordinator**
Carlos Alberto de Mattos Scaramuzza

**Technical Coordination**
Agnes de Lemos Velloso, Iona'i Ossami de Moura, Lidio Coradin

**Technical Team**
MMA Staff: Carlos Alberto de Mattos Scaramuzza, Lidio Coradin, Daniela América Suarez de Oliveira, Iona'i Ossami de Moura, Camila Neves Soares Oliveira, Krishna Barros Bonavides, Deivid Pereira de Souza (trainee).
Consultants: Agnes de Lemos Velloso, Andreina D'Ayala Valva

ISBN _____

---

Brazil, Ministry of the Environment. Secretariat of Biodiversity and Forests - SBF.
Fifth National Report to the Convention on Biological Diversity: Brazil. Brasília: Ministry of the Environment, 2015.
1. Biodiversity – Brazil. 2. Convention on Biological Diversity – Brazil.

---

Ministério do Meio Ambiente – MMA
Esplanada dos Ministérios – Bloco B
Brasília, DF
CEP: 70068-900

Secretaria de Biodiversidade e Florestas
Diretoria do Programa Nacional de Conservação da Biodiversidade
SEPN 505 – Bloco B
Asa Norte
Brasília, DF
CEP 70730-54

# CONTENTS

# LIST OF TABLES

# LIST OF FIGURES

# ABBREVIATIONS AND ACRONYMS

| | PORTUGUESE | ENGLISH |
|---|---|---|
| ABS | Acesso e Repartição de Benefícios | Access and Benefit Sharing |
| ANA | Agência Nacional de Águas | National Water Agency |
| APA | Área de Proteção Ambiental | Environmental Protection Area |
| APP | Área de Preservação Permanente | Permanent Preservation Area |
| BFN | Biodiversidade para Alimentação e Nutrição | Biodiversity for Food and Nutrition |
| CAIXA | Caixa Econômica Federal | Federal Savings Bank |
| CAR | Cadastro Ambiental Rural | Rural Environmental Cadaster |
| CBD | Convenção sobre Diversidade Biológica | Convention on Biological Diversity |
| CENARGEN | Centro de Recursos Genéticos e Biotecnologia da Embrapa | Genetic Resources and Biotechnology Center of Embrapa |
| CESP | Companhia Energética de São Paulo | São Paulo Energy Company |
| CGEN | Conselho do Patrimônio Genético | Genetic Heritage Management Council |
| CITES | Convenção sobre o Comércio Internacional de Espécies da Fauna e Flora Selvagens em Perigo de Extinção | Convention on International Trade in Endangered Species of Wild Fauna and Flora |
| CNCFlora | Centro Nacional de Conservação da Flora | National Center for Plant Conservation |
| CNI | Confederação Nacional da Indústria | National Confederation of Industries |
| CNZU | Comitê Nacional de Zonas Úmidas | Brazilian National Wetlands Committee |
| CONAB | Compania Nacional de Abastecimento | National Supply Company |
| CONABIO | Comissão Nacional de Biodiversidade | National Biodiversity Commission |
| CRA | Cota de Reserva Ambiental | Environmental Reserve Certificate |
| CSR/IBAMA | Centro de Sensoriamento Remoto do IBAMA | Remote Sensing Center of IBAMA |
| DPG/MMA | Departamento do Patrimônio Genético do MMA | Department of Genetic Heritage under the MMA |
| Embrapa | Empresa Brasileira de Pesquisa Agropecuária | Brazilian Agricultural Research Corporation |
| FAO | Organização das Nações Unidas para Alimentação e Agricultura | Food and Agriculture Organization of the United Nations |
| FGV | Fundação Getúlio Vargas | Getúlio Vargas Foundation |
| FNMA | Fundo Nacional do Meio Ambiente | National Fund for the Environment |
| FUNAI | Fundação Nacional do Índio | National Indigenous Affairs Foundation |
| FUNBIO | Fundo Brasileiro para a Biodiversidade | Brazilian Biodiversity Fund |
| GEF | Fundo Global do Meio Ambiente | Global Environmental Facility |
| GHG | Gases do efeito estufa | Greenhouse gases |
| IBAMA | Instituto Brasileiro do Meio Ambiente e Recursos Naturais Renováveis | Brazilian Institute for the Environment and Renewable Natural Resources |
| IBGE | Instituto Brasileiro de Geografia e Estatística | Brazilian Institute of Geography and Statistics |
| ICB | Índice de Conservação da Biodiversidade | Biodiversity Conservation Index |
| ICCAT | Comissão Internacional para a Conservação de Atuns Atlânticos | International Commission for the Conservation of Atlantic Tunas |
| ICMBio | Instituto Chico Mendes de Conservação da Biodiversidade | Chico Mendes Institute for Biodiversity Conservation |
| IIEB | Instituto Internacional de Educação do Brasil | Brazil's International Education Institute |
| IMAZON | Instituto do Homem e Meio Ambiente da Amazônia | Amazon Institute of People and the Environment |
| INCRA | Instituto Nacional da Reforma Agrária | National Institute for Agrarian Reform |
| INMETRO | Instituto Nacional de Metrologia, Qualidade e Tecnologia | National Institute of Metrology, Quality and Technology |
| INPE | Instituto Nacional de Pesquisas Espaciais | National Institute for Space Research |
| IPEA | Instituto de Pesquisa Econômica Aplicada | National Institute of Applied Economics Studies |
| IQA | Índice de Qualidade das Águas | Water Quality Index |

| | | |
|---|---|---|
| IUCN | União Internacional para a Conservação da Natureza | International Union for the Conservation of Nature |
| MAPA | Ministério da Agricultura Pecuária e Abastecimento | Ministry of Agriculture, Livestock and Food Supply |
| Mcid | Ministério das Cidades | Ministry of Cities |
| MCTI | Ministério da Ciência, Tecnologia e Inovação | Ministry of Science, Technology and Innovation |
| MDIC | Ministério do Desenvolvimento, Indústria e Comércio Exterior | Ministry of Development, Industry and Foreign Trade |
| MDS | Ministério do Desenvolvimento Social e Combate à Fome | Ministry of Social Development and Fight Against Hunger |
| MMA | Ministério do Meio Ambiente | Ministry of the Environment |
| MP | Ministério Público | Ministry of Justice |
| MPA | Ministério da Pesca e Aquicultura | Ministry of Fisheries and Acquaculture |
| PAHO | Organização Pan-Americana de Saúde | Pan American Health Organization |
| PAN | Planos de Ação Nacionais para Conservação de Espécies Ameaçadas de Extinção ou do Patrimônio Espeleológico | National Species Conservation Action Plans |
| PELD | Programa de Pesquisas Ecológicas de Longa Duração | Long Term Ecological Research Program |
| PES | Pagamento por Serviços Ambientais | Payment for Ecosystem Services |
| PMDBBS | Projeto de Monitoramento do Desmatamento nos Biomas Brasileiros por Satélite | Project on Satellite Monitoring of Deforestation in Brazilian Biomes |
| PRODES | Projeto de Monitoramento do Desflorestamento da Amazônia Legal | Legal Amazon Deforestation Monitoring Project |
| PSRM | Plano Setorial para os Recursos do Mar | Sectoral Plan for Sea Resources |
| REDD | Redução das Emissões por Desmatamento e Degradação | Reduction of Emissions caused by Deforestation and Degradation |
| REVIMAR | Avaliação, Monitoramento e Conservação dos Recursos Vivos Marinhos | Evaluation, Monitoring and Conservation of Marine Biodiversity |
| REVIZEE | Programa REVIZEE – Avaliação do potencial sustentável de recursos vivos na Zona Econômica Exclusiva do Brasil | REVIZEE Program – Assessment of the sustainability potential of the living resources in the Brazilian Exclusive Economic Zone |
| RL | Reserva Legal | Legal Reserve |
| SBF/MMA | Secretaria de Biodiversidade e Florestas do MMA | Secretariat of Biodiversity and Forest under the MMA |
| SFB | Serviço Florestal Brasileiro | Brazilian Forest Service |
| SiBBr | Sistema de Informação sobre a Biodiversidade Brasileira | Information System on Brazilian Biodiversity |
| SISBIOTA | Sistema Nacional de Pesquisa em Biodiversidade | National Biodiversity Research System |
| SPU | Secretaria de Propriedade da União | Secretariat of Federal Property |
| TCU | Tribunal de Contas da União | Federal Court of Accounts |
| TEEB | Economia dos Ecossistemas e da Biodiversidade | The Economics of Ecosystem and Biodiversity |
| TIRFAA | Tratado Internacional sobre Recursos Fitogenéticos para a Alimentação e Agricultura. | International Treaty on Plant Genetic Resources for Food and Agriculture |
| UFG | Universidade Federal de Goiás | Federal University of Goiás |
| UNDP | Programa das Nações Unidas para o Desenvolvimento | United Nations Development Programme |
| UNEP | Programa das Nações Unidas para o Meio Ambiente | United Nations Environment Programme |
| UNESCO | Organização das Nações Unidas para a Educação, a Ciência e a Cultura | United Nations Educational, Scientific and Cultural Organization |
| WHO | Organização Mundial de Saúde | World Health Organization |

# BRAZIL
# Fifth National Report to the CBD

## Foreword

It is with great satisfaction that Brazil presents to the Secretariat of the Convention on Biological Diversity its 5th National Report, which fulfills an important national commitment under the Convention. The Report results from broad consultations carried out with the various sectors of Brazilian society with the objective of obtaining contributions for the preparation of this document, which provides an intermediary analysis of developments regarding biodiversity since 2010.

This report indicates that Brazil is taking important steps to promote awareness and internalize the Aichi Biodiversity Targets. The work carried out to complete this document is one of them. The country is also mobilizing significant efforts in the process of reviewing its National Biodiversity Strategy and Action Plans, which should be concluded by June 2015. Another notable step was the approval of the National Biodiversity Targets for 2020 by the National Biodiversity Commission – CONABIO, through its Resolution nº 6, of 03 September 2013. The definition of indicators for assessing the degree of achievement of such national targets is currently in progress, and will be an important improvement for monitoring and adjusting the implementation process.

In the context of its National Strategy, Brazil is currently finalizing a Federal Government Action Plan, in which the main causes related to the loss of biodiversity are identified. This Action Plan will seek to enhance synergies among the ministries and other federal agencies to find adequate solutions to address such causes, in addition to optimize the use of resources, the achievement of targets established in the Federal Multi-Year Plan 2012-2015, the maintenance of social benefits, and the improvement in social understanding concerning ecosystem services provided by biodiversity. The Governmental Action Plan should be launched still in 2014.

Brazil has been enhancing its support for the conservation and sustainable use of its biodiversity with remarkable outcomes such as in deforestation reduction and generation of knowledge on biodiversity. At the same time, our population's living standards are improving significantly through effective efforts to eradicate poverty and hunger. As one of the megadiverse countries, Brazil remains committed to develop and implement policies and solutions to integrate the conservation and sustainable use of biological resources into sustainable development strategies.

Izabella Mônica Vieira Teixeira
Minister of the Environment

# Opening Remarks

The Fifth National Report – Brazil to the Convention on Biological Diversity was prepared according to Article 26 of the Convention and decision X/10 of the Conference of the Parties, and its structure follows the *Guidelines for the Fifth National Report* published by the Convention. The proposed structure, similar to the fourth national report, required gathering and summarizing a vast amount of information, given the size of the country and the mega-biodiversity harbored in Brazil. Although biodiversity-related initiatives are gradually becoming more numerous and relevant information has become more readily available in recent years, still the preparation of the fifth national report represented a challenge in the collection and systematization of varied information from several sectors and agencies.

While the first national report to the CBD provided a detailed description of national biodiversity and of the legal and institutional structure for the environment at the time, the inventory of the main biodiversity initiatives and programs was complemented in the second and third report. The fourth national report introduced a more analytical format, presenting an assessment of the status and trends of biodiversity and ecosystems, as well as of the effectiveness of the national biodiversity strategy and degree of achievement of national and global biodiversity targets, among other related aspects. This fifth national report updates information presented on the fourth report and describes the new national biodiversity targets, as well as a variety of new initiatives and programs developed and under implementation since the previous report, to assist in the national implementation of the CBD.

Preparation of the fifth national report required the collaborative work of a team of consultants and technical staff from the Ministry of the Environment to collect the necessary information from official sources, and interview other relevant agencies and stakeholders from various sectors. The information thus obtained was analyzed and summarized in this report to answer the questions proposed by CBD.

As in the fourth national report, this fifth report presents in its Part I an extensive assessment of the status of Brazilian biodiversity and ecosystems. The assessment was based on the most recent mapping exercises to monitor vegetation cover, results of studies and prioritization initiatives for the conservation of biodiversity, new policies and instruments for CBD implementation, biodiversity valuation initiatives, and threat assessments, among other themes.

Part II provides a summarized historical account of the process to prepare and update the national biodiversity strategy and action plan, introduces the new national 2020 biodiversity targets, which are very similar to the global Aichi targets, and summarizes the Action Plan for Biodiversity Conservation and Sustainable Use. An analysis is also presented on the status of the integration of biodiversity issues into other sectors.

Part III presents an analysis of achievement of the national and global biodiversity targets, and of the relevant Millennium Development Goals, as well as lessons learned from the national implementation of the CBD. Annexes and appendices to this report present the policy instrument that established the new national biodiversity targets and a description of the process to prepare this fifth national report.

The Fifth National Report to the CBD was discussed by the National Biodiversity Commission – CONABIO in its 57$^{th}$ ordinary meeting, held in Brasília on 17 and 18 September 2014, and approved in its 17$^{th}$ extraordinary meeting, held in Brasília on 29 September 2014.

Roberto Brandão Cavalcanti
Secretary of Biodiversity and Forests

# EXECUTIVE SUMMARY

In 2010, Brazil had the honor of hosting the Rio+20 Conference, which recognized poverty eradication as the greatest challenge to be faced, and achieved consensus on the need to transition to sustainable patterns of production and consumption. The event contributed to creating awareness on the importance of conservation and sustainable use initiatives, as well as to increase knowledge on biodiversity (approximately 30,000 people gathered daily for the Peoples Summit), and was notable for the engagement of other sectors in the biodiversity theme, particularly the private sector. Seven thousand large multi-national companies, including 226 Brazilian companies, committed to promote environmentally sustainable measures in their production processes. Rio+20's outcome provided for the agreement by member States to launch the development of a set of Sustainable Development Goals (SDGs), which should include goals, objectives and indicators specifically related to biodiversity. During the event, a proposal was also launched for a new indicator on Inclusive Richness Index to be applied at the country level, which takes the natural, human, and manufactured capital of 20 States into account. During the Conference, Brazil provided information regarding the updating of the National Biodiversity Strategy and Action Plan, including the results of the broad multi-sectoral consultation process carried out in 2011, known as the Dialogues on Biodiversity. Another significant achievement of Rio+20 was the presence of over 100 Heads of State who came together to discuss socio-environmental issues, producing the final document "The Future We Want", which re-stated the intrinsic value of biological diversity, as well as the need to integrate the economic, social and environmental well-being.

Continuing its efforts to fulfill the national commitments under the Convention on Biological Diversity (CBD), Brazil updated in 2013 its National Biodiversity Targets, following the multi-sector consultation process 'Dialogues on Biodiversity'. The necessary structures to promote and monitor the implementation of the National Targets are under construction, including a multi-sector panel – PainelBio, an updated National Biodiversity Strategy and Action Plan, and the definition of a relevant and manageable set of indicators to measure target achievement. Although the specific indicators are still being developed, a preliminary assessment of progress obtained to-date toward the National Biodiversity Targets was carried out and presented in this Report.

With approximately 6 years remaining to 2020, Brazil has in general achieved progress toward its National Biodiversity Targets. According to a preliminary analysis, it is possible to infer that national progress have been more expressive towards five National Targets (5, 7, 11, 15 and 19), particularly when evaluated separately for the Amazon biome.

Public awareness of the natural environment and biodiversity, as well as their importance to human lives and activities has increased in Brazil along the last 20 years and, since 2010, the country has intensified its efforts to generate and disseminate knowledge on biodiversity and biodiversity value through multi-sectoral partnerships. Such efforts include the creation and implementation of policies and programs that incorporate social and biodiversity values, in addition to the development and launching of various important initiatives and policies at different governmental levels and by the private sector geared toward sustainable production and consumption (Targets 1, 2 and 4). The systematic monitoring of natural habitats in all biomes has become current

practice in recent years with the progressive improvement of monitoring systems, and national data on habitat loss is currently being revised with the application of the most recent technological advancements (Target 5). Monitoring results indicate that a reduction in the rate of loss of native habitats is occurring, particularly in the Amazon biome, although reaching zero loss, as required by the target, is still a challenge. Improved habitat monitoring systems will also allow to better assess progress towards the protection of important ecosystems and habitats (Target 11) and, following the remarkable results of Phases 1 and 2 of the Amazon Protected Areas Program (ARPA), Brazil launched in May 2014 the Program's Phase 3, named *ARPA for Life* given its focus on the long-term financial sustainability of the Amazon protected area system. In parallel, *ex situ* conservation efforts are advancing to protect an array of socially, culturally and economically significant species from the vast national biodiversity (Target 13).

Regarding the incorporation of sustainable management practices, notable progress has been observed in the silviculture sector. Brazil is also seeking the ways and means for the sustainability of agricultural production, particularly targeting the family and community-based production of small scale agriculture, extractive activities, and organic/agroecological production through a number of policies and initiatives. In face of the sizeable agricultural sector in the country, current advances must still gain in scope and in the rate of adoption of sustainable practices (Target 7). Additionally, Brazil has revised one of its most important environmental policies, the former Forest Code, now replaced by Law n$^{o}$ 12.651/2012, named Law on Protection of Native Vegetation. This new Law sets the stage for effectively implementing the restoration of natural habitats and the necessary instruments are being developed to enable local and landscape-scale vegetation restoration, which should significantly contribute to the protection of important ecosystem services (Target 14). The participatory updating of the National Biodiversity Strategy should be completed by 2015 (Target 17), and significant advances have been obtained toward the provision of support for the sustainable development of indigenous peoples and traditional communities, and their enhanced participation in decision making (Target 18). Finally, an extraordinary step forward was obtained regarding the generation and systematization of scientific information on Brazilian biodiversity (Target 19), including through the comprehensive assessment of the conservation status of all known plants, vertebrate species and selected invertebrate species, the ongoing revision of threatened species lists, and the preparation of Conservation Action Plans for threatened species (Target 12). Another relevant step contributing to Target 12 was the institution, in February 2014, of the National Program for the Conservation of Threatened Species – the Pro-Species Program, which officially adopts the IUCN different threat categories for threatened species, in addition to other structuring instruments to enhance species conservation work. Continuing and increasing current efforts will be necessary to achieve significant reduction of the risk of extinction for Brazilian threatened species.

Moderate advances were obtained regarding other targets, such as toward reducing perverse incentives and developing positive incentives for the conservation and sustainable use of biodiversity (Target 3), and reducing and monitoring pollution (Target 8). Although Brazil advanced in the identification of invasive species and the pathways they use, stronger efforts are necessary to complete the necessary legal and policy framework and effectively address impacts from invasive species (Target 9). Some progress was also achieved in the reduction of direct pressure on biodiversity and habitats, particularly in the Amazon, although additional efforts will be required to

achieve effective protection of the integrity and function of coral reefs, mangroves and other coastal and marine ecosystems, as well as for enhancing the resilience of ecosystems and the contribution of biodiversity to carbon stocks (Targets 10 and 15).

Steps were taken to design a national strategy for the mobilization of resources and for meeting capacity needs for the implementation of the National Biodiversity Strategy (Target 20) and, a request for the ratification of the Nagoya Protocol and an improved Bill on access and benefit-sharing were submitted to National Congress for analysis and approval (Target 16). Significant challenges still remain in order to achieve the sustainable use of living water resources, including the generation of crucial information on existing stocks and the development of adequate monitoring systems (Target 6). To meet the challenge of CBD's objectives, Brazil aims to continue to invest in the generation of knowledge and capacity, the continuous improvement of environmental monitoring and enforcing capabilities, and in mainstreaming biodiversity concerns into sectoral policies and programs, in addition to gaining scale in the other numerous initiatives that are already being implemented to allow Brazil to achieve its 2020 National Biodiversity Targets.

# Part I – An update on biodiversity status, trends, and threats and implications for human well-being

## 1.1 Introduction

Brazil's natural assets and ecosystem services are crucially important to the resilience of nationally significant economic sectors such as agriculture, energy, fisheries and forestry. As knowledge on the country's high biodiversity increases, including through the study of traditional uses of biodiversity, so does the array of options of food species, wild relatives of cultivated species, and new sources of fibers, drugs, essential oils and a variety of other products.

Advances in pollinator research are also uncovering the importance of native pollinator species to agricultural production, such as tomato and cotton production, as well as various native and non-native fruits (see section 1.2.1.2). Furthermore, soil research has been demonstrating the importance of soil biodiversity to sustain fertility and productivity, and the positive influence on soil biodiversity exerted by environmentally-friendly production practices and by the presence and size of native vegetation patches maintained in the agricultural property. Recent changes in climate patterns, combined with unchecked urban growth, are also increasing the importance of ecosystem-based adaptation measures such as maintaining vegetation cover and ecosystem balance in order to reduce the effects of drought and floods, which are also starting to be felt more clearly in the energy (hydropower) and water supply sectors.

The share of continental fisheries represented by production from aquaculture of native fish species is gradually increasing, representing 45.8% of total continental aquaculture production in 2011 with 249,310 tons (see section 1.2.1.4), and the profile of products from socio-biodiversity is also becoming more apparent, supported by national policies and market demands.

It is also worth mentioning that the country's potential for ecotourism is immense, both along its extensive and inviting coastline and throughout the various types of forests, savannas, grasslands and floodplains, and the sector's viability requires environmental conservation. Despite the enormous contribution of biodiversity and ecosystem balance to the country's socio-economic development and human well-being, the conscience of this dependence is still not ingrained enough in the specific culture of the various economic sectors to raise the importance of biodiversity conservation to its due degree in sectoral programs and policies.

Contributing to change this scenario, the Ministry of the Environment has formed various alliances with other agencies and is leading a number of efforts to generate and disseminate knowledge on biodiversity and biodiversity value, such as with the Brazil Natural Capital Initiative. Similar initiatives are also being developed by the private sector and research agencies, as discussed in section 1.2.1.2. Progress has also been obtained regarding more practical initiatives to advance biodiversity conservation and knowledge, such as through ICMBio's Action Plans for the conservation of endangered species or groups of species.

Nevertheless, public opinion poll results indicate that public awareness of the natural environment and biodiversity, as well as their importance to human lives and activities has increased in Brazil along the last 20 years. Since 1992, five polls (1992, 1997, 2001,

2006 and 2012) were commissioned by the Ministry of the Environment[1] to measure awareness of Brazilians on environmental issues, sustainable consumption and biodiversity. Each poll interviewed 2,200 adults in urban and rural areas and revealed that, along two decades, the two extremes of the age scale – those between 16 and 24 years old and those at 51 or older – are the groups that know less about environmental issues, although awareness has increased. Twenty years ago, almost 40% of participants between 16 and 24 did not have an opinion about the environment, as well as over 60% of Brazilians 51 or older, while the percentages fell, respectively, to 6% and 16.5% in 2012. The most recent poll (2012) indicates that 50% of Brazilians are aware of biodiversity loss in comparison to 43% in 2006. The capacity to recognize elements of biodiversity has also increased with a positive modification to a more sophisticated concept of what comprises the environment and biodiversity: in 2006, only 36% of participants believed that human beings were part of biodiversity, while this percentage rose to 67% in 2012. The 2012 poll also indicated that the environment holds the 6$^{th}$ place in the list of main concerns of the Brazilian population, after health, violence, unemployment, education, and politicians, in comparison to the 12$^{th}$ place in 2006 and no mention in 1992.

The main environmental problem mentioned by poll participants since the first edition of the poll is deforestation (first concern of 67% of participants in 2012). Other main environmental concerns are: water pollution (47%); air pollution (36%); increase of solid waste generation (28%); wasteful consumption of water (10%); ozone layer (9%); and climate change (6%); among other aspects with fewer mentions. The increase of awareness and knowledge on biodiversity and related themes does not depend solely on government action, and the series of polls reveal a substantial role and potential for schools in building this awareness for current and future generations, as well as the decisive role of communications channels represented by TV, internet and social networks. The influence and contribution of businesses and environmental NGOs also continue to be of high importance.[2]

The sections below provide an overall scenario of current status of biodiversity conservation and knowledge, as well as the actions being carried out for conservation at the species, ecosystem and landscape levels. Parts II and III of this report focus on overarching policies for biodiversity conservation at the national level and provide an assessment of the degree of achievement of both national and international biodiversity targets.

[1] Brasil. 2012. O que o brasileiro pensa do meio ambiente e do consumo sustentável: Pesquisa nacional de opinião: principais resultados. Ministério do Meio Ambiente. Secretaria de Articulação Institucional e Cidadania Ambiental. www.conferenciameioambiente.gov.br/wp-content/uploads/2013/02/o-que-o-brasileiro-pensa-do-meio-ambiente-e-do-consumo-sustentavel.pdf

[2] Weigand Jr., R. et al, 2011. Metas de Aichi : situação atual. UICN, WWF-Brasil and IPE; and http://www.brasil.gov.br/meio-ambiente/2012/08/pesquisa-revela-o-que-o-brasileiro-pensa-do-meio-ambiente-e-do-consumo-sustentavel

## 1.2 Update of biodiversity status and trends

### 1.2.1 Ecosystems and habitats

#### 1.2.1.1 Vegetation cover

Amazon

Forest[3] cover in the Legal Amazon[4] region has been monitored annually since 1988 by the National Institute for Space Research (INPE – *Instituto Nacional de Pesquisas Espaciais*). This monitoring system was improved in 2002 with the development and adoption of digital classification of satellite images (the Prodes[5] methodology). By 2009, Prodes recorded an accumulated deforestation of 18.2% of the Legal Amazon and the remaining forest cover was 78.8% (Figure 1). The historical series of measurements[6] indicates that deforestation has been steadily reducing and is now significantly lower than the 2004 peak (27,772 km$^2$), at 5,843 km$^2$ deforested during 2013. This number, however, indicates an increase from 2012 (see section 1.3).

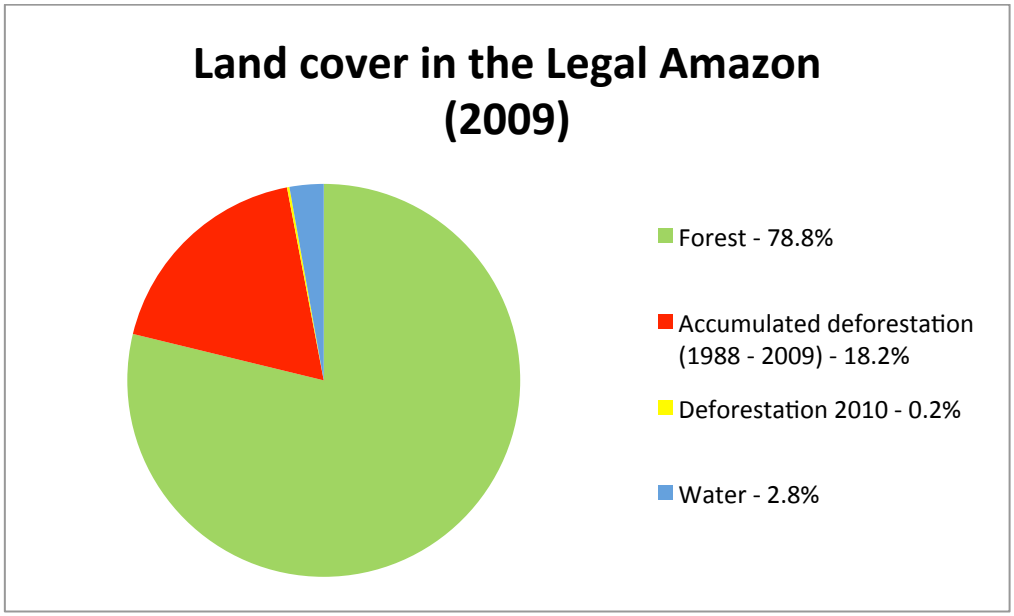



**Figure 1:** Land cover in the Legal Amazon Region based on accumulated (1988-2009) deforestation data.
**Source:** Modified from TerraClass 2010 http://www.inpe.br/cra/projetos_pesquisas/sumario_terraclass_2010.pdf.

Although monitoring precision to detect deforestation events in the Amazon increased with Prodes, this system does not re-evaluates areas that have already been marked as deforested, thus failing to point out eventual natural or induced regeneration of

[3] The Prodes program monitors deforestation in forest systems only, excluding the open fields and savannah-like enclaves (cerrado, campinarana, lavrado) that exist in the Amazon biome. These important ecosystems, which house higher biodiversity than the Cerrado and are better suited for agriculture, are currently not monitored by any system.

[4] "Legal Amazon" is a Brazilian political subdivision corresponding to an area larger than the Amazon biome in the Brazilian territory, and which includes the entire states of Amazonas, Pará, Acre, Roraima, Rondônia, Amapá, Tocantins, Mato Grosso, and part of Maranhão, totaling approximately 5.1 million km$^2$. The Legal Amazon encompasses Amazon forest and transitional vegetation, while the Amazon biome within Brazil corresponds to approximately 4.1 million km$^2$ covered exclusively with Amazon forest.

[5] PRODES – Legal Amazon Deforestation Monitoring Project (*Projeto de Monitoramento do Desflorestamento da Amazônia Legal*).

[6] http://www.obt.inpe.br/prodes/index.php

previously deforested areas or other land use changes. To address this information gap, at the request of the Ministry of Agriculture Livestock and Food Supply (MAPA – *Ministério da Agricultura, Pecuária e Abastecimento*) a first study[7] was published in 2013 by INPE and the Brazilian Company for Agricultural Research (Embrapa – *Empresa Brasileira de Pesquisa Agropecuária*) based in accumulated deforestation data (1988 – 2008), identifying and classifying land use in previously deforested areas in the Legal Amazon. Findings of this study (TerraClass 2008) classified and mapped land use according to 12 classes: open pasture, secondary vegetation, pasture with scrub, regeneration combined with pasture, annual agriculture, occupation mosaic, urban areas, mining, pasture with exposed soil, deforestation events in 2008[8], other uses, and areas that were not observed due to cloud cover. Embrapa and INPE repeated this study in 2010 (TerraClass 2010)[9], based on deforestation data up to 2009, and in 2012 (results still not available), initiating an unprecedented effort for the dynamic monitoring of land use change and cover in deforested areas in the Legal Amazon Region. As carbon emissions vary among different land uses, this study represents an interesting contribution for estimating GHG emissions from deforestation in the Amazon, as well as for identifying trends in regional land use change to inform public policies.

As shown in Table 1 below, both in 2008 and 2009 the predominant land use in previously deforested areas in the Legal Amazon was pasture, combining the categories of open pasture (top use), pasture with scrub, regeneration combined with pasture, and pasture with exposed soil. Together, pasture categories occupied in 2009 approximately 460,000 km$^2$ (66%, up from 63% in 2008) of the total deforested areas. Interesting to note, the second most frequent class was secondary vegetation (21.26% in 2008 and 22.27% in 2009), covering in 2009 an area of 165,229 km$^2$, which is slightly larger than the sum of all deforestation occurrences from 2002 to 2013 (163,977 km$^2$). While this may represent an important gain in forest recovery or forest cover, studies would be necessary to estimate the rate of biodiversity re-composition and loss, as well as the functional and structural resilience of these secondary forests. It is also relevant to note that the "secondary vegetation" class in the TerraClass study corresponded to areas which, after complete vegetation suppression, presented an advanced stage of arboreal regeneration; but this class also included areas which, after complete suppression of native vegetation by 2008/2009, were being used for silviculture or permanent forest plantations with native or non-native species.

**Table 1:** Distribution of land use classes among previously deforested areas in the Legal Amazon by 2008 and 2010.

| Mapped land use classes | Total area (km$^2$) 2008 | Total area (km$^2$) 2010 | 2008 (%) | 2010 (%) |
|---|---|---|---|---|
| Open pasture | 335,714.94 | 339,851.87 | 47.32% | 45.82% |
| Secondary vegetation | 150,815.31 | 165,229.31 | 21.26% | 22.27% |
| Pasture with scrub | 62,823.75 | 56,076.64 | 8.85% | 7.56% |
| Regeneration combined w/ pasture | 48,027.37 | 63,165.46 | 6.77% | 8.52% |
| Areas that were not observed | 45,406.27 | 45,849.48 | 6.40% | 6.18% |
| Annual agriculture | 34,927.24 | 39,977.85 | 4.92% | 5.39% |
| Occupation mosaic | 24,416.57 | 17,962.95 | 3.44% | 2.42% |

[7] Coutinho, A.C. *et al*., 2013. Uso e cobertura da terra nas áreas desflorestadas da Amazônia Legal – TerraClass 2008. Brasília, DF: Embrapa e Belém, AM: INPE. 108p.

[8] When the TerraClass assessment was repeated with 2009 data, this class was replaced by "reforestation".

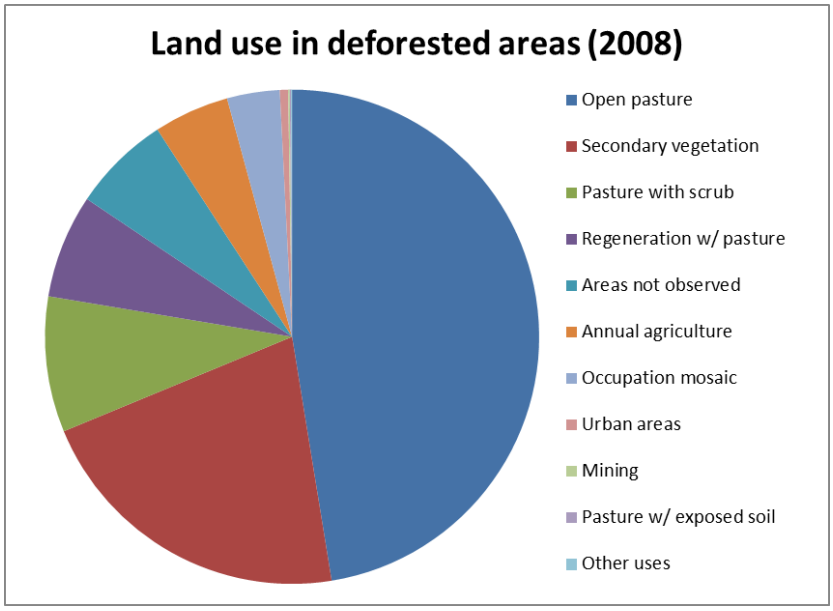
[9] http://www.inpe.br/cra/projetos_pesquisas/sumario_terraclass_2010.pdf

| | | | | |
|---|---|---|---|---|
| Urban areas | 3,818.14 | 4,473.56 | 0.54% | 0.60% |
| Reforestation | 0* | 3,014.79 | 0* | 0.41% |
| Mining | 730.68 | 966.82 | 0.10% | 0.13% |
| Pasture with exposed soil | 594.19 | 373.16 | 0.08% | 0.05% |
| Other uses | 477.88 | 2,730.64 | 0.07% | 0.37% |
| **TOTAL** | **707,752.36** | **739,672.54** | | |

* This class was not measured in 2008.

**Source:** Modified from the on-line publication *Sumário TerraClass 2010* (TerraClass 2010 Summary) available at: http://www.inpe.br/cra/projetos_pesquisas/sumario_terraclass_2010.pdf.

Even though the TerraClass data series is still in its early stages (two iterations, with the results of the third to be made available in 2014), the repetition of this assessment allows the initial identification of trends for the dynamics of land use change in deforested areas in the Amazon. Data indicates an increase both in areas with secondary vegetation (22%, up from 21%) and areas occupied with agriculture (5.4%, up from 4.9%). While this increase occurred over pasture, in turn pasture advanced over areas that were deforested in 2008 and 2009 and over occupation mosaics. The evolution in land use change uncovered by TerraClass is shown graphically in Figure 2 below.



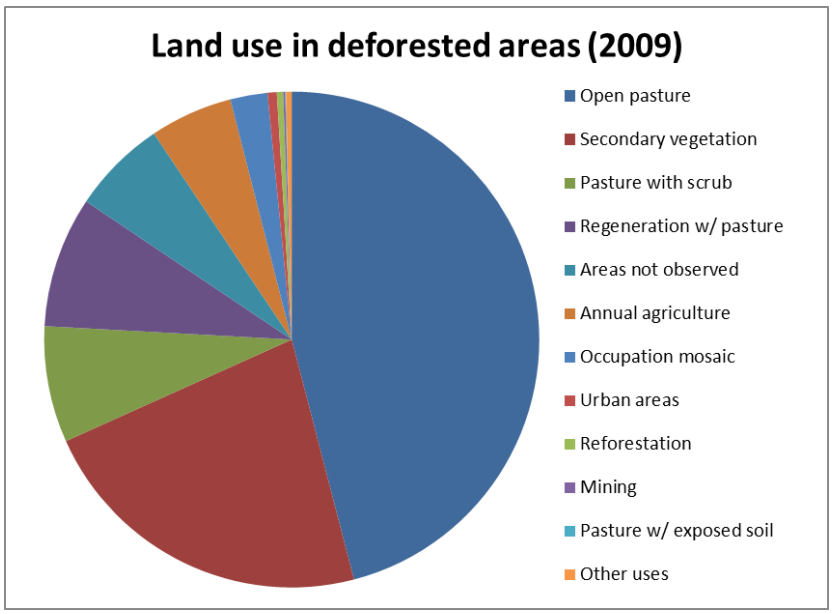



**Figure 2:** Land use change (2008-2009) in previously deforested areas of the Legal Amazon region.
**Source:** Modified from http://www.inpe.br/cra/projetos_pesquisas/sumario_terraclass_2010.pdf.

Other biomes[10]

A baseline land use mapping exercise similar to the Amazon TerraClass is being prepared for the Cerrado by a partnership between the Ministry of the Environment – MMA, Embrapa, the Brazilian Institute for the Environment and Renewable Natural Resources – IBAMA, the Federal University of Goiás – UFG, and the National Space Research Institute – INPE, based in Landsat-8 satellite images from 2013. Results should be available by the end of 2014. As deforestation rates in the Cerrado and the Amazon contribute significantly to greenhouse gas emission rates in Brazil, these periodic assessments should contribute to monitor national emission reduction targets (see section 1.4).

To complement the successful initiative that has been monitoring the Amazon forest cover annually since 1988, IBAMA maintains since 2008 the Program on Satellite Monitoring of Deforestation in Brazilian Biomes – PMDBBS[11] for the other five terrestrial biomes (Atlantic Forest, Cerrado, Pantanal, Pampas, and Caatinga). However, the Prodes system used for deforestation monitoring in the Amazon is more precise than the system being used by PMDBBS. INPE and IBAMA are currently collaborating to develop a land use and vegetation cover monitoring system to cover all Brazilian biomes, generate compatible data for the entire national territory, and generate continuous data series on deforestation, vegetation cover and land use for all biomes. Previous data on all biomes is currently being revised, with part of the revised data already available (Table 2).

**Table 2:** Status of the process of revision of existing vegetation cover data per year for each biome.

| Biome | 2002 | 2008 | 2009 | 2010 | 2011 | 2013 |
|---|---|---|---|---|---|---|
| **Cerrado** | Available | Available | Available | Available | Under preparation | Under preparation |
| **Pantanal** | Available | Available | Available | Under preparation | Under preparation | To be initiated in 2015 |
| **Pampas** | Available | Available | Available | Under preparation | Under preparation | To be initiated in 2015 |
| **Atlantic Forest** | Available | Available | Available | Under preparation | To be initiated in 2015 | To be initiated in 2015 |
| **Caatinga** | Available | Available | Available | Under preparation | Under preparation | To be initiated in 2015 |

**Source:** Prepared by SBF/MMA in September 2014 based on information provided by CSR/IBAMA.

As the most recent year for which revised data on vegetation cover data exists for all biomes is 2009, Table 3 below presents data up to that year.

[10] In Brazil, the word *biome* is often used as a synonym to *morphoclimatic* and *phyto-geographical domain*. As the latter two terms refer to geographical regions that can contain a variety of ecosystems and biomes, according to Coutinho (Coutinho, L.M., 2006. O conceito de bioma. Acta Bot. Bras. 20(1):1-11) they would be the most appropriate terms to designate the regions referred to as biomes: the Amazon, Atlantic Forest, Caatinga, Cerrado, Pampas and Pantanal. Nevertheless, as the word *biome* is commonly and as a misconception used in official documents in Brazil, and answering to a request from CONABIO, this term was maintained in this report.

[11] PMDBBS – *Programa de Monitoramento do Desmatamento dos Biomas Brasileiros por Satélite*. http://siscom.ibama.gov.br/monitorabiomas/

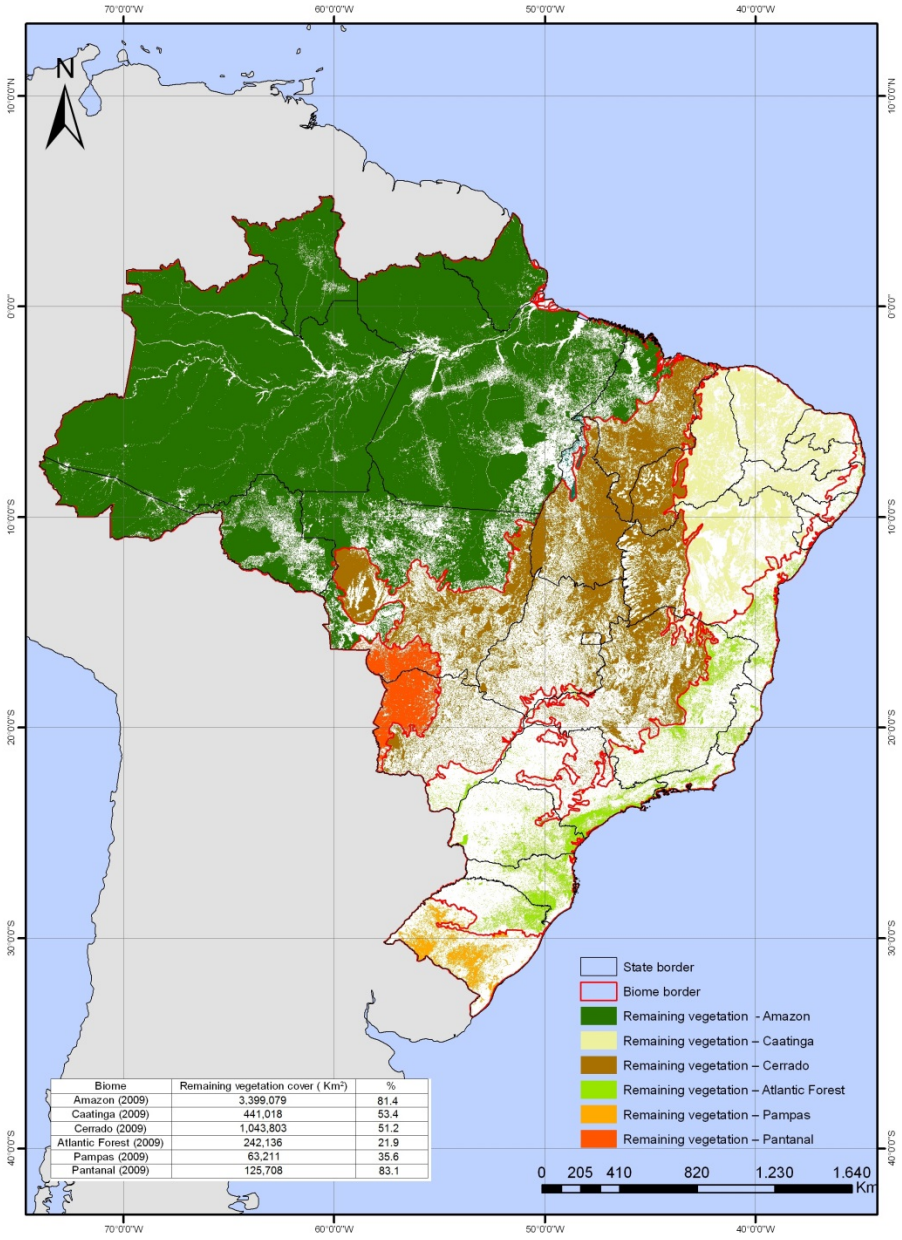
**Table 3:** Remaining natural vegetation cover in Brazilian biomes according to revised data.

| **Amazon (total area = 4,175,857 km²)** | | | | |
|---|---|---|---|---|
| **Class** | **≤ 2002 (km²)** | **2002-2008 (km²)** | **2009 (km²)** | **% of biome** |
| Deforested area | 530,011 | 132,719 | 11,813 | |
| Remaining vegetation | 3,543,611 | 3,410,892 | 3,399,079 | 81.4% |
| Water | 102,234 | 102,234 | 102,234 | |
| **Caatinga (total area = 826,411 km²)** | | | | |
| **Class** | **≤ 2002 (km²)** | **2002-2008 (km²)** | **2008-2009 (km²)** | **% of biome** |
| Deforested area | 358,540 | 16,576 | 1,921 | |
| Remaining vegetation | 459,870 | 442,939 | 441,018 | 53.4% |
| Water | 8,001 | 8,356 | 8,356 | |
| **Cerrado (total area = 2,039,386 km²)** | | | | |
| **Class** | **≤ 2002 (km²)** | **2002-2008 (km²)** | **2008-2009 (km²)** | **% of biome** |
| Deforested area | 890,636 | 85,074 | 7,637 | |
| Remaining vegetation | 1,136,514 | 1,051,440 | 1,043,803 | 51.2% |
| Water | 12,236 | 12,236 | 12,236 | |
| **Atlantic Forest (total area = 1,103,961 km²)** | | | | |
| **Class** | **≤ 2002 (km²)** | **2002-2008 (km²)** | **2009 (km²)** | **% of biome** |
| Deforested area | 834,876 | 2,742 | 248 | |
| Remaining vegetation | 248,406 | 245,664 | 242,136 | 21.9% |
| Water | 20,679 | 20,679 | 23,959 | |
| **Pampas (total area = 177,767 km²)** | | | | |
| **Class** | **≤ 2002 (km²)** | **2002-2008 (km²)** | **2009 (km²)** | **% of biome** |
| Deforested area | 94,277 | 2,179 | 331 | |
| Remaining vegetation | 65,721 | 63,542 | 63,211 | 35.6% |
| Water | 17,769 | 17,769 | 17,769 | |
| **Pantanal (total area = 151,313 km²)** | | | | |
| **Class** | **≤ 2002 (km²)** | **2002-2008 (km²)** | **2009 (km²)** | **% of biome** |
| Deforested area | 18,691 | 4,279 | 188 | |
| Remaining vegetation | 130,212 | 125,896 | 125,708 | 83.1% |
| Water | 2,409 | 2,445 | 2,445 | |

**Source:** Revised data provided by IBAMA/PMDBBS in June 2014.

The map below (Figure 3) combines the most recent (2009) revised data available through PMDBBS on remaining natural vegetation cover for all biomes. The 2009-2010 vegetation cover data for the Cerrado biome is already available, indicating that 6,469 km² were deforested in the period, leaving 50.84% of remaining Cerrado vegetation[12].

[12] IBAMA, 2010. Relatório do Projeto de Monitoramento do Desmatamento nos Biomas Brasileiros por Satélite: Monitoramento do Bioma Cerrado 2009-2010. Available at: siscom.ibama.gov.br/monitorabiomas/cerrado/RELATORIO%20FINAL_CERRADO_2010.pdf




| Biome | Remaining vegetation cover ( Km²) | % |
|---|---|---|
| Amazon (2009) | 3,399,079 | 81.4 |
| Caatinga (2009) | 441,018 | 53.4 |
| Cerrado (2009) | 1,043,803 | 51.2 |
| Atlantic Forest (2009) | 242,136 | 21.9 |
| Pampas (2009) | 63,211 | 35.6 |
| Pantanal (2009) | 125,708 | 83.1 |

**Figure 3:** Map of estimated remaining vegetation cover in Brazilian biomes.
**Source:** Prepared by IBAMA – PMDBBS in April 2014.

Currently, the remaining vegetation cover is not directly monitored/interpreted, but rather statistically calculated from measured deforestation, which is monitored separately for each biome. As the precision of monitoring systems evolves with new technology, imprecisions of earlier mapping exercises are uncovered, particularly those that applied less detailed scales. Efforts are being carried out to resolve border mismatches between biomes and biome-state-municipal limits, as well as rough versus detailed interpretation of satellite images. Additionally, IBAMA revised the 2002-2008 combined deforestation data for all extra-Amazonian biomes, as well as annual deforestation data for 2009. The 2010, 2011, 2012 and 2013 data are currently being revised for all extra-Amazonian biomes and complete results should be available by 2015.

Among future next steps to improve the precision of vegetation monitoring is the resolution of compound classes such as anthropic areas, which contain patches of remaining native vegetation interposed with other land uses such as agriculture or urban areas. The single remaining key ecosystem still not under regular remote sensing monitoring is comprised by the savannas of the Amazon biome, which cover an area of approximately 150,000 $km^2$, roughly equivalent to the territory of Uruguay.

The work carried out by PMDBBS includes an effort to establish a vegetation monitoring system that not only covers the entire national territory, but also that generates data that is comparable among all biomes. In Brazil, there are currently separate monitoring systems that were established at different times and use different, and constantly evolving, methodologies and criteria to process satellite images and calculate vegetation cover and deforestation, and sometimes use data from different satellites: for the Amazon region, there are the PRODES and DETER systems under INPE, as well as the SAD system under Imazon; for the Atlantic forest, there are the PMDBBS and the SOS Mata Atlântica systems; and for the other biomes there is the PMDBBS system. Data is often not comparable among these systems due to the different methodological approaches adopted, and data series vary in length for the different biomes, with some having just recently been initiated.

*Mangroves*[13]: According to a mapping exercise carried out in 2009 by MMA, the Chico Mendes Institute for Biodiversity Conservation – ICMBio, and IBAMA, and revised in 2014, mangroves in Brazil cover approximately 1,382,815 hectares along almost the entire Brazilian coast, from the Oiapoque River to the north up to the border of the Laguna/Jaguaruna municipalities in the southern state of Santa Catarina, corresponding to 9% of all mangroves in the world. Together, the states of Maranhão and Pará house the largest contiguous extension of mangroves in the world, or 57% of the total national mangrove area. Close to 80% of the 7,367 km of Brazilian coast line contain mangroves, which face, however, various threats related to human activity, urban expansion and climate change (see section 1.3).

Biodiversity Conservation Index

A recent paper[14] by the National Institute of Applied Economics Studies – IPEA (*Instituto de Pesquisa Econômica Aplicada*) assesses the status of biodiversity conservation in Brazil with a regional and state-level approach. While most public policies adopt the regional or state level as planning or implementation unit, the federal environmental policies usually adopt the Brazilian biomes as planning units, and based on study results, the IPEA paper proposes improvements in the national strategy for biodiversity conservation. The paper introduces the Biodiversity Conservation Index – ICB (*Índice de Conservação da Biodiversidade*), which is calculated based on the following variables: number of threatened species, area covered by protected areas under SNUC and indigenous lands, remaining vegetation cover, and number of *ex situ* biodiversity conservation sites. The ICB varies from 0 to 1, with lower values indicating poor status of state biodiversity conservation.

[13] MMA, ICMBio, and IBAMA, 2014. Draft National Work Plan Proposal for the implementation of the REVIMAR. Internal Report, 24p.

[14] Viana, J.P.; Silva, A.P.M.; Roma, J.C.; Saccaro Jr., N.L.; Silva, L.R.; Sano, E.E. & Freitas, D.M. 2013. Avaliação do estado de conservação da biodiversidade brasileira: desigualdades entre regiões e unidades da federação. In: Rogério Boueri, Marco Aurélio Costa.(eds.). Brasil em desenvolvimento 2013: estado, planejamento e políticas públicas / Instituto de Pesquisa Econômica Aplicada. Brasília: Ipea, 2013. 3 v. 757-791p.

Results of the ICB highlight the contrasts that exist among the Brazilian regions and states regarding the status of biodiversity conservation (Figure 4). The opposing extremes are occupied by the North region (states with higher ICB values) and the Southeast region (states with lower ICB values). The state with the higher conservation status was Amapá (ICB = 0.831), while the lowest ranking state was Espírito Santo (ICB = 0.291), presenting a combination of high level of threatened animal and plant species, few *ex situ* conservation sites, and low area coverage of protected areas and remaining vegetation cover (Table 4). Overall, biodiversity conservation status tends to be lower in the Southeast and South regions, intermediate in the Northeast and Central-West regions, and higher in the North region.

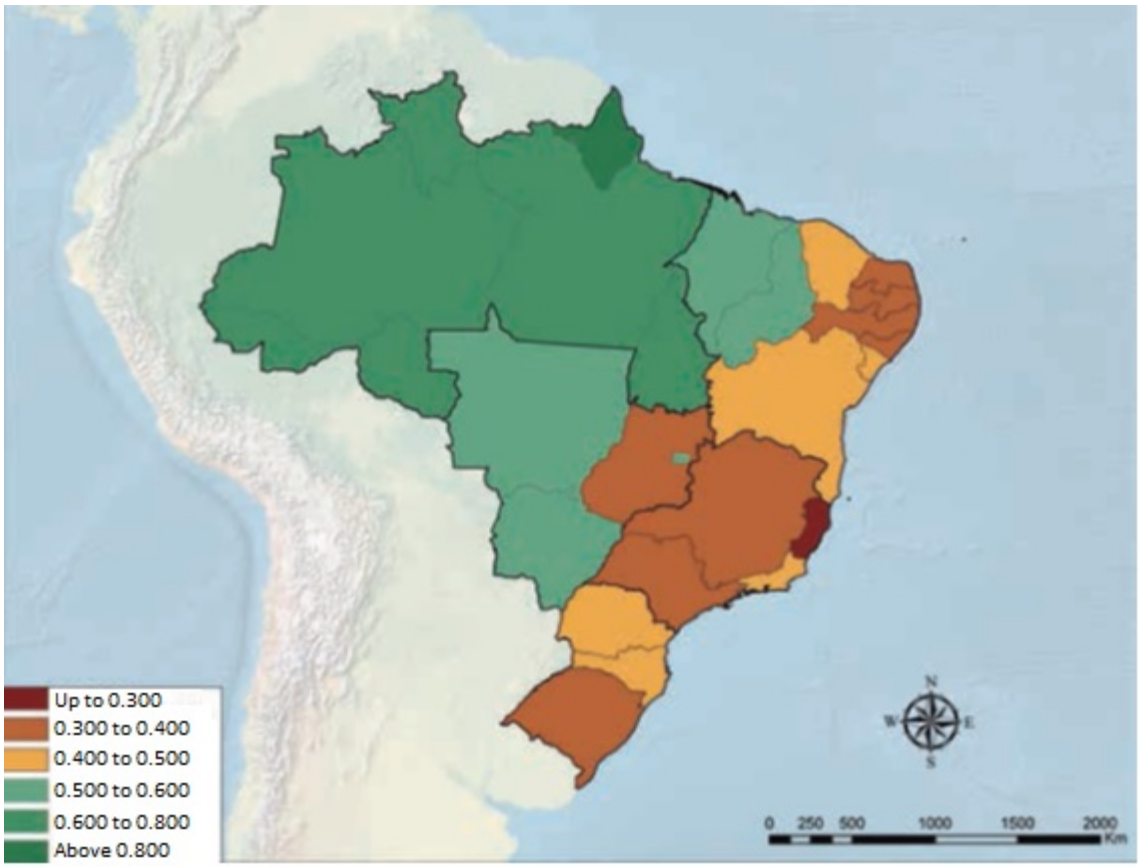



**Figure 4:** Biodiversity Conservation Index (ICB) values for Brazilian states.
**Source:** Viana, J.P. *et al*., 2013. Avaliação do estado de conservação da biodiversidade brasileira: desigualdades entre regiões e unidades da federação. In: Rogério Boueri, Marco Aurélio Costa. (eds.). Brasil em desenvolvimento 2013: estado, planejamento e políticas públicas / Instituto de Pesquisa Econômica Aplicada. Brasília: Ipea, 2013. 3 v. 757-791p.

In addition to the differences among states in area covered by protected areas, regional and state differences also exist regarding the land occupation pattern and processes, and the degree of economic development, which also influence the patterns of biodiversity conservation status revealed by the IPEA paper. All states of the North region present favorable conditions for biodiversity conservation, given the large area covered by protected areas and native vegetation in those states. On the other hand, 12 states (Alagoas, Ceará, Espírito Santo, Goiás, Minas Gerais, Paraíba, Paraná, Pernambuco, Rio Grande do Norte, Rio Grande do Sul, Sergipe, Santa Catarina) have less than 10% of their individual territories under protection, while five other (Bahia, Mato Grosso do Sul, Piauí, Rio de Janeiro, and São Paulo) have between 10% and 20% of their territories in protected areas. Results also demonstrated that the regions and states with fewer hectares of protected areas are also those with the smallest

coverage of remaining native vegetation, leading to less favorable conditions for biodiversity conservation.

The ICB results indicate the need to consider the regional and state levels in the processes for planning, prioritizing and implementing policies and actions for the conservation of Brazilian biodiversity. According to the IPEA study, a different focus according to the existing conditions for biodiversity conservation may be applied for different regions or states, increasing the effectiveness of environmental policies.

**Table 4:** Value and ranking of the assessed variables and resulting Biodiversity Conservation Index for Brazilian states.

| UF | Fauna / Rk | Flora / Rk | Rep / Rk | TI (%) / Rk | UC PI (%) /Rk | UC US (%) /Rk | Rem (%) /Rk | Total Ranking | ICB |
|---|---|---|---|---|---|---|---|---|---|
| AP | 19 / 24 | 3 / 26 | 1 / 7 | 8.3 / 20 | 33.5 / 27 | 29.5 / 26 | 95.8 / 27 | 157.0 | 0.831 |
| AC | 11 / 26 | 4 / 24 | 1 / 7 | 14.8 / 22 | 9.7 / 23 | 22.6 / 25 | 92.7 / 24 | 151.0 | 0.799 |
| AM | 29 / 21 | 8 / 15.5 | 4 / 16 | 27.1 / 26 | 9.5 / 22 | 17.9 / 23 | 95.7 / 26 | 149.5 | 0.791 |
| RR | 10 / 27 | 1 / 27 | 0 / 3 | 46.1 / 27 | 5.2 / 18 | 7.4 / 15 | 95.2 / 25 | 142.0 | 0.751 |
| PA | 54 / 13 | 20 / 10.5 | 5 / 19.5 | 22.7 / 25 | 10.3 / 25 | 22.3 / 24 | 82.8 / 23 | 140.0 | 0.741 |
| RO | 13 / 25 | 5 / 20.5 | 0 / 3 | 21.0 / 24 | 14.1 / 26 | 10.9 / 19 | 72.0 / 20 | 137.5 | 0.728 |
| TO | 31 / 20 | 5 / 20.5 | 0 / 3 | 9.2 / 21 | 5.8 / 20 | 8.4 / 16 | 70.2 / 19 | 119.5 | 0.632 |
| MA | 42 / 15 | 8 / 15.5 | 0 / 3 | 6.6 / 19 | 4.1 / 17 | 14.4 / 22 | 72.2 / 21 | 112.5 | 0.595 |
| DF | 28 / 22 | 7 / 17 | 2 / 11 | 0.0 / 2 | 10.1 / 24 | 89.5 / 27 | 29.3 / 7 | 110.0 | 0.582 |
| MT | 38 / 19 | 6 / 18 | 2 / 11 | 14.8 / 23 | 3.5 / 15 | 2.6 / 6 | 64.0 / 18 | 110.0 | 0.582 |
| PI | 25 / 23 | 4 / 24 | 1 / 7 | 0.0 / 2 | 5.5 / 19 | 6.3 / 10 | 74.5 / 22 | 107.0 | 0.566 |
| MS | 39 / 18 | 5 / 20.5 | 2 / 11 | 2.1 / 18 | 1.1 / 9 | 9.9 / 18 | 38.2 / 12 | 106.5 | 0.563 |
| PR | 103 / 8 | 20 / 10.5 | 14 / 24.5 | 0.5 / 12 | 2.3 / 13 | 7.3 / 14 | 18.3 / 3 | 85.0 | 0.450 |
| SE | 41 / 16 | 4 / 24 | 3 / 14 | 0.2 / 9 | 1.1 / 8 | 5.0 / 9 | 18.6 / 4 | 84.0 | 0.444 |
| CE | 55 / 12 | 10 / 13 | 5 / 19.5 | 0.1 / 5 | 0.5 / 3 | 6.8 / 12 | 59.1 / 17 | 81.5 | 0.431 |
| BA | 162 / 3 | 93 / 3 | 5 / 19.5 | 0.5 / 13 | 1.6 / 10 | 9.5 / 17 | 46.9 / 14 | 79.5 | 0.421 |
| RJ | 187 / 2 | 107 / 2 | 6 / 22 | 0.1 / 4 | 7.7 / 21 | 13.4 / 21 | 24.6 / 6 | 78.0 | 0.413 |
| SC | 105 / 7 | 34 / 6 | 10 / 23 | 0.9 / 15 | 2.7 / 14 | 1.9 / 4 | 34.5 / 9 | 78.0 | 0.413 |
| SP | 213 / 1 | 52 / 5 | 65 / 27 | 0.1 / 6 | 3.8 / 16 | 12.3 / 20 | 16.2 / 2 | 77.0 | 0.407 |
| PE | 99 / 9 | 24 / 9 | 4 / 16 | 1.2 / 17 | 0.8 / 5 | 4.5 / 7 | 39.6 / 13 | 76.0 | 0.402 |
| GO | 52 / 14 | 26 / 8 | 5 / 19.5 | 0.1 / 8 | 0.9 / 7 | 4.5 / 8 | 34.6 / 10 | 74.5 | 0.394 |
| MG | 148 / 4 | 126 / 1 | 17 / 26 | 0.1 / 7 | 1.9 / 11 | 6.8 / 11 | 35.6 / 11 | 71.0 | 0.376 |
| PB | 60 / 11 | 9 / 14 | 2 / 11 | 0.6 / 14 | 0.1 / 2 | 1.4 / 3 | 50.4 / 15 | 70.0 | 0.370 |
| RN | 40 / 17 | 5 / 20.5 | 2 / 11 | 0.0 / 2 | 0.1 / 1 | 1.3 / 2 | 51.6 / 16 | 69.5 | 0.368 |
| RS | 129 / 5 | 30 / 7 | 14 / 24.5 | 0.4 / 10 | 0.9 / 6 | 1.9 / 5 | 31.2 / 8 | 65.5 | 0.347 |
| AL | 83 / 10 | 11 / 12 | 0 / 3 | 1.0 / 16 | 0.7 / 4 | 6.8 / 13 | 14.5 / 1 | 59.0 | 0.312 |
| ES | 122 / 6 | 63 / 4 | 4 / 16 | 0.4 / 11 | 2.3 / 12 | 1.0 / 1 | 19.3 / 5 | 55.0 | 0.291 |

**Key:** UF = State; Rk = Ranking; Rep = Repository; TI = Indigenous Land; UC PI = Full protection protected area; UC US = Sustainable use protected area; Rem = Remaining vegetation; ICB = Biodiversity Conservation Index.

**Source:** Modified from Viana, J.P. *et al*., 2013. Avaliação do estado de conservação da biodiversidade brasileira: desigualdades entre regiões e unidades da federação. In: Rogério Boueri, Marco Aurélio Costa. (eds.). Brasil em desenvolvimento 2013: estado, planejamento e políticas públicas / Instituto de Pesquisa Econômica Aplicada. Brasília: Ipea, 2013. 3 v. 757-791p.

While lower ICB values may indicate the need for more urgent conservation action, the IPEA paper suggests that the reversion of this unfavorable scenery for biodiversity conservation may depend on actions, plans and programs implemented at the state and municipal levels, as these levels are closer to the factors that contribute to such unfavorable conditions.

#### 1.2.1.2 Environmental goods and services

Priority areas for biodiversity conservation

Between 1997 and 2000, the Ministry of the Environment carried out a broad consultation process, described in more detail in the 4th National Report to the CBD, to define the priority areas and actions for the conservation and sustainable use of Brazilian biodiversity. This work comprised five complementary processes, addressing all Brazilian biomes (Amazon, Caatinga, Cerrado and Pantanal, Atlantic Forest and Pampas), and the Coastal and Marine Zone. The first updating process that revised the list of priority areas and actions started in 2006, applying a Systematic Conservation Planning methodology[15]. The resulting updated map of priority areas was published by the Ministry of the Environment through Administrative Ruling nº 9, of 23 January 2007.

The second iteration of the updating process is currently in course, applying the same methodology used in 2006-2007. The present effort is focused on improving the use of these priority areas as working tools by the daily processes of the national conservation agenda and by environmental organizations. Some of the key challenges to be addressed are: continuous updates of the database; applying cutting edge technology to insert a continuous use feature; tools for scenario generation; and friendly graphical user interfaces, among other aspects. The database is also being strengthened with additional data to improve qualification of the selected areas, to provide information on environmental licensing, research, creation and management of protected areas, sustainable use, and restoration of degraded areas. The second updating process was already concluded for the Cerrado and Pantanal biomes, is currently ongoing (partially completed) for the Caatinga biome, and is in its initial phase for the remaining biomes. It is expected that the results of all processes will be validated and published by the Ministry of the Environment by early 2015.

The current map of priority areas for the conservation and sustainable use of Brazilian biodiversity is available at http://www.mma.gov.br/biodiversidade/projetos-sobre-a-biodiveridade/projeto-de-conserva%C3%A7%C3%A3o-e-utiliza%C3%A7%C3%A3o-sustent%C3%A1vel-da-diversidade-biol%C3%B3gica-brasileira-probio-i/%C3%A1reas-priorit%C3%A1rias.

The MMA, with support from the German Government[16] and the Brazilian Biodiversity Fund – FUNBIO (*Fundo Brasileiro para a Biodiversidade*), and in partnership with several universities[17], published in 2013 the results of a mapping and prioritizing exercise[18] focusing on the Atlantic Forest, comprising an important subsidy to the development of conservation strategies at the landscape level in this biome. This exercise innovates by combining the recent advances in landscape ecology and remote sensing to apply integrated spatial approaches that consider different levels of

[15] Margules, C.R. & Pressey, R.L., 2000. Systematic Conservation Planning methodology. Nature, v.405, pages 243-253.

[16] Support to this project was provided by the German Ministry of the Environment through GIZ – Deutsche Gesellschaft für Internationale Zusammenarbeit and the KFW Development Bank.

[17] UnB – University of Brasília, UNESP – São Paulo State University, UFMG – Federal University of Minas Gerais, and USP – University of São Paulo.

[18] MMA, 2013. Mapeamentos para a conservação e recuperação da biodiversidade na Mata Atlântica: em busca de uma estratégia espacial integradora para orientar ações aplicadas. André A. Cunha & Fátima B. Guedes, Editores. Brasília, 216 p.

information such as species data, information on patches of remaining original forest cover, land use types, existing protected areas, and the various types of pressure on the native biodiversity. The exercise sought to integrate biodiversity conservation and different land uses, and resulted in two maps: (i) Strategic areas for restoration aimed at increased connectivity in the Atlantic Forest, and (ii) Strategic areas for the conservation of Atlantic Forest biodiversity. These results will support the updating of the Map of Priority Areas for this biome.

Payment for ecosystem services

In its Chapter X, Art. 41, the new Law of Native Vegetation (Law 12.651/2012), which resulted from the revision of the former Forest Code, authorizes the Federal Government to establish programs to promote environmental conservation, including through the payment for ecosystem services (PES) such as: (i) carbon sequestration; (ii) conservation of scenic landscapes; (iii) biodiversity conservation; (iv) conservation of water resources and services; (v) climate regularization; (vi) valuation of traditional knowledge; (vii) soil conservation and improvement; (viii) maintenance of Permanent Preservation Areas (APPs) and Legal Reserves (RLs) of restricted use[19]. However, many instruments of the existing legislation related to PES developed and/or adopted both at the federal and state levels followed previous, independent processes and therefore do not establish links with the recently established Rural Environmental Register – CAR or any other monitoring tool, as shown by the Amazon Institute of People and the Environment – IMAZON and the Getúlio Vargas Foundation – FGV in a 2012 analysis of existing legal instruments on PES.[20]

The IMAZON/FGV study shows that several Brazilian states have been developing and adopting legislation on the payment for ecosystem services (PES) and presents an analysis of the status of these legal instruments at the federal and state levels. This study focuses on forest ecosystem services and analyses 28 legal instruments on PES, as well as the main bills under discussion by the National Congress on PES and on the reduction of emissions caused by deforestation and degradation – REDD+.

Eight of the 28 analyzed legal instruments are federal initiatives (2 laws, 2 decrees and 4 bills) and 20 at the state level (14 laws and 6 decrees), involving eight states: Acre, Amazonas, Espírito Santo, Minas Gerais, São Paulo, Rio de Janeiro, Santa Catarina, and Paraná. These instruments apply a variety of approaches, such as climate change, water services or the specific theme of PES as the main focus to create PES and REDD+ instruments, and some adopt socio-environmental safeguards while others do not highlight this theme. Most instruments mention landowners, family rural producers and settlers, as well as traditional communities and indigenous peoples as the main beneficiaries of PES, but few laws mention which property categories are eligible for PES projects or actions. Institutional arrangements and sources of funds also vary among instruments, but governmental arrangements and resources prevail, although some foresee the participation of private institutions and committees with or without the participation of civil society, as well as donations and international funds. The study

[19] APPs and RLs are set aside areas for the protection of vegetation around water bodies and steep slopes; ecosystem services; and timber and non-timber products.

[20] IMAZON & FGV, 2012. Marco regulatório sobre pagamento por serviços ambientais no Brasil. Organizado por Priscilla Santos; Brenda Brito; Fernanda Maschietto; Guarany Osório; Mário Monzoni. – Belém, PA: IMAZON; FGV. CVces, 2012.

concludes that the development of a federal overarching law would be an important instrument to harmonize the diversity of state regulations and structure a strong PES system. Such federal instrument would also be an opportunity to create a monitoring system, which is essential to verify the delivery of the ecosystem services that are being paid.

Soares Filho (2013) and Soares Filho *et al*. (2014)[21] consider the Environmental Reserve Certificate – CRA (*Cota de Reserva Ambiental*) as one of the most important of the new PES instruments created by the revised Forest Code. The CRA is a tradable environmental certificate issued to areas with intact or regenerating native vegetation cover exceeding legal requirements. This surplus area represented by the CRA in one property may be used to offset a Legal Reserve deficit in a different property within the same biome and, preferably, within the same state. This compensation system was envisioned to be operated through the Rural Environmental Cadaster – CAR (*Cadastro Ambiental Rural*), which is currently under implementation at the federal and state levels (see section 1.4.1), and through the consolidation of a trading market for forested lands, thus adding monetary value to the maintenance of standing native forests. One initiative to operationalize this market is already underway with the launch of the BVTrade platform in December 2012, under the Bolsa Verde do Rio de Janeiro (Rio de Janeiro Green Stock Market)[22]. Soares Filho *et al*. (2014) estimate that the CRA market could potentially reduce by 56% the current national deficit of compliance with Legal Reserve requirements.

*Water*: Since 2001, the National Water Agency – ANA coordinates the Water Producer Program (*Programa Produtor de Água*), which is a voluntary initiative focusing on remunerating rural producers that adopt conservation practices in their properties with the objective of conserving soil and water resources. Examples or eligible practices are: construction of infiltration basins or terraces; adequate adaptations to back roads; restoration and protection of headwaters; reforestation of Permanent Protection Areas and Legal Reserves; and environmental sanitation. In 2014, the Program comprises 20 ongoing projects distributed in various states and including water recharge areas of seven Brazilian metropolitan regions (e.g. São Paulo, Rio de Janeiro, and others). Over 1,000 rural producers currently benefit from income generated by the provision of environmental services that positively impact a population of over 30 million people.[23]

Certification

*Private sector*: In 2009, the LIFE Institute[24] launched an initiative to certify companies based on an assessment of impacts caused on biodiversity by business activities and the related mitigation or compensation activities carried out by the company to offset impacts. LIFE Certification assesses the company's environmental management through a scorecard system, with the objective of proposing a minimum set of conservation actions that each company should implement in order to obtain the Certification. This is

[21] (i) Soares-Filho, B. 2013. Impacto da revisão do código florestal: como viabilizar o grande desafio adiante? Subsecretaria de Desenvolvimento Sustentável, Secretaria de Assuntos Estratégicos da Presidência da República, 1-28p. (ii) Soares-Filho, B.; Rajão, R.; Macedo, M.; Carneiro, A.; Costa, W.; Coe, M.; Rodirgues, H. & Alencar, A. 2014. Cracking Brazil's Forest Code. **Science** 344: 363-364.

[22] www.bvrio.org ; www.bvtrade.org

[23] produtordeagua.ana.gov.br/Principal.aspx ; www.abar.org.br/acontece-nas-agencias/2595-ana-apresenta-programa-produtor-de-agua-na-camara.html

[24] http://institutolife.org/

a voluntary process based on environmental audits performed by independent certifying agencies accredited by the LIFE Institute according to the best international practices. The Gaia, Silva, Gaede & Associates law office in Curitiba was the first business to fulfill all requirements for LIFE Certification. The energy company Itaipu Binacional is currently in the process of being certified and other large companies have already initiated internal changes to apply.[25] Other certifying agencies targeting the private sector are also present in Brazil, such as ISO 14001 (private sector environmental management) and LEED – *Liderança em Energia e Design Ambiental* (environmentally-friendly buildings).[26]

*Agriculture and products*: The adoption of organic production methods has been growing in recent years, both in geographical terms and in number of producers and consumers. The growing market and higher product prices (close to 40% higher for products *in natura* and 170% - 200% higher for processed products) are making organic production stand out as an alternative for small scale rural producers to increase their income. Organic certification provides a reliable quality standard that facilitates communication between producers and consumers. Accreditation of the certifying organizations in Brazil is carried out by the Ministry of Agriculture Livestock and Food Supply – MAPA, who entrusts the National Institute of Metrology Quality and Technology – INMETRO to verify compliance of the certification processes applied by certifying organizations. Since 2007, all certifying organizations are required to record information on certified producers and products in a MAPA database. Over 25 national and international certifying organizations are currently active in Brazil through two different certification methods: (i) community (or participatory) certification, usually applied by rural producers' associations and cooperatives; and (ii) audit-based certification applied by national or foreign certifying organizations with international credibility. Organic certification also acts as a tool for the social inclusion of small scale rural producers by providing access to markets and promoting local economic development, in addition to promoting social organization. Furthermore, organic production practices are viable in small properties and favor production diversification in time and space, which leads to better diets for consumers and greater economic stability for producers.[27]

With support from the GEF-funded National Biodiversity Mainstreaming and Institutional Consolidation Project – PROBIO II, 21 Compliance Assessment Organizations (*Organismos de Avaliação da Conformidade*) were registered with MAPA for ensuring organic quality, 13 of which are participatory certification systems, and eight audit-based certification systems. There are currently 7,169 organic producers registered with MAPA, 3,241 of which under social (participatory) control systems. MAPA developed and made available an online system – SigOrgWeb[28] (*Sistema de Informações Gerenciais da Produção Orgânica*) for registering organic producers, production properties, and activities of the certification systems.[29]

---

[25] http://www.gazetadopovo.com.br/vidaecidadania/meio-ambiente/conteudo.phtml?tl=1&id=1430460&tit=Selo-Life-reconhece-empresas-verdes

[26] http://planetasustentavel.abril.com.br/noticia/desenvolvimento/conteudo_298573.shtml

[27] Silva, M.V. & Oliveira, M.A.B., 2013. Situação atual do processo de certificação orgânica no Brasil. Revista Verde (Mossoró – RN – Brasi) vol. 8, n. 5, p. 20-30 (Edição Especial) dezembro 2013.

[28] sistemasweb.agricultura.gov.br/pages/SIGORGWEB.html

[29] Information provided by SBF/MMA in July 2014.

Forest Stipend (*Bolsa Floresta*)[30]

A pioneering and innovative initiative involving the payment for ecosystem services, the Forest Stipend has been rewarding and improving since 2007 the quality of life of traditional communities that live in and off the forest of Amazonas state and are committed to reducing deforestation. The Forest Stipend was the first internationally certified program of its kind in Brazil and is one of the largest PES programs in the world, reaching over 35,000 people in 15 state protected areas – a total area encompassing 10 million hectares of Amazonian forest.

This program was established by the Amazonas State Government through its Environment and Sustainable Development Secretariat – SDS by means of Law 3.135/2007 and Complementary Law 53/2007, and with the objective of valuating and providing an economic compensation to the environmental conservation efforts of the families living in state protected areas. The program has currently four components: (i) Forest Stipend – Income (BFR – *Bolsa Floresta Renda*) is an incentive to sustainable production, investing R$140,000/year in each protected area; (ii) Forest Stipend – Social (BFS – *Bolsa Floresta Social*) has the objective of enhancing citizenship and life quality of isolated communities, investing R$140,000/year in each protected area according to a participatory Work Plan; (iii) Forest Stipend – Family (BFF – *Bolsa Floresta Familiar*) is an incentive to families to reduce deforestation, paying a monthly reward of R$50/month to mothers living inside protected areas that commit to environmental conservation and sustainable development; and (iv) Forest Stipend – Association (BFA – *Bolsa Floresta Associação*) equivalent to 10% of the sum of all BFFs, the BFA seeks to strengthen the community associations of producers and families living in state protected areas, as well as strengthen social control over the Forest Stipend program. In 2013, a total of 37,013 people were benefitted by the Forest Stipend in 541 communities living in 15 state sustainable use protected areas.

Green Stipend (*Bolsa Verde*)

The Green Stipend Program to Support Environmental Conservation[31] was created by Law 12.512/2011 and grants quarterly R$300 stipend payments to extremely poor families that live in priority areas for environmental conservation. The benefit may be granted for two years, with the option of renewal, and intends to combine the income increase of communities living in extreme poverty in rural areas with the conservation of ecosystems and the sustainable use of natural resources. The objectives of this stipend are to: (i) promote ecosystem conservation and sustainable use; (ii) promote citizenship and the improvement of life quality; (iii) increase the income of the population living in extreme poverty that carry out activities for the conservation of natural resources in rural areas; and (iv) promote the participation of beneficiaries in environmental, social, technical and professional capacity building activities. As a side benefit, the Green Stipend Program also contributes to create a local constituency favorable to the creation and maintenance of sustainable use protected areas.

Regulated by Decree 7.572/2011, the Green Stipend is part of the Brazil without Poverty Program (*Brasil Sem Miséria*) and focuses on communities that live off the sustainable use of natural resources in Extractive Reserves, National Forests, federal

[30] http://fas-amazonas.org/programa-bolsa-floresta/

[31] http://www.mma.gov.br/desenvolvimento-rural/bolsa-verde

Sustainable Development Reserves, and Environmentally Differentiated Settlements of the Agrarian Reform. Traditional communities such as river-side communities (*ribeirinhos*), extractive workers, indigenous peoples, *quilombolas*[32] and others may also benefit from this program, which is a form of recognizing these communities for the environmental services they conserve.

Since its onset, 60,239 families have been enrolled in the Green Stipend program, according to June 2014 data. Beneficiary families live on 68 federal protected areas managed by the Chico Mendes Institute for Biodiversity Conservation – ICMBio (19,659 families), 830 resettlement projects of the National Institute for Agrarian Reform – INCRA (35,348 families), and 63 municipalities with areas managed by the Secretariat of Federal Property – SPU (5,232 families).

On the 2014 International Day for Biological Diversity (22 May), the Ministry of the Environment announced that the Green Stipend will also benefit economically and socially vulnerable communities living in areas that are relevant for the conservation of threatened species. This initiative intends to engage vulnerable communities in the conservation of threatened species and to avoid hunting or illegal capture and trade which may lead to species extinction. ICMBio is currently identifying eligible families in sustainable use protected areas.[33] One key challenge to be addressed by these programs is the improvement of their monitoring processes, including conservation-based indicators.

Pollinators Project[34]

In a first attempt to work with ecosystem services in a theme where the relation with biodiversity is very clear, complex and rich, since 2009 Brazil has been implementing the Project: Ecosystem Approach for the Conservation and Management of Pollinators for a Sustainable Agriculture. The project, under FAO, should close in 2014 and involves the participation of seven countries: South Africa, Brazil, Ghana, India, Nepal, Pakistan, and Kenya. The objective of the project is to improve food and nutrition safety, as well as quality of life, through the conservation and sustainable use of pollinators which, among other aspects, are crucial to ensure higher productivity for various foods important for human diet. The project has four lines of action, through which the participating countries seeks to: develop an integrated database on wild pollinators' services; disseminate pollinator-friendly agricultural practices; sensitize and build the capacity of producers and land managers on the importance of pollinators; and integrate the conservation and sustainable use of pollinators in other sectors.

Each participating country is expected to contribute to the following project targets: (i) at least 445,000 hectares are managed with pollinator-friendly agricultural practices, and that (ii) 20% of producers in over 300 local communities have their agricultural productivity increased by 10%. The project defined STEP[35] sites where the countries are promoting the development of studies, training events, assessments, and the promotion of pollinator-friendly practices. STEP sites in Brazil comprise rural properties

[32] *Quilombolas* are traditional groups or communities of African origin.

[33] http://www.icmbio.gov.br/portal/comunicacao/noticias/4-destaques/4815-acoes-integradas-garantem-mais-eficencia-na-preservacao-das-especies.html

[34] Information Note Jan 2014/DCBio/SBF/MMA from the Ministry of the Environment/DCBio to IBAMA.

[35] STEP: Study, Training, Evaluation and Promotion.

producing cotton, cashew, canola, apples, melons, Brazil nuts, and tomatoes. Under the Pollinators Project, Brazil supported the development and dissemination of various studies on the benefits from wild pollinator species, particularly bees. These studies demonstrate that the adoption of agricultural practices that allow the conservation of these species actually contribute to increase productivity in agricultural systems, as well as to increase the income of rural producers. These studies are carried out by several universities and research centers[36], and some of the resulting papers published from 2010 to 2013 are listed in Box 1.

**Box 1**
**Papers published from 2010 to 2013 with results from research supported by the Pollinators Project**

1) Cavalcante et al. (2012) Pollination requirements and the foraging behavior of potential pollinators of cultivated Brazil nut (*Bertholletia excelsa* Bonpl.) trees in Central Amazon rainforest. *Psyche* Article ID 978019, 9 p.
2) Deprá et al. (2013) Pollination deficit in open-field tomato crops (*Solanum lycopersicon* L., Solanaceae) in Rio de Janeiro State, Southeast Brazil. Journal of pollination ecology 11: 8 p.
3) Ferreira et al. (2013) What do we know about the effects of landscape changes on plant-pollinator interaction networks? *Ecological indicators* 31:35-40
4) Gaglianone et al. (2010) Importância de Centridini (Apidae) na polinização de plantas de interesse agrícola: o maracujá-doce (*Passiflora alata* Curtis) como estudo de caso na região sudeste do Brasil. *Oecologia australis* 14:152-164
5) Garibaldi et al. (2013) Wild pollinators enhance fruit set of crops regardless of honey bee abundance. *Science* 339:1608-1611
6) Imperatriz-Fonseca et al. (2012) O desaparecimento das abelhas melíferas (*Apis mellifera*) e as perspectivas do uso de abelhas não melíferas na polinização. *Embrapa Semiárido. Documentos*, 249:213-226
7) Kennedy et al. (2013) A global quantitative synthesis of local and landscape effects on wild bee pollinators in agroecosystems. *Ecology letters* 16:584-589
8) Magalhães & Freitas (2013) Introducing nests of the oil-collecting bee *Centris analis* (Hymenoptera: Apidae: Centridini) for pollination of acerola (*Malpighia emarginata*). *Apidologie* 44:234-239
9) Milfont et al. (2013) Higher soybean production using honeybee and wild pollinators, a sustainable alternative to pesticides and autopollination. *Environ Chem Lett* 11:335-241
10) Nunes-Silva et al. (2013) The 36xclusiv of *Bombus impatiens* (Apidae, Bombini) on tomato (*Lycopersicon esculentum* Mill., Solanaceae) flowers: pollination and reward perception. *Journal of pollination ecology* 11:33-40
11) Oliveira et al. (2012) Abelhas visitantes florais, eficiência polinizadora e requerimentos de polinização na cajazeira (*Spondias mombin*). *Rev Acad Ciênc Agrár Ambient* 10:277-284
12) Rizzardo et al. (2012) *Apis mellifera* pollination improves agronomic productivity of anemophilous castor bean (*Ricinus communis*). *An Acad Bras Cienc* 84:1137-1145
13) Rosa et al. (2011) Honey bee contribution to canola pollination in Southern Brazil. *Sci Agric* 68:255-259
14) Silva-Neto et al. (2013) Native bees pollinate tomato flowers and increase fruit production. *Journal of pollination ecology* 11:41-45
15) van der Valk et al. (2012) Aspects determining the risk of pesticides to wild bees: risk profiles for local crops on three continents. *Julius-Kuhn-Archiv* 437:1-17
16) Viana et al. (2012). How well do we understand landscape effects on pollinators and pollination services? *Journal of pollination ecology* 7:31-41
17) Witter et al. (2012) Desempenho de cultivares de morango submetidas a diferentes tipos de polinização em cultivo protegido. *Pesq agropec Bras* 47:58-65

[36] Pollinator studies are carried out by the Chico Mendes Institute for Biodiversity Conservation (ICMBio), Rio Grande do Sul Catholic University (PUCRS), University of Brasília (UnB), São Paulo University (USP), Darcy Ribeiro State University of Norte Fluminense (UENF), Bahia Federal University (UFBA), Goiás Federal University (UFG), Ceará Federal University (UFC), Rural Federal University of the Semi-Arid (UFERSA), and the Embrapa centers: Embrapa Western Amazon (CPAA), Embrapa Eastern Amazon (CPATU), Embrapa Genetic Resources and Biotechnology (CENARGEN), and Embrapa Semi-Arid (CPATSA).

18) Zimbres et al (2012) Uso da terra e fragmentação de habitat: efeitos sobre o serviço ecológico dos polinizadores nativos e a produtividade econômica no Cerrado. *Anais do IV Seminário de Pesquisa e Iniciação Científica do ICMBIO*, p. 103

Informative folders and guidance to rural producers based on project results are being produced for distribution, among which the "Tomato plant pollination", which reveals the pollination incompatibility with the European bee (*Apis mellifera*) and highlights the crucial importance of conserving wild pollinators to ensure tomato production; "Pollinator management and passion fruit pollination"; "Bees in Brazilian cotton cultivation"; "Solitary bees produce West Indian cherry"; "Beetles produce *graviolas*"; and "Preserving insects, producing *mangabas*". Additionally, an "Illustrated guide on pollinator bees in Brazil" was prepared. A more substantial publication (400-page book) is also being prepared on the "Sustainable use and restoration of the diversity of autochthonous pollinators in agriculture and associated ecosystems". With the participation of 86 researchers, this book will feature management plans and pollinator information related to the assai palm, West Indian cherry, cotton, *araticum*, *graviola*, *mangaba*, mango, passion fruit, and tomato.

Approximately 75% of the human diet depends directly or indirectly on pollinated plants, and the decline of pollinators may lead to a significant reduction of vegetables and fruit production to a level below the current global demand. The honey bee (*Apis mellifera*) is the pollinator of agricultural importance most utilized in the world, but native pollinators are also crucial for several crops. The impacts from habitat loss and fragmentation, the uncontrolled use of pesticides (particularly those containing neonicotinoids), the spread of pathogens and lack of pollinator-friendly agricultural practices are heavily harming numerous pollinator species, particularly bees, and leading to the collapse of numerous hives (see also section 1.3.1).[37] The Ministry of the Environment commissioned a study under the Pollinators Project to assess the value of the pollination service for the production of plant species included in the project. Results from this study should be available by the end of 2014.

Valuation of biodiversity

Given the crucial role of ecosystem services in the viability of all human activities, the need to reflect their importance as a component of global economy led in 2007 to the launch of a collaborative effort to promote a better understanding of the actual economic value of the services provided by ecosystems: The Economics of Ecosystems and Biodiversity – TEEB. The implementation of national TEEB efforts became an international commitment under the CBD and the Aichi Targets, and a Brazilian national commitment related to the National Biodiversity Targets (CONABIO Resolution n° 6, of 03 September 2013). With a country economy heavily based on agriculture, it is particularly important for Brazil to understand, recognize and capture the value of ecosystem services and the value of biodiversity to assist decision-makers

[37] MMA, 2013. Mortandade disseminada das abelhas devido ao uso de agrotóxicos. PowerPoint presentation for a Public Hearing held on 04 July 2013. file:///D:/Downloads/Audiência%20pública_polinizadores_4julho13.pdf And: MMA, 2014. Nota Informativa n° 51/2014/DCBIO/SBF/MMA, of 17 July 2014.

in the definition of national strategies and priorities. Since 2010, a partnership[38] led by the Ministry of the Environment is building the national effort to demonstrate the value of Brazilian natural assets and their key relationship with the national economy – the Brazilian Natural Capital Initiative, or EEB (*Iniciativa Capital Natural do Brasil*).

The EEB has the objectives to: (i) identify and highlight the benefits from the conservation and sustainable use of national biodiversity and ecosystem services, as well as estimate the costs of their loss; (ii) promote the mainstreaming of the economics of ecosystems and biodiversity in the decision-making processes at different levels, so that decisions may lead to the sustainable use of the natural assets; and (iii) influence the implementation of public policies and management instruments, as well as behavioral changes to ensure the long term provision of natural assets.

Three inter-related components comprise the Brazilian initiative: (i) national policies (National TEEB); (ii) promotion of the internalization of the value of ecosystem services in decision making processes (Regional-Local TEEB); and (iii) risks and costs of the loss of biodiversity to the business sector (Business Sector TEEB).

The Brazilian Natural Capital Initiative is led by a Coordination Commission responsible for planning, coordinating and validating the work and results of all three components of the national initiative. A Working Group is responsible for technical and methodological coordination, as well as for monitoring results of the National TEEB. The scope of the National TEEB was drafted in December 2012, when the Working Group discussed the possible approaches to integrate the value of ecosystem services in decision making processes, and since early 2013 the Ministry of the Environment and partners have promoted broad dialogues to further develop the scope and institutional aspects of the initiative. The dialogues identified a clear demand for scientific contribution to the initiative, which resulted in the engagement of the Ministry of Science Technology and Innovation (MCTI).

The initiative faces various challenges, particularly: (i) complying with the international (CBD and Aichi Targets) and national (National Biodiversity Targets) commitments; (ii) meeting the national expectations related to economic growth and poverty reduction while relying in a development model that is heavily based on conventional models of natural resource use; (iii) building the necessary working links among the political stakeholders at the national level responsible for the development of policies and strategies that affect (or are affected by) the health of ecosystems; and (iv) defining and prioritizing clear policies and sectoral instruments for promoting the internalization of the economic benefits deriving from the sustainable use of natural assets, and for engaging decision makers.

In July 2013 the Working Group defined 10 potential themes to be addressed by the National TEEB. These themes involve the development of economic instruments (using public procurement to promote sustainable production chains; tax and economic incentives and disincentives related to environmental policies; national environmental

[38] The Brazilian Natural Capital Initiative is being implemented through a joint effort of the Ministry of the Environment – MMA (*Ministério do Meio Ambiente*), Ministry of Internal Revenue – MF (*Ministério da Fazenda*), Ministry of Science Technology and Innovation – MCTI (*Ministério da Ciência, Tecnologia e Inovação*), National Institute of Applied Economics Research – IPEA (*Instituto de Pesquisa Econômica Aplicada*), Secretariat of Strategic Affairs of the President's Office – SAE-PR (*Secretaria de Assuntos Estratégicos da Presidência da República*), Brazilian Institute of Geography and Statistics – IBGE (*Instituto Brasileiro de Geografia e Estatística*), United Nations Programme for the Environment – UNEP, National Industry Confederation – CNI (*Confederação Nacional da Indústria*), Conservation International Brazil (CI), and German Technical Cooperation – GIZ (*Deutsche Gesellschaft für Internationale Zusammenarbeit*).

accounts for forests and water; economics of ecological restoration; economic contributions from water and hydroelectric sector companies for protected areas); and impact studies (impacts and dependence of the energy, agricultural and fisheries sectors on ecosystem services; environmental licensing; and a map of ecosystem services).

Some of the EEB activities are being carried out independently, but in a coordinated manner to ensure the complementarity of results. The progress to-date achieved by the three components is summarized below.

*National TEEB*: A prioritization exercise carried out in November 2013 selected four of the ten themes (defined by the Working Group in July 2013) as priorities to be addressed in the first phase of the National TEEB initiative: (i) promotion of sustainable production chains through public procurement processes; (ii) Economics of ecological restoration; (iii) Impacts and dependence of the agricultural sector on ecosystem services; and (iv) map of ecosystem services. The initiative has commissioned the currently on-going work for the development of a work plan for these four priority themes, including the definition of the actions and products expected for each theme. The next step will involve the engagement of strategic stakeholders from all sectors, and a special effort will be applied to engage actors that are not yet sensitive to these themes.

*Regional-Local TEEB*: This component has recently concluded its final phase of planning and coordination with state actors. Implementation of planned activities initiated in 2014. This component will identify on-going processes at the regional and local levels with good results in biodiversity conservation and high potential to foster the broad adoption of an ecosystem approach in the development of economic and financial instruments, as well as innovative approaches for the valuation and conservation of biodiversity and ecosystem services. These initiatives will be supported by the Regional-Local TEEB and will be used as pilot cases at the regional and local levels. The aim is to use these pilot cases to develop replicable models for the integration of biodiversity and ecosystem services considerations in policies and management processes of governmental and business stakeholders. Support to the pilot cases should involve: studies and research activities; capacity building; and technical assistance for knowledge management. Examples of initiatives for the construction of pilot cases are: (i) in the public sector – territorial planning and regularization, and public policies for biodiversity, forest restoration, environmental licensing, among others; (ii) in the business sector – development of financial mechanisms for compliance with the environmental legislation, methods for valuating biodiversity and ecosystem services in connection with value chains, and training programs providing an ecosystem approach to cost reduction, access to markets and custom captivation, as well as access to other income sources such as PES.

*Business Sector TEEB*: This component was launched in October 2011 and is being coordinated by Conservation International. Its main objective is to reveal and highlight the economic benefits from business initiatives that favor the conservation of biodiversity and maintenance of ecosystem services, given that all business rely at some degree on the provision of ecosystem services (energy, water, raw materials, stable climate, soil fertility, pollinators, etc.). This component aims at demonstrating that the integration of natural assets considerations in business decision-making not only assists companies in making the best choices to improve production, but also brings resilience to businesses. In March 2014, the Business Sector TEEB published the results of an unprecedented study comparing the environmental value of different agricultural practices for the production of palm oil (*dendê*) and soybean in pilot projects of the

Natura and Monsanto companies (http://www.conservation.org.br/noticias/noticia.php?id=734). In both cases, results prove that conserving the natural capital is "good business".

To assist the engagement of all sectors with the ecosystem services theme, in 2012 the German cooperation agency GIZ published the results[39] of a partnership between the National Confederation of Industries – CNI and MMA, which produced a manual to guide the integration of ecosystem services into development planning – the "*Integration of Ecosystem Services into Development Planning: A step-by-step guide for practitioners based on the TEEB Initiative*". The publication considers the environmental and economic trade-offs associated to development actions and didactically assists development planners to systematically integrate the opportunities and risks associated to ecosystem services into the planning, revision and implementation of projects and proposals, development strategies, sectoral and spatial planning, environmental and climate assessments, and other similar planning exercises.

The EEB initiative also organized two international events[40], held in May 2014, to exchange experiences in the implementation of national TEEB initiatives: (i) the Brazil-India-Germany TEEB Dialogue (May 5-7) promoted a technical discussion among the invited delegations on lessons learned, possible pathways to promote the mainstreaming of biodiversity and ecosystem values in the public policies and business sector, and the contribution of the national TEEB initiatives to the achievement of the CBD targets; and (ii) the International Workshop on Businesses and the Natural Assets (May 7-9) was an open event to strengthen cooperation among government, the business sector, academic sector, and civil society to achieve the objectives of the CBD.

Other initiatives are being led or are in the early stages of development by business sector partnerships and/or research agencies to collaborate with the valuation and integration of ecosystem services into business sectors' planning and activities, such as the Business Partnership for Ecosystem Services – PESE (*Parceria Empresarial pelos Serviços Ecossistêmicos*) and Trends in Ecosystem Services – TeSE (*Tendências em Serviços Ecossistêmicos*).[41] Such initiatives are still under development and results are expected in the next few years.

Additional information on the Brazilian Natural Capital Initiative and publications can be found at: http://www.mma.gov.br/publicacoes/biodiversidade/category/143-economia-dos-ecossistemas-e-da-biodiversidade and http://teebnegociosbrasil.com.br/.

#### 1.2.1.3 Hydrographic regions

Water quality[42]

The Brazilian Water Quality Index – IQA (*Índice de Qualidade das Águas*), assesses the quality of water for public supply after conventional water treatment. The IQA is

[39] Deutsche Gesellschaft für Internationale Zusammenarbeit – GIZ, 2012. Integração de Serviços Ecossistêmicos ao Planejamento do Desenvolvimento: Um passo-a-passo para profissionais com base na iniciativa "TEEB". Brasília, 81 p.

[40] http://www.portaldaindustria.com.br/cni/iniciativas/eventos/2014/03/1,35239/workshop-internacional-negocios-e-capital-natural-dialogos-para-uma-parceria-sustentavel.html

[41] cebeds.org.br/camaras_restrita/pese/pese ; www.fgv.br/ces

[42] ANA – Agência Nacional de Águas, 2013. Conjuntura dos Recursos Hídricos no Brasil. Brasília, 432 p

calculated based on nine parameters – temperature, total solids, pH, turbidity, thermo-tolerant coliforms, biochemical oxygen demand, dissolved oxygen, total phosphorus, and total nitrogen – and is particularly sensitive to the contamination by domestic wastewater, which represent the main pressure on water quality in Brazil (Table 5).

**Table 5:** Classes and meaning of the IQA

| IQA Value | Classes | Meaning |
|---|---|---|
| 79 < IQA ≤ 100 | Excellent | Water that is adequate for public supply after conventional treatment. |
| 51 < IQA ≤ 79 | Good | |
| 36 < IQA ≤ 51 | Regular | |
| 19 < IQA ≤ 36 | Poor | Water that is inadequate for public supply after conventional treatment, requiring advanced treatment. |
| IQA ≤ 19 | Very poor | |

**Source:** Modified from ANA – Agência Nacional de Águas, 2013. Conjuntura dos Recursos Hídricos no Brasil. Brasília, 432 p.

In 2011, considering the mean IQA values measured at 2,001 monitoring sites around the country, 6% presented excellent conditions, 76% good, 11% regular, 6% poor, and 1% very poor. The proportions of excellent and good water quality reduce significantly when only urban areas are considered (Figure 5).

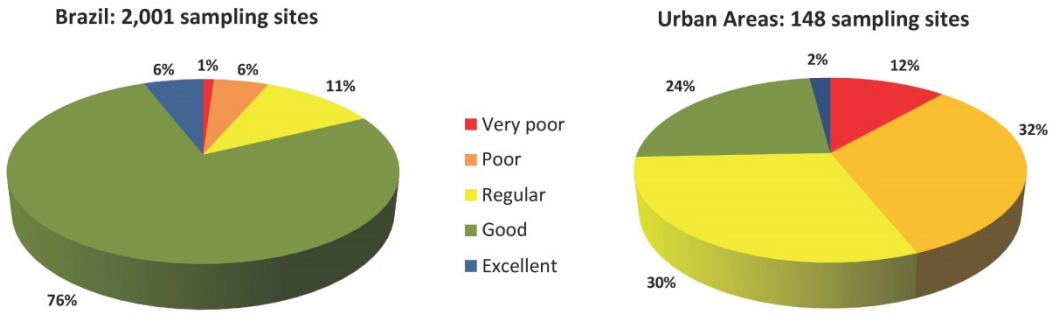



**Figure 5:** Water quality in Brazil (left) and urban areas (right) in 2011.
**Source:** ANA – Agência Nacional de Águas, 2013. Conjuntura dos Recursos Hídricos no Brasil. Brasília, 432 p.

Most of the *poor* and *very poor* IQA values were measured in water bodies that cross heavily populated urban areas, such as metropolitan regions and large cities. The low quality was mainly a result of treated effluents or untreated domestic wastewater flowing into water bodies. Considering only the 148 sites in urban areas, poor and very poor percentages alter dramatically, respectively from 6% to 32% and from 1% to 12%, indicating that water quality status is more critical in densely populated areas (Figure 6).

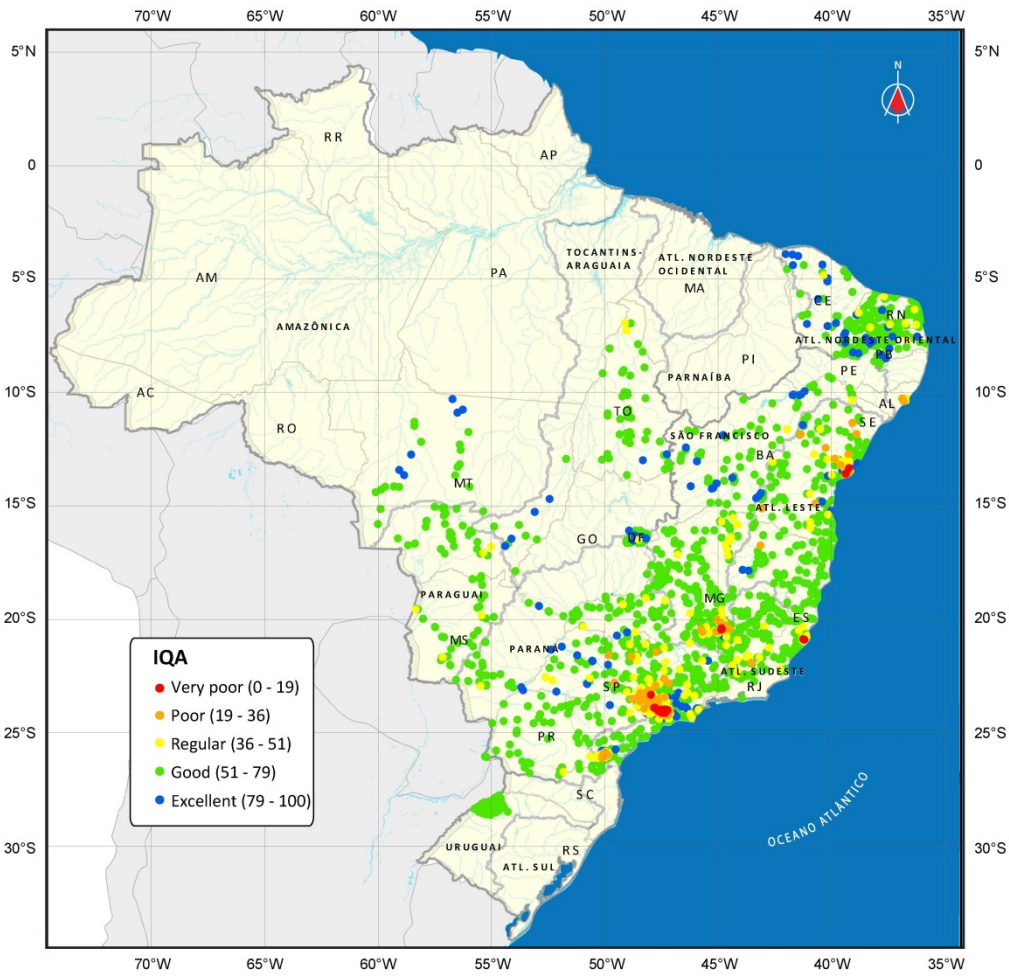



**Figure 6:** Water quality in Brazilian hydrographic regions (2011).
**Source:** ANA – Agência Nacional de Águas, 2013. Conjuntura dos Recursos Hídricos no Brasil. Brasília, 432 p.

The National Water Agency – ANA (*Agência Nacional de Águas*) also analyzed the trends in water quality for 658 monitoring sites for which data series were available for the period of 2001 – 2011. These sites are located in the states of Minas Gerais (244), São Paulo (189), Paraná (103), Mato Grosso do Sul (72), Espírito Santo (27), Mato Grosso (17), Goiás (4), and Pernambuco (2). Of the 27 Brazilian states, only 17 have water quality monitoring networks, and only eight of these 17 maintain sufficient and continuous monitoring data for the trend analysis proposed by ANA.

Of the 658 sites analyzed, 50 (8%) presented an improvement trend, while 33 (5%) presented a decreasing trend in the average values of IQA (Figure 7). No trend was detected for the other 575 monitoring sites. The average IQA for the sites with increasing trend was 54, while the average IQA for the sites with decreasing trend was 64. In general terms, the reason for decreasing IQAs was the increase in the load of domestic wastewater as a result of population growth, which was not matched by investments in wastewater collection and treatment systems. Other probable causes of these trends are: discharge of industrial effluents, agricultural activities, mining, diffuse nutrient loads from agricultural areas, and the reduction in water flow. Pollution control actions are urgent and essential for the watersheds with decreasing trends in IQA. The elaboration of the National Sanitation Plan (Plansab – *Plano Nacional de Saneamento Básico*) and the perspective of an increase in sanitation investments along the next

several years reinforce the need to broaden the systematic monitoring of the country's water quality to allow a realistic analysis of the effectiveness of the planned actions on the recuperation of water quality.

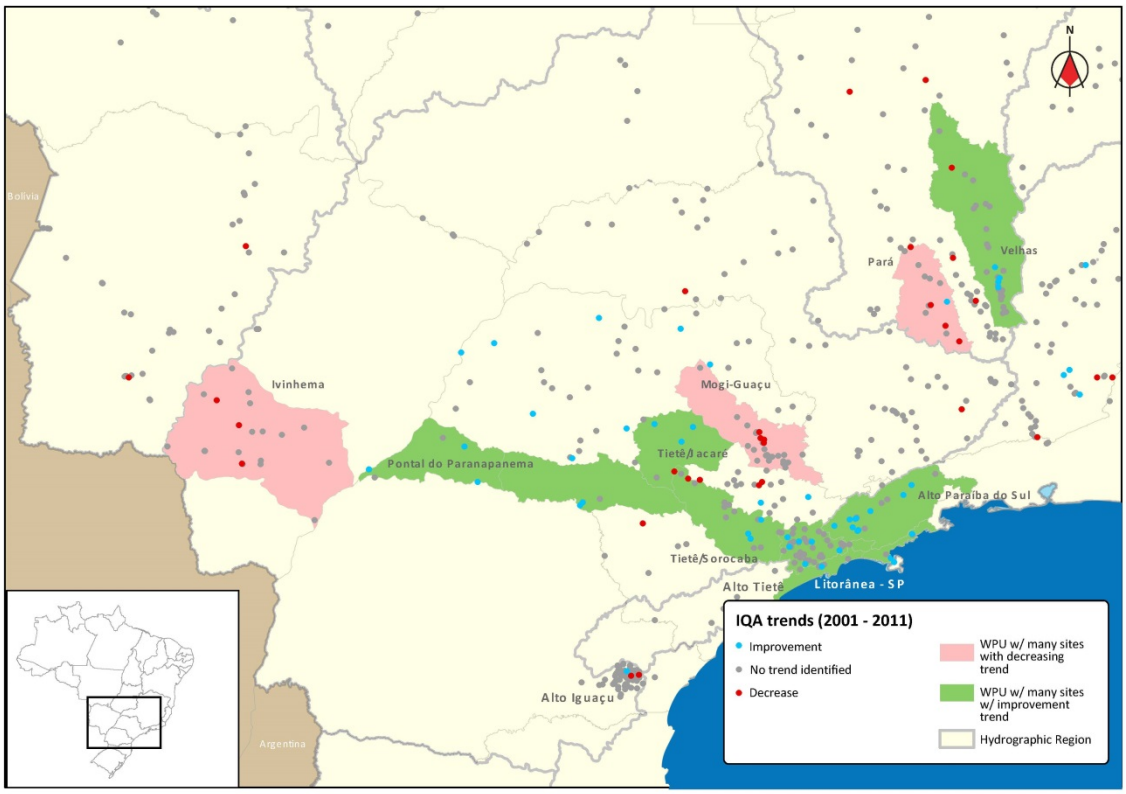



**Figure 7:** Increasing and decreasing trends in water quality in assessed sites, highlighting Water Planning Units (WPU) where improvement and decrease in water quality were observed.
**Source:** ANA – Agência Nacional de Águas, 2013. Conjuntura dos Recursos Hídricos no Brasil. Brasília, 432 p.

As shown in Figure 8 below, the hydrographic regions of Tocantins-Araguaia, Amazon (*Amazônica*), and Western Northeast Atlantic (*Atlântico Nordeste Ocidental*) present the worse indexes of urban water supply, as well as the worse indexes of wastewater collection, together with the Parnaíba hydrographic region. The Paraná, Southeast Atlantic (*Atlântico Sudeste*), São Francisco, and East Atlantic (*Atlântico Leste*) hydrographic regions present the highest indexes of wastewater collection, well above the national average.

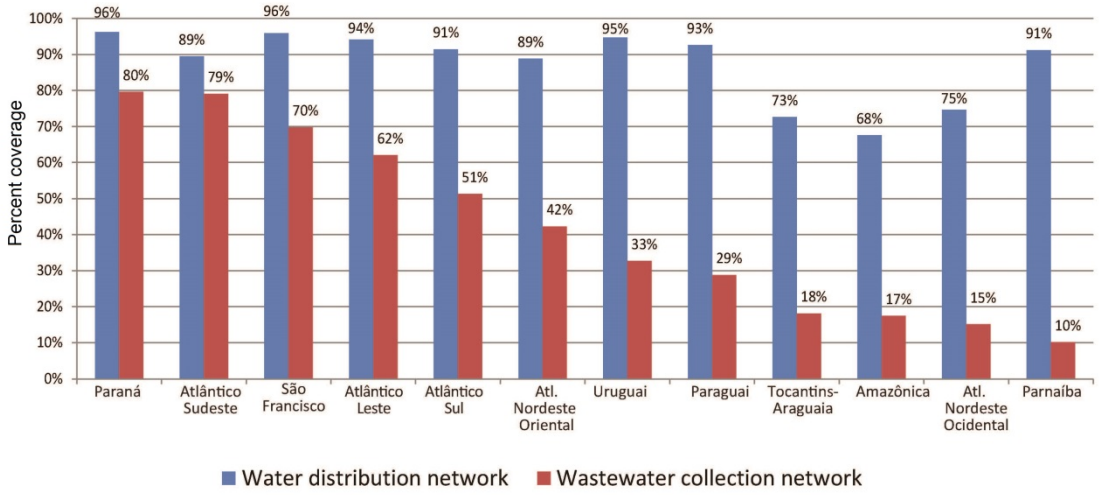



**Figure 8:** Percent population with access to water supply systems and wastewater collection networks by hydrographic region (2010).
**Source:** ANA – Agência Nacional de Águas, 2013. Conjuntura dos Recursos Hídricos no Brasil. Brasília, 432 p.

Of the total volume of treated wastewater per day in Brazil (8.5 million $m^3$), only 10% receive tertiary treatment, which removes phosphorus, the main element responsible for the eutrophication of freshwaters. The resulting organic load that remains in the effluents discharged in water bodies greatly surpasses the average water flow of the receiving water body, except for the Amazon hydrographic region, given its vast availability of water (Figure 9).

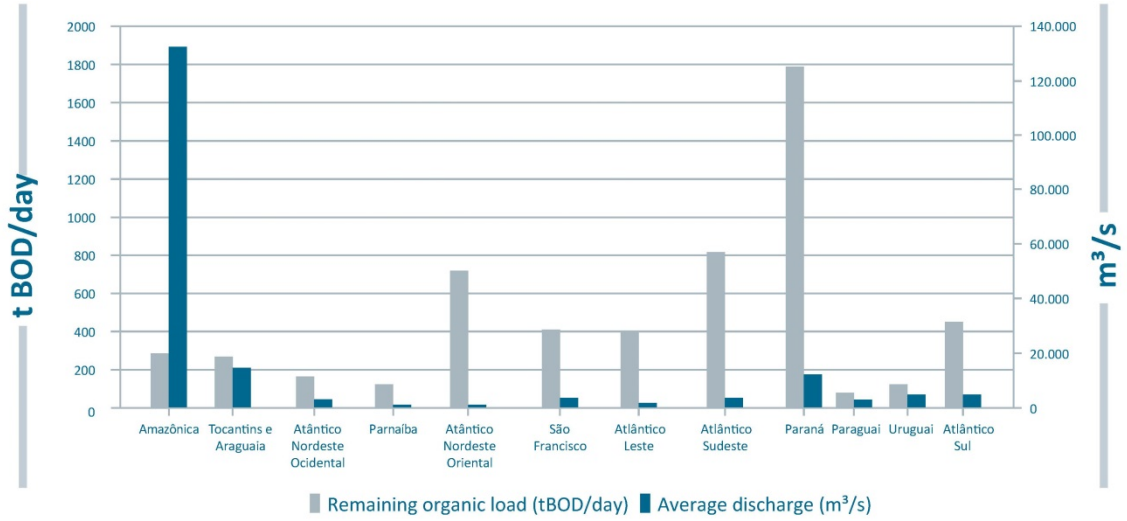



**Figure 9:** Remaining organic load and average water discharge by hydrographic region (2008).
**Source:** ANA – Agência Nacional de Águas, 2013. Conjuntura dos Recursos Hídricos no Brasil. Brasília, 432 p.

## Water use

The distribution of the increasing water demand among the main water use categories has shown little variation in the period 2002-2006. As presented in the 4th National Report to the CBD, the total water intake in 2002 was 1,592 $m^3/s$ distributed as: 26% for urban use, 18% industrial use, 3% rural use, 7% animal use, and 46% for irrigation.

This distribution pattern was maintained for 2006 and 2010 (Figure 10), with irrigation maintaining the largest demand at 54% of the water intake in 2010, which represented 72% of the total actual water consumption among all categories.

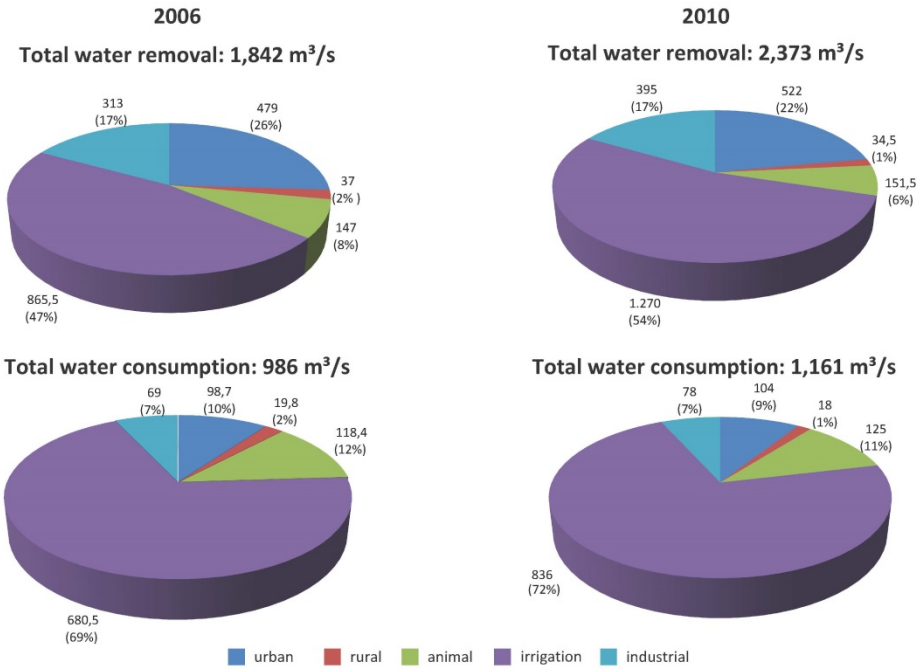



**Figure 10:** Evolution of the distribution of water demand and use (2006 and 2010).
**Source:** ANA – Agência Nacional de Águas, 2013. Conjuntura dos Recursos Hídricos no Brasil. Brasília, 432 p.

An increase of 29% in total water intake was verified in 2010 in comparison with 2006, mostly due to the demand for irrigation. When these data are analyzed by hydrographic region, the Paraná region stands out as the largest water demand of the country, followed by the South Atlantic (*Atlântico Sul*), São Francisco, and Eastern Northeast Atlantic (*Atlântico Nordeste Oriental*) regions. The smallest water intakes (<100 $m^3/s$) are located in the regions of the Western Northeast Atlantic (*Atlântico Nordeste Ocidental*), Paraguai, Parnaíba, and Amazon (*Amazônica*) (Figure 11).

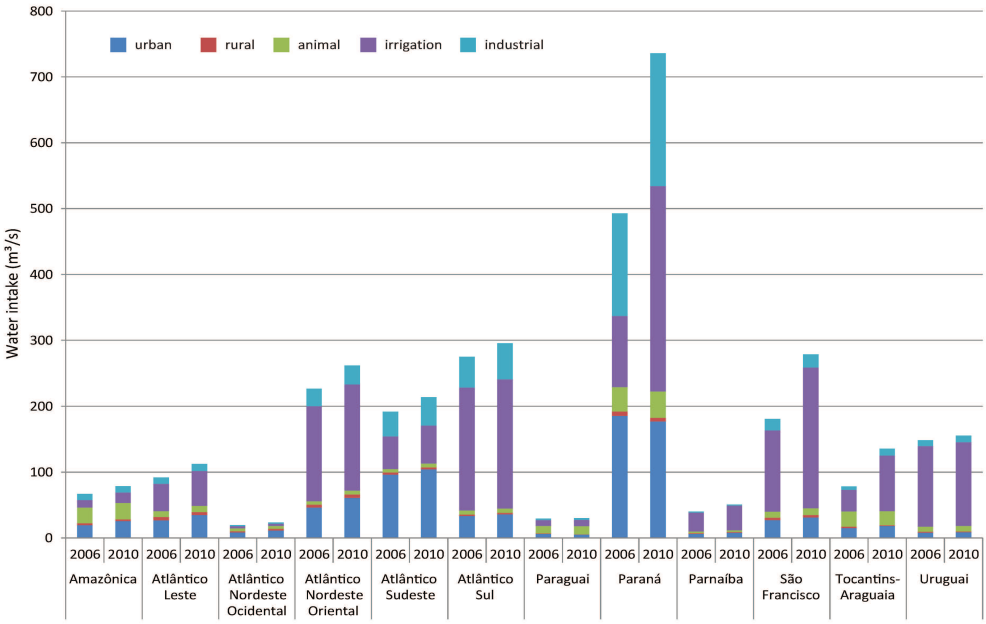



**Figure 11:** Water intake by hydrographic region and water use (2006 and 2010).
**Source:** ANA – Agência Nacional de Águas, 2013. Conjuntura dos Recursos Hídricos no Brasil. Brasília, 432 p.

#### 1.2.1.4 Coastal and marine, and continental aquatic resources

Matters related to the marine environment have been growing in importance, both regarding the environmental theme – considering the urgency of conservation actions in oceans, and the socio-environmental theme – considering the intensification of human actions in this environment, thus leading to growing discussions on the need and importance of establishing standards for the shared use of the marine environment. The increasing relevance of the sustainability aspect of development points out to the *governance of oceans* as the guiding instrument for the adequate use of the marine environment with the goal of achieving the sustainable use of its numerous resources, while responding to governmental interests and resulting in positive benefits to human society and to the marine ecosystems.

In this scenario, the Inter-ministerial Commission for Sea Resources (CIRM[43] - *Comissão Interministerial para os Recursos do Mar*) serves in Brazil as the forum for discussions on the governance of oceans and coordinates the implementation of the National Policy on Resources of the Sea (PNRM – *Política Nacional para os Recursos do Mar*), and the synergy and consensus among CIRM members have been generating significant results. In 2013, the Working Group for the Shared Use of the Marine Environment was created under CIRM with the purpose of harmonizing the various interests, and to analyze and propose directives and guidance for the national marine spatial planning as a contribution to the decision making process related to the use of the marine environment. Additionally, the periodically updated Sectoral Plan for Sea Resources – PSRM (*Plano Setorial para os Recursos do Mar*), under CIRM responsibility, established 10 Actions, two of which are particularly relevant for marine

[43] CIRM was created through Decree nº 74.557, of 12 September 1974, and is composed by 15 Ministries, the President's Office, the Secretariat for Ports of the President's Office, and Brazilian Navy Command.

biodiversity: (i) Marine Biotechnology – the BIOMAR Action, and (ii) Evaluation, Monitoring and Conservation of Marine Biodiversity – the REVIMAR Action.

The sub-sections below present information on the BIOMAR and REVIMAR Actions, as well as on living aquatic resources (marine and freshwater) and on the National Program for the Conservation of Coral Reefs – ReefCheck Brazil.

BIOMAR Action

The BIOMAR Action under the Sectoral Plan for Sea Resources – PSRM was created in 2005 and is coordinated by an Executive Committee chaired by the Ministry of Science Technology and Innovation. This Action has the objective of promoting the study and sustainable use of the biotechnological potential of the marine biodiversity within Brazilian jurisdictional waters and in other areas of national interest, through networks on marine biotechnology research. The aim is to promote the country's scientific, technological and economic development.

Under this action, the Brazilian Navy develops studies on the sustainable use of biodiversity and to generate knowledge, such as: ecological inventory of the species in the resurgence region of Cabo Frio (Rio de Janeiro state), bioactive substances from marine species for pharmaceutical uses, and development of anti-fouling paint using natural biocide substances, in addition to coordinating biodiversity-related projects. These studies are carried out by the Admiral Paulo Moreira Research Institute (IEAPM – *Instituto de Pesquisa Almirante Paulo Moreira*), which coordinates one of the National Science and Technology Institutes on Marine Sciences (INCT-Mar – *Institutos Nacionais de Ciência e Tecnologia em Ciências do Mar*).

REVIMAR Action

To follow the REVIZEE Program under CIRM[44], which carried out a broad assessment of the sustainability of the living marine resources of the Brazilian Exclusive Economic Zone from 1995 to 2005, the REVIMAR Action was created in 2005 by Decree n$^{o}$ 5.382/2005 as one of the 10 Actions of the Sectoral Plan for Sea Resources – PSRM (*Plano Setorial para os Recursos do Mar*), also under CIRM. The REVIMAR has the objective to assess, monitor and promote the conservation of marine biodiversity with an ecosystem approach, in order to establish the scientific basis necessary to support the development and implementation of coordinated policies and actions, as well as shared management strategies, for the conservation and sustainable use of marine living resources. The REVIMAR is coordinated by an Executive Committee led by the Ministry of the Environment and with representatives from various sectors: Environment; Science, Technology and Innovation; Agriculture, Livestock and Food Supply; Fisheries and Aquaculture, Mines and Energy, and Brazilian Navy. Targets proposed for REVIMAR are revised for each cycle of the Federal Multi-Year Plan every four years.

The most recent revision of REVIMAR was included in the Federal Multi-Year Plan 2012-2015 as part of the 8$^{th}$ PSRM under CIRM with the following targets:

- Establish a monitoring program for marine species, focusing particularly on vulnerable, threatened and overexploited species;

[44] Please see Brazil's 4$^{th}$ National Report to the CBD.

- Maintain the continuous assessment of six protected areas containing reef ecosystems with the ReefCheck monitoring method;
- Monitor 100% of the mapped mangrove areas (1,382,815 ha in 2009);
- Assess the conservation status of marine species to update the lists of threatened species;
- Double the number of Action Plans prepared for marine threatened species;
- Increase the total of marine consolidated protected areas to 4% of the Brazilian Territorial Sea and Exclusive Economic Zone; and
- Increase by 20% per year the planned operations to enforce the adequate use of living marine resources, aiming at their protection and sustainable use.

The planning and implementation of actions related to all of these targets are being led by the REVIMAR Executive Committee, under CIRM. Discussions are being finalized in 2014 for a work plan to streamline the achievement of the 2012-2015 targets, and the proposal includes institutional arrangements for targets that are still in the planning phase, such as the monitoring program for marine species.

The designing process of the monitoring program for marine species has defined the following parameters for monitoring through the sampling of landings, on-board observations or scientific expeditions: (i) composition of monthly catches by species, area, fishing method, total production, biological measurements of main target species, production by unit of fishing effort, record of threatened species captured, proportion of used and rejected volumes in landed catches, capture costs, price of first selling, etc.; (ii) main environmental parameters related to each fishing effort or research expedition, with an ecosystem approach; (iii) define research priorities regarding the type of fishing efforts and respective threatened or accompanying species, to assist in the identification of mitigation measures to reduce impacts from fishing activities; and (iv) apply mathematical methods to analyze fish stocks based on capture data to define priorities for regulation or conservation. When necessary, periodic efforts to assess the available biomass may also be applied. The monitoring program should have its operation supervised by IBAMA and evaluated by the REVIMAR Executive Committee. The next step will promote the coordination and cooperation among the REVIMAR participating institutions to ensure the adequate implementation of planned actions.

*Other coastal and marine monitoring*. The continuous assessment of five protected areas containing coral reefs is being carried out by ICMBio through the National Program for Monitoring Coral Reefs. This program has been monitoring reef ecosystems inside and outside protected areas since 2002 with ReefCheck methodology (see sub-section further down on the ReefCheck Brazil program).[45]

The national monitoring of mangrove areas is being carried out by the Remote Sensing Center of IBAMA – CSR/IBAMA, where maps of all Brazilian mangrove areas (totaling 1,382,815 hectares in 2009, corresponding to 9% of global mangroves) are currently being produced based on revised 2010 and 2011 data. Updated maps from 2010 onward should be available by the end of 2014. Nevertheless, given the ecosystem characteristics of high productivity, biodiversity and vulnerability, as well as the strong pressures from human activities, a complementary monitoring strategy will be developed under REVIMAR to collect data on threatened species, direct use of species

[45] The National Program to Monitor Coral Reefs was created through a technical agreement between MMA and the Federal University of Pernambuco – UFPE, which was implemented from 2005 to 2010. ICMBio continues to collect data in federal protected areas, and UFPE continues to collect data in some state and municipal protected areas.

and mangrove ecosystems, and human impacts inside and outside of protected areas, which will provide a stronger basis for decision-making and policy development.

*Conservation assessment of coastal and marine species*. ICMBio is in charge of assessing the conservation status of marine species to update the National Official List of Threatened Species of the Brazilian Fauna under the Pro-Species Program[46]. To-date, 1,418 marine species of bone fish and marine invertebrates had their status assessed, 144 of which were classified as threatened (Table 6). By the end of 2014, the target is to assess the status of 106 species of marine birds, additional 190 species of bone fish, and approximately 100 species of marine invertebrates.[47] The assessment being carried out by ICMBio identifies and locates the main threats to each species, the areas that are important for their conservation, evaluates compatibility with human activities, and provides information for the construction of species-specific risk scenarios. This information supports the updating of the National Official List of Threatened Species of the Brazilian Fauna, as well as the preparation of National Action Plans for the conservation and recovery of all threatened species. It is expected that, through the implementation of the Action Plans, the conservation status of targeted species will improve enough in the short and medium term to allow their removal from the official lists of threatened species.

**Table 6:** Number of marine species with conservation status assessed by April 2014, by taxonomic group

| Group | No. of assessed species | No. of threatened species |
|---|---|---|
| Mammals | 51 | 8 |
| Turtles | 5 | 5 |
| Bone fish | 1,021 | 39 |
| Elasmobranchs | 152 | 56 |
| Hagfish (*Myxini*) | 5 | 1 |
| Invertebrates* | 184 | 35 |
| **Total** | **1,418** | **144** |

*Assessed invertebrate species belonged to the classes of Mollusks, Crustaceans and Cnidarians.
**Source:** ICMBio, 2014. Diagnóstico da Fauna: Avaliação do Estado de Conservação de Espécies da Fauna Brasileira. Internal report to MMA.

The Elasmobranchs stand out among the marine taxonomic groups with threatened species, with all of its 56 species currently threatened by fishing activities, particularly trawling, net and trawl-line fishing. Their threatened status is further aggravated by the low population recruitment capacity of most species in this group. Of the 39 threatened bone fish species, 35 are also threatened by fishing activities, particularly trawl fishing.

On the 2014 International Day for Biological Diversity (22 May), the federal government announced two inter-ministerial Administrative Rulings for reducing the impact of fisheries activities on sharks and marine birds, currently awaiting publication: one forbids the by-catch and commercialization of hammerhead shark and silky sharks, and the second adopt measures to prevent the capture of albatrosses[48] and marine turtles. These instruments seek to implement ICCAT recommendations approved in 2010 and 2011. Additionally, the Ministry of the Environment and the Ministry of Fisheries and

[46] Pró-Espécies – Programa Nacional de Conservação das Espécies Ameaçadas de Extinção [*Pro-Species – National Program for the Conservation of Species Threatened with Extinction*], created by Administrative Ruling 43/2014.

[47] MMA, ICMBio, and IBAMA, 2014. Draft National Work Plan Proposal for the implementation of the REVIMAR. Internal Report, 24p.

[48] This new Administrative Ruling improves the previous protection measures established in INI MMA MPA nº 4/2011.

Aquaculture published an Inter-ministerial Administrative Ruling[49] establishing a five-year moratorium, starting in January 2015, for the capture and commercialization of *piracatinga* (*Callophysus macropterus*), an Amazonian freshwater fish. This latter measure intends to protect the pink dolphin, the tucuxi dolphin and caymans, which are hunted to serve as bait used to capture *piracatinga*, a carrion eating fish.[50]

ICMBio is also in charge of preparing the National Species Conservation Action Plans (PAN – *Planos de Ação Nacionais para Conservação de Espécies Ameaçadas de Extinção ou do Patrimônio Espeleológico*) for the conservation of individual threatened species, groups of species or habitats. PANs are policy instruments for regulating *in situ* and *ex situ* conservation actions for species, setting specific objectives within a defined timeline. Up to April 2014, 45 Action Plans (see section 1.4) had already been developed, addressing 49% (306) of the threatened species listed on the current official list. Seven of these Action Plans address coastal-marine species, and four other PANs are in preparation, as shown in Table 7.

**Table 7:** National Action Plans addressing coastal and marine species (April 2014)

| **PANs w/ preparation completed** | **Number of threatened species addressed** | **Number of planned actions** |
|---|---|---|
| Great Whales | 6 | 126 |
| Small Cetaceans | 0* | 107 |
| Marine Turtles | 5 | 71 |
| Sirenians | 1 | 130 |
| Franciscana dolphin | 1 | 88 |
| Island Reptiles | 4 | 78 |
| Albatrosses and Petrels | 11 | 69 |
| **Total** | **28** | **669** |
| **PANs in preparation** | **Number of threatened species addressed** | **Number of actions** |
| Sharks | 12 | To be defined |
| Reef Environments | 18 | To be defined |
| Mangroves | 11 | To be defined |
| Coastal and marine birds | 16 | To be defined |
| **Total** | **57** | |

**Source:** MMA, ICMBio, and IBAMA, 2014. Draft National Work Plan Proposal for the implementation of the REVIMAR. Internal Report, 24p.

*The Small Cetaceans PAN includes all small cetaceans in Brazilian waters, including the Franciscana dolphin, for which a specific PAN was later prepared. The 2014 review of the conservation status of Brazilian animal species carried out by ICMBio indicates that the number of threatened species addressed by the Small Cetaceans PAN may change from 0 to 6, after the publication of the revised official list of threatened species.

For the 2012 – 2015 REVIMAR period, ICMBio's target is to complete the preparation of four new Action Plans for marine threatened species, and have 11 Action Plans for marine species under implementation.

The Ministry of the Environment and ICMBio intend to achieve the REVIMAR target to increase the total of marine consolidated protected areas to 4% of the Brazilian Territorial Sea and Exclusive Economic Zone mainly through the implementation of the

[49] Ministério da Pesca e Aquicultura, 2014. Instrução Normativa Interministerial nº 6, de 17 de julho de 2014. http://pesquisa.in.gov.br/imprensa/jsp/visualiza/index.jsp?jornal=1000&pagina=13&data=18/07/2014

[50] http://www.mma.gov.br/informma/item/10143-governo-comemora-resultados-e-amplia-a%C3%A7%C3%B5es-em-defesa-da-fauna ; http://www.icmbio.gov.br/portal/comunicacao/noticias/4-destaques/4815-acoes-integradas-garantem-mais-eficencia-na-preservacao-das-especies.html

GEF-supported Marine Protected Areas Project – GEF Mar[51], currently in its final phase of negotiations. The main objective of this 5-year Project is to support the expansion and consolidation of a Coastal and Marine Protected Areas System in Brazil that is globally significant, representative, and effective, as well as to identify mechanisms for the financial sustainability of the protected areas system.

Finally, IBAMA coordinates the REVIMAR target to increase by 20% per year the planned operations to enforce the adequate use of living marine resources, aiming at their protection and sustainable use. The draft work plan[52] proposes that this increase should be obtained with the integration of actions planned by the agencies responsible for this enforcement, among which: IBAMA, ICMBio, Ministry of Fisheries and Aquaculture – MPA (*Ministério da Pesca e Aquicultura*), and Brazilian Navy. The strategy should include the proposal of regulations and institutional structure adjustments, as well as the development of an inter-ministerial collaborative information network to combat illegal actions at sea, among other aspects.

Living aquatic resources

Although no new broad assessment of the conservation status of marine resources was carried out since the REVIZEE 2006 initiative, 2011 data on marine and freshwater fisheries production is available through the Ministry of Fisheries and Aquaculture.

Despite the indication provided by REVIZEE 2006[53] that most marine fish stocks in the Brazilian Exclusive Economic Zone are overexploited, the total national fisheries production in 2011 reached 1,432,974 tons, representing a 13.2% increase in comparison with 2010, mostly due to marine and continental aquaculture production. Marine extractive fisheries maintained its rank contributing with the largest portion of the national fisheries production (553,670 tons, or 38.7% of the total production), followed closely by continental aquaculture with 544,490 tons (38.0%). The continental extractive fisheries contributed with 249,600 tons (17.4%), and marine aquaculture with 84,214 tons (5.9%). The Northeast region continued in 2011 to record the highest fisheries production in Brazil (454,217 tons or 31.7% of national production), while the South region was responsible for 336.452 tons (23.5%), the North region reached 326,128 tons (22.8%), the Southeast reached 226,233 tons (15.8%), and the Center-West region 88.945 tons (6.2%) (Figure 12).[54]

[51] Projeto de Apoio a Sistemas Representativos e Efetivos de Áreas Costeiras e Marinhas Protegidas – GEF Mar.

[52] MMA, ICMBio, and IBAMA, 2014. Draft National Work Plan Proposal for the implementation of the REVIMAR. Internal Report, 24p.

[53] Brasil, Ministério do Meio Ambiente. 2006. Programa REVIZEE – Relatório Executivo: Avaliação do potencial sustentável de recursos vivos na Zona Econômica Exclusiva do Brasil.

[54] MPA, 2011. Boletim Estatístico da Pesca e Aquicultura – versão preliminar. Brasília, 60p.

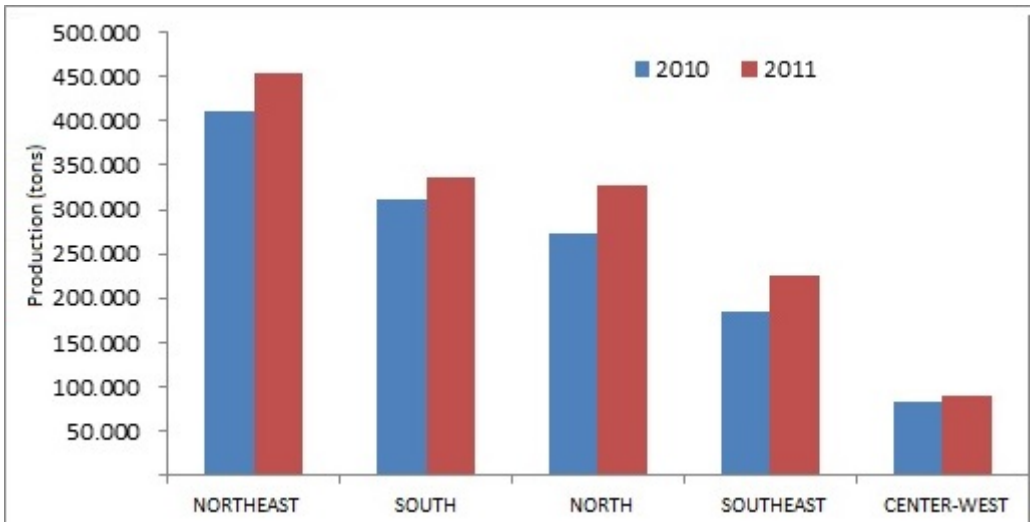



**Figure 12:** National fisheries production (tons) by region, in 2010 and 2011.
**Source:** MPA, 2011. Boletim Estatístico da Pesca e Aquicultura – versão preliminar. Brasília, 60p.

Among Brazilian states, Santa Catarina in the South region remained at the top of the list of fisheries production with 192,867 tons (13.6%), followed by the Northern state of Pará with 153,332 tons (10.7%) and the Northeastern state of Maranhão with 102,868 tons (7.2%). The states of Bahia, Rio Grande do Sul, São Paulo, Mato Grosso, Alagoas, Sergipe, and Federal District presented a reduction in fisheries production in comparison with 2010, while all other states presented a production increase (Figure 13).

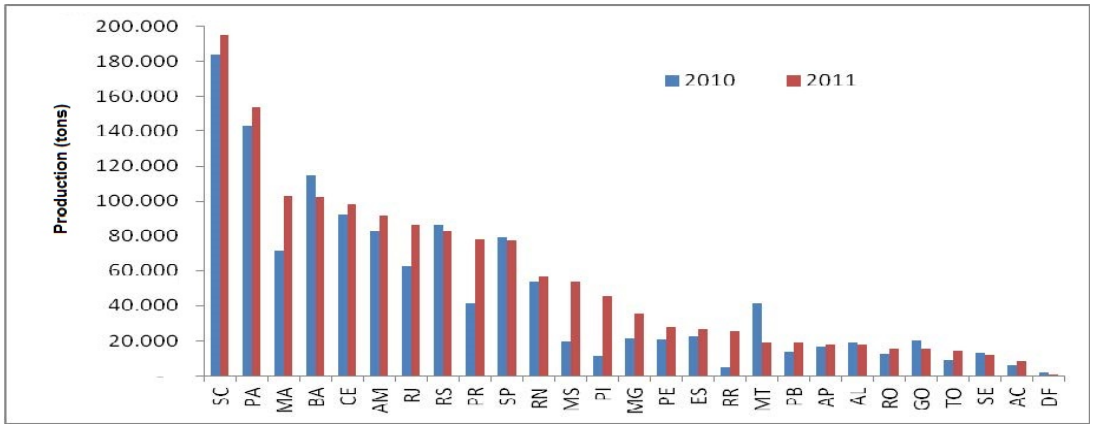



**Figure 13:** Total national fisheries production (tons) by Brazilian states, in 2010 and 2011.
**Source:** MPA, 2011. Boletim Estatístico da Pesca e Aquicultura – versão preliminar. Brasília, 60p.

Considering exclusively the extractive fisheries production, an increase of approximately 2.3% in 2011 was observed in the marine extractive production comparison with 2010, while the continental extractive production increased by 3.2% in the same period (Table 8).

**Table 8:** National extractive fisheries production (marine and continental) in 2009, 2010 and 2011.

| Extractive fisheries | 2009 (tons) | 2010 (tons) | 2011 (tons) |
|---|---|---|---|
| Continental | 239,493 | 248,911 | 249,600 |
| Marine | 585,671 | 536,455 | 553,670 |
| **Total** | **825,164** | **785,366** | **803,270** |

**Source:** Modified from MPA, 2011. Boletim Estatístico da Pesca e Aquicultura – versão preliminar. Brasília, 60p.

Fish species represented 87% of the total marine extractive fisheries production in 2011, followed by crustaceans (10%) and mollusks (3%). Among the most captured fish species, the Brazilian sardinella (*Sardinella brasiliensis*) represented the largest landing volume (75,123 tons). The second most captured species was the whitemouth croaker (*Micropogonias furnieri*), followed by the "other fish" categories. The skipjack tuna (*Katsuwonus pelamis*) was the fourth most captured fish species in 2011, with 30,563 tons. Among the crustaceans, the Atlantic seabob and São Paulo shrimp (*Xiphopenaeus kroyeri* and *Farfantepenaeus paulensis*) remain as the most captured species in Brazilian waters, representing 45% of the total national crustacean production. The lobster, which is one of the main species captured for export, represented 12% of the total captured crustaceans. And among mollusks, the mussel remains as the most captured species, followed by the *sururu* shellfish and octopuses (Table 9).

**Table 9:** National marine extractive fisheries production by species in 2009, 2010 and 2011.

| Species/ Zoological Group | | 2009 | 2010 | 2011 |
|---|---|---|---|---|
| **TOTAL** | | **585,671.5** | **536,454.9** | **553,670.0** |
| **FISH (local names)** | **Scientific names** | **510,523.8** | **465,454.7** | **482,335.7** |
| Abrótea | *Urophycis* spp. | 5,858.7 | 5,531.6 | 5,587.5 |
| Agulha | *Hyporhamphus unifasciatus* | 1,205.4 | 1,135.6 | 1,150.0 |
| Agulhão | | 1.9 | 10.8 | 115.6 |
| Agulhão-branco | *Tetrapturus albidus* | 52.3 | 35.0 | 59.7 |
| Agulhão-negro | *Makaira nigricans* | 149.1 | 130.1 | 63.4 |
| Agulhão-vela | *Istiophorus albicans* | 432.2 | 71.0 | 137.0 |
| Albacora | | 624.3 | 589.9 | 595.4 |
| Albacora-bandolim | *Thunnus obesus* | 1,175.4 | 1,151.1 | 1,799.2 |
| Albacora-branca | *Thunnus alalunga* | 202.3 | 270.8 | 1,269.1 |
| Albacora-lage | *Thunnus albacares* | 3,313.0 | 3,668.5 | 3,498.8 |
| Albacorinha | *Thunnus atlanticus* | 348.1 | 328.6 | 45.7 |
| Arabaiana | *Seriola lalandi* | 739.5 | 697.8 | 704.9 |
| Arenque | *Lycengraulis* spp. | 46.6 | 44.0 | 44.4 |
| Ariacó | *Lutjanus synagris* | 2,046.5 | 1,932.5 | 1,951.3 |
| Arraia | Species of the families Rajidae, Rhinobatidae, Myliobatidae, Gymnuridae, Narcinidae, and Dasyatidae | 7,482.3 | 7,072.8 | 7,132.9 |
| Atum (tuna) | | 240.3 | 724.9 | 1,718.0 |
| Badejo | *Mycteroperca* spp. | 2,047.0 | 1,934.6 | 1,604.0 |
| Bagre | Species of the Ariidae family | 10,108.8 | 9,554.5 | 9,636.9 |
| Baiacu | *Lagocephalus laevigatus* | 657.0 | 620.9 | 626.1 |
| Bandeirado | *Bagre* spp. | 4,344.4 | 4,102.6 | 4,142.1 |
| Batata | *Caulolatilus chrysops* *Lopholatilus villarii* | 845.0 | 797.6 | 805.7 |
| Beijupirá | *Rachycentron canadum* | 975.9 | 922.9 | 930.4 |
| Bicuda | *Sphyraena tome* | 411.7 | 389.0 | 392.6 |
| Biquara | *Haemulon plumierii* | 1,288.3 | 1,216.4 | 1,228.3 |
| Boca-torta | *Larimus breviceps* | 0.4 | 0.3 | 0.3 |
| Bonito | | 2,023.4 | 1,910.7 | 1,928.6 |
| Bonito-cachorro | *Auxis thazard* | 313.2 | 204.5 | 582.7 |
| Bonito-listrado | *Katsuwonus pelamis* | 23,307.2 | 20,639.7 | 30,563.3 |
| Bonito-pintado | *Euthynnus alletteratus* | 489.6 | 462.7 | 466.8 |
| Budião | *Sparisoma* spp. | 279.8 | 264.4 | 266.6 |
| Cabeçudo | *Stellifer* spp. | 338.1 | 320.3 | 322.6 |
| Cabra | *Prionotus* spp. | 5,816.4 | 5,493.3 | 5,545.0 |
| Cação | Species of the families Lamnidae, Carcharhinidae, Triakidae, Odontaspididae, | 12,000.8 | 11,909.1 | 9,770.5 |

| Species/ Zoological Group | | 2009 | 2010 | 2011 |
|---|---|---|---|---|
| | Sphyrnidae, Alopiidae, and Squalidae | | | |
| Cação-azul | *Prionace glauca* | 1,273.5 | 1,500.5 | 1,979.5 |
| Cambeua | *Notarius grandicassis* | 1,347.9 | 1,270.5 | 1,283.6 |
| Cambuba | *Haemulon flavolineatum* | 55.7 | 52.6 | 53.1 |
| Camurupim | *Megalops atlanticus* | 865.4 | 817.7 | 581.8 |
| Cangatá | *Aspistor quadriscutis* | 3,001.9 | 2,833.2 | 2,863.2 |
| Caranha | *Lutjanus* spp. | 177.5 | 167.4 | 82.9 |
| Carapeba | *Diapterus auratus*<br>*Eugerres brasilianus*<br>*Eucinostomus argenteus* | 2,115.1 | 1,996.8 | 988.8 |
| Carapitanga | *Lutjanus* spp. | 260.2 | 245.2 | 248.0 |
| Castanha | *Umbrina canosai* | 12,761.2 | 12,051.6 | 12,164.8 |
| Cavala | *Scomberomorus cavala*<br>*Acanthocybium solandri* | 4,752.5 | 4,491.9 | 4,531.1 |
| Cavalinha | *Scomber japonicus* | 5,362.6 | 5,058.6 | 5,117.1 |
| Cherne | *Epinephelus* spp.<br>*Hyporthodus flavolimbatus*<br>*Polyprion americanus* | 468.4 | 442.3 | 446.7 |
| Cioba | *Lutjanus analis*<br>*Ocyurus chrysurus* | 3,160.9 | 2,986.9 | 3,014.5 |
| Congro | *Conger* spp. | 91.1 | 86.4 | 86.9 |
| Congro-rosa | *Genypterus brasiliensis* | 643.4 | 607.7 | 613.5 |
| Corcoroca | *Haemulon* spp.<br>*Pomadasys* spp.<br>*Orthopristis ruber* | 235.7 | 222.5 | 224.7 |
| Coró | *Conodon nobilis* | 54.5 | 51.5 | 52.0 |
| Corvina | *Micropogonias furnieri*<br>*Micropogonias undulatus* | 45,750.2 | 43,191.3 | 43,369.7 |
| Dentão | *Lutjanus jocu* | 999.4 | 943.2 | 953.1 |
| Dourado | *Coryphaena hippurus* | 8,588.0 | 7,999.3 | 4,379.2 |
| Enchova | *Pomatomus saltatrix* | 3,954.4 | 3,731.1 | 3,769.0 |
| Enguia | *Conger orbignyanus* | 37.0 | 35.0 | 35.3 |
| Peixe-espada | *Trichiurus lepturus* | 2,673.2 | 2,523.2 | 2,530.1 |
| Espadarte | *Xiphias gladius* | 3,385.6 | 2,925.6 | 3,033.0 |
| Galo-de-profundidade | *Zenopsis conchifer* | 50.6 | 48.0 | 48.3 |
| Garajuba | *Caranx crysos* | 1,729.7 | 1,633.8 | 1,648.7 |
| Garapau | *Selar crumenophthalmus* | 681.6 | 646.1 | 650.1 |
| Garoupa | *Epinephelus* spp. | 1,171.3 | 1,107.2 | 1,116.7 |
| Goete | *Cynoscion jamaicensis* | 3,249.1 | 3,068.2 | 3,097.0 |
| Golosa | *Genyatremus luteus* | 1.1 | 1.0 | 1.0 |
| Guaiúba | *Cardisoma guanhumim* | 5,233.1 | 4,945.3 | 4,988.1 |
| Guaivira | *Oligoplites* spp. | 1,964.5 | 1,855.8 | 1,354.6 |
| Gurijuba | *Arius* spp. | 6,520.5 | 6,159.9 | 6,218.1 |
| Jurupiranga | *Amphiarius rugispinis* | 281.8 | 266.2 | 268.8 |
| Linguado | *Amphiarius rugispinis*<br>*Bothus* spp.<br>*Gymnachirus* spp.<br>*Scyacium* spp.<br>*Etropus* spp.<br>*Citharichthys* spp.<br>*Cyclopsetta* spp.<br>*Monolene* sp. | 2,812.9 | 2,657.9 | 2,682.3 |
| Manjuba | *Anchoa* spp.<br>*Centengraulis edentulus*<br>*Anchoviella* spp.<br>*Lycengraulis grossidens* | 4,855.9 | 4,583.4 | 4,528.8 |

| Species/ Zoological Group | | 2009 | 2010 | 2011 |
|---|---|---|---|---|
| Merluza | *Merluccius hubbsi* | 2,013.8 | 1,900.9 | 1,920.0 |
| Mero | *Epinephelus itajara* | 327.5 | 309.0 | 312.2 |
| Mororó | *Gymnothorax* spp. | 45.6 | 43.0 | 43.5 |
| Namorado | *Pseudopercis* spp. | 672.8 | 635.1 | 641.5 |
| Olhête | *Seriola lalandi* | 367.0 | 346.7 | 349.8 |
| Olho-de-boi | *Seriola dumerili* | 149.7 | 141.3 | 142.7 |
| Olho-de-cão | *Priacanthus* spp. | 210.1 | 198.0 | 200.5 |
| Oveva | *Larimus breviceps* | 244.3 | 230.7 | 233.0 |
| Pacamão | *Amphicthys cryptocentrus* | 344.2 | 325.1 | 328.2 |
| Palombeta | *Chloroscombrus chrysurus* | 2,971.2 | 2,806.3 | 2,832.8 |
| Pampo | *Trachinotus* spp. | 1,155.3 | 1,093.8 | 817.6 |
| Papa-terra | *Menticirrhus* spp. | 2,133.6 | 2,014.8 | 2,034.0 |
| Pargo | *Lutjanus purpureus* | 6,554.6 | 6,198.6 | 6,247.7 |
| Pargo-rosa | *Pagrus pagrus* | 2,359.7 | 2,228.8 | 2,249.6 |
| Parú | *Chaetodipterus faber* | 270.7 | 255.9 | 258.1 |
| Peixe-galo | *Selene* spp. | 2,167.6 | 2,045.8 | 1,781.9 |
| Peixe-pedra | *Genyatremus luteus* | 1,640.6 | 1,548.0 | 1,564.5 |
| Peixe-rei | *Atherinella brasiliensis*<br>*Odontesthes* spp.<br>*Odontesthes argentinensis* | 1.5 | 1.4 | 1.4 |
| Peixe-sapo | *Lophius gastrophysus* | 2,743.9 | 2,591.9 | 2,616.2 |
| Peixe-voador | *Hirundichthys affinis*<br>*Cheilopogon cyanopterus* | 1,118.9 | 1,055.6 | 1,054.9 |
| Peroá | *Balistes capriscus*<br>*Aluterus monóceros* | 5,543.3 | 5,239.8 | 5,284.1 |
| Pescada | *Cynoscion* spp.<br>*Macrodon* spp. | 6,821.8 | 6,435.1 | 6,504.0 |
| Pescada amarela | *Cynoscion acoupa* | 22,102.3 | 20,878.6 | 21,074.2 |
| Pescada-branca | *Cynoscion leiarchus* | 1,003.4 | 948.1 | 956.3 |
| Pescada-cambuçu | *Cynoscion virescens* | 819.9 | 777.6 | 782.3 |
| Pescada-olhuda | *Cynoscion guatucupa* | 6,339.1 | 6,002.2 | 6,044.6 |
| Pescadinha-real | *Macrodon ancylodon* | 11,138.5 | 10,507.1 | 7,043.7 |
| Pirajica | *Kyphosus* spp. | 55.9 | 52.8 | 53.2 |
| Prejereba | *Lobotes surinamensis* | 20.1 | 19.0 | 19.1 |
| Robalo | *Centropomus* spp. | 3,859.3 | 3,644.9 | 3,680.3 |
| Roncador | *Conodon nobilis* | 108.3 | 102.2 | 103.2 |
| Sapuruna | *Haemulon* spp. | 324.1 | 306.3 | 308.9 |
| Saramonete | *Pseudupeneus maculatus* | 473.1 | 447.3 | 451.0 |
| Sarda | *Sarda sarda* | 367.2 | 346.8 | 350.1 |
| Sardinha | Species of the Clupeidae and Engraulidae families | 18,507.7 | 17,476.6 | 17,646.2 |
| Sardinha-cascuda | *Harengula clupeola* | 296.1 | 279.8 | 282.3 |
| Sardinha-lage | *Opisthonema oglinum* | 9,237.2 | 8,709.5 | 8,810.3 |
| Sardinha-verdadeira | *Sardinella brasiliensis* | 83,286.5 | 62,133.9 | 75,122.5 |
| Savelha | *Brevoortia* spp. | 907.7 | 856.9 | 865.8 |
| Serra | *Scomberomorus maculatus* | 10,133.3 | 9,572.6 | 9,658.8 |
| Sororoca | *Scomberomorus brasiliensis* | 449.1 | 424.3 | 428.3 |
| Tainha | *Mugil* spp. | 18,918.6 | 17,866.1 | 18,045.9 |
| Tira-vira | *Percophis brasiliensis* | 817.8 | 772.4 | 780.1 |
| Tortinha | *Isopisthus parvipinnis* | 91.1 | 86.1 | 86.8 |
| Trilha | *Mullus argentinae* | 1,051.2 | 992.7 | 1,002.4 |
| Uricica | *Hexanematichthys bonillai* | 1,196.1 | 1,129.7 | 1,140.6 |
| Uritinga | *Arius proops* | 6,368.0 | 6,013.7 | 6,070.5 |
| Vermelho | *Lutjanus* spp. | 2,969.4 | 2,803.5 | 2,831.6 |
| Xaréu | *Caranx hippos* | 2,597.3 | 2,453.5 | 2,476.5 |
| Xarelete | *Caranx hippos* | 3,707.1 | 3,498.9 | 3,360.2 |
| Xirá | *Haemulon* spp. | 3.8 | 3.6 | 3.6 |

| Species/ Zoological Group | | 2009 | 2010 | 2011 |
|---|---|---|---|---|
| Xixaro | *Trachurus lathami* | 1,656.2 | 1,563.3 | 1,580.3 |
| Other | | 42,128.6 | 39,796.0 | 40,168.2 |

| Species/ Zoological Group | | 2009 | 2010 | 2011 |
|---|---|---|---|---|
| **CRUSTACEANS (local name)** | **Scientific name** | **60,475.4** | **57,141.7** | **57,344.8** |
| Aratu | *Goniopsis cruentata* | 98.6 | 93.4 | 94.1 |
| Camarão | *Litopenaeus vannamei* | 4,949.9 | 4,680.5 | 4,720.3 |
| Camarão-barba-ruça | *Artemesia longinaris* | 3,335.4 | 3,149.5 | 3,180.5 |
| Camarão-branco | *Litopenaeus schimitti* | 4,316.3 | 4,077.1 | 4,115.7 |
| Camarão-rosa | *Farfantepenaeus paulensis*<br>*Farfantepenaeus brasiliensis*<br>*Farfantepenaeus subtilis* | 10,841.0 | 10,237.3 | 10,331.2 |
| Camarão-santana | *Pleoticus muelleri* | 1,011.2 | 954.2 | 963.5 |
| Camarão-sete-barbas | *Xiphopenaeus kroyeri* | 16,168.4 | 15,275.8 | 15,417.8 |
| Caranguejo-uçá | *Ucides cordatus* | 9,027.4 | 8,534.7 | 8,607.5 |
| Guaiamum | *Cardisoma guanhumim* | 94.0 | 88.7 | 89.6 |
| Lagosta | *Panulirus laevicauda* | 7,267.6 | 6,865.6 | 6,929.2 |
| Lagostim | *Metanephrops rubellus* | 170.4 | 161.1 | 162.5 |
| Siri | *Callinectes* spp. | 2,405.5 | 2,274.4 | 2,292.9 |
| Other | | 789.8 | 749.4 | 440.2 |

| Species/ Zoological Group | | 2009 | 2010 | 2011 |
|---|---|---|---|---|
| **MOLLUSKS (local name)** | **Scientific name** | **14,672.2** | **13,858.4** | **13,989.4** |
| Berbigão | *Anomalocardia brasiliana* | 59.9 | 56.6 | 57.1 |
| Calamar-argentino | *Illex argentinus* | 393.0 | 371.6 | 374.8 |
| Lula | *Loligo* spp.<br>*Lolliguncula brevis*<br>*Doryteuthis plei*<br>*Sepioteuthis sepioidea*<br>*Todarodes filippovae*<br>*Ornithoteuthis* spp.<br>*Symplectoteuthis luminosa*<br>*Hyaloteuthis pelágica* | 1,701.8 | 1,608.4 | 1,623.6 |
| Maçunim | *Tivela mactroides* | 1,754.1 | 1,652.5 | 1,670.8 |
| Mexilhão | *Perna perna* | 3,956.4 | 3,729.6 | 3,772.5 |
| Ostra | *Crassostrea* spp. | 1,294.5 | 1,223.5 | 1,233.7 |
| Polvo | *Octopus* spp.<br>*Eledone* spp. | 2,191.7 | 2,069.2 | 2,089.6 |
| Sarnambi | *Lucina pectinata* | 142.1 | 135.3 | 135.7 |
| Sururu | *Mytilus falcata* | 2,238.1 | 2,116.3 | 2,133.3 |
| Vieira | *Euvola ziczac* | 0.9 | 0.9 | 0.9 |
| Other | | 939.7 | 894.6 | 897.4 |

**Source:** Modified from MPA, 2011. Boletim Estatístico da Pesca e Aquicultura – versão preliminar. Brasília, 60p.

The total continental extractive fisheries production in 2011 reached 249,600 tons, with the North region figuring as the top producer with 137,145 tons (55% of total national capture). The second largest production came from the Northeast region with 68,701 tons, with the remaining regions presenting comparatively much lower volumes (Figure 14). Among the Northern states, the Amazonas presenting by far the most expressive volume (63,743 tons or 40.3%) of continental extractive fisheries production followed by Pará with 55,403 tons, and Maranhão in the Northeast with 25,744 tons (Figure 15).

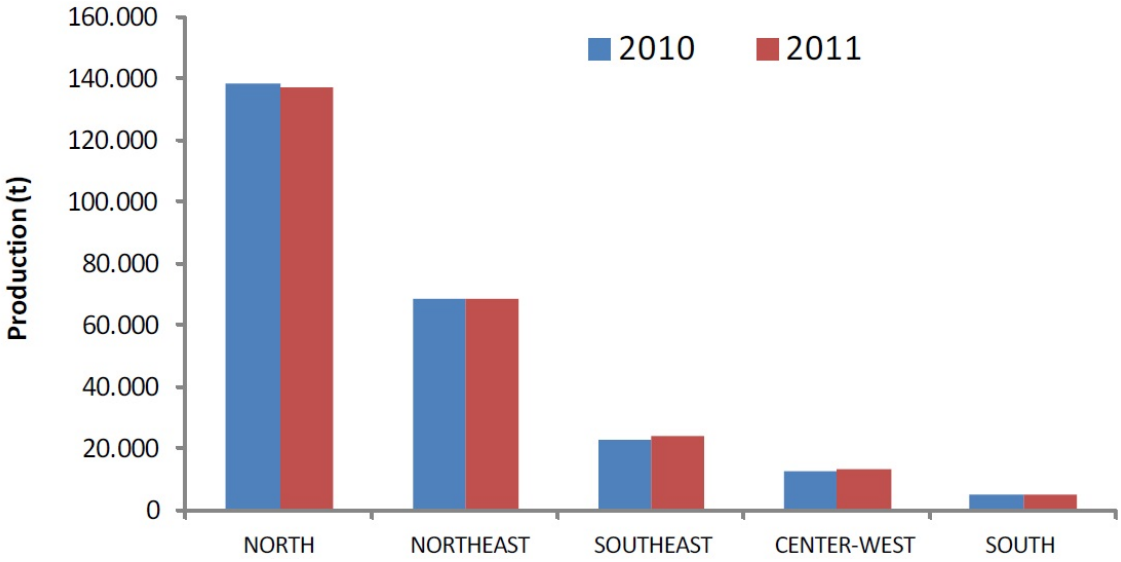



**Figure 14:** Total continental extractive fisheries production by region in 2011.
**Source:** MPA, 2011. Boletim Estatístico da Pesca e Aquicultura – versão preliminar. Brasília, 60p.

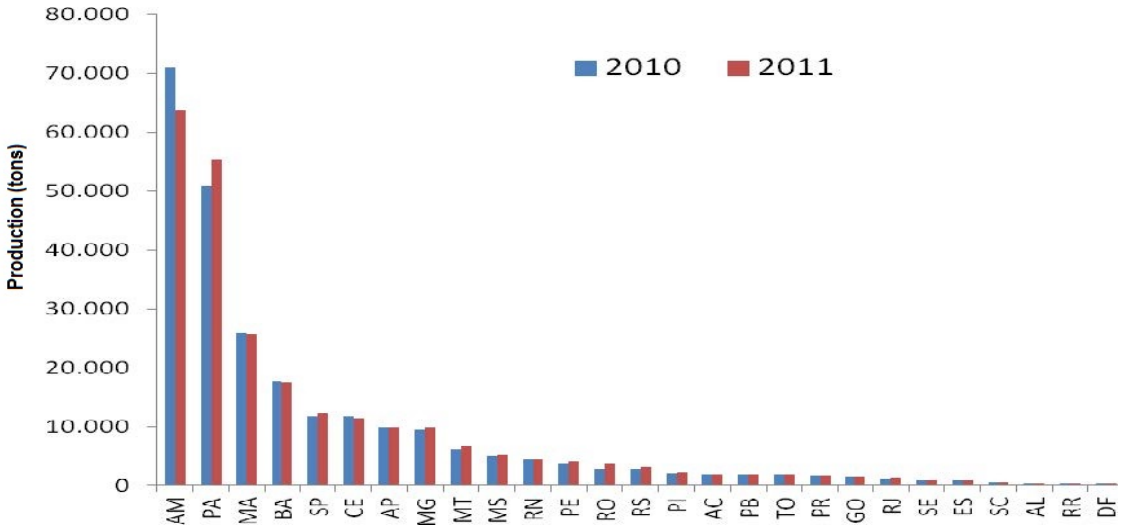



**Figure 15:** Total continental extractive fisheries production by state in 2011.
**Source:** MPA, 2011. Boletim Estatístico da Pesca e Aquicultura – versão preliminar. Brasília, 60p.

Among the captured continental fish, the *curimatã* represented the largest volume with 28,643 tons, followed by *piramutaba* with 24,789 tons, *jaraqui* with 16,557 tons, *dourada* with 14,486 tons, *pescada* with 13,150 tons, and *pacu* with 11,123 tons. Together, in 2011 these six species represented 44.6% of the national continental fisheries production (Table 10). Some of the listed species with significant volumes captured by continental extractive fisheries activities in open freshwater habitats are not native to Brazil, such as carp and tilapia.

**Table 10:** Continental extractive fisheries production (tons) by species in 2008, 2009 and 2010.

| **Species/ Zoological Group** | | **2009** | **2010** | **2011** |
|---|---|---|---|---|
| **TOTAL** | | **239,492.6** | **248,911.4** | **249,600.2** |
| **FISH (local name)** | **Scientific name** | **233,972.9** | **243,174.7** | **243,820.7** |
| Acará | *Geophagus* spp. | 3,542.9 | 3,682.2 | 3,709.5 |
| Acaratinga | *Geophagus proximus* | 738.2 | 767.2 | 772.9 |
| Acari-bodó | *Pterygoplichthys* spp.<br>*Hypostomus* spp. | 1,471.1 | 1,529.0 | 1,540.3 |
| Apaiari | *Astronotus ocellatus* | 1,869.5 | 1,943.0 | 1,957.4 |
| Apapá | *Pellona* spp. | 67.3 | 70.0 | 70.5 |

| Species/ Zoological Group | | 2009 | 2010 | 2011 |
|---|---|---|---|---|
| Aracu | *Schizodon* spp. | 4,977.3 | 5,173.1 | 5,211.3 |
| Arenque | *Lycengraulis* spp. | 0.5 | 0.5 | 0.5 |
| Armado | *Pterodoras granulosus* | 298.9 | 310.6 | 312.9 |
| Arraia | *Potamotrygon* spp. | 758.3 | 788.1 | 794.0 |
| Aruanã | *Osteoglossum bicirrhosum*<br>*Osteoglossum ferreirai* | 1,662.1 | 1,727.4 | 1,740.3 |
| Bacu | *Platydoras costatus* | 210.6 | 218.9 | 220.5 |
| Bagre-amarelo | *Pimelodus maculatus* | 29.1 | 30.2 | 30.4 |
| Bagre (mandi) | *Pimelodus* spp. | 6,188.8 | 6,432.2 | 6,479.9 |
| Barbado | *Pirinampus pirinampu* | 1,110.9 | 1,154.6 | 1,135.0 |
| Bico-de-pato | *Sorubim lima* | 221.9 | 230.6 | 154.5 |
| Boca | *Boops boops* | 19.5 | 20.3 | 20.4 |
| Branquinha | *Curimata* spp.<br>*Cyphocarax* spp. | 5,012.4 | 5,209.5 | 5,248.1 |
| Cachara | *Pseudoplatystoma reticulatum* | 998.9 | 1,038.1 | 1,045.8 |
| Cachorra | *Hydrolycus scomberoides* | 146.0 | 151.7 | 152.9 |
| Cará | *Várias espécies* | 6.8 | 7.1 | 7.2 |
| Carpa | *Cyprinus carpio* | 430.6 | 447.5 | 450.9 |
| Cascudo | *Hypostomus* spp.<br>*Megalancystrus aculeatus*<br>*Loricaria* spp<br>*Rhinelepisaspera* | 566.7 | 589.0 | 593.4 |
| Charuto | *Leporellus* spp. | 1,300.2 | 1,351.3 | 1,361.3 |
| Cubiu | *Anodus elongatus* | 0.7 | 0.7 | 0.7 |
| Cuiú-cuiú | *Oxydoras niger* | 439.2 | 456.5 | 459.8 |
| Curimatã | *Prochilodus* spp. | 27,356.3 | 28,432.6 | 28,643.0 |
| Dourada | *Brachyplatystoma rousseauxii* | 13,835.3 | 14,379.4 | 14,486.1 |
| Dourado | *Salminus* spp | 3,042.0 | 3,161.7 | 3,184.8 |
| Filhote | *Brachyplatystoma filamentosum* | 3,161.8 | 3,286.1 | 3,310.4 |
| Jaraqui | *Semaprochilodus* spp. | 15,813.0 | 16,434.8 | 16,556.8 |
| Jatuarama | *Argonectes* spp. | 282.9 | 294.0 | 296.2 |
| Jaú | *Paulicea luetkeni*<br>*Zungaro zungaro* | 804.0 | 835.7 | 841.8 |
| Jeju | *Hoplerythrinus unitaeniatus* | 302.1 | 314.0 | 316.3 |
| Jundiá | *Rhamdia* sp. | 338.8 | 352.1 | 354.7 |
| Jurupoca | *Hemisorubim platyrhynchus* | 12.0 | 12.5 | 12.6 |
| Lambari | *Astyanax* spp. | 1,056.4 | 1,097.9 | 1,068.3 |
| Linguado | *Catathiridium jenynsii* | 3.1 | 3.2 | 3.2 |
| Mandubé | *Ageneiosus inermis* | 2,158.6 | 1,908.3 | 2,071.8 |
| Mapará | *Hypophthalmus* spp. | 9,211.0 | 9,573.2 | 9,622.9 |
| Matrinchã | *Brycon* spp. | 4,901.5 | 5,027.7 | 5,094.7 |
| Mistura | Several species | 385.0 | 400.1 | 403.1 |
| Muçum | *Synbranchus marmoratus* | 33.1 | 34.4 | 34.7 |
| Pacamão | *Lophiosilurus alexandri* | 548.9 | 570.5 | 574.7 |
| Pacu | *Metynnis* spp.<br>*Myleus* spp.<br>*Myloplus* spp.<br>*Mylossoma* spp. | 10,624.2 | 11,042.0 | 11,123.9 |
| Pati | *Luciopimelodus pati* | 0.5 | 0.5 | 0.5 |
| Peixe-voador | *Hemiodus* spp. | 103.9 | 108.0 | 87.2 |
| Peixe-cachorro | *Acestrorhynchus* spp. | 29.7 | 30.9 | 31.1 |

| Species/ Zoological Group | | 2009 | 2010 | 2011 |
|---|---|---|---|---|
| Peixe-rei | *Odontesthes* spp. | 63.3 | 65.8 | 66.3 |
| Pescada | *Plagioscion* spp. | 12,036.8 | 14,966.8 | 13,150.3 |
| Pescada-do-Piauí | *Plagioscion squamosissimus* | 6,708.9 | 4,516.0 | 5,644.4 |
| Piau | *Leporinus* spp. | 5,295.3 | 5,503.6 | 5,544.4 |
| Piava | *Schizodon* spp. | 36.6 | 38.0 | 38.3 |
| Pintado | *Pseudoplatystoma corruscans* | 1,966.1 | 2,043.4 | 2,058.6 |
| Pirá | *Conorhynchus conirostris* | 1,359.5 | 1,413.0 | 1,423.5 |
| Piracanjuba | *Brycon orbignyanus* | 8.1 | 8.4 | 8.5 |
| Piramutaba | *Brachyplatystoma vaillantii* | 23,676.3 | 24,607.4 | 24,789.3 |
| Piranha | *Serrasalmus* spp. | 3,507.8 | 3,645.7 | 3,672.8 |
| Pirapitinga | *Piaractus brachypomus* | 2,089.0 | 2,237.6 | 2,202.1 |
| Pirarara | *Phractocephalus hemiliopterus* | 695.2 | 722.5 | 727.9 |
| Pirarucu | *Arapaima gigas* | 1,205.7 | 1,253.1 | 1,262.4 |
| Sardinha | *Triportheus* spp. | 3,238.8 | 3,366.1 | 3,391.1 |
| Surubim | *Pseudoplatystoma* spp. | 8,359.7 | 8,688.5 | 8,752.8 |
| Tambaqui | *Colossoma macropomum* | 4,044.7 | 4,203.7 | 4,234.9 |
| Tambicu | *Oligosarcus* spp. | 19.8 | 20.6 | 20.7 |
| Tamoata | *Hoplostemum* spp. | 545.3 | 566.7 | 570.9 |
| Tilápia | *Oreochromis niloticus Tilapia rendalli* | 9,246.6 | 9,610.3 | 9,681.6 |
| Traíra | *Hoplias* spp. | 9,449.6 | 9,821.3 | 9,894.0 |
| Truta | *Oncorhynchus mykiss* | 0.5 | 0.5 | 0.5 |
| Tubarana | *Salminus hilarii* | 14.4 | 15.0 | 15.1 |
| Tucunaré | *Cichla* spp. | 8,886.6 | 9,236.1 | 9,304.4 |
| Ubarana | *Anodus elongatus* | 27.9 | 29.0 | 29.2 |
| Viola | *Loricariichthys anus* | 146.9 | 152.6 | 153.8 |
| Other | | 5,271.2 | 5,813.7 | 5,593.8 |
| **CRUSTACEANS (local name)** | **Scientific name** | **5,519.7** | **5,736.7** | **5,779.5** |
| Camarão | *Litopenaeus vannamei* | 5,519.7 | 5,736.7 | 5,779.5 |

**Source:** Modified from MPA, 2011. Boletim Estatístico da Pesca e Aquicultura – versão preliminar. Brasília, 60p.

Regarding aquaculture, the total national production in 2011 reached 628,704 tons, representing a 31.1% increase in comparison with 2010. As in previous years, the largest volumes come from continental production, where fish represent 86.6% of total national aquaculture production[55] (Table 11).

**Table 11:** Total aquaculture production (tons) in 2009, 2010 and 2011.

| Aquaculture | 2009 | 2010 | 2011 |
|---|---|---|---|
| Continental | 337,353 | 394,340 | 544,490 |
| Marine | 78,296 | 85,059 | 84,214 |

**Source:** Modified from MPA, 2011. Boletim Estatístico da Pesca e Aquicultura – versão preliminar. Brasília, 60p.

Marine aquaculture in Brazil currently comprises the production of mollusks and crustaceans, with shrimp production representing approximately 78% of total marine aquaculture production in 2011. Among mollusks, the production of mussels far outruns the production of oysters and scallops (Table 12).

[55] MPA, 2011. Boletim Estatístico da Pesca e Aquicultura – versão preliminar. Brasília, 60p.

**Table 12:** Total marine aquaculture production (tons) by species in 2011.

| Species and Type of Culture | Scientific name | 2011 |
|---|---|---|
| **TOTAL** | | **84,212.3** |
| **MOLLUSK PRODUCTION** | | **18,541.7** |
| Mexilhão (mussel) | *Perna perna*<br>*Mytella charruan* | 15,989.9 |
| Ostra (oyster) | *Crassostrea gigas*<br>*Crassostrea* spp. | 2,538.4 |
| Vieira (scallop) | *Euvola ziczac* | 13.4 |
| **CRUSTACEAN PRODUCTION** | | **65,670.6** |
| Camarão (shrimp) | *Litopenaeus vannamei* | 65,670.6 |

**Source:** Modified from MPA, 2011. Boletim Estatístico da Pesca e Aquicultura – versão preliminar. Brasília, 60p.

As in previous years, the continental aquaculture production was larger in the South region, corresponding to 28.2% of the national production. As shown in Table 13 below, the combined volumes of an alien species (tilapia) and a native species (*tambaqui*) represent 67% of the national continental aquaculture production, with several other native and alien species also being used for captive production. Four species alone – two native (*tambaqui* and *tambacu*) and two alien (tilapia and carp) – represent 83% of the total continental aquaculture production in Brazil.

**Table 13:** Total continental aquaculture production (tons) by species in 2011.

| Local name | Scientific name | 2011 Production |
|---|---|---|
| **TOTAL** | | **544,490.0** |
| Bagre | *Clarias gariepinus*<br>*Ictalurus punctatus* | 7,048.1 |
| Carpa | *Cyprinus carpio* | 38,079.1 |
| Cascudo | *Hypostomus* spp. | 58.0 |
| Curimatã | *Prochilodus* spp. | 7,143.1 |
| Jundiá | *Rhamdia* sp. | 1,747.3 |
| Matrinxã | *Brycon amazonicum* | 5,702.1 |
| Pacu | *Metynnis* spp. | 21,689.3 |
| Piau | *Leporinus* spp. | 4,309.3 |
| Pirarucu | *Arapaima gigas* | 1,137.1 |
| Pirapitinga | *Piaractus brachypomus* | 9,858.7 |
| Piraputanga | *Brycon hilarii* | 265.0 |
| Pintado | *Pseudoplatystoma corruscans* | 8,824.3 |
| Tambacu | *Colossoma macropomum (female) &*<br>*Piaractus mesopotamicus (male)* | 49,818.0 |
| Tambaqui | *Colossoma macropomum* | 111,084.1 |
| Tambatinga | *Colossoma macropomum (female) &*<br>*Piaractus brachypomus (male)* | 14,326.4 |
| Tilápia | *Oreochromis niloticus* | 253,824.1 |
| Traíra | *Hoplias* spp. | 926.5 |
| Truta | *Oncorhynchus mykiss* | 3,277.2 |
| Other | | 5,372.2 |

**Source:** Modified from MPA, 2011. Boletim Estatístico da Pesca e Aquicultura – versão preliminar. Brasília, 60p.

ReefCheck Brazil[56]

More than 10 years of monitoring data were generated[57] on reef environments in Brazil through the National Program for the Conservation of Coral Reefs (ReefCheck Brazil), which has been applying the participatory ReefCheck methodology to monitor representative reef environments along the Brazilian coast since 2002. The program has been monitoring from four to 12 protected areas (Table 14) in different protection categories (different types of sustainable use and full protection protected areas, and inside and outside no-take zones), comparing reef environments under different types of use regimes and impacts (Figure 16).

**Table 14:** Protected areas monitored by the ReefCheck Brazil Program.

| Region | Area | Category | Type of use |
|---|---|---|---|
| Northeast | Atol das Rocas | Biological Reserve | Full protection |
| | Fernando de Noronha | Marine National Park | Full protection |
| | Maracajaú | State Coral Reefs Environmental Protection Area | Sustainable use |
| | Tamandaré | Costa dos Corais Federal Environmental Protection Area | Sustainable use with no-take area |
| | São José da Coroa Grande | | Sustainable use |
| | Maragogi | | Sustainable use |
| East | Itaparica-Pinaúnas | Baía de Todos os Santos State Environmental Protection Area / Recife das Piraúnas Municipal Environmental Protection Area | Sustainable use |
| | Itaparica-Caramuanas | | Sustainable use |
| | Itacolomis | Corumbau Extractive Reserve | Sustainable use |
| | Abrolhos Archipelago | Abrolhos Marine National Park | Full protection |
| | Parcel dos Abrolhos | | Full protection |
| | Ponta da Baleia | Ponta da Baleia State Environmental Protection Area | Sustainable use |

**Source:** Modified from Padovani Ferreira, B. & Coxey, M.S., 2012. Unpublished report to the Ministry of the Environment to support the publication of a book on monitoring Brazilian coral reefs. 68p.

[56] Sources: http://www.mma.gov.br/biodiversidade/biodiversidade-aquatica/zona-costeira-e-marinha/recifes-de-coral and Padovani & Coxey, 2012 unpublished report to the Ministry of the Environment to support the publication of a book on monitoring Brazilian coral reefs. 68p.

[57] These data were collected by the Federal University of Pernambuco – UFPE and by the Coastal Reefs Institute – IRCOS (*Instituto Recifes Costeiros*), under a technical agreement between MMA and UFPE.

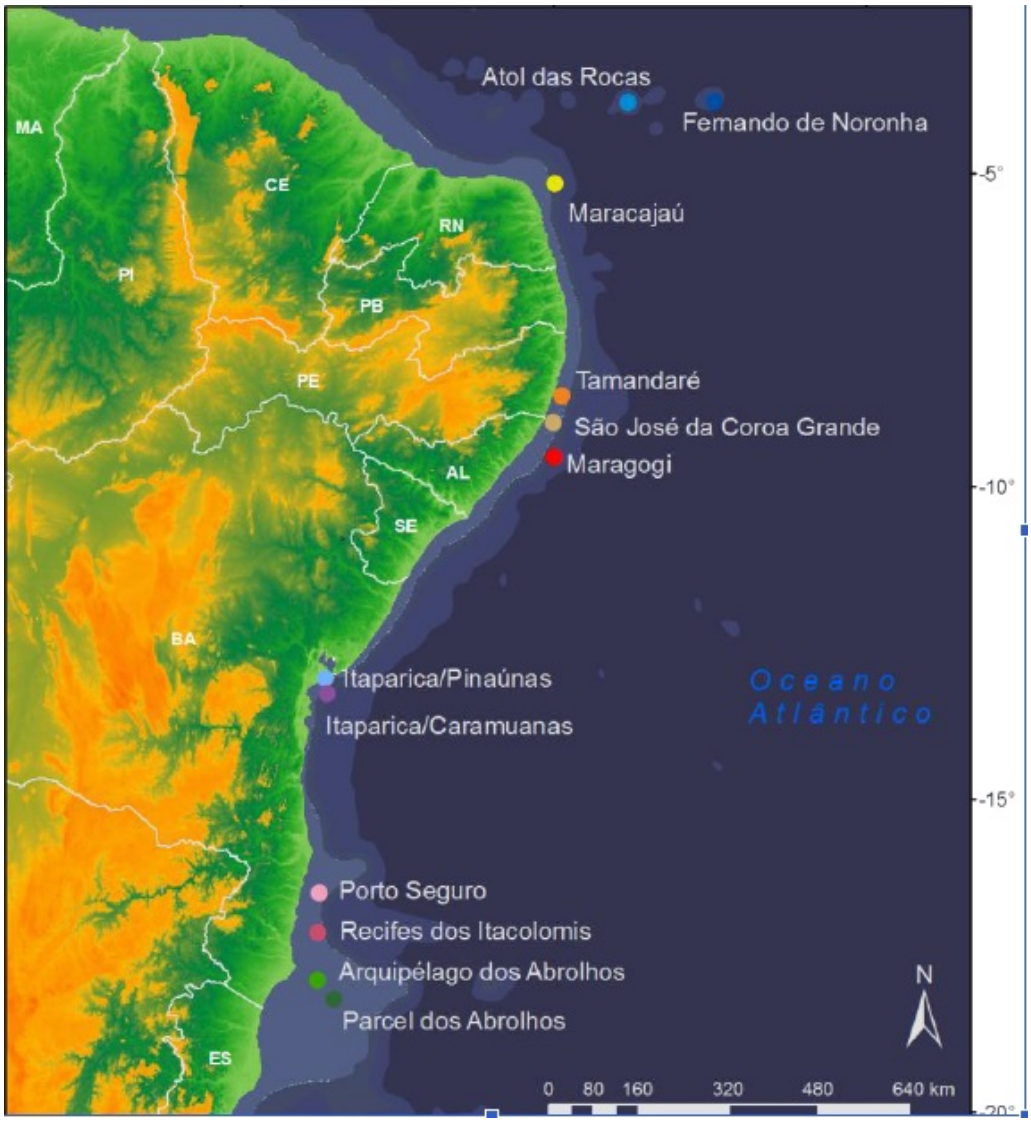



**Figure 16:** Areas monitored by ReefCheck Brazil.
**Source:** Padovani Ferreira, B. & Coxey, M.S., 2012. Unpublished report to the Ministry of the Environment to support the publication of a book on monitoring Brazilian coral reefs. 68p.

From 2002 to 2012, ReefCheck Brazil monitored coral reefs in the six main reef regions of Brazil, within which the monitored protected areas are located: (i) oceanic islands and banks of the Fernando de Noronha ridge; (ii) Touros-Natal; (iii) Pirangi-Maceió; (iv) Baía de Todos os Santos-Camamú; (v) Porto Seguro-Cabrália; and (iv) Itacolomis and Abrolhos. Although the data series is still being revised for publication, preliminary results indicate some trends in species distribution, integrity of corals, and size and abundance of organisms composing reef communities, among other aspects. Regarding fish, the main indicator species were all more abundant in full protection protected areas than in sustainable use protected areas, except for the smaller-size groupers (such as *Cephalopholis fulva* or *Epinephelus adscensionis*), as shown in Figure 17.

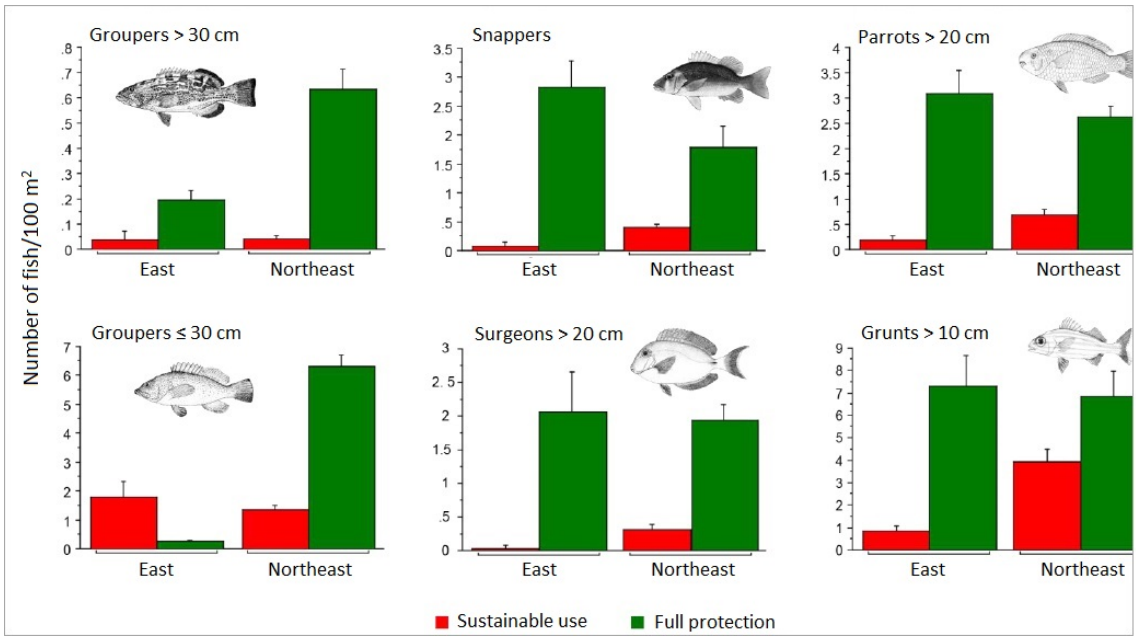



**Figure 17:** Abundance of the main fish indicators in sustainable use and full protection protected areas, in the east and northeast regions.
**Source:** Padovani Ferreira, B. & Coxey, M.S., 2012. Unpublished report to the Ministry of the Environment to support the publication of a book on monitoring Brazilian coral reefs. 68p.

The effect that closing an area for fisheries and recreational activities can have on fish abundance was analyzed by comparing sustainable use coral reefs of Costa dos Corais Environmental Protection Area – Tamandaré and São José da Coroa Grande, with the no-take area of Tamandaré: all of the main indicator species (parrots, surgeons, groupers and snappers) were significantly more abundant and presented larger individual size inside the no-take area (Figure 18). Additionally, during the entire period of 2002-2012 the no-take area was the only site where the presence of groupers over 30 cm and Atlantic goliath grouper (*Epinephelus itajara*) was recorded, demonstrating the importance of the implementation of such closed areas for the maintenance of fish species of high biological and economic value. A clear pattern was also identified for the parrot fish (Scaridae family) with sizes larger than 20 cm, where higher abundances were always found in full protection protected areas rather than the sustainable use ones. Additionally, in sustainable use areas the higher abundances were found farther from the coast, where fisheries activities are less intense.

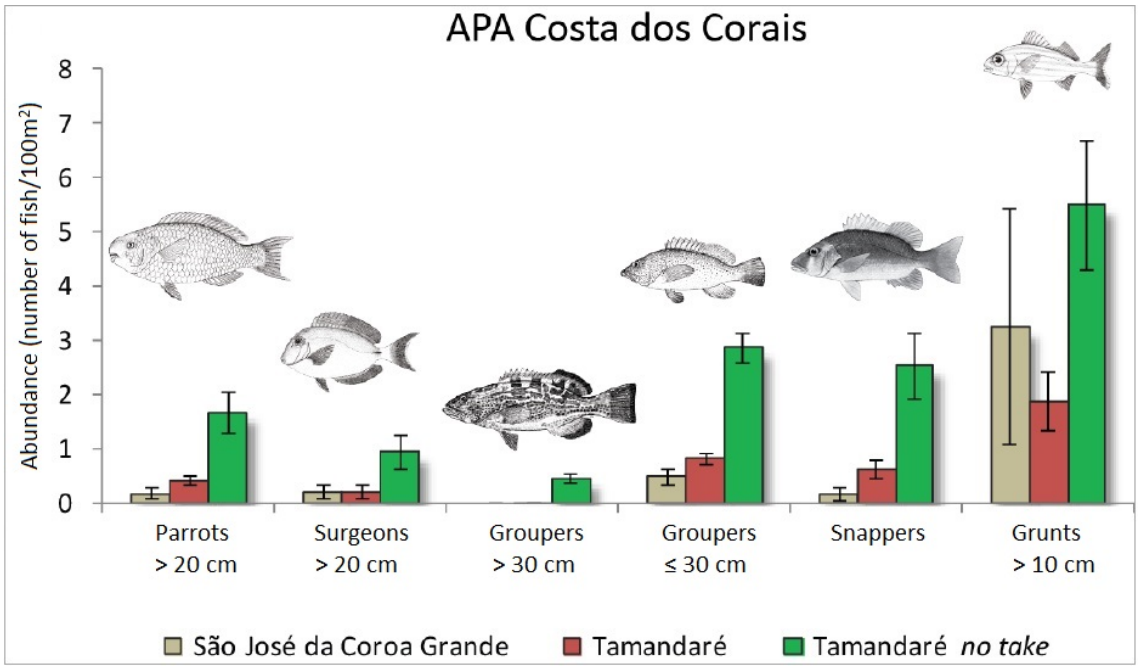



**Figure 18:** Abundance of the main fish indicators in no-take (Tamandaré no-take) and surrounding open areas (Tamandaré and São José da Coroa Grande) of the Environmental Protection Area of Costa dos Corais.
**Source:** Padovani Ferreira, B. & Coxey, M.S., 2012. Unpublished report to the Ministry of the Environment to support the publication of a book on monitoring Brazilian coral reefs. 68p.

Among indicator invertebrates, the lobster (*Panulirus* spp.), which is one of the main invertebrate targets of fisheries activities in reef environments, and the banded coral shrimp (*Stenopus hispidus*) presented higher abundance in full protection protected areas than in sustainable use protected areas, with the highest abundance in oceanic islands, indicating good environmental health. Additionally, within the same sustainable use protected area, the abundance of lobster was significantly higher in no-take areas than in the surrounding areas where controlled fisheries activities are allowed, while the reverse situation was observed for shrimp. The common sea urchin had higher abundance observed in coral reefs closer to the coast, reaching 70 individuals per square meter in São José da Coroa Grande, within the Federal Environmental Protection Area of Costa dos Corais (sustainable use protected area). Within each protected area, the abundance of the common sea urchin followed the expected pattern with higher occurrence outside no-take areas, where pressure from its natural predators is lower and the higher number of urchins imposes greater damage to coral communities. Most of the other invertebrates chosen as indicators of impacts on coral reefs did not present apparent patterns or trends in their distribution among monitored regions or type of protected area, such as starfish and sea cucumber (Table 15).

**Table 15:** Invertebrate species monitored by the ReefCheck Brazil program.

| Local name/group | Family | Species/local name |
|---|---|---|
| Anemones | Aliciidae | *Lebrunia* sp. |
| | Actiniidae | *Condyloctis gigantea* |
| | Chrysomeloidea | *Bellactis ilkalyseae* |
| Cephalopod | Octopodidae | *Octopus vulgaris* |
| Crustaceans | Majidae | *Stenorhynchus seticornis* |
| | Anchistioididae | *Periclimenes pedersoni*<br>*Periclimenes yucatanicus* |
| Local names:<br>camarão-aranha<br>camarão-palhaço | Hippolytidae | *Thor amboinensis* |
| | Stenopodidae | *Stenopus hispidus* |

| | | |
|---|---|---|
| caranguejo<br>lagosta-sapata<br>lagosta<br>tamarutaca | Xanthidae | *Carpilius corallinus* |
| | Scyllaridae | *Parribacus antarticus*<br>*Scyllarides brasiliensis* |
| | Palinuridae | *Panulirus argus*<br>*Panulirus echinatus*<br>*Panulirus laevicauda* |
| | Order Stomatapoda | stomatapoda |
| Echinoderm | Class Crinoidea | Lírio-do-mar |
| Starfish/ophidiasterids | Echinasteridae | *Echinaster brasiliensis* |
| | Ophidiasteridae | *Linckia* sp. |
| | Ophiodermatidae | *Ophioderma* sp. |
| Gastropods | Aplustridae | *Micromela undata* |
| | Cypraeidae | *Cypraea cinerea* |
| | Prosobranchia | *Cassis tuberosa* |
| | Turbinidae | *Lithopoma* spp. |
| Fireworm | Amphinomidae | *Hermodice carunculata* |
| Corals | Gorgoniidae | *Phyllogorgia dilatata* |
| | Nephtheidae | *Neospongodes atlantica* |
| | Plexauridae | *Muriceopsis* sp.<br>*Muriceopsis sulphurea*<br>*Plexaurella dichotoma*<br>*Plexaurella grandiflora*<br>*Plexaurella regia*<br>*Plexaurella* sp. |
| Holothurian | Class Holothurioidea | Sea cucumber |
| Mollusk | Aplysiidae | *Aplysia dactylomela* |
| Sea urchins | Toxopneustidae | *Lytechinus* sp.<br>*Tripeneustes ventricosus* |
| | Echinometridae | *Echinometra lucunter* |
| | Diadematidae | *Diadema antillarum* |
| | Cidaridae | *Eucidaris tribuloides* |

**Source:** Modified from Padovani Ferreira, B. & Coxey, M.S., 2012. Unpublished report to the Ministry of the Environment to support the publication of a book on monitoring Brazilian coral reefs. 68p.

## 1.2.2 Species diversity

### 1.2.2.1 Status of the knowledge on Brazilian biodiversity

Brazil is the most biodiverse country in the world. According to published scientific data, 43,893 plant species and at least 104,546 animal species (vertebrates and invertebrates) are currently known in Brazil (Table 16).

**Table 16:** Number of currently known species in Brazil.

| Group | No. of species | Data source |
|---|---|---|
| Plants | 43,893 | Lista de Espécies da Flora do Brasil. [*Species List of the Brazilian Flora*] Jardim Botânico do Rio de Janeiro. Available at: http://floradobrasil.jbrj.gov.br/. Accessed on: 24 March 2014. |
| Mammals | 712 | Revised data: ICMBio, in press. Diagnóstico da Fauna: Resultados parciais 2012-2014.<br>For the previous data on 701 species: Paglia, A.P., Fonseca, G.A.B. da, Rylands, A. B., Herrmann, G., Aguiar, L. M. S., Chiarello, A. G., Leite, Y. L. R., Costa, L. P., Siciliano, S., Kierulff, M. C. M., Mendes, S. L., Tavares, V. da C., Mittermeier, R. A. & Patton J. L. 2012. *Lista Anotada dos Mamíferos do Brasil / Annotated Checklist of Brazilian Mammals.* 2ª Edição / 2nd Edition. *Occasional Papers in Conservation* |

| | | |
|---|---|---|
| | | *Biology*, No. 6. Conservation International, Arlington, VA. 76pp. |
| Birds | 1,900 | Comitê Brasileiro de Registros Ornitológicos [*Brazilian Committee of Ornithological Records*] (2014). Listas das aves do Brasil [*Lists of Brazilian birds*]. 11ª Edição. Available at: http://www.cbro.org.br. Accessed on 29 July 2014. |
| Reptiles | 751 | Revised data: ICMBio, in press. Diagnóstico da Fauna: Resultados parciais 2012-2014.<br>For the previous data on 744 species: Bérnils, R. S. e H. C. Costa (org.). 2012. Répteis brasileiros: Lista de espécies. Versão 2012.2. [*Species list. Version 2012.2*]. Available at: http://www.sbherpetologia.org.br/. Sociedade Brasileira de Herpetologia. Accessed on 26 March 2014. |
| Amphibians | 978 | Revised data: ICMBio, in press. Diagnóstico da Fauna: Resultados parciais 2012-2014.<br>For the previous data on 971 species: AmphibiaWeb: Information on amphibian biology and conservation. [web application]. 2014. Berkeley, California: AmphibiaWeb. Available at: http://amphibiaweb.org/. Accessed: 27 March 2014. |
| Fish | 4,667 (total)<br><br>Freshwater: 3,287<br>Marine: 1,380 | Revised data: ICMBio, in press. Diagnóstico da Fauna: Resultados parciais 2012-2014.<br>Previous data: 2,300 freshwater species and 1,298 marine species according to: Rosa, R.S. & Lima, F.C.T. 2010. Os peixes brasileiros ameaçados de extinção [*Brazilian threatened fish species*]. In: Machado, A.B.M.; Drummond, G.M. & Paglia, A.P. (Eds.). *Livro vermelho da fauna brasileira ameaçada de extinção*. Brasília, DF: MMA; Belo Horizonte, MG: Fundação Biodiversitas. 2v. (1420 p.). |
| Invertebrates | Estimate: 96,669 – 129,840 | Lewinsohn, T. M. e P. I. Prado. 2005. How many species are there in Brazil? *Conservation Biology*, 19: 619-624. |

**Source:** Prepared by DCBio/MMA and ICMBio for the 5th National Report to the CBD.

The list of Brazilian plant species[58] currently includes a total of 43,893 species, of which: 4,310 algae; 32,131 angiosperms; 1,535 bryophytes; 4,665 fungi; 30 gymnosperms; and 1,222 ferns and lycophytes. The collective effort of numerous experts to prepare and publish this list represents the first update in over one hundred years of the original work that first catalogued the Brazilian flora (*Flora Brasiliensis*), initiated by naturalist von Martius in 1840 and concluded in 1906. This list is available online and will function as the basis to prepare the Brazilian Flora Online System, containing the description, taxonomical identification tools and additional information on all listed species. By making the Brazilian Flora Online System available, Brazil will fulfil one of its national commitments under the Global Strategy for Plant Conservation – GSPC.

Some previous studies have provided the number of known species by biome (Table 17) and, although the numbers are not up-to-date, it is possible to draw a picture of the distribution of species diversity and knowledge in Brazil.

[58] Lista de Espécies da Flora do Brasil. Jardim Botânico do Rio de Janeiro. Available at: http://floradobrasil.jbrj.gov.br/. Accessed on: 24 March 2014.

**Table 17:** Number of known species by biome.

| Group* | Amazon | Atlantic Forest | Cerrado | Caatinga | Pampas |
|---|---|---|---|---|---|
| Plants[a] | 13,993 | 18,951 | 13,014 | 4,508 | 1,675 |
| Mammals[b] | 399 | 298 | 251 | 153 | 102 |
| Birds[c] | 1,300 | 1,020 | 837 | 510 | 476 |
| Reptiles[d] | 284 | 197 | 202 | 107 | 110 |
| Amphibians[e] | 250 | 340 | 150 | 49 | 50 |
| Fish[f] | 1,800 | 350 | 1,000 | 185 | 151 |
| **Total** | **18,026** | **21,156** | **15,454** | **5,512** | **2,564** |

*Numbers presented for each biome correspond to the number of known species in a given taxonomic group at the time of source publication. As many species occur in more than one biome, the sum of the numbers presented in this table for species in each taxonomic group per biome will not match the total number of known species presented in the previous table.

**Sources:**

a: Lista de Espécies da Flora do Brasil. Jardim Botânico do Rio de Janeiro, 2013.

b: Lista Anotada dos Mamíferos do Brasil. Conservation Biology, 2012.

c: Lista das Aves do Brasil. Comitê Brasileiro de Registros Ornitológicos (CBRO), 2011; and Marini, M.A & Garcia, F.I., 2005. Conservação de Aves no Brasil. Megadiversidade vol 1, nº1/2005.

d and e: A Lista Brasileira de Anfíbios e Répteis. Sociedade Brasileira de Herpetologia, 2010.

f: Lewinsohn, T. M; Prado, P. I. Quantas espécies há no Brasil?. Megadiversidade, 2005. http://www.conservacao.org/publicacoes/megadiversidade/07Lewinsohn_Prado.pdf

## SiBBr

In 2010, the Ministry of Science Technology and Innovation (MCTI) obtained funds for starting the development and implementation of the Information System on Brazilian Biodiversity[59] (SiBBr – *Sistema de Informação sobre a Biodiversidade Brasileira*), with the objective of creating a tool to integrate information on Brazilian biodiversity and ecosystems which is frequently scattered among various databases under different governmental and other institutions. The purpose of this initiative, funded by GEF and MCTI resources, is to establish an online system containing quality information to support the development of scientific research and inform public policies. The SiBBr will not replace existing databases, but will rather integrate the information currently available in them; whereby researchers and institutions will maintain the recognition of data authorship and will also be able to choose the information to be integrated with SiBBr.

The development of SiBBr involves three components: (i) the consolidation of infrastructure, tools and technologies necessary to qualify, gather and make available (online and freely through SiBBr) the biodiversity information currently contained in biological collections throughout the country; (ii) expand the knowledge base on national biodiversity and the capacity to manage and obtain data, through investments in building capacity on systematics, taxonomy and curatorship, as well as in the modernization and consolidation of biological collections; and (iii) manage information for data mapping and modelling, and offer services that respond to social demands and allow decision makers to develop policies that integrate biodiversity conservation and sustainable use into productive sector operations.

It is also important to note that SiBBr is the focal point (national node) for the Global Biodiversity Information Facility – GBIF, a global multilateral initiative for sharing biodiversity data and making them available online. By becoming a member of this information facility, Brazil secures access to infrastructure and technology developed for the interoperability of biodiversity data. Considering that Brazil is just starting the

[59] http://www.sibbr.gov.br

process of data organization through the construction of SiBBr, access to such technology will greatly benefit the current efforts to integrate national data.

The SiBBr is already available at http://www.sibbr.gov.br/ and in the near future the system will provide access to the database containing information on the research sites of the Long Term Ecological Research Program – PELD (*Programa de Pesquisas Ecológicas de Longa Duração*). Researchers will be able to store metadata and data, and a search tool will give access to metadata and research results (if made available by the author) for the general public.

SISBIOTA[60]

The National Biodiversity Research System – SISBIOTA (*Sistema Nacional de Pesquisa em Biodiversidade*) has the following objectives: promote and expand the knowledge on Brazilian biodiversity; improve the capacity to forecast responses to global change, particularly land use change and climate change; and link research to the capacity-building of human resources, environmental education and dissemination of scientific knowledge. This system works through four main themes: (i) Expanding the knowledge on biodiversity; (ii) Patterns and processes related to biodiversity; (iii) Biodiversity monitoring; and (iv) Development of bio-products and biodiversity use.

This multi-institutional initiative[61] is coordinated by the Ministry of Science Technology and Innovation through its subordinate agencies and launched the first call for proposals in 2010, which approved research projects in the six Brazilian biomes (Amazon, Caatinga, Cerrado, Pantanal, Atlantic Forest and Pampas), and in the Coastal and Marine Zone, on three thematic lines: (i) Line 1 – Syntheses and gaps of Brazilian biodiversity knowledge; (ii) Line 2 – Research on thematic networks for expanding knowledge on Brazilian biodiversity: biota, functional roles, use and conservation; and (iii) Line 3 – Research on thematic networks for understanding and forecasting responses of Brazilian biodiversity in face of climate change and land use.

A total of 39 proposals were approved under this first call for proposals involving over 350 research institutions and 186 projects. This first set of projects should conclude activities in 2014 and a meeting of partner institutions was held in April 2014 to discuss a second call for proposals.

#### 1.2.2.2 Threatened species

The previous lists of all officially recognized Brazilian threatened animal and plant species[62] are currently being revised for publication and, complementarily, in 2014 the Ministry of the Environment published a ruling (MMA IN nº 01, of 16 April 2014)

[60] http://www.cnpq.br/web/guest/apresentacao11

[61] This initiative involves: the Ministry of the Environment – MMA, National Fund for Scientific and Technological Development – FNDCT, Coordination for Professional Improvement of Higher Education Graduates – CAPES, the National Scientific and Technological Council – CNPq, and 18 state foundations for research support.

[62] Official lists currently in force are: (i) for plants, the MMA Ruling IN 06, of 23 September 2008; (ii) for animals, MMA rulings IN 03, of 27 May 2003 (terrestrial invertebrates, amphibians, reptiles, birds, mammals), IN 05, of 21 May 2004 (aquatic invertebrates and fish), and IN 52, of 08 November 2005 (alters Annexes 1 and 2 of the 2004 IN).

recognizing the new CITES list of species endangered by illegal international trade, which updates the 2010 list.

There are important initiatives being carried out to enhance knowledge and conservation action on Brazilian threatened plant and animal species, which are informing the processes to revise the current official lists of threatened species, as described below. These initiatives are now further supported by the publication of Administrative Ruling (*Portaria*) MMA n$^{o}$ 43 of 05 February 2014, instituting the National Program for the Conservation of Threatened Species – Pro-Species (*Programa Nacional de Conservação das Espécies Ameaçadas de Extinção – Pró-Espécies*). Pro-Species significantly strengthens national action to enhance knowledge on and the conservation status of Brazilian threatened species by officially recognizing for the first time in Brazil the international standard of different threat categories for threatened species applied by IUCN; designating institutional responsibilities for the different steps in the process of identifying and classifying threatened species and preparing Conservation Action Plans; creating databases to support the assessment of the conservation status of Brazilian species; among other rulings.

Plants

The National Center for Plant Conservation – CNCFlora (*Centro Nacional de Conservação da Flora*) at the Rio de Janeiro Botanical Garden coordinated an extensive effort to assess the conservation status of the Brazilian plant species. The result to-date of this assessment was published in 2013 in the form of a red book containing an indicative list of the Brazilian plant species[63] considered by specialists as threatened with extinction. This effort was developed with the collaboration of a broad network of botanical specialists and will inform the process to update the official list of the Brazilian threatened plants, which is expected to be published by the end of 2014. The current official list, published in 2008, contains 472 threatened Brazilian plant species.

Over 4,617 species had their conservation status evaluated according to criteria to be applied in all future extinction risk assessments (such as state-level assessments), of which 2,118 (45.9%) were classified in the red book as threatened at different risk categories. This assessment represented the first time that Brazilian efforts to identify threatened plant species followed the international methodology applied by IUCN. Considering the number of species assessed in each taxonomic group, the Pteridophytes comprise the most threatened group, while Bryophytes were considered the least threatened.

Most of the assessed species belong to the Angiosperms (97.87%). Among these, the Asteraceae represent the largest absolute number of threatened species (242 out of 378 assessed species), followed by the Bromeliaceae (202 out of 371 assessed species), and Orchidaceae (169 out of 432 assessed species). However, as the number of threatened species in each family is positively correlated with the number of assessed species in each family, when this aspect is taken into account other families stand out, such as Malpighiaceae, Poaceae, and Melastomataceae. Considering the risk categories, the Bromeliaceae carry the highest number of "critically threatened" species, followed by Orchidaceae and Asteraceae. Asteraceae holds the highest number of "threatened"

[63] Martinelli, G. & Moraes, M.A. 2013. Livro vermelho da flora do Brasil. Andrea Jakobsson: Instituto de Pesquisas Jardim Botânico do Rio de Janeiro, 1100p. Available online at: cncflora.jbrj.gov.br/LivroVermelho.pdf

species, followed by Bromeliaceae and Orchidaceae. This latter is also the family with the highest number of "vulnerable" species, followed by Asteraceae and Fabaceae.

The red book also found that among the most diverse genders of the Brazilian flora, *Begonia* (Begoniaceae), *Vriesea* (Bromeliaceae), and *Xyris* (Xyridaceae) present respectively the highest numbers of threatened species. However, when the proportion between assessed and threatened species is taken into account, other genders stand out, such as *Mimosa* (Fabaceae), *Hyptis* (Lamiaceae), *Mikania* (Asteraceae), *Chamaecrista* (Fabaceae), and *Eugenia* (Myrtaceae), all of which with more than 50% of their assessed species classified as threatened. Furthermore, the Atlantic Forest was the biome with the highest number of threatened plant species, followed by the Cerrado. The Amazon came out as fifth in the number of threatened plant species, which may be a consequence of the vast area under protection, as well as the information gaps for the region given the gaps in the taxonomical collection coverage and numerous areas of difficult access (Figure 19).

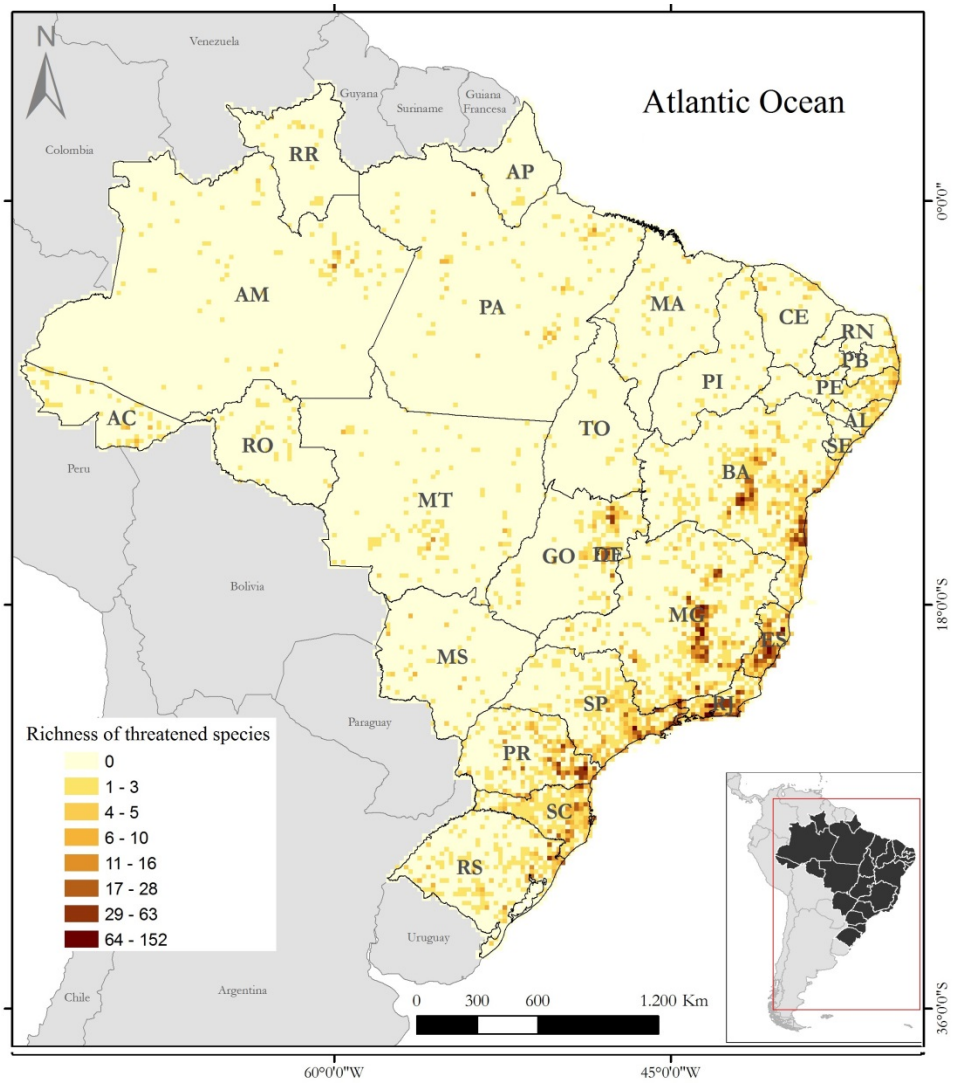



**Figure 19:** Richness of threatened species using a grid composed of 0.6 squared degree cells. Darker cells represent those areas with higher numbers of threatened species.
**Source:** Martinelli, G. & Moraes, M.A. 2013. Livro vermelho da flora do Brasil. Andrea Jakobsson: Instituto de Pesquisas Jardim Botânico do Rio de Janeiro, 1100p.

The prospects for plant conservation in each biome was also estimated by the red book on threatened plant species, as shown in Table 18 below.

**Table 18:** Prospects for plant conservation in each biome.

| Biome | Geographic | | | Floristic | CNCFlora's Assessment | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | TA ($km^2$) | DA (%) | PA (%) | (H) | A | T | NT | DD | RCI |
| Atlantic Forest | 1,103,961 | 76 | 10 | 16,146 | 3,595 | 1,544 | 1,786 | 265 | 337 |
| Cerrado | 2,039,386 | 49 | 11 | 12,070 | 1,987 | 645 | 1,226 | 116 | 156 |
| Caatinga | 826,411 | 46 | 6 | 4,440 | 1,026 | 253 | 724 | 49 | 80 |
| Pampas | 177,767 | 54 | 4 | 1,458 | 483 | 120 | 336 | 27 | 37 |
| Amazon | 4,198,964 | 14 | 38 | 1,235 | 714 | 87 | 537 | 90 | 142 |
| Pantanal | 151,313 | 15 | 5 | 1,082 | 262 | 21 | 232 | 9 | 24 |

**Key:** TA: total area. DA: deforested area. PA: protected area. H: number of described plant species according to Forzza *et al*. 2010. A: number of assessed species. T: number of threatened species. NT: number of non-threatened species. DD: number of species with insufficient data. RCI: number of non-threatened species of interest for conservation and research initiatives.
**Source:** Modified from Martinelli, G. & Moraes, M.A. 2013. Livro vermelho da flora do Brasil. Andrea Jakobsson: Instituto de Pesquisas Jardim Botânico do Rio de Janeiro, 1100p.

Additionally, the red book carried out an analysis of the existing types of threat for the assessed species, which showed (Figure 20) that habitat loss and degradation is the most important threat in 87.4% of the cases, followed by human disturbance (4.0%) and intrinsic factors (3.6%).

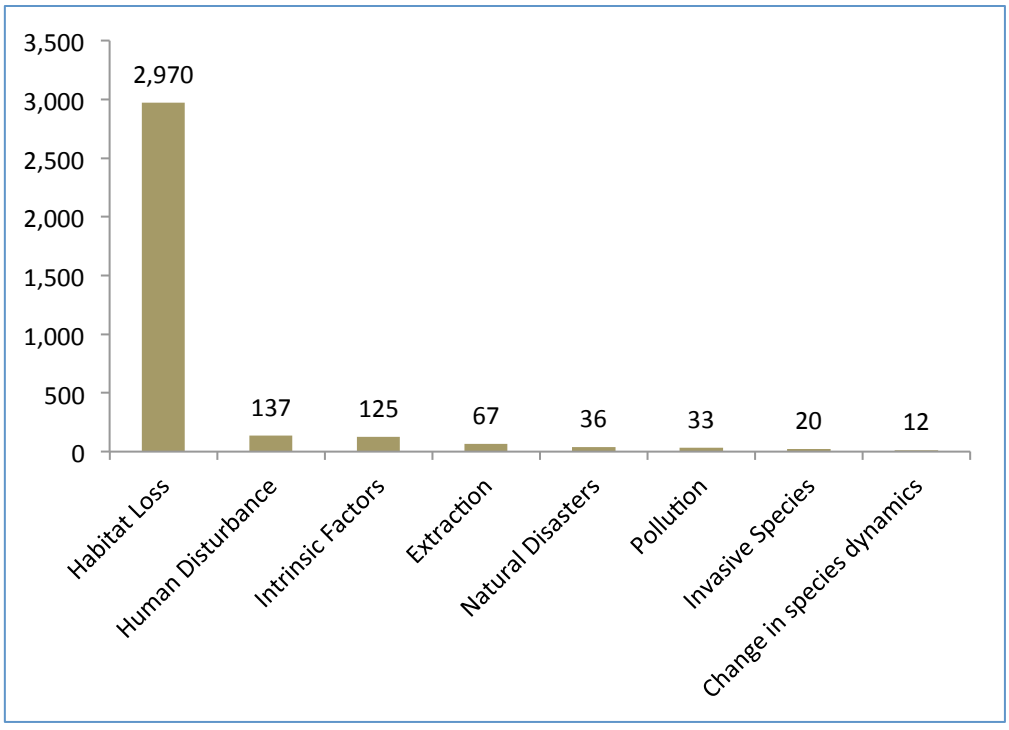



**Figure 20:** Number of occurrences for different types of threat, according to CMP/IUCN classification, version 2.1.
**Source:** Martinelli, G. & Moraes, M.A. 2013. Livro vermelho da flora do Brasil. Andrea Jakobsson: Instituto de Pesquisas Jardim Botânico do Rio de Janeiro, 1100p. Available online at: cncflora.jbrj.gov.br/LivroVermelho.pdf

When the main threat type of *habitat loss* is broken down, agriculture appears as the primary cause of habitat loss and degradation (36.1%). However, infrastructure and

development plans (23.5%) and the use of natural resources (22.3%) also contribute significantly to this process. Human-induced fire is also a source of concern at 11%, even in the fire-adapted Cerrado (Figure 21).

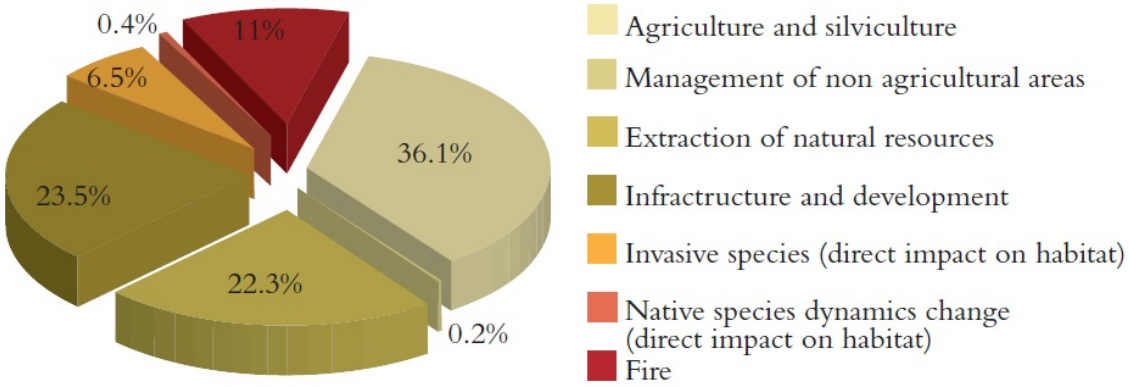



**Figure 21:** Causes of habitat loss according to the threat classification by CMP/UICN version 2.1.
**Source:** Martinelli, G. & Moraes, M.A. 2013. Livro vermelho da flora do Brasil. Andrea Jakobsson: Instituto de Pesquisas Jardim Botânico do Rio de Janeiro, 1100p. Available online at: cncflora.jbrj.gov.br/LivroVermelho.pdf

Although the threat scenario is very similar across Brazilian biomes, when analyzed separately some particularities are revealed. In the Amazon, the use of natural resources contributes almost as much as agricultural activities for the loss of habitats, while in the Pampas, invasive alien species represent a higher threat than in other biomes. Notwithstanding, agriculture is by far the primary cause of habitat loss in the Pampas and in the Pantanal. On the other hand, infrastructure and development projects represent higher threats in the Atlantic Forest and Cerrado than in the other biomes (Figure 22).

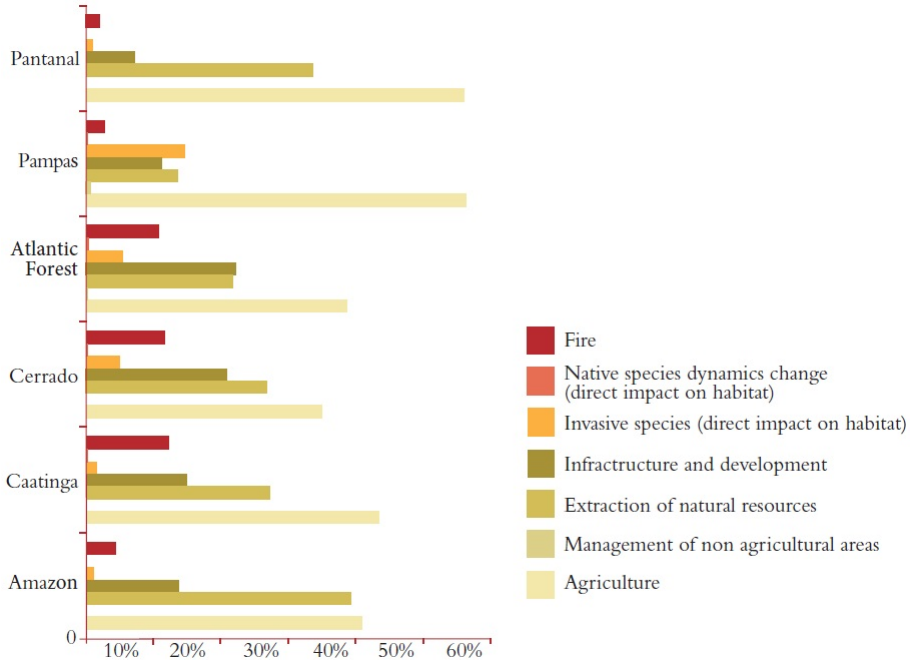



**Figure 22:** Causes of habitat loss in each Brazilian biome according to the threat classification of CMP/IUCN version 2.1.
**Source:** Martinelli, G. & Moraes, M.A. 2013. Livro vermelho da flora do Brasil. Andrea Jakobsson: Instituto de Pesquisas Jardim Botânico do Rio de Janeiro, 1100p. Available online at: cncflora.jbrj.gov.br/LivroVermelho.pdf

Animals

The strategy adopted by ICMBio[64] to coordinate the processes for updating the Official National Lists of Threatened Animal Species involves an assessment of the conservation status of all vertebrate species occurring in Brazil, as well as of some invertebrates that can function as indicators of environmental quality, such as mollusks, crustaceans, corals, bees, and butterflies. This assessment is carried out by taxonomic group and results in a diagnostic of the risk of extinction of assessed species, which also includes information on the identification and location of the main threats, areas that are important for the species' conservation, and compatibility with human activities. This information also contributes to the preparation of National Action Plans for the conservation of threatened species.

The assessment is a participatory process which counts with the collaboration of numerous experts in academia, governmental agencies and other research institutions, and applies IUCN's methodology to assess and classify the threatened status of species. The process to assess the conservation status of Brazilian animal species follows six steps: (i) information gathering and preparation of distribution maps; (ii) consultation (experts and society); (iii) evaluation workshop; (iv) validation of the proposed classification; (v) publication of results; and (vi) publication of a legal instrument with the validated results on threat status.

ICMBio is currently in the process of assessing various taxonomic groups to update the previous Official List of Brazilian Threatened Animal Species (MMA IN 03, of 26 May 2003, MMA IN 05, of 21 May 2004, and MMA IN 52, of 08 November 2005). By April 2014, the process to assess conservation status had initiated or was at advanced stages for at least 35 taxonomic groups (Table 19) covering all large animal groups, including arachnids, insects, amphibians, reptiles, birds, mammals, and vertebrate and invertebrate aquatic species.

**Table 19:** Taxonomic groups and assessment stage of species conservation status (April 2014).

| Assessment stage | Taxonomic groups | Number of assessed species in each group |
|---|---|---|
| Information gathering | Freshwater fish | 590 |
| | Insects – Hymenoptera (bees and ants) | 360 |
| | Continental mollusks | 56 |
| Consultation | Birds | 408 |
| | Insects – Lepidoptera (moths) | 178 |
| | Insects – Coleoptera (beetles) | 77 |
| | Diplopoda | 207 |
| | Reptiles – Lizards | 162 |
| | Amphibians | 101 |
| | Freshwater fish | 290 |
| | Porifera (sponges) | 317 |
| | Marine invertebrates (starfish, acorn worms) | 54 |
| Assessed | Arachnids | 125 |
| | Marine birds | 106 |
| | Ephemeroptera | 67 |

[64] http://www.icmbio.gov.br/portal/biodiversidade/fauna-brasileira/avaliacao-do-risco-de-extincao.html

| | | |
|---|---|---|
| | Freshwater fish<br>Marine fish<br>Odonata | 380<br>190<br>754 |
| Validated | Amphibians<br>Birds<br>Marine mollusks<br>Freshwater fish<br>Marine fish<br>Chondrichthyes (sharks, skates and ray fish)<br>Collembola<br>Cnidarians<br>Crustaceans<br>Hagfish<br>Insects – Lepidoptera (butterflies)<br>Mammals – Aquatic<br>Mammals – Bats<br>Mammals – Marsupials<br>Mammals – Primates<br>Mammals – Rodents<br>Mammals – Xenarthra (sloths, armadillos and anteaters)<br>Onycophora<br>Reptiles – Continental Chelonia<br>Reptiles – snakes | 877<br>1,460<br>49<br>2,119<br>1,033<br>169<br>313<br>26<br>255<br>5<br>176<br>54<br>177<br>58<br>139<br>244<br>19<br>16<br>31<br>373 |
| Published | Annelids<br>Hagfish<br>Mammals – Carnivores<br>Mammals – Ungulates<br>Reptiles – Marine turtles<br>Reptiles – Crocodilians | 3<br>5<br>27<br>12<br>5<br>6 |
| Public instrument prepared | - | - |

**Source:** http://www.icmbio.gov.br/portal/biodiversidade/fauna-brasileira/avaliacao-do-risco-de-extincao.html

Table 20 below displays the results to-date of the species conservation status assessment with the already validated results consolidated by taxonomic group, indicating the number of species in each threat category. By the end of November 2014, ICMBio intends to complete the assessment process for all target taxonomic groups, comprising between 10,000 – 11,000 species (of which approximately 9,050 vertebrates).

**Table 20:** Validated threat classification in assessed taxonomic groups (April 2014) with available data resulting from the ongoing assessment of species conservation status.

| **Validated taxonomic group** | | **Extinction Risk Categories*** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **EX** | **RE** | **EW** | **CR** | **EN** | **VU** | **NT** | **LC** | **DD** | **NA** | **Total assessed species** |
| Annelids | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | **3** |
| Amphibians | 1 | 0 | 0 | 15 | 12 | 11 | 22 | 666 | 150 | 0 | **877** |
| Birds | 2 | 3 | 1 | 35 | 63 | 114 | 53 | 1,121 | 31 | 37 | **1,460** |
| Bone fishes – freshwater | 0 | 0 | 0 | 88 | 103 | 84 | 82 | 1,477 | 280 | 5 | **2,119** |
| Bone fishes – marine | 0 | 0 | 0 | 7 | 6 | 25 | 22 | 823 | 99 | 51 | **1,033** |
| Chondrichthyes – Sharks, rays and skates | 0 | 2 | 0 | 28 | 8 | 19 | 13 | 37 | 61 | 1 | **169** |
| Collembola | 0 | 0 | 0 | 10 | 2 | 3 | 0 | 282 | 15 | 1 | **313** |
| Cnidarians | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 11 | 10 | 1 | **26** |
| Crustaceans | 0 | 0 | 0 | 9 | 13 | 6 | 10 | 169 | 47 | 1 | **1,255** |
| Hagfish | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 3 | 0 | **5** |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Insects – Lepidoptera | 0 | 0 | 0 | 24 | 25 | 9 | 0 | 83 | 32 | 3 | **176** |
| Mammals – Aquatic | 0 | 0 | 0 | 2 | 5 | 3 | 2 | 15 | 8 | 19 | **54** |
| Mammals – Bats | 0 | 0 | 0 | 0 | 1 | 6 | 1 | 126 | 42 | 1 | **177** |
| Mammals – Carnivores | 0 | 0 | 0 | 0 | 0 | 12 | 1 | 12 | 2 | 0 | **27** |
| Mammals – Marsupials | 0 | 0 | 0 | 1 | 1 | 3 | 2 | 42 | 9 | 0 | **58** |
| Mammals – Primates | 0 | 0 | 0 | 6 | 15 | 14 | 12 | 77 | 14 | 1 | **139** |
| Mammals – Rodents | 1 | 0 | 0 | 3 | 19 | 8 | 6 | 172 | 28 | 7 | **244** |
| Mammals – Ungulates | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 2 | 3 | 0 | **12** |
| Mammals – Xenarthra (sloths, armadillos, anteaters) | 0 | 0 | 0 | 0 | 1 | 3 | 0 | 10 | 4 | 1 | **19** |
| Marine mollusks | 0 | 0 | 0 | 3 | 1 | 2 | 2 | 18 | 22 | 1 | **49** |
| Onychophora | 0 | 0 | 0 | 2 | 1 | 1 | 1 | 3 | 8 | 0 | **16** |
| Reptiles – Crocodilians | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | **6** |
| Reptiles – Continental Chelonia | 0 | 0 | 0 | 1 | 0 | 0 | 5 | 18 | 7 | 0 | **31** |
| Reptiles – Marine turtles | 0 | 0 | 0 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | **5** |
| Reptiles – Snakes | 0 | 0 | 0 | 4 | 20 | 10 | 3 | 261 | 22 | 1 | **373** |

*Category of risk of extinction: Extinct (EX); Regionally Extinct (RE); Extinct in the Wild (EW); Critically Endangered (CR); Endangered (EN); Vulnerable (VU); Near Threatened (NT); Least Concern (LC); Insufficient Data (DD); Not Applicable (NA).

**Sources:** http://www.icmbio.gov.br/portal/biodiversidade/fauna-brasileira/avaliacao-do-risco-de-extincao.html ; and: ICMBio, 2014. Diagnóstico da Fauna: Avaliação do Estado de Conservação de Espécies da Fauna Brasileira. Internal report to MMA.

In total to-date, during the past four years in a joint effort involving ICMBio and over 929 Brazilian and international experts in 188 national and international institutions, 7,647 species had their conservation status assessed, representing 75% of all known vertebrate species in Brazil. Of these, the inventory concluded that 88% are not endangered, but nine species are already considered extinct in the national territory, in the Extinct or Regionally Extinct categories (Table 21), and 1,051 other are classified under some threatened category. One additional species, the Alagoas curassow (*Pauxi mitu*), is considered Extinct in the Wild and a specific Action Plan was prepared and is being implemented in the effort to reverse this status. Nevertheless, up to now the assessment indicates that 126 species improved their conservation status in comparison with the previous assessment (2002) and 77 species should be taken out of the category of species threatened with extinction.[65]

**Table 21:** Species considered by the ongoing assessment of species conservation status as extinct (EX) or regionally extinct (RE) in Brazil.

| Group | Species | Common name | Category | Last record |
|---|---|---|---|---|
| Mammal | *Noronhomys vespuccii* | Vespucci's rodent | EX | Approximately 500 years ago |
| Birds | *Numenius borealis* | Eskimo curlew | RE | Over 150 years ago |
| | *Glaucidium mooreorum* | Pernambuco pigmy owl | EX* | 1990 |
| | *Anodorhynchus glaucus* | Glaucous macaw | RE | 1912 |
| | *Philydor novaesi* | Alagoas foliage-gleaner | EX* | 2011 |
| | *Sturnella defilippii* | Pampas meadowlark | RE | Over 100 years ago |
| Amphibian | *Phrynomedusa fimbriata* | Spiny-knee leaf frog | EX | End of 19th century |

[65] http://www.icmbio.gov.br/portal/comunicacao/noticias/4-destaques/4813-governo-anuncia-novas-medidas-para-protecao-da-fauna-brasileira.html

| | | | | |
|---|---|---|---|---|
| Elasmobranchs | *Carcharhinus isodon* | Finetooth shark | RE | Approximately 40 years ago |
| | *Schroederichthys bivius* | Narrowmouth catshark | RE | End of the 1980's |

**Source:** Prepared by the Biodiversity Conservation Status Assessment Unit under /DIBIO/ICMBio in August 2014.

* Although the last record for these two species was less than 50 years ago, the exhaustive effort carried out by experts to locate these species in their natural habitats since the noted dates indicate that they are indeed extinct in Brazil.

### 1.2.3 Genetic resources

#### 1.2.3.1 Agrobiodiversity[66]

Embrapa Genetic Resources and Biotechnology – CENARGEN continuously develops several research actions on plant and animal genetic resources, as is the case of *ex situ* conservation activities targeted at native Brazilian species of actual or potential use, including the maintenance of a national collection of genetic samples[67]. Examples of current activities include the finalization of activities planned under the PROBIO II Project[68]: (i) Active Germplasm Bank for wild *Arachis* (peanuts) species; (ii) Taxonomic, cytogenetic and reproductive characterization of forage grasses and legumes; and (iii) Use of geographical and ecological data for *in situ* conservation of the diversity of wild relatives of plant species with economic importance.

These activities contributed to increase knowledge on agrobiodiversity and wild relatives, with floristic and other studies as well as genetic conservation actions for the following plants: *Arachis* and *Stylosanthes* in the Fabaceae family, various genus of the Poaceae and Lythraceae families, collaborated in the preparation of checklists for Poaceae and Fabaceae of the state of São Paulo, revised the Poaceae and Lythraceae of the Caatinga (Plants of the São Francisco River Caatinga Formations – *Flora das Caatingas do Rio São Francisco*), studies species of *Paspalum* (Poaceae) of Rio Grande do Norte, described a new species of *Arachis* and a new species of *Paspalum*, as well as new species of *Cuphea*, *Diplusodon* (Lyhtraceae) and *Ouratea* (Ochnaceae), and adjusted the taxonomic status of the former genus *Thrasyopsis*, now included in the genus *Paspalum* (Poaceae). Various publications resulted from these activities, as listed in Box 2.

**Box 2: Publications by Embrapa Genetic Resources and Biotechnology**


Cavalcanti, T .B. New taxa in Diplusodon (Lythraceae) from Brazil. Phytotaxa, v. 38, p. 29-35, 2011.

Chacon, R.G.; Yamamoto, K.; Cavalcanti, T. B. *Ouratea lancifolia* R.G. Chacon & K. Yamamoto (Ochnaceae), uma nova espécie do Cerrado, Brasil. Revista Brasileira de Botânica (Impresso) JCR, v. 34, p. 603-605, 2011.

Costa, L.C. ; Valls, J.F.M. *Stylosanthes* in Lista de Espécies da Flora do Brasil. Jardim Botânico do Rio de Janeiro. <http://floradobrasil.jbrj.gov.br/jabot/floradobrasil/FB29854>.

Filgueiras, T.S.; Longhi-Wagner, H.M.; Viana, P.L.; Zanin, A.; Oliveira, R.C.; Canto-Dorow, T.S.; Shirasuna, R.T.; Valls, J.F.M.; Oliveira, R.P.; Rodrigues, R.S.; Santos-Gonçalves, A.P.; Welker, C.A.D.; Ferreira, F.M.; Carvalho, M.L.S.; Silva, A.S.; Reis, P.A.; Dorea, M.C.; Silva, C.; Mota, A.C. *Poaceae* in Lista de Espécies da Flora do Brasil. Jardim Botânico do Rio de Janeiro.


[66] Embrapa Recursos Genéticos e Biotecnologia, 2014. Internal report to the Ministry of the Environment to support the preparation of the 5th National Report to the CBD. Brasília, March 2014.

[67] See Brazil's 4th National Report to the CBD for detailed information.

[68] The GEF-supported Second National Biodiversity Mainstreaming and Institutional Consolidation Project – Probio II is closing in December 2014.

<http://floradobrasil.jbrj.gov.br/jabot/floradobrasil/FB193>.
Graham, S. A.; Cavalcanti, T. B. Taxonomic Revision of Cuphea sect. *Euandra* subsect. *Oidemation* (Lythraceae). Phytotaxam v. 113, p. 1-86, 2013.
Longhi-Wagner, H.M.; Valls, J.F.M.; Oliveira, R.C.; Zanin, A.; Guglieri, A.; Oliveira, R.P.; Clark, L.G.; Canto-Dorow, T.; Boldrini, I.I.; Filgueiras, T.; Londoño, X. 2011. Checklist of Spermatophyta of the São Paulo State, Brazil: Poaceae. Biota Neotropica v.11, n.1a, p.342-354. http://www.biotaneotropica.org.br/v11n1a/en/abstract?inventory+bn0131101a2011
Medeiros, M. B.; Walter, B. M. T.; Prereira-Silva, G.; Gomes, B.M.; Lima, I. L. P.; S.R. Silva; Moser, P.; Oliveira, W.L.; Cavalcanti, T. B.. Vascular Flora of the Tocantins River Middle Basin, Brazil. Check List (São Paulo. Online), v. 8(5), p. 852-885, 2012.
Oliveira, R.C.; Santana, S.H.; Silva, A.S.; Maciel, J.R.; Valls, J.F.M. *Paspalum* L. (Poaceae) no Rio Grande do Norte. Rodriguésia, v.64, n.4, p.847-862, 2013.
Ramos, D.M.; Valls, J.F.M.; Oliveira, R.C.; Graciano-Ribeiro, D. A New awned species of *Paspalum* (Poaceae: Paniceae) from Central Brazil. Novon: A Journal for Botanical Nomenclature, v.21, p.368-372, 2011. [*Paspalum rostratum* D. Ramos, Valls & R. C. Oliveira]
Rua, G.H.; Valls, J.F.M. On the taxonomic status of the genus *Thrasyopsis* (Poaceae, Panicoideae, Paspaleae): new combinations in *Paspalum*. Phytotaxa, v.73, p.60-66, 2012.
Siqueira Filho, J.A.; Conceição, A.A.; Rapini, A.; Coelho, A.O.P.; Zuntini, A.R.; Coutinho, A.J.; Vieira, A.O.S.; Prata, A.P.N.; Machado, A.F.P.; Alves-Araújo, A.G.; Melo, A.L.; Amorim, A.M.A.; Fontana, A.P.; Moreira, .D.R.; Lima, C.T.; Proença, C.E.B.; Luz, C.L.; Kameyama, C.; Caires, C.S.; Bove, C.P.; Mynssen, C.M.; Sá, C.F.C.; Melo, E.; Souza, E.B.; Leme, E.M.C.; Firetti-Leggieri, F.; Salimena, F.R.G.; França, F.; Rainer, H.; Faria Júnior, J.E.Q.; Maciel, J.R.; Lopes, J.C.; Braga, J.M.A.; Stehmann, J.R.; Jardim, J.G.; Pereira, J.F.; Pastore, J.F.B.; Valls, J.F.M.; Melo, J.I.M.; Pirani, J.R.; Silva, J.A.; Paula-Souza, J.; Cardoso, L.J.T.; Matias, L.Q.; Lohmann, L.G.; Queiroz, L.P.; Oliveira, M.A.; Sobral, M.E.G.; Silva, M.J.; Meiado, M.V.; Coelho, M.A.N.; Costa e Silva, M.B.; Mamede, M.C.H.; Lucena, M.F.A.; Pessoa, M.C.R.; Loiola, M.I.B.; Arbo, M.M.; Barbosa, M.R.V.; Marchioretto, M.S.; Buril, M.T.; Bovini, M.G.; Bueno, N.C.; Fiaschi, P.; Borges, R.A.X.; Forzza, R.C.; Sebastiani, R.; Mello-Silva, R.; Couto, R.S.; Lima, R.B.; Pereira, R.C.A.; Marquete, R.; Barreto, R.C.; Xavier, S.R.S.; Profice, S.R.; Cavalcanti, T.B.; Silva, T.R.S.; Pott, V.J.; Klein, V.L.G.; Souza, V.C. "A flora das caatingas do Rio São Francisco." In: Siqueira Filho, J.A. (org.). Flora das Caatingas: História natural e conservação. Rio de Janeiro: Andrea Jakobsson, 2012. 556 pp. [Cap.13, p.447-452]
Tozzi, A.M.G.A.; Queiroz, L.P.; Miotto, S.T.S.; Lima, H.C.; Sartori, A.L.B.; Moreira, J.L.A.; Mansano, V.F.; Flores, A.S.; Klitgaard, B.B.; Valls, J.F.M.; Fortunato, R.; Semir, J.; Fortuna-Perez, A.P.; Meireles, E.C.; Carvalho, A.M.; Rodrigues, R.S.; Sciamarelli, A.; Filliettaz, A.M.; Saleh, E.O.L.; Neubert, E.E.; Neves, F.F.D.; Shimizu, G.; Prado, L.R.; Silva, M.J.; Pinheiro, M.; Fantz, P.R.; Pennington, R.T.; Silva, R.R.; Fernandes, A.G.; Brandão, M.; Lima, L.C.P.; Quieroz, R.T. 2011. Checklist of Spermatophyta of the São Paulo State, Brazil. Fabaceae – Faboideae. Biota Neotropica v.11, n.1a, p.267-274. http://www.biotaneotropica.org.br/v11n1a/en/abstract?inventory+bn0131101a2011
Valls, J.F.M. *Arachis* in Lista de Espécies da Flora do Brasil. Jardim Botânico do Rio de Janeiro. <http://floradobrasil.jbrj.gov.br/jabot/floradobrasil/FB22797>.
Valls, J.F.M.; Costa, L.C.; Custodio, A.R. A novel trifoliolate species of *Arachis* (Fabaceae) and further comments on the taxonomic section *Trierectoides*. Bonplandia, v.22, n.1, p.91-97, 2013. [*Arachis sesquijuga* Valls, L.C. Costa & Custodio]

**Source:** Embrapa Recursos Genéticos e Biotecnologia, 2014. Internal report to the Ministry of the Environment to support the preparation of the 5th National Report to the CBD. Brasília, March 2014.

Research projects carried out by Embrapa Genetic Resources and Biotechnology also include an initiative (on-going since 1997) to collect samples of animal and plant species traditionally maintained by indigenous groups of the Parque Indígena do Xingu, in the state of Mato Grosso, with the objective to increase the genetic variability of crops, particularly those cultivated by traditional communities. The initiative also studies the traditional methods for species management used by those indigenous groups and in what ways these methods interfere in the dynamics of species evolution and genetic diversity. Additionally the risks of diversity loss for species managed by those indigenous groups are also identified, as well as the causes leading to risk. *Ex situ* collections of the studied species are also maintained in the long term by Embrapa

Genetic Resources and Biotechnology as a prevention measure against diversity loss (see section 1.2.3.4).

Regarding rural producers, Embrapa Genetic Resources and Biotechnology carried out an assessment of how existing legislation is impacting on the conservation of local products, given that it has been observed that the implementation of public policies has been leading to a decrease in the seed/species exchange networks among rural producers, which creates a risk of loss of land race varieties of cultivated and raised species, reduction of gene flow, and reduction of the generation of new varieties.

Studies were also carried out on the genetic diversity of several tree species of the Amazon and Cerrado biomes with timber and non-timber uses (*maçaranduba*, *jatobá*, *araticum*, *pequi*, Brazil nut, *baru*, cashew, among others), species of the genus *Piper*, *Capsicum*, *Arachis*, and *Gossypium*, cassava, and several palm trees, among other species. Additionally, Embrapa Genetic Resources and Biotechnology implements efficient *ex-situ* and on-farm conservation of various native species of actual or potential value, through cultivation, *in vitro* reproduction, or cryogenic preservation of viable seeds: *Manihot*, *Ananas*, *Anacardium*, *Capsicum*, *Piper*, *Arachis*, *Oryza*, *Gossypium*, *Solanum*, *Palmacea*, among others.

Since 2009, Embrapa Genetic Resources and Biotechnology implements the project "National Network of Plant Genetic Resources" – Plant Network (*Rede Nacional de Recursos Genéticos Vegetais – Rede Vegetal*), with the objective to modernize the management and coordination of projects carried out by Embrapa agencies on plant genetic resources to better satisfy the current and future national demands for plant germplasm. Special emphasis is given to species enrichment, conservation, characterization, documentation and availability of autochthonous and alien germplasm to improve Brazilian food security. A significant portion of project actions focus on products or species with high impacts on agribusiness and family agriculture.

The following initiatives comprise the National Network of Plant Genetic Resources project – Plant Network: (i) Active Germplasm Banks for Cereals; Greens; Forage Plants; Fruit Species; Medicinal, Aromatic, Coloring and Insecticide Species; Ornamental Species; Forest and Palm Tree Species; Industrial Species; Legumes, Oil Producing Species and Fibers; Roots and Tubers; (ii) Collection of plant genetic resources and associated systematic studies; (iii) Medium and long term conservation of plant collections; (iv) *In situ* and *on-farm* conservation of genetic resources in traditional and indigenous communities; (v) Plant Network; and (vi) Complementary activities of the Plant Network.

The project "Latin American Network for TIRFAA implementation: improvement of food security in Latin America under the climate change scenario", through FAO, was approved in late November 2013 and implementation should start in 2014. The project plans to organize the germplasm banks in Brazil, Uruguay and Paraguay for facing the future scenario of climate change.

The Germplasm-Seed Bank (*Banco de Base de Germoplasma-Semente*) was created in 1976 to safeguard the seeds of economically relevant species, protecting the genetic resources that support nutrition and agriculture. Current capacity of the seed bank is 250,000 accesses and to-date its cold chambers house over 107,000 accesses of 661 species, subspecies and races. Additionally, in 11 February 2014, Embrapa shipped 514 accesses of beans (*Phaseolus vulgaris*) to the Global Seed Vault – GSV in Svalbard, located in the town of Longyearbyen, under Norwegian administration. Those seeds are

part of Embrapa's Nuclear Bean Collection, and will join other 264 corn accesses and 541 rice accesses that were shipped to GSV in September 2012.

#### 1.2.3.2 Plants for the Future

As part of its efforts to promote biodiversity conservation and sustainable use, the Ministry of the Environment established an initiative, also known as the Plants for the Future project (2004 – 2007), for inventorying native species of the Brazilian flora of actual or potential value, and of local or regional use. Through this initiative and in collaboration with several governmental and non-governmental institutions, the Ministry of the Environment coordinated and supported the development of research activities aiming at enhancing and disseminating knowledge on agrobiodiversity and promoting the cultivation of various neglected or under-exploited native species of economic value. Although many native species have been domesticated in Brazil, some since the times of first human occupation in South America, the use of these species in agricultural production is still incipient.

A wealth of information was generated by the Plants for the Future project on over 750 species, which were prioritized among over 10,000 inventoried species from the five Brazilian regions (north, northeast, center-west, southeast, and south). This information has been undergoing revision for the past several years, and the first volume of results was published in 2011 as a 934-page book on the Native Species of the Brazilian Flora with Current or Potential Economic Value – Plants for the Future – South Region (Biodiversity Series n$^{o}$ 40). A similar volume on the Central-West Region is being finalized for publication in 2014, with the revision of various portfolios of groups of medicinal, food and ornamental plant species having been concluded in 2013. In parallel, the process to select and analyze the portfolios of plant groups that will be included in the results volume for the North region is also under way.

The broad process of data analysis is greatly contributing to increase knowledge on the Brazilian native plant biodiversity, stimulating the conservation and use of these species, several of which are already starting to reach the table and markets of Brazilian urban centers, offering new options to consumers. Such is the case of the mountain guava (*Acca sellowiana*) and heart of palm/assai (*Euterpe edulis* and *Euterpe oleracea*). The study is also identifying and promoting the diversification of uses of each species, such as the use of fruit pulp of the *Euterpe* palm trees, which represents a more sustainable and permanent use and management of these species than targeting only the heart of palm for consumption. Another example is the Brazilian pine (*Araucaria angustifolia*), which until recently was targeted exclusively for its timber to the point of becoming an officially protected species, and now has a broad market acceptance for its abundant nut crop.

#### 1.2.3.3 Biodiversity for Food and Nutrition[69]

Together with Kenya, Sri Lanka and Turkey, since 2012 Brazil participates in the international GEF-funded initiative on "Mainstreaming Biodiversity Conservation and Sustainable Use for Improved Human Nutrition and Well-being", also known as Biodiversity for Food and Nutrition – BFN (2012-2017), with support from Biodiversity

[69] Information provided by DCBio/MMA in March 2014.

International, FAO and UNEP. The project supports research on the biodiversity`s role in nutrition, and also aims at providing information on the nutritional and health benefits of traditional food sources to human health. Although traditional foods are often more nutritious and better adapted to local environments, for economic or scale reasons many current agricultural policies often include mechanisms and facilities that direct producers to a limited variety of seeds, leading to a change of habits and neglect of traditional foods. Results of the BFN project should enhance the development of policies and regulatory frameworks that promote biodiversity conservation and sustainable use of important and underutilized local and regional foods, leading to a more diversified and resilient nutrition.

In Brazil, the BFN project seeks to increase the cultivation of native species currently used as foods; mitigate problems related to simplified diets; enhance the genetic and productive food base; promote the sustainable management of agrobiodiversity, agro-extractive activities, and extractive activities; and strengthen the country's food sovereignty. The project established partnerships with various existing national public policies[70] to implement a variety of actions: the Food Acquisition Program – PAA; National School Nutrition Program – PNAE; National Policy on Food and Nutrition – PNAN; National Plan to Promote Production Lines of Socio-biodiversity Products – PNPSB; National Agroecology and Organic Production Plan – PLANAPO; and Minimum Price Policy for Sociobiodiversity-based Products – PGPMBio.

Project activities are each implemented jointly by two or more partner institutions: MMA, MDA, MDS, MEC, MS, MAPA and CONAB. Some specific activities such as the analysis of nutritional value are implemented through the Collaborative Centers for School Food and Nutrition – CECANEs (*Centros Colaboradores em Alimentação e Nutrição Escolar*), which are higher education federal agencies under PNAE/MEC. The main proposed actions of the project are:

- Analysis of the composition (macro and micro nutrients) of species listed in the Plants for the Future initiative (see section above), as well as those addressed by PNPSB, which includes information on traditional knowledge. Resulting information will be included in databases such as Food Composition Table and others, associating the information on nutritional composition traditional knowledge and promoting potential better and wider use of these species in human diet.
- Assessment of the impact of diversified diets offered through public policies related to food and nutritional security on the health of populations and communities benefited by the policies, with emphasis on the PAA and PNAE.
- Education activities directed at the inclusion of regional products with higher nutritional quality in diets offered by public schools, including training events for cooks, nutritionists, and communities (focusing on enhancing the food preparation and the use of varied foods), as well as activities to enhance community perception on local and regional foods.
- Development of a strategy to ensure that the next Household Budget Survey (*Pesquisa de Orçamentos Familiares*), carried out by IBGE, will include data on

[70] *Programa de Aquisição de Alimentos* – PAA; *Programa Nacional de Alimentação Escolar* – PNAE; *Política Nacional de Alimentação e Nutrição* – PNAN; *Plano Nacional de Promoção das Cadeias de Produtos da Sociobiodiversidade* – PNPSB; *Plano Nacional de Agroecologia e Produção Orgânica* – PLANAPO; and *Política de Garantia de Preços Mínimos para Produtos da Sociobiodiversidade* – PGPMBio.

the consumption of regional foods that are considered "minority" in terms of food acquisition.

- Inventory of traditional foods (knowledge and flavors), including data on the forms of food preparation used by traditional peoples and communities, and the assessment of the nutritional composition of these traditional foods.
- Institutional actions to strengthen and/or implement processes of biodiversity mainstreaming into public policies, and to provide options for discussion linked to the development of new public policies.

Project activities have initiated with the analysis of the nutrition composition of the selected traditional foods, for which an inventory of existing information is currently being carried out, to be followed by complementary laboratory analyses.

*Awareness raising on traditional biodiversity for food and nutrition.* A number of cultural and gastronomic events were organized in Brazil during the first half of 2014 to raise awareness on traditional biodiversity for food and nutrition. During celebrations held in Brasília-DF for the Organic Food Week – a nation-wide event that takes place every year between the end of May and beginning of June – the Ministry of the Environment and the Ministry of Agriculture sponsored three gastronomic stands promoting the diversity of native species of the Brazilian Cerrado and their potential value for diversifying diets. Species included baru (*Dipteryx alata*), buriti (*Mauritia vinifera*), cagaita (*Stenocalyx dysentericus*), mangaba (*Hancornia speciosa*) and pequi (*Caryocar brasiliense*), all of them currently being analyzed for their nutritional properties by the BFN Project, as well as umbu (*Spondias* spp.) from the Caatinga biome and cupuaçu (*Theobroma grandiflora*) from the Amazon. Stands were installed in public places, including the city park (Parque da Cidade) – the biggest urban park in Brazil – and cooking demonstrations were provided. The event also sought to sensitize farmers and traders on the market potential for these species as consumers increasingly seek healthier and more diversified diets. The event attracted thousands of visitors and was the largest of its kind in Brasília.

Momentum around the conservation and sustainable use of biodiversity for nutrition was kept going with the organization of the "VIII Meeting and Exhibition of the People from the Cerrado Biome" that took place between 5-8 June 2014 in Brasília. The event brought together indigenous community representatives, quilombolas, family farmers and institutions to discuss current land, biodiversity, water and culture challenges faced in the Cerrado biome and to find political solutions to strengthen the conservation and sustainable use of diversity in the Cerrado. Within the rich cultural agenda, roundtable discussions were organized by the Ministry of the Environment on the themes of "Biodiversity and Governmental Procurement", "Biodiversity and Public Policies for Food and Nutrition Security" and "Biodiversity and Nutrition". A gastronomic space was also organized to showcase BFN and recipes typical of this region.

#### 1.2.3.4 *Ex situ* and *in situ* Conservation

Embrapa Genetic Resources and Biotechnology inaugurated on 24 April 2014 the third largest gene bank of the world[71], with capacity to store some 750,000 seed samples, in addition to 10,000 *in vitro* plant samples. The bank can also store over 200,000 other

[71] https://www.embrapa.br/busca-de-noticias/-/noticia/1663125/embrapa-inaugura-terceiro-maior-banco-genetico-do-mundo

cryopreserved samples of plants, animals or microorganisms. Total capacity of the new gene bank, built in Brasília, is over 1,000,000 samples under different conservation methods. The new structure encompasses four cold rooms for long-term conservation, a room to receive samples, waiting and drying rooms, phytopathology lab, base-collection rooms for *in vitro* samples, and cryogenic tanks for storing animal, plant and microorganism samples. In addition to allowing the expansion of the categories of genetic materials to be stored, the inclusion of laboratory facilities in the new structure facilitates the logistics of research activities. The structure also foresees the construction of a liquid nitrogen factory connected to the building, which will facilitate the logistics of storage of genetic materials.

The new gene bank will receive copies of all genetic materials deposited with the various Embrapa research centers throughout Brazil, serving as a backup of these collections. The new facilities will support research activities on new technologies and agricultural products, and the conservation of agrobiodiversity (Brazilian and other), serving a safety-deposit box for Brazilian agriculture and livestock production. The collection of materials deposited in the new gene bank will be managed through a data system developed by Embrapa, named "Alelo" (allele), which will provide information on date and place of origin and the amount of samples stored, among other relevant data, and will allow public access to part of the information.

The conservation of genetic material in the 350 Brazilian germplasm banks is coordinated by Embrapa Genetic Resources and Biotechnology through the National Platform on Genetic Resources. The Campinas Agronomic Institute is one of the main germplasm banks in the country – its collection in 2010 included some 32,543 samples of 5,104 plant species (see section 1.2.3.1 above and Brazil's 4th National Report to the CBD). Embrapa is the lead institution in Brazil investing in the generation of knowledge on national genetic resources, including the identification of wild relatives of cultivated plants and crioula varieties.

To further support the conservation of national genetic resources and the ecologically sustainable rural production, in 2013 Embrapa and the MMA, through its Secretariat of Extractive Activities and Sustainable Rural Development (SEDR), carried out five workshops on the theme "Agrobiodiversity and Agroecology". The workshops counted with the participation of representatives from civil society and governmental agencies, Embrapa researchers, and partners in the implementation of the National Plan of Agroecology and Organic Production (PLANAPO – see section 1.4.7.2). The main objective of these events was to organize the development and coordination of projects to continuously map the organizations, networks and initiatives related to the conservation of genetic resources from agrobiodiversity and of interest to agroecology and organic production, *in situ*, *ex situ* and *on farm*. The events promoted the engagement of such projects and initiatives with PLANAPO and the Embrapa's Portfolio of Ecologically-based Agriculture. Additionally, in 2013 a Technical Cooperation Agreement was signed between MMA and Embrapa to coordinate inter-institutional efforts to obtain information on the representativeness of species, populations, and crop varieties integrating agro-biodiverse systems; geographical representativeness; conservation status of collections; research activities; infrastructure available for the conservation of seeds; and research and development needs.[72]

[72] Information provided in March 2014 by the Secretariat of Extractive Activities and Sustainable Rural Development of the Ministry of the Environment.

An important complementary initiative for *in situ* conservation of genetic resources is being led by MMA and Embrapa Genetic Resources and Biotechnology, with participation of ICMBio: the inventory of wild relatives of cultivated species, as well as native species of economic interest that are present in protected areas under SNUC. The purpose of this initiative is to integrate biodiversity conservation and the conservation of genetic resources that are important for food and nutrition. Results should not only improve food security, but also highlight to the productive sector the importance of protected areas and of protecting the genetic resources that will ensure adaptability and long-term sustainability for economic sectors that depend on biodiversity such as agriculture and various industry segments.

The inventory initiative selected the Cerrado biome to start its activities, initiated in early 2014 in two priority areas: Chapada dos Veadeiros and Brasília National Parks. The practical objective of the initiative is to identify and protect viable populations of wild relatives of cultivated species and native species of economic interest. Examples of such biodiversity elements in the Cerrado region are: cassava, peanuts, cashew, araticum, pequi and cagaita, among numerous other fruits, nuts, roots, fibers and oils used or cultivated in the region. The mapping of these populations may also eventually result in recommendations to expand the limits of protected areas to include important wild populations of genetic resources.

The rich diversity of Brazilian genetic resources is still very much under used, although some species are now starting to find their way into consumer markets, such as *baru*, *araticum*, mountain guava, Brazilian pine nuts, among others. However, Brazilian production and consumption of important staple crops such as rice are still heavily dependent of non-native species, while four wild relatives to rice are present in native biodiversity. Investments in mapping and protecting the populations of these wild rice species, and in research for domesticating and improving some of their varieties may result in improved food security based on national resources. The same is true for a variety of other crops. Results and the first genetic reserve recommendations arising from the initial inventory activities should become available by 2015, when inventory efforts should begin to expand to other protected areas in the Cerrado. By 2016, the inventory should expand further to include protected areas in other biomes.[73]

Regarding animal genetic diversity, Embrapa has maintained for the last 20 years a program on the Conservation and Use of Animal Genetic Resources with the objective of avoiding the loss of locally adapted domestic animal species (local, crioula or naturalized races). The program maintains a network of Conservation Nuclei in farms distributed all over the country, which provide the Animal Germplasm Bank (BGA – *Banco de Germoplasma Animal*) with semen and embryos.[74]

### 1.2.4 Traditional knowledge

#### 1.2.4.1 Traditional knowledge and products

The National Plan to Promote Production Chains of Products from Socio-Biodiversity (PNPSB – *Plano Nacional de Promoção das Cadeias de Produtos da*

[73] Information provided in June 2014 by the Secretariat of Biodiversity and Forests/MMA.

[74] Information provided by Embrapa on April 2014.

*Sociobiodiversidade*) was created in June 2009 with the objective of promoting the sustainable use of biodiversity by traditional peoples and communities. Since then, the Plan identified 30 traditionally used species with potential economic and sustainable use. In 2012, the Plan provided support to 12 local organizations for the mobilization, coordination and capacity-building of the economic organizations of traditional peoples and communities (cooperatives and associations), as well as other actors that interfere in socio-biodiversity production chains. The ultimate goal is to strengthen Local Production Arrangements (APL – *Arranjos Produtivos Locais*) focusing on priority production chains, thus facilitating the organization of traditional peoples and communities to access markets and establish fairer relations with other economic segments that interfere or participate in these chains. APLs supported to-date focused on the following products: *pequi* pulp (north of Minas Gerais state); pine nuts (Paraná state); *umbu* and *licuri* (Paulo Afonso region in Bahia state); piassava palm (south of Bahia); *pequi* and babassu (Serra do Araripe region in Ceará state); babassu (middle Mearim River region in Maranhão state); *buriti* palm (Piauí state); carnauba palm (Piauí state); Brazil nut and a*ndiroba* and copaiba oils (BR 163 highway region in Pará state); assai and copaiba oil (lower Amazonas River region – Oriximiná, in Pará state); assai (Marajó Island in Pará state); and piassava palm (upper and middle Negro River in Amazonas state). These same APLs continued to receive support from the Ministry of the Environment in 2013, except for the pine nut APL in Paraná and the carnauba palm APL in Piauí, where the proposed projects had already been concluded in 2012.[75]

From January 2012 to December 2013, the Brazilian government invested R$10.4 million in subsidies to products from extractive activities, through the national Policy on Minimum Prices for Products from Socio-biodiversity (PGPMBio – *Política de Garantia de Preços Mínimos para Produtos da Sociobiodiversidade*) and the national Program for Food Acquisition (PAA – *Programa de Aquisição de Alimentos*). These programs facilitated the commercialization of assai (fruit, pulp, heart of palm), piassava palm fibers, Brazil nut, babassu nut, and rubber produced by extractive families. The subsidy led to a significant increase in production and collaborated to the formalization of the commercialization of these products, with the creation of price tables and structured production chains for products from socio-biodiversity. Currently, PGPMBio lists 13 products from extractive activities and the investment budget foreseen until 2016 is R$120 million. Support to these production chains through governmental procurement and subsidies contributes to overcome economic exploitation practices and monopoly relations practiced by local traders and to create competition among buyers, which in turn improves prices paid to extractive workers and favors the formalization and structuring of extractive production chains.[76]

The National Policy for the Sustainable Development of Traditional Peoples and Communities (PNPCT – *Política Nacional de Desenvolvimento Sustentável dos Povos e Comunidades Tradicionais*)[77], enacted in 2007, aims at promoting the sustainable development of these communities with emphasis on the acknowledgement, strengthening and safeguarding of their territorial, social, environmental, economic and cultural rights, respecting their identities, organization patterns and institutions. The

[75] Information provided in March 2014 by the Secretariat of Extractive Activities and Sustainable Rural Development of the Ministry of the Environment.

[76] Information provided in March 2014 by the Secretariat of Extractive Activities and Sustainable Rural Development of the Ministry of the Environment.

[77] http://www.mma.gov.br/desenvolvimento-rural/terras-ind%C3%ADgenas,-povos-e-comunidades-tradicionais

National Commission for the Sustainable Development of Traditional Peoples and Communities (CNPCT) coordinates the implementation of this Policy.

Under CNPCT, an Inter-ministerial Working Group (GTI) was created in 2012 to develop the 1st National Plan for the Sustainable Development of Traditional Peoples and Communities of African Origin, launched in January 2013 with the primary objective of safeguarding the African tradition preserved in Brazil. The Plan comprises a set of public policies to safeguard rights, protect the cultural heritage, and combat extreme poverty through the implementation of emergency actions and the promotion of economic production inclusion.

A second GTI was created in 2013 to develop a Plan for Strengthening Extractive Activities (PLANAFE – *Plano de Fortalecimento do Extrativismo*), still under preparation. Under the same theme, in November 2013 the federal government supported the event 2nd Forest Call (2º *Chamado da Floresta*), organized by the National Council of Extractive Workers (CNS – *Conselho Nacional dos Extrativistas*) and with the participation of 1.600 extractive workers, in addition to technical staff and representatives of governmental agencies. The event represented an opportunity to take stock and evaluate the implementation of public policies addressing extractive populations, as well as to propose commitments and targets for the development of extractive activities in Brazil in the short, medium and long term. Additionally, in 2012 the National Fund for the Environment (FNMA – *Fundo Nacional do Meio Ambiente*) supported the development of five Plans for the Sustainable Development of Traditional Peoples and Communities, three of which addressing conservationist community initiatives led by women (fisherwomen, mussel collectors, babassu coconut-crackers, and family farmers).[78]

The Ministry of the Environment is also supporting an ongoing initiative for the development and launching of a database on existing organizations of traditional peoples and communities – the YPADÊ portal (www.caa.org.br/ypade). The portal contains information on traditional peoples and communities, as well as the initial mapping and database of their representative organizations. Consulting services are currently being hired (early 2014) to complement and expand the existing database.[79]

Contributing to the complex and urgent need to devise effective means of protecting, valuating and promoting traditional knowledge as it relates to biological and cultural diversity, the Ministry of Culture through its Secretariat of Citizenship and Cultural Diversity (SCDC/MinC) has been carrying out various initiatives to promote and disseminate traditional knowledge and practices. To insert traditional knowledge into formal education, MinC and the University of Brasília are promoting since 2010 the participation of instructors from traditional cultures in the workshops of the project Knowledge Sharing and Cultural Diversity (*Encontro de Saberes e Diversidade Cultural*) in Brazilian Universities. Instructors from traditional communities taught various modules, including themes such as reforestation, nature and culture, and medicinal plants, among other cultural aspects such as dance, mythology and music. In 2014, the project expanded to include the Federal University of Minas Gerais, and five

[78] Information provided in March 2014 by the Department of Extractive Activities of the Secretariat of Extractive Activities and Sustainable Rural Development – DEX/SEDR/MMA.

[79] Information provided in March 2014 by the Department of Extractive Activities of the Secretariat of Extractive Activities and Sustainable Rural Development – DEX/SEDR/MMA.

other universities have expressed interest in offering the modules on traditional knowledge and culture.[80]

In July 2013, MinC also supported the 13th Meeting of Traditional Cultures of Chapada dos Veadeiros, in Goiás state, which was attended by 30,000 people. The annual event features debates and conferences to build capacity and promote, value and protect the ways of living of the Brazilian traditional peoples. The Meeting also includes workshops on previous informed consultation, the national policy on traditional knowledge associated to biodiversity, and rights and benefit sharing.[81]

#### 1.2.4.2 Environmental Management in Indigenous Lands[82]

The National Policy on Territorial and Environmental Management of Indigenous Lands – PNGATI (*Política Nacional de Gestão Territorial e Ambiental de Terras Indígenas*) was enacted in 2012 through Decree 7774, of 05 June 2012. The main objectives of this policy are to support the following themes involving indigenous peoples: (i) the protection of indigenous territories and natural resources; (ii) indigenous governance and participation; (iii) protected areas under SNUC and indigenous lands; (iv) prevention and recuperation of environmental damages; (v) sustainable use of natural resources and indigenous initiatives on production; (vi) intellectual property and genetic heritage; and (vii) capacity building, training, information exchange and environmental education.

The PNGATI Management Committee was established by Inter-ministerial Ruling 1.701, of 19 April 2013, and became operational in October 2013. Since then, progress has been obtained in the development and implementation of Territorial and Environmental Indigenous Land Management Plans – PGTA (*Planos de Gestão Territorial e Ambiental*). In 2013, 16 projects were approved to develop, by the end of 2014, PGTAs for indigenous lands in the Amazon: Kaxinawá do Igarapé do Caucho (Acre); Indigenous Lands of the Rio Negro (Amazonas); Kotira and Kubeo (Amazonas); Caititu (Amazonas); Camicuã (Amazonas); Parque do Tumucumaque, Paru d'Este, Trombetas/Mapuera and Nhamundá/Mapuera (Amapá); Amapá Indigenous Lands (Amapá); Caru (Maranhão); Alto Turiaçu (Maranhão/Pará); Governador (Maranhão); Marãiwatsédé (Mato Grosso); Apiaká-Kayabi (Mato Grosso); Las Casas (Pará); Kapiruna (Rondônia); Zoró (Mato Grosso); and Manoá-Pium (Roraima). A joint initiative by Fundo Amazônia/BNDES, MMA, FUNAI and COIAB is currently in progress to support the implementation of PGTAs in the Amazon biome. One of the main goals of this initiative is to contribute to reducing deforestation in indigenous lands. Public bids are also in preparation by Fundo Clima/MMA and FUNAI for publication by mid-2014 for the development of PGTAs for indigenous lands in the Cerrado and Caatinga biomes. These new bids will target lands presenting the highest levels of deforestation and high degree of vulnerability to soil degradation as a result of global climate change.

Seven regional training courses to build management capacity for the implementation of the PNGATI policy are ongoing in the Legal Amazon (4), Cerrado and Caatinga (3),

[80] Information provided in March 2014 by the Secretariat of Citizenship and Cultural Diversity – SCDC/MinC.

[81] Information provided in March 2014 by the Secretariat of Citizenship and Cultural Diversity – SCDC/MinC.

[82] http://www.funai.gov.br/pngati/ and Ministry of the Environment/DEX/SEDR, 2014. Internal Information Note to support the preparation of the 5th National Report to the CBD.

and the Atlantic Forest (1). Courses are structured in modules totaling 200 hours and are being carried out through a partnership between the Ministry of the Environment/ICMBio, the National Indigenous Affairs Foundation – FUNAI, and the NGO Brazil's International Education Institute – IIEB. Additional information is available at http://www.funai.gov.br/pngati/.

A partnership was also built among the Brazilian indigenous movement, the National Indigenous Affairs Foundation – FUNAI, the Ministry of the Environment – MMA, The Nature Conservancy – TNC, and the United Nations Development Program – UNDP to implement the GEF-supported Indigenous Environmental and Territorial Management Project – GATI[83]. The GATI project has the main objective of strengthening indigenous practices for the management, sustainable use and conservation of natural resources, as well as enhancing social inclusion of indigenous peoples. Project results should consolidate the contribution of indigenous lands as essential areas for the conservation of biological and cultural diversity in Brazilian forest biomes (Amazon, Atlantic Forest, Cerrado, Caatinga and Pantanal).

A total of 32 indigenous lands were selected for project implementation, with at least one reference area in each of the five Brazilian forest biomes. These areas were selected based on (i) evidence of significant biological diversity and vegetation cover in the indigenous land in comparison with other lands in the region; (ii) possible threats to its natural resources that do not prevent project activities and that can be minimized by them; (iii) outstanding indigenous initiatives for territorial protection, natural resource management or traditional environmental conservation practices in comparison with other lands in the region; and (iv) successful experiences in ethno-environmental management inside or next to the indigenous land that may serve as a baseline for future project activities.

The GATI project is being implemented since 2010 through three main themes: (i) strengthening and structuring, which aims at developing mechanisms and tools to allow the recognition and strengthening of indigenous lands' contribution to the conservation of natural resources, biodiversity and environmental services; (ii) experiences and ethno-management networks, which aims at consolidating an experiences exchange network on conservation actions in indigenous lands that is effectively managed by indigenous peoples; and (iii) forest management models in different forest biomes, which implements reference areas in indigenous lands with replicable sustainable forest management practices based in ethno-management directives.

GATI results to-date include:

- Indigenous Portfolio: The project is supporting various small projects in Reference Areas involving the sustainable management or production of native species and indigenous women projects, among other themes. The first public bid benefitted 12 indigenous lands with projects to be completed by July 2014 (indigenous land/state): Xakriabá/Minas Gerais, Bakairi/Mato Grosso, Guarani do Ribeirão Silveira/São Paulo, Córrego João Silveira/São Paulo, Jaguaripe/Mato Grosso do Sul, Sassoró/Mato Grosso do Sul, Potiguara/Paraíba, Caiçara/Alagoas, Tenonde Porã/São Paulo, Wajãpi/Amapá, Igarapé Lourdes/Rondônia, Mamoadate/Acre.
- Agroecology and agroforestry systems: various workshops on these themes were carried out in 2013, such as the agroforestry workshop in Cachoeirinha

[83] http://cggamgati.funai.gov.br/index.php/projeto-gati/o-que-e-o-gati/

Indigenous Land (Mato Grosso do Sul), and the implementation of an agroforestry plot in the Pirakuá Indigenous Land (Mato Grosso do Sul).

- Information exchange and strengthening of ethno-management networks: over 10 exchange events were supported in 2012 and 2013, such as the participation of indigenous peoples in the 1st Mebengoke Seed Fair held at the Kayapó Indigenous Land (Pará); participation of indigenous representatives in the United Nations Conference on Sustainable Development (Rio +20); and participation of indigenous peoples in the Seed Fair held at the Pirakuá Indigenous Land (Mato Grosso do Sul).
- Indigenous Capacity Building Center – CFI (*Centro de Formação Indígena*): facilities were built to contribute to the political strengthening of indigenous peoples and their organizations. Several CFIs are already operational in various regions, such as: Amazon Center for Indigenous Capacity Building – CAFI in Manaus, Amazonas; Raposa Serra do Sol Indigenous Center for Capacity Building and Culture – CIRCRSS, at the Raposa Serra do Sol Indigenous Land, Roraima; and the Capacity Building Center of the Forest People in Rio Branco, Acre. Other proposals for the creation of new CFIs are currently being evaluated for GATI support.
- Indigenous Environmental Agents: as a key aspect for the development of various environmental management actions within indigenous lands, the capacity of indigenous environmental agents is being strengthened through regional debates and workshops, and the distribution of printed materials on themes such as Environmental and Indigenous Peoples Legislation, Environmental Services and Indigenous Peoples, and Indigenous Environmental Agents.
- Support to the structuring and consolidation of PNGATI: the GATI project has been supporting the implementation of the PNGATI policy through the development and consolidation of methodologies and approaches, and through the implementation of actions in indigenous lands.

#### 1.2.4.3 Access and Benefit Sharing

Wiegand Jr. et al.[84] note that despite the significant advances among indigenous peoples and traditional communities in their political organization and representation of their agendas by the government and general society, it is still a challenge to find representative voices for the high diversity of these groups to effectively include their demands in public policies. The high diversity increases the complexity of consultation processes and legitimate representation. The creation of the National Commission for the Sustainable Development of Traditional Peoples and Communities in 2006 was an important step to deal with such complexity, although other equally complex challenges remain, such as to build reliable processes and enough capacity to meet the commitment of informed consultation, informed consent and fair and equitable benefit sharing. To deal with this challenge, the civil society organization Grupo de Trabalho Amazônico – GTA with technical support and cooperation of the Ministry of the Environment is developing a methodology for the participatory preparation of community-specific Community Protocols defining the conditions and terms for access to traditional

[84] Weigand Jr, Ronaldo et al., 2011. Metas de Aichi: situação atual. UICN; WWF-Brasil and Ipê.

knowledge or genetic resources and benefit sharing. Traditional communities from the Bailique archipelago in Amapá state are participating in the constructions of a methodology for the development of Community Protocols (see Box 3), which the MMA intends to replicate to other traditional communities. The ultimate goal of this participatory process is to prepare local, indigenous and traditional populations to dialogue with any external actor about biodiversity conservation, sustainable use of natural resources, and benefit sharing.

The development of such Community Protocols thus also prepares the community for engaging in access contracts by building local capacity on the subject and preventively establishing conditions and terms that are agreeable to the community. This, in turn, also facilitates access procedures for interested companies by reducing upfront costs, as capacity building for informed consent was already established, and streamlines the process of obtaining validated contracts for accessing traditional knowledge and/or resources, and benefit sharing.

**Box 3 – Case Study: The Bailique Community Protocol[85]**

**Strengthening local communities and protecting traditional knowledge**

One of the main challenges of the consolidation of public policies for the protection of traditional knowledge associated to biodiversity is the construction of resilient national level institutions and capacities. The Ministry of the Environment cannot tackle single-handedly the provision of support to the countless local organizations on access and benefit sharing (ABS), and therefore complementary initiatives from other sectors and governmental agencies are required. Nevertheless, the MMA is carrying out important efforts to strengthen the legal framework related to ABS from genetic resources and traditional knowledge related to biodiversity, as well as to contribute to the preparedness of traditional peoples and communities for engaging with the private sector and research institutions on ABS matters.

Through the participatory process of preparation itself, the development of community-specific protocols for ABS that take into account the customary law of local communities contribute both to build local ABS capacity to access public policies and engage with external actors, and to the creation of sustainable community-led institutions for the shared management of biodiversity resources and territorial use, significantly reducing the technical gap that often exists between traditional communities and the sectors seeking the use of traditional genetic resources and knowledge. Additionally, the development of such protocols facilitate the access to genetic resources and the associated traditional knowledge by reducing transaction costs and promoting more transparent benefit sharing. Furthermore, the creation of rules for engaging with actors external to the communities bestow a "greener" image to companies that adhere to community protocols, as a demonstration of engagement with the construction of a green (sustainable) economy and ethical bio-trade.

In addition to its mega-biodiversity, Brazil is also home to a mega-sociodiversity with at least 231 different indigenous peoples and a large variety of other traditional groups, most of which maintain their traditional knowledge incorporated in their ways of life, including the use of biodiversity and natural resources. The challenge of building community protocols for ABS rests on adapting the methodology to the specificity of each region and traditional community, thus seeking the enhancement of the life quality of diverse local communities. The MMA is supporting the participatory development and testing of a methodology for the preparation of community protocols with the assistance of the 50 traditional communities of the Bailique archipelago, which spans a territory equivalent to the Island of Mallorca and houses 10,000 inhabitants. The territory is comprised mostly of tidal marshes on eight islands on the coast of Amapá state and the main economic activities are fisheries, extraction of non-timber forest products, and small-scale agriculture and livestock. The development of the Bailique Protocol involves a set of complex interactions that relate, among others, to the history of local communities and the strategies they developed to adapt to their environment and coexist with biodiversity.

The participatory methodology is based on customary law and involves workshops with community stakeholders followed by the validation of discussion results with each household. Discussions focus on

[85] Information provided in June 2014 by Carlos Potiara Castro (SBF/MMA) and Rubens Gomes (President, GTA).

six themes that were identified as having the potential to generate positive results to be consolidated in the long term: (i) support to the construction of a community identity; (ii) access to public policies; (iii) national and international legislation; (iv) officially applied concepts; (v) access and benefit sharing; and (vi) traditional medicinal knowledge and gender. The construction of the Bailique Protocol is planned to last three years, according to the following steps: Year 1 – systematization of existing customary law and adoption of complementary rules as necessary; Year 2 – valuation of local production chains to increase income and implement decisions agreed in Year 1; Year 3 – certification of local products and establishment of partnerships for market access.

As an additional result, a Traditional Knowledge Group with 17 women and 2 men was created during the process of developing the Bailique Protocol, providing a valuable opportunity for the midwives, masseuses, *puxadeiras* and *puxadeiros*, *herveiras*, healers, *benzedeiras* and *benzedeiros* to discuss their activities. The Group identified 135 plant species with medicinal properties, their territorial distribution, threat status, and capacity to grow outside of their natural habitat. The work of this Group resulted in the plan for preparing a publication on the Bailique Pharmacopoeia.

The methodology for the Bailique Protocol is being developed by the NGO network Grupo de Trabalho Amazônico – GTA, with financial support from Fundo Vale and Avina Foundation and technical support from the Ministry of the Environment. It will serve as a model for future similar initiatives and should become a tool to be applied by the Secretariat of Biodiversity and Forests/MMA for the implementation of commitments under the CBD and Nagoya Protocol. It is expected that the development of community protocols for ABS will contribute to inhibit isolated actions by individuals and companies not committed to ethical bio-trade, thus increasing protection to national biodiversity resources and traditional knowledge.

Since 2001, when Brazil published Provisional Act 2.186-16/2001 on ABS, the country has been struggling to improve the national legal instruments to regulate the CBD provisions on access to biodiversity resources and associated traditional knowledge, and benefits resulting from their use. Major advances were obtained in the past three years, with the joint preparation of a Bill on access and benefit sharing, developed in a cross-sectoral partnership by the Ministry of the Environment – MMA, the Ministry of Science Technology and Innovation – MCTI, and the Ministry of Development Industry and Foreign Trade – MDIC. The Bill received feedback from other Ministries and was submitted to Congress on 25 June 2014, where it is currently being analyzed.[86]

While Provisional Act 2.186-16/2001 is in force, the Department of Genetic Heritage under the Secretariat of Biodiversity and Forests of the Ministry of the Environment (DPG/SBF/MMA) provides a public information service to answer questions on compliance with ABS legislation. In 2012 and 2013, this service responded to some 1,850 E-mail queries and DPG held workshops with representatives from private sector companies, universities and other institutions to explain the existing legislation and clarify specific issues related to existing cases. Several other events and workshops were held by DPG in 2012 and 2013 to discuss ABS issues with the governmental and private sectors and academia, as well as to build capacity on this theme among traditional peoples and communities. Additionally, to assist the private sector with this theme, the National Confederation of Industries (CNI – *Confederação Nacional da Indústria*) published an analysis on the impacts of the Nagoya Protocol for the private sector[87].

Under the Provisional Act and its supporting legislation, the inter-ministerial Genetic Heritage Management Council (CGEN – *Conselho do Patrimônio Genético*) is chaired by the Ministry of the Environment and is the major governmental player regarding

[86] Information provided in April 2014 by the Department of Genetic Heritage under MMA (DPG/MMA).

[87] Confederação Nacional da Indústria, 2014. Decisões da CDB e o setor de negócios. Brasília, 184 p. Available at file:///C:/Users/86948750125/Downloads/Nagoya_Protocol_on_the_Brazilian_Industry.pdf

ABS issues. Although both CGEN and accredited institutions[88] can authorize access to genetic heritage and/or associated traditional knowledge, all Contracts for the Use of Genetic Heritage and Benefit Sharing (CURBs) need to receive CGEN's concurrence.

From 2004 to 2013, a total of 98 CURBs received CGEN concurrence. And from 2002 to 2013, 1,316 authorizations to access genetic heritage and/or associated traditional knowledge were issued by CGEN and accredited institutions[89]. The number of authorizations and CGEN concurrences are not directly related, as research projects do not require a CURB and some CGEN authorizations are connected to more than one benefit sharing contract. Additionally, in the same period 192 institutions were accredited as trustees for accessed genetic material.

## 1.3 Main threats to biodiversity

### 1.3.1 Disorganized Expansion of Agriculture

Brazil is one of the main food producers in the world, with a 70% increase in agricultural and livestock production from 2000 to 2012.[90] Enhanced productivity, rather than increase in land area occupied by agriculture and livestock activities, was the primary driver for this production increase (Table 22).

**Table 22:** Evolution of productivity (grains and fibers) in comparison with the extension of crop lands.

| | 1976/1977 | 2012/2013 | Growth |
|---|---|---|---|
| **Production** | 46.9 tons | 187.0 tons | 298.7% |
| **Planted area** | 37.3 hectares | 53.3 hectares | 42.9% |
| **Productivity** | 1,258 kg/hectare | 3,507 kg/hectare | 178.8% |

**Source:** Data provided in September 2014 by the National Agriculture Confederation – CNA, based on Conab data.

Although no new iteration of the 2006 rural and agricultural census has yet been carried out, data revised in 2012 by IBGE show that rural production properties occupied a total of 333.7 million hectares, predominantly covered by pastures (48.0%) and natural forests (26.1%). Temporary and permanent agriculture occupied 16.9% of these properties, while agroforestry systems and planted forests combined corresponded to only 3.9% (Table 23).

**Table 23:** Land use in rural production properties in Brazil.

| Land use | Area (millions of hectares) | Share of total area (%) |
|---|---|---|
| Temporary agriculture | 44.6 | 13.4 |
| Permanent agriculture | 11.7 | 3.5 |
| Natural pasturelands | 57.6 | 17.3 |
| Planted pastures in good conditions | 92.5 | 27.7 |
| Degraded panted pastures | 9.9 | 3.0 |
| Natural forests (excluding Permanent Preservation Areas – APPs and agroforestry systems) | 36.1 | 10.8 |
| Natural forests set aside for APPs or Legal Reserves | 50.9 | 15.3 |
| Planted forests (with native or alien species) | 4.7 | 1.4 |

[88] Accredited institutions are: Brazilian Institute for the Environment and Renewable Natural Resources – IBAMA; National Research Council – CNPq; and National Institute for the National Historical and Artistic Heritage – IPHAN.

[89] From this total, 259 authorizations were issued by CGEN; 806 by IBAMA; 224 by CNPq; and 27 by IPHAN.

[90] IPEA 2014. Políticas agroambientais e sustentabilidade: desafios, oportunidades e lições aprendidas. Brasília,273 p

| | | |
|---|---|---|
| Agroforestry systems | 8.3 | 2.5 |
| Hay fields and other cultivated foraging plants | 4.2 | 1.3 |
| Degraded lands (eroded, in desertification, salinized, etc.) | 0.8 | 0.2 |
| Lands unsuitable for agriculture or livestock (marshes, sand or rock fields, etc.) | 6.1 | 1.8 |
| Other areas (natural or artificial lakes, cultivated flower fields, greenhouses, roads and buildings, aquaculture in public lands, among other) | 6.2 | 1.8 |
| **Total** | **333.7** | **100.0** |

**Source:** IBGE, 2012. Censo Agropecuário 2006: Segunda Apuração. Rio de Janeiro, 774p.

According to a study carried out by Soares Filho *et al.* in 2014 and published in *Science*[91], the changes introduced by the new Law on Native Vegetation Protection nº 12,651/2012, which recently replaced the Forest Code (see section 1.4.1), have altered the total area previously protected under Legal Reserves (RL) and Permanent Preservation Areas (APP) by modifying the definition of these instruments, which are set-aside areas for the protection of natural vegetation and resources, water bodies and steep slopes. The revised legislation established compliance instruments through which the remaining deficit may now be settled through one of the following: the restoration of vegetation; the compensation in other properties with vegetation cover; or through the regularization of land tenure in existing protected areas with pending ownership status. However, the legislation still allows legal deforestation of areas with native vegetation on private properties, which are in surplus of conservation requirements. This opens up the possibility of further conversion of natural habitats and biodiversity that may occur in compliance with legislation, although some instruments included in the revised legislation will be key to establish a landscape approach to the sustainable use of natural resources and for water, soil and biodiversity conservation, such as the Rural Environmental Register – CAR, the Environmental Reserve Certificates – CRA, and schemes for the payment of environmental services (see section 1.4.1).

Investments in land-sparing-oriented policy incentives and improvements in productivity that forego the need for converting natural habitats to areas occupied with crops and pasture can also contribute to reduce potential natural habitat loss. Striking advances in productivity have been obtained for agriculture: from 1990/1991 to 2009/2011, the total area planted with grains grew 30% while production increased by 150%. Progress was also achieved for livestock, on which a study concluded that the pasture area required for a single cow was on average 1.96 hectares in 1970, reducing to 0.93 hectare per animal in 2006, although this may reflect measures of soil use optimization rather than indicate better productivity as a result of genetic improvement.[92] Techniques that seek to efficiently recuperate degraded pastures by rotating grazing and agriculture, restoring soil fertility and enhancing pasture composition, and the adoption of better pasture and herd management may significantly

[91] Soares Filho, B. et al. 2014. Cracking Brazil's Forest Code. **Science** vol. 344, pp363-364. www.sciencemag.org This is the most compreensive modelling effort to evaluate the impacts of Forest Code changes, which also generated estimates of the non-compliance deficit regarding RLs and APPs, as well as of the total existing area of native vegetation in private properties that is in surplus of conservation requirements. On the ground data on these areas should become available within the next two years, as by the end of this period all rural properties should be registered in CAR.

[92] IPEA 2014. Políticas agroambientais e sustentabilidade: desafios, oportunidades e lições aprendidas. Brasília,273 p

contribute to improve livestock production within existing pastures, together with the already applied herd genetic improvement practices, but require research and development investments, as well as better policy incentives and credit lines, such as the national Low-Carbon Agriculture (ABC – *Plano de Agricultura de Baixa Emissão de Carbono*) plan, which aims at increasing agricultural and livestock productivity while reducing the associated carbon emissions, and supporting forest restoration of illegally converted set-aside areas.

In addition to the loss, fragmentation and simplification or modification of natural habitats resulting from land use change, the threat from environmental contamination due to the inadequate use of agricultural chemicals needs to be addressed in order to ensure the balance and conservation of important biodiversity and ecosystems, including to the survival of various pollinator species important for agricultural production. One of the key points to be addressed is the current registration system for agricultural chemicals in Brazil, which requires reassessment and improvement to include periodical reviews and renewal of permits, among other aspects. Brazil is still the world's largest consumer of agricultural chemicals, with gross consumption increasing by 194% or 315,000 tons in 12 years, from 2000 to 2012 (Figure 23).

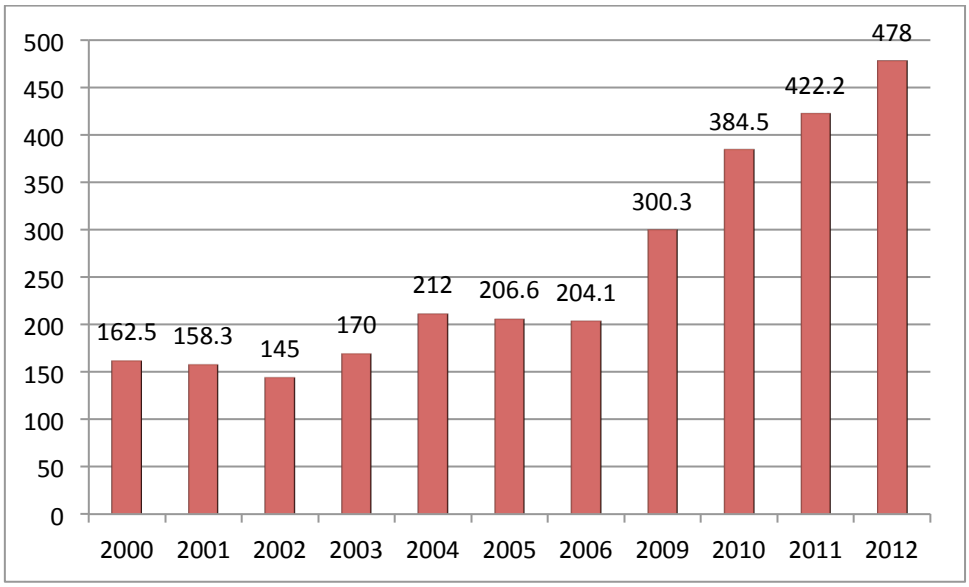



**Figure 23:** Consumption of agricultural chemicals in Brazil 2002-2012 (in 1,000 tons of active ingredient).
**Source:** Data provided by companies dealing agricultural chemicals to IBAMA in July 2013, In: MMA-PNIA 2012, in press. Painel Nacional de Indicadores Ambientais – PNIA.

Several substances still broadly used in Brazil have already been identified as detrimental to pollinators, especially bees. Assessments of active ingredients and their effects on pollinators are being carried out by IBAMA. Still, the efforts to reduce and forbid the use of such substances face the difficult challenge of resistance to change, even though the inadequate application of substances that are harmful to pollinators in conventional practices is detrimental to the very result of agricultural investments.[93]

[93] IBAMA published a Communication in July 2012 forbiding the aerial application of agricultural chemicals containing any of four active ingredients of the neonicotinoids family: imidacloprid, thiamethoxam, clothianidin, and fipronil (Federal Official Gazette – DOU of 19 July 2012). However, such prohibition was edited by MAPA in October 2012 (DOU of 03 October 2012) to exceptionally allow the use of those substances due to the "need to minimize economic impacts on certain cultures". A Joint Administrative Ruling was published in January 2013 (DOU of 04 January 2014) forbidding specific forms of application of those substances in specific cultures, and defined the next steps in impact assessment.

Particularly, there is increasing concern regarding the use of products containing neonicotinoids, given the serious risk they represent to key pollination services for agricultural production, as it has been shown that such substances cause the collapse of bee colonies, soil contamination, and the decline of birds and water invertebrates.[94]

### 1.3.2 Invasive Alien Species[95]

In 2013, the Ministry of the Environment, in consultation with other agencies, prepared a draft Ruling (*Portaria*) which, after endorsement and publication (expected for 2014), will represent the first time that Brazil officially recognizes a list of marine invasive alien species in Brazil. This legal instrument will institutionalize the priority invasive alien species to be targeted by management and control actions and will represent an important step towards the implementation of the National Strategy on Invasive Alien Species, which has been in place since October 2009. The Ministry of the Environment is currently working on the means to strengthen the National Strategy on Alien Invasive Species and promote its institutionalization, which would include the preparation of an administrative ruling to officially adopt this Strategy and promote its implementation at the federal, state and municipal levels. Additionally, following the endorsement and publication of the draft ruling mentioned above, a working group will be constituted to prepare an action plan for the management of marine invasive alien species in Brazil.

The Ministry of the Environment has been investing in the inventory of actual and potential invasive alien species present in Brazil, funding a study that resulted in the internal document 'First National Report on Invasive Alien Species', which inventoried alien species in marine, freshwater and terrestrial environments, in addition to agricultural systems and alien species that affect human health. Information from this internal report is being revised and systematized for publication in several individual volumes. MMA already published in 2009 the volume on Marine Alien Invasive Species[96] and the volume on Freshwater Invasive Alien Species is in press, to be published by late 2014.

The revised data to be published in the Report on Freshwater Invasive Alien Species[97] lists all identified potential invasive alien species contained in artificial habitats, recorded or established in open natural habitats, and those already considered invasive, and also provides an analysis of their population status, possible impacts and current geographical distribution. Various continental freshwater habitats were assessed, such as lakes, lagoons, reservoirs, streams, rivers, swamps, floodplains, and cave habitats such as subterranean lakes and rivers. The report indicates invasive alien species that have already caused negative impacts including, for example, impacts in the reservoirs

---

94 http://www.nature.com/nature/journal/vaop/ncurrent/full/nature13531.html; http://onlinelibrary.wiley.com/doi/10.1002/ps.3836/abstract; http://link.springer.com/article/10.1007/s11356-014-3180-5; http://www.nature.com/nature/journal/vaop/ncurrent/full/nature13642.html; http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0062374; http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0092821; http://onlinelibrary.wiley.com/doi/10.1002/etc.2201/abstract;jsessionid=7D179770D208D74961658788EE2E1698.f03t01?deniedAccessCustomisedMessage=&userIsAuthenticated=false; http://www.bulletinofinsectology.org/pdfarticles/vol67-2014-125-130lu.pdf

95 Ministry of the Environment/DCBio/SBF, 2014. Internal Information Note to support the preparation of the 5th National Report to the CBD.

96 Brasil – MMA/SBF, 2009. Informe sobre as Espécies Exóticas Invasoras Marinhas no Brasil. 439 p.

97 Brasil – MMA/SBF, 2014. Informe sobre as Espécies Exóticas Invasoras de Águas Continentais no Brasil. Série Biodiversidade 39. Brasília, 803 p.

of hydroelectric power plants, as those caused by the golden mussel, one hydrozoa species and various macrophytes.

Records on freshwater potential and invasive alien species were analyzed based on broad consultation and published data. A total of 1,612 validated occurrences of these organisms were recorded corresponding to 163 species, including 3 hybrids (2 fish species and one macrophyte). Fish (67%) and mollusks (12%) predominate among occurrences recorded in Brazilian freshwater habitats, although 11 different biological groups were identified among the 163 species: 109 fish species; 12 micro-organisms including micro-crustaceans; 12 aquatic macrophytes; 11 crustaceans; 4 amphibians; 7 mollusks; 2 reptiles; 2 platyhelminthes; 2 cnidarians; 1 nemathelminthes; and 1 annelid.

Of the 163 species listed in the report, 40 were confirmed as invasive alien species in Brazilian natural habitats. In the space of four years from the initial completion of the inventory (2006) and revision of data for publication (2010), the classification of some of the identified species changed from *occurrence recorded* in 2006 to *established* species in 2010 in Brazilian natural habitats, and new potential invasive alien species were recorded in the country. The North region (Amazon) is the least invaded by alien species, followed by the Center-West region (Pantanal). Factors contributing to this may be their better conservation status compared to other regions, and lower human pressure. Higher concentrations of occurrence of alien species in natural habitats follow the higher concentration of human presence and activities (see Figure 24).

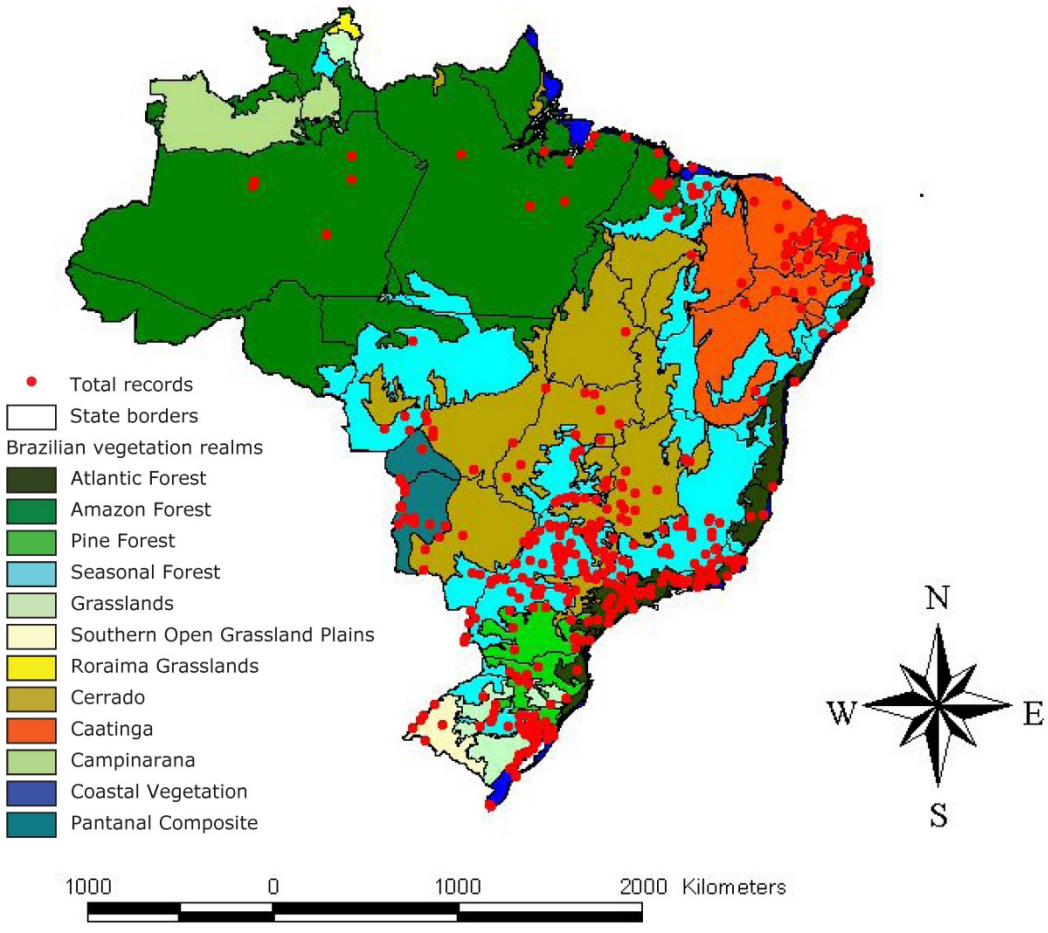


**Figure 24:** Distribution of validated records of potential and invasive alien species in Brazilian freshwater habitats of the different vegetation types. Each dot on the map represents a municipality for which at least one occurrence was recorded.
**Source:** Modified from Brazil – MMA/SBF, 2014. Informe sobre as Espécies Exóticas Invasoras de Águas Continentais no Brasil. Biodiversidade 39. Brasília, 803 p.

Information on terrestrial alien species is being revised since 2013 and should be published by late 2014 or early 2015. This will be followed by the revision and publication of the volumes on alien species in agricultural systems and alien species that affect human health. These publications are informing the preparation of proposed official lists of invasive alien species in Brazil and the development of strategies and public policies to prevent new introductions of alien species, as well as for the monitoring and control of invasive alien species.

Complementarily, an inventory of invasive alien species recorded in federal protected areas was published by ICMBio in 2014[98]. This inventory assessed 313 protected areas and identified the presence of 144 invasive alien species, of which 106 vascular plants, 11 fish, 11 mammals, 5 mollusks, 3 reptiles, 3 insects, 2 cnidarians, 1 amphibian, 1 crustacean, and 1 isopod.

### 1.3.3 Deforestation

Deforestation data from 2009 to 2013 is currently being revised for all extra-Amazonian biomes by the Project on Satellite Monitoring of Deforestation in Brazilian Biomes – PMDBBS. The most recent year for which revised data is available for all extra-Amazonian biomes is 2009[99]. According to PRODES and PMDBBS data, deforestation in 2009 varied among biomes between 0.02% and 0.37% of total biome size, with the Atlantic Forest, for which the strictest anti-deforestation legislation is in place, being the least deforested and the Cerrado, where agricultural pressures are currently most intense, being the most affected by deforestation (Table 24).

**Table 24:** Deforestation comparison among biomes (2008-2009).

| Biome (total area km$^2$) | Deforested area in the 2008-2009 period (km$^2$) | % of deforested area in relation to total biome area |
|---|---|---|
| Cerrado (2,047,146) | 7,637 | 0.37% |
| Caatinga (826,411) | 1,921 | 0.23% |
| Pampas (177,767) | 331 | 0.18% |
| Amazon (4,196,943) | 7,464 | 0.17% |
| Pantanal (151,313) | 188 | 0.12% |
| Atlantic Forest (1,103,961) | 248 | 0.02% |
| **Total** | **17,789** | |

**Source:** Prodes/INPE and PMDBBS/IBAMA data accessed in June 2014, modified from http://siscom.ibama.gov.br/monitorabiomas/mataatlantica/APRESENTACAO%20MATA%20ATLANTICA%202008%202009.pdf

Deforestation rates are in general lower than in previous years (see 4th National Report to the CBD). Due to the size and importance of the Amazon and Cerrado biomes, specific action plans were created under the National Policy on Climate Change (PNMC)[100] to reduce greenhouse gas emissions from deforestation and land use change within these two biomes – respectively the PPCDAm and the PPCerrado (see section

[98] Sampaio, A.B. and Schmidt, I.B., 2014. Espécies Exóticas Invasoras em Unidades de Conservação Federais do Brasil. Biodiversidade Brasileira – 2ª Ed., pages 32-49. Brazil: ICMBio. file:///D:/Downloads/351-1751-1-PB.pdf

[99] http://siscom.ibama.gov.br/monitorabiomas/index.htm

[100] PNMC – *Política Nacional sobre Mudança do Clima*, Law 12187/2009.

1.4). In 2010, these two biomes combined were responsible for 89.4% of the greenhouse gas emissions of the forest sector[101]. As the PNMC establishes specific emission reduction targets for these two biomes and the Amazon already has yearly detailed Prodes satellite data available to monitor deforestation, the Cerrado became the next priority for monitoring enhancement. Deforestation data should be available yearly for all biomes by 2015 (comprising revised data from 2013-on). In the Cerrado, to enhance precision of the monitoring process a new and improved baseline for deforestation and land use monitoring is being prepared by a partnership among IBAMA, Embrapa, INPE and the Federal University of Goiás – UFG for this biome at the 1:250,000 scale, based on 2013 Landsat 8 data. This study is being financed through the GEF Sustainable Cerrado Initiative project and its results should be available by the end of 2014.

Deforestation in the Amazon has been showing a reducing trend since 2004, but the 29% increase from 4,571 $km^2$ to 5,843 $km^2$ seen between 2012 and 2013 indicate that efforts must continue to achieve deforestation reduction targets (see particularly National Targets 5, 14 and 15 in Part II and Annex I of this document, and PNMC). The states of Pará, Mato Grosso and Rondônia are the top contributors to Amazon deforestation rates (Table 25).

**Table 25:** Legal Amazon deforestation rates 2004 – 2013, by state ($km^2$).

| State \ Year | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|---|---|---|---|---|---|---|---|---|---|---|
| Acre | 728 | 592 | 398 | 184 | 254 | 167 | 259 | 280 | 305 | 199 |
| Amazonas | 1,232 | 775 | 788 | 610 | 604 | 405 | 595 | 502 | 523 | 562 |
| Amapá | 46 | 33 | 30 | 39 | 100 | 70 | 53 | 66 | 27 | 11 |
| Maranhão | 755 | 922 | 674 | 631 | 1,271 | 828 | 712 | 396 | 269 | 382 |
| Mato Grosso | 11,814 | 7,145 | 4,333 | 2,678 | 3,258 | 1,049 | 871 | 1,120 | 757 | 1,149 |
| Pará | 8,870 | 5,899 | 5,659 | 5,526 | 5,607 | 4,281 | 3,770 | 3,008 | 1,741 | 2,379 |
| Rondônia | 3,858 | 3,244 | 2,049 | 1,611 | 1,136 | 482 | 435 | 865 | 773 | 933 |
| Roraima | 311 | 133 | 231 | 309 | 574 | 121 | 256 | 141 | 124 | 185 |
| Tocantins | 158 | 271 | 124 | 63 | 107 | 61 | 49 | 40 | 52 | 43 |
| **Legal Amazon** | **27,772** | **19,014** | **14,286** | **11,651** | **12,911** | **7,464** | **7,000** | **6,418** | **4,571** | **5,843** |

Source: Modified from http://www.obt.inpe.br/prodes/index.php

### 1.3.4 Fire

Since the 1980's the National Space Research Institute – INPE has been developing and enhancing the operational system to detect fire occurrences through a reference satellite. The annual historical data series started in 1998 and allows the analysis of trends for given regions and given time periods. The trends in fire occurrences depend, among other factors, on climate variation, land cover, economic aspects, and public subsidies and policies. The 1998-2012 historical series shows a 37% increase (+276,000 occurrences) in the total number of fire occurrences between the 1998-2002 and 2003-2007 periods, followed by a 19% fall between the 2003-2007 and 2008-2012 periods.[102] From 2012 to 2013, a 40% decrease is observed while in 2014, from January to April, 8,048 fire occurrences were recorded representing a 15% increase in comparison with the same period in 2013 (Figure 25).

[101] Ministério de Ciência, Tecnologia e Inovação – MCTI, 2013. Estimativas anuais de emissões de gases de efeito estufa no Brasil. Brasília, 80 p.

[102] MMA-PNIA 2012, in press. Painel Nacional de Indicadores Ambientais – PNIA.

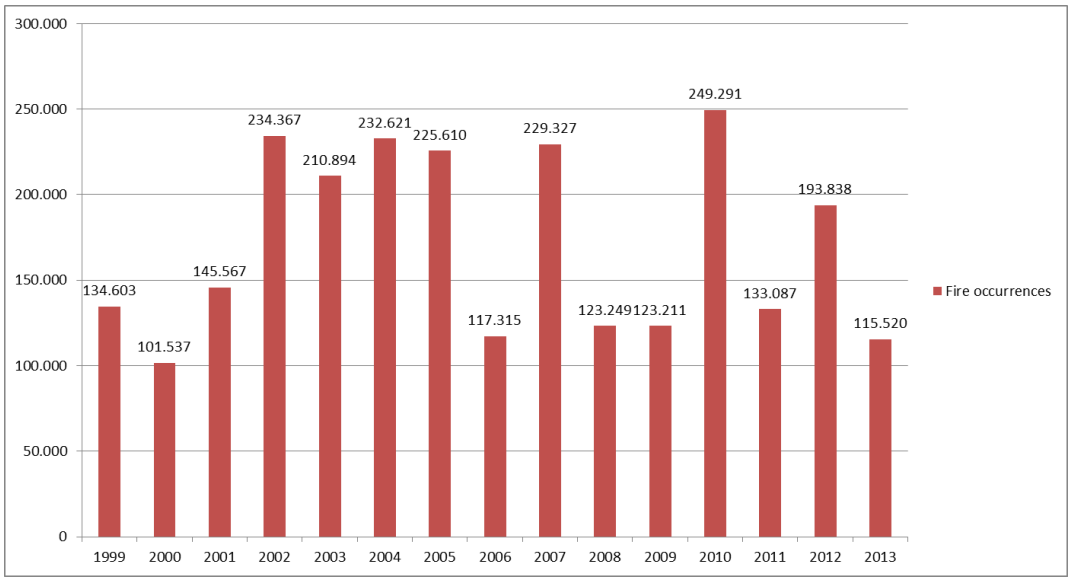



**Figure 25:** Historical series of fire occurrences (1999-2012) according to the reference satellite.
**Source:** Prepared with data obtained from http://www.inpe.br/queimadas/estatisticas.php

Despite the decreasing trend, the number of fire occurrences in the Amazon and in the Cerrado remains higher than in any other biome (Figure 26). In order to enhance forest fire prevention and control in Brazil, the revised Forest Code (replaced with Law nº 16.651/2012) establishes that all landholders must request authorization to the state environmental agencies in order to use fire as a land management tool for agricultural, livestock and forestry activities. It also establishes that all environmental agencies (federal, state and municipal) that comprise the National Environment System – SISNAMA must update and implement contingency plans to control forest fires, and the federal government must establish a national policy on the management, prevention and control of forest fires. The Ministry of the Environment is currently coordinating the development of this national policy, which is expected to be launched by 2015.

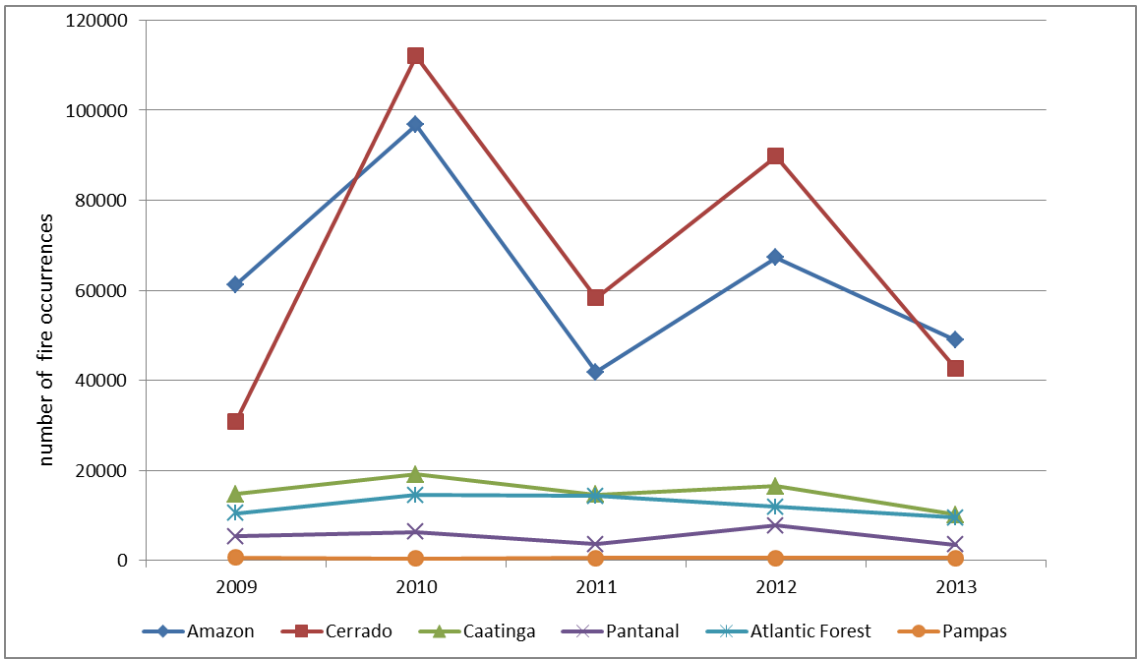



**Figure 26:** Fire occurrences in the Brazilian biomes (2009-2013).

**Source :** INPE, 2014 (http://www.dpi.inpe.br/proarco/bdqueimadas). Data from the reference satellite[103].

The Multi-agency Integrated Center for Operational Cooperation – CIMAN initiated its activities in June 2014, with the objective of combining efforts among federal agencies that work on the direct combat to forest fires. The Center is intended to facilitate the monitoring of fire combat needs and actions during critical periods, sharing information, defining priorities, coordinating large fire combat operations, and assessing the results. During the first six months of 2014, a 39% increase in fire occurrences in comparison to the same period in the previous year, as a result of the El Niño climate patterns.[104]

### 1.3.5 Climate change

Since 2009, with the institution of the National Policy on Climate Change (PNMC), Brazil has set voluntary emissions reduction targets[105]. To support achievement of the reduction commitments, this policy established mitigation and adaptation plans, and foresees the use of the Clean Development Mechanism – CDM and Nationally Appropriate Mitigation Actions – NAMAs. Nine plans are currently being implemented: (i) Action Plan for the Prevention and Control of Deforestation in the Legal Amazon; (ii) Action Plan for the Prevention and Control of Deforestation in the Cerrado, (iii) Low Carbon Agriculture Plan; (iv) Decennial Energy Plan; (v) Steel Mill Plan; (vi) Low Carbon Mining Plan; (vii) Industry Plan; (viii) Transportation and Urban Mobility Plan; and (ix) Health Sector Plan for Mitigation and Adaptation to Climate Change. The national estimates of greenhouse gas (GHG) emissions from five sectors are periodically reported through the National Communication of Brazil to the UNFCCC: Energy, Industrial processes, Agriculture and livestock, Land use change and forestry, and Waste treatment.

In 2010, the estimated GHG emissions in the Land Use Change and Forestry sector were 1 billion tons of carbon dioxide equivalent ($tCO_2eq$) lower than the projected levels for 2020, regardless of the common metric applied (Global Warming Potential – GWP or Global Temperature Potential – GTP). Although all other assessed sectors (energy, industry, waste, and agriculture and livestock) presented an increase in absolute GHG emission in comparison with 1990, their emissions in 2010 were still below projected levels for 2020.[106]

Given the significant reduction in GHG emissions from the Land Use Change and Forestry sector, the proportion of sector emission contributions to total national emissions also changed, as shown in Figure 27 below.

[103] "Reference satellite" is the satellite providing daily fire detection data used to build the time series along the years of monitoring, thus allowing the analysis of trends based on the number of fire occurrences in the same region within defined periods of time. From 1999 to 09 August 2007, the reference satellite was NOAA-12, and after that date, the AQUA_M-T. For various states, the historical data series starts in 1992.

[104] http://sigma.cptec.inpe.br/ciman/

[105] PNMC – *Política Nacional sobre Mudança do Clima*, Law 12.187/2009. PNCM established as voluntary target the reduction of greenhouse gas emissions by between 36.1% and 38.9% in comparison to Brazilian emissions projected until 2020. This translates in a reduction between 1.168 Gt $CO_2eq$ and 1.259 Gt $CO_2eq$ of the 2020 estimated rate of 3.236 Gt $CO_2eq$.

[106] Ministério do Meio Ambiente/DPCD/SMCQ, 2014. Unpublished draft of the National Plan on Climate Change.

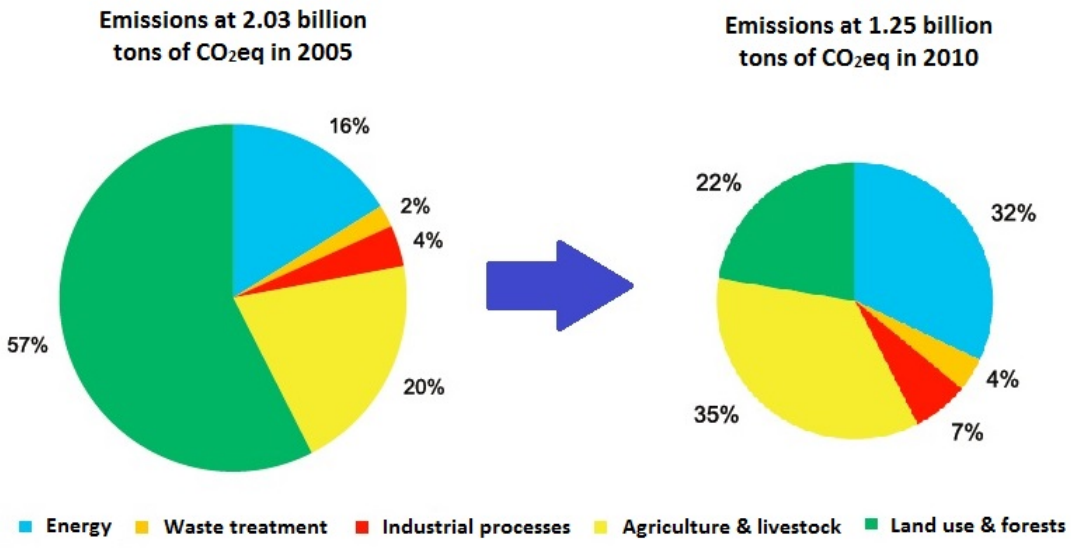



**Figure 27:** Comparative estimated GHG emissions in $CO_2$eq, by sector (2005 and 2010).
**Source:** Modified from: MCTI, 2013. Estimativas anuais de emissões de gases de efeito estufa no Brasil. SEPED/CGMC/MCTI. Brasília, 80 p.

### 1.3.6 Threats to aquatic and coastal habitats

Approximately 80% of the Brazilian coastline contains mangroves, covering a total of 1,382,815 hectares in 16 states, from north to south. Brazilian mangroves are fragile environments that are being impacted by various threats, such as fragmentation and loss of vegetation cover, and the deterioration of aquatic habitat quality mainly due to pollution and changes in hydrodynamics, leading to the decline of available natural resources on which numerous traditional communities and sectors directly depend for survival. Among the main economic activities of coastal traditional communities are the fisheries activities in mangroves (targeting fish, crabs, mollusks and oysters), the community-based tourism, and beekeeping for honey production, all of which present high potential for generating income in sustainable bases. Although mangrove fisheries data are limited, it is estimated that in some Brazilian states the contribution of these ecosystems reaches almost 50% of total artisanal fisheries production.[107]

Regarding the wider coastal and marine environments, of the 144 threatened marine species identified by ICMBio's assessment of species conservation status, 134 are threatened by some type of fisheries activity. Activities that cause the degradation of marine and coastal environments were identified as the second most relevant threat, with pollution affecting 72 species, including seven threatened by sound pollution (six mammals and one elasmobranch) and five marine turtles threatened by photo-pollution. Transport infrastructure (ports and marine traffic, as well as collision with vessels), uncontrolled tourism, urban coastal development, and mining were also identified among the major threats to marine species. Additionally, aquaculture, invasive alien

[107] MMA, ICMBio, and IBAMA, 2014. Draft National Work Plan Proposal for the implementation of the REVIMAR. Internal Report, 24p.

species, and destruction of coral reefs and mangroves were also listed among threats to marine species.[108]

In addition to pollution (see section 1.3.7), one of the major threats to freshwater habitats can be the construction of dams. Brazil's energy sector is heavily dependent on hydroelectricity produced by some 1,127 operating small and large-scale hydroelectric power plants spread throughout the national territory. In 2014, hydroelectric power represented 67% of the power grid, with 33 new hydroelectric power plants currently under construction and 209 water use permits already issued for the construction and operation of other hydroelectric power plants to generate additional 6,879 MW.[109] While this represents a significant renewable source of energy, the construction of dams can cause a number of adverse impacts on rivers, by dramatically changing habitats and interfering with the natural cycles of aquatic species. These effects can be compounded when a series of dams is built along the same river or watershed.

Upstream of dams, lotic habitats are transformed into lentic habitats when a reservoir is formed, and the characteristics of the reservoir and operation of the dam affect the hydrological regime of the river, sediment and organic load, water volume and quality, and other physical characteristics of the habitat such as temperature and pH, among several other aspects. Dams and reservoirs often lead to the loss of reproduction sites and other habitats that are important for a diversity of species, such as marginal pools and rocky habitats, and changes or loss of downstream flood regimes, in addition to interrupting migratory routes and hampering gene flow. In general, local extinction of species and abrupt changes in the structure of biological communities are observed as a result of the modification in the length of time of water retention and altered water quality. Fish ladders built for minimizing the effects of river fragmentation on migratory species often fail to succeed in their intent, as their structure is highly selective for aquatic species and essentially allows movement in a single direction. In the Paraná River watershed, for example, some ladders allow fish to enter a reservoir where no suitable habitat is available for breeding and growth, while reproduction would be possible in downstream tributaries. Thus, instead of contributing to the maintenance of local populations, some fish ladders are contributing to the extinction of migratory species.[110]

River fragmentation impacts can be more effectively mitigated when environmental assessments of the synergic impacts of the relevant set of infrastructure investments affecting a river or watershed are carried out prior to construction, in time for making environmentally relevant adaptations to the planned infrastructure. Considering the numerous (>200) future investments on hydroelectric infrastructure planned for the coming years in Brazil, it will be crucial to continue to develop effective tools to support decision making during the required environmental licensing procedures. Such tools should apply a watershed planning view to thoroughly consider possible environmental impacts on aquatic biodiversity generated by the entire set of infrastructure investments. MMA is currently developing studies to identify critical

[108] ICMBio, 2014. Diagnóstico da Fauna: Avaliação do Estado de Conservação de Espécies da Fauna Brasileira. Internal Report to MMA.

[109] www.aneel.gov.br/aplicacoes/capacidadebrasil/capacidadebrasil.cfm accessed on 30 July 2014.

[110] Agostinho, A.A., Thomaz, S.M., Gomes, L.C. 2005. Conservação da biodiversidade em águas continentais do Brasil. **Megadiversidade** vol. 1, No. 1. July 2005. And: Silve, E.M. & Pompeu, P.S., 2011. Análise crítica dos estudos de ictiofauna para o licenciamento de 40 PCH no Estado de Minas Gerais. Revista PCH Notícias & SHP News – No. 37. http://www.cerpch.unifei.edu.br/arquivos/artigos/93d3a0cf0697dccba50ed88743d83aee.pdf

species and areas that are vulnerable to impacts from hydroelectric power plants, with a view to inform planning processes in the energy sector.

### 1.3.7 Pollution

Treated and untreated domestic wastewater is still an important source of water pollution, particularly in urban areas. It is also a relevant contribution to organic loads in Brazilian water bodies, together with agriculture runoff (see sections 1.2.1.3 and 1.3.1). In 2010, 15.2% of the main Brazilian rivers presented some type of critical status: 10.9% faced critical conditions regarding water quantity, 1.5% regarding water quality, and 2.8% faced critical conditions regarding both water quantity and quality[111].

In 2012, according to the National Sanitation Information System – SNIS (*Sistema Nacional de Informações sobre Saneamento*) under the Ministry of Cities, only 56% of the Brazilian urban population had access to wastewater collection systems, and 69% of the collected wastewater was treated. When the analysis considered the volume of generated wastewater (equivalent to the volume of consumed water) instead of collected wastewater, the percentage of treatment fell to 39%.[112] Furthermore, the current sewage treatment systems in Brazil are not capable of removing hormones or antibiotics, which end up in the water bodies, which has been demonstrated by research projects to cause harmful effects on human health and aquatic biota.[113]

In its efforts to reduce water pollution, since 2012 Brazil has been revising its legal framework or adopting new policy instruments through the National Environmental Council – CONAMA. Examples are the publication of Decree 8.127/2013 on the National Contingency Plan for Oil Pollution Incidents in Brazilian Jurisdictional Waters, and the CONAMA Resolution No. 454/2012 ruling on dredging practices to reduce impact on fisheries activities, and adequate management and disposal of dredging materials to reduce contamination of the aquatic habitat with heavy metals and polycyclic aromatic hydrocarbons.

The collection and treatment of solid waste is a responsibility of the municipality and historical data is very incomplete on this theme, with a varying number of municipalities providing data in different years. Nevertheless, the Ministry of Cities – MCid carried out some analyses on available data for the period 2003-2011, indicating an increase in the number of municipalities that offer the service of domestic solid waste collection from 95 in 2003 to 1,288 municipalities in 2011. The average *per capita* generation of solid waste seems to vary between 0.72 and 1.30 kg/habitant/day. Where present, the service of solid waste collection addresses between 95.3 to 100% of the urban population, although the reported rates of recycling compared to total waste collected have not yet surpassed 5.79%.[114] In June 2014, the Ministry of the Environment launched a new online tool – the EducaRES, with the objective of mapping and disseminating actions that contribute to addressing the challenges of the

[111] ANA, 2013. Conjuntura dos Recursos Hídricos no Brasil. Brasília, 432 p. Available at: http://arquivos.ana.gov.br/institucional/spr/conjuntura/webSite_relatorioConjuntura/projeto/index.html

[112] Brasil, Ministério das Cidades, Secretaria Nacional de Saneamento Ambiental – SNSA, 2014. Sistema Nacional de Informações sobre Saneamento: Diagnóstico dos Serviços de Água e Esgotos. Brasília, 164 p. www.snis.gov.br

[113] Agencia.fapesp.br/contaminantes_emergentes_na_agua/12846/; www.unicamp.br/unicamp/ju/590/estudo-avalia-impactos-de-efluentes-em-etes

[114] Data provided by SRHU/MCid in July 2013, In: Weigand Jr., R. et al, 2011. Metas de Aichi: situação atual. UICN, WWF-Brasil and IPE.

implementation of the National Solid Waste Policy (PNRS), and to create a database on existing good practices on PNRS implementation.[115]

Brazil has been very diligent in reducing the consumption of substances that affect the ozone layer. Since the 2002 baseline, Brazil has already brought down to zero the consumption of CFCs in 2010, and of methyl bromide in 2006 (with residual use of methyl bromide exclusively for quarantine and shipping purposes). However, HCFC consumption levels are still higher than baseline, although consumption rates were frozen in 2013.[116] A significant reduction in atmospheric pollution by vehicles was also observed in the period 2002-2012, even though the national fleet grew from 25 million vehicles to 45 million. Although still high, emissions have reduced significantly: carbon monoxide by 46% to 1.4 million tons; nitrogen oxide by 17.4% to 0.95 million tons; HC by 44.4% to 0.25 million tons; and particulate matter by 54.5% to 25 million tons.[117]

At the end of 2013, the National Environment Council (CONAMA – *Conselho Nacional do Meio Ambiente*) created a working group to revise the CONAMA Resolution n$^{o}$ 03/1990 on air quality standards to prevent harm to human health. Considering the scientific and technological advances that occurred along the 24 years of this Resolution, its updating is crucial to enhance pollution reduction and control. Also under CONAMA, the Programs to Control Air Pollution by Automobiles (PROCONVE – *Programa de Controle da Poluição do Ar por Veículos Automotores*, created in 1986) and by Motorcycles (PROMOT - *Programa de Controle da Poluição do Ar por Motociclos e Veículos Similares*, created in 2002), have obtained significant results in reducing air pollution from these sources. Before these Programs, the average emissions of carbon dioxide (CO), for example, from a small car was estimated at 54 g/km, and has currently fallen to 0.4 g/km[118]. The National Inventory of Atmospheric Emissions by Automobiles for 2013 (based on 2012 data) indicated that the CO emissions from automobiles have fallen significantly since 1991, going from approximately 5.5 million tons of CO in 1991 to 1.3 million tons of CO in 2012[119].

## 1.4 Main actions to protect biodiversity

### 1.4.1 Revised legislation

The original national Forest Code (Law 4.771/1965) was a groundbreaking legislation in force since 1965, and amended numerous times along its 47 years of existence. Although it stood as the most important national instrument for the protection of native vegetation, a significant deficit of compliance accumulated along time, compounded by the establishment of the Law on Environmental Crimes (Law 9.605/1998) in 1998. Under this scenario, in 2012 Brazil revised the former Forest Code, replacing it with Law 12.651/2012 enacted on May 25, 2012. The new law maintained the previously defined deforestation thresholds in private lands: within the Legal Amazon, landowners are required to maintain a proportion of the property covered with native vegetation

[115] http://educares.mma.gov.br/index.php/main

[116] MMA/IBAMA data In: Weigand Jr., R. et al, 2011. Metas de Aichi: situação atual. UICN, WWF-Brasil and IPE.

[117] MMA/SRHU data In: Weigand Jr., R. et al, 2011. Metas de Aichi: situação atual. UICN, WWF-Brasil and IPE.

[118] http://www.ibama.gov.br/areas-tematicas-qa/programa-proconve

[119] MMA, 2014. Inventário Nacional de Emissões Atmosféricas por Veículos Automotores Rodoviários 2013 (ano base 2012). Brasília, 114 p.

(designated as Legal Reserve), corresponding to a minimum of 80% of the property in areas covered with forest, 35% of the property when covered with Cerrado vegetation, and 20% of the property when covered with any other type of vegetation. In all other Brazilian biomes, landowners are required to set aside a Legal Reserve of 20% of the rural property.

Although specific definitions were revised, the new Law 12.651/2012 also maintained the concept of Permanent Preservation Areas – APPs (*Áreas de Preservação Permanente*), which correspond to natural areas to be protected within a private property, encompassing land strips bordering natural or artificial water bodies; slopes over 45°; *restingas*; mangroves; the border of plateaus; mountaintops and hilltops (minimum of 100 meters high); and areas above 1,800 meters. The size of the land strip to be maintained with native vegetation cover in APPs varies with the size and type of the APP, and different rules apply for natural and artificial water bodies.

An important aspect of the revised legislation was the effort to establish the means to resolve the large deficit of compliance accumulated along time regarding the maintenance of Legal Reserves and APPs. The actual dimension of this deficit will only be fully known after the completion of the Rural Environmental Registry – CAR (*Cadastro Ambiental Rural*), a new mandatory mechanism created under Law 12.651/2012, in which all rural landowners must record the geo-referenced location and size of their properties and of the Legal Reserve and APPs in their properties. Extensive debates resulted in the definition of a cut-off date (22 July 2008, when Decree 6.514/2008 was enacted, regulating the Law on Environmental Crimes and establishing penalties for lack of compliance with the Forest Code), after which the new rules on vegetation preservation and re-composition as stated in the revised Forest Code will apply.

Part of the deficit generated by illegal deforestation before 22 July 2008 was reduced by the revised Forest Code, which establishes that part of the area illegally deforested before the cut-off date should be considered as having a "consolidated" use and exempted small properties (up to 4 fiscal modules[120]) from recuperating pre-2008 deficits in their Legal Reserves. Small properties with less than 20% set aside as Legal Reserve were allowed to be considered in compliance regarding Legal Reserves if they maintain the vegetation cover that existed in 2008. Nevertheless, Legal Reserve deficits in properties larger than 4 fiscal modules must be recomposed to achieve the required size. Additionally, the new legislation establishes that agroforestry systems may be used in the restoration of Legal Reserves, with up to 50% of alien species intermixed with native species.

Specific rules were also established for pre-2008 deforested APPs along natural water bodies (springs, water courses, *veredas*[121], and natural lakes and lagoons), according to which the landowner is required to restore a minimum width of land strip that varies according to the size of the property and width of the water body, and the remaining

[120] Fiscal module is an agrarian unit applied in Brazil according to Law 6.746/1979, measured in hectares and corresponding to the minimum area necessary for the viable economic use of a rural property. The size of a fiscal module varies among municipalities (from 5 to 110 hectares) and is defined according to: (i) predominant land use in the municipality; (ii) income obtained with the predominant land use; (iii) other important land uses with significant income generation; and (iv) the concept of family property. Thus, for instance, a fiscal module in the Amazon is usually much larger than one in heavily urbanized regions such as the Atlantic Forest.

[121] *Veredas* are savannah phytophysiognomies found in hydromorphic soils, usually alongside springs/small streams and with the presence of the palm tree *Mauritia flexuosa*, an emerging species that does not form a canopy, among groups of bush and herbaceous species.

portion is considered of "consolidated use". No minimum restoration requirement was established for the remaining types of APPs (reservoirs, slopes, hilltops and mountaintops, plateaus, mangroves, *restingas*[122], and areas above 1,800 meters).

To assist in the resolution of the pre-July 2008 Legal Reserve deficit, the new Law 12,651/2012 also introduced a mechanism to allow landowners who, by the 2008 cutoff date, had exceeded the allowed threshold, to compensate the deficit area by maintaining an area of equivalent size covered with native vegetation in the same biome and preferably, within the same state (location within the same watershed is no longer a requirement). The compensation may occur within the same property or in a different property, and the Legal Reserve may be compensated in its entirety or only its deficit area. The property that hosts a Legal Reserve compensation must be enrolled in the Rural Environmental Registry – CAR, and must be covered with vegetation or have a CAR-approved Environmental Regularization Program. Only the area that exceeds a property's required Legal Reserve may be used for compensation, through a lease, forest easement, or through the acquisition of Environmental Reserve Bonds (this mechanism is still not fully in place).

Two important steps towards the implementation of the revised Forest Code took place on 05 May 2014, when the Ministry of the Environment published its Ruling IN 02/2014, which establishes the procedures and operation rules for the Rural Environmental Registry – CAR, and the national Decree 8.235/2014 was published regulating the Environmental Regularization Program – PRA (*Programa de Regularização Ambiental*), which is the main instrument to enable the implementation of the new legislation. Decree 8.235/2014 rules on the regularization of damaged Permanent Preservation Areas (APPs), Legal Reserves (RL) and Reserves of Restricted Use[123] (RU), which can be achieved through the recuperation, restoration or regeneration of these areas, or through the compensation of Legal Reserves.

The publication of MMA IN 02/2014 triggers the countdown of the one year deadline, extendable for one additional year, for all rural landowners to register their properties and respective remaining native vegetation cover, APPs, RLs and RUs in the Rural Environmental Registry – CAR. Beyond this deadline, non-compliant landowners shall be subject to impossibility to access rural credit lines and to a non-compliant legal status attached to their property. It is expected that approximately 5.6 million rural properties and holdings will be registered into CAR. After registration into CAR, those rural properties presenting lack of compliance regarding their APPs or RLs will be required to join state-ruled Environmental Regularization Programs – PRA through the signature of individual Terms of Conduct Adjustment – TACs (*Termos de Ajuste de Conduta*).[124]

---

[122] *Restinga* is a coastal phytophysiognomy of the Atlantic Forest, comprised by a mosaic of scrub and herbaceous vegetation over sandy soils, usually found in beaches and sand strips.

[123] Areas of Restricted Use (RU – *Áreas de Uso Restrito*) are: (i) marshes and fields subject to periodic flooding, where the ecologically sustainable use of the area and its natural resources is allowed according to technical recommendations of official research agencies, and where new deforestation of native vegetation for changes in land use are conditioned to the authorization of state environmental agencies; and (ii) slopes between 25° and 45°, where the sustainable forest management and agricultural, silvicultural and grazing activities are allowed according to good agronomical practices, as well as the maintenance of associated physical infrastructure, and where the conversion of new areas is forbidden, except in those cases considered of public utility and social interest.

[124] www.mma.gov.br/informma/item/10112-sistema-do-cadastro-ambiental-rural-já-vigora-em-todo-o-brasil, www.observatorioflorestal.org.br/?p=1338, and www.institutocarbonobrasil.com.br/noticias6/noticia=737013.

#### 1.4.1.1 Effectiveness of public policies

*Aquatic species*. In December 2013 the MMA signed a cooperation agreement[125] with the Rio Grande Federal University Foundation – FURG to quantify the efficiency of the ruling on fishing with net gear in the southeast and south regions of Brazil. This study is expected to provide an assessment of the benefits of the Inter-ministerial Ruling MPA/MMA INI 12/2012 on the populations of threatened and vulnerable aquatic species. The study should generate reports on: (i) estimate of the annual mortality of the Franciscana dolphin (*Pontoporia blainvillei*), turtles, marine birds, and elasmobranch species as a result of by-catch in net fishing in the state of Rio Grande do Sul; (ii) comparison of spatial distribution and intensity of by-catch and fisheries production before and after the implementation of INI 12/2012; and (iii) protocol for the effective monitoring of the fishing fleet using net gear through a national program on on-board observers.

Since the publication of the comprehensive REVIZEE Report in 2006, it is known that the main marine fish stocks explored by fisheries activities were already exhausted or overexploited, preventing the increase of fisheries production through the increase of fishing efforts. In its efforts to achieve the sustainability of national marine and continental fisheries resources, the government applies a variety of regulating measures, focusing particularly on the control of fishing efforts, protection of species during the reproductive period, and conserving aquatic species. Legal instruments from 2004/2005 listed the threatened and over-exploited aquatic species and indicated the need to prepare action plans for the conservation of these species and restoration of fisheries stocks (see 4th National Report to the CBD). In 2011, the first action plan was published for the conservation of threatened aquatic species of the Paraíba do Sul watershed. The recent increase in the volume of continental aquaculture production (see section 1.2.1.4) may also contribute to reduce pressure on natural fisheries resources, although enhanced policy incentives may be necessary to achieve this effect. The regulation of extractive fisheries activities, however, has proven a challenge particularly at the institutional level, with the creation of new agencies and redefinition of responsibilities, which compound with the still present conflict of assigned duties between the environmental agencies and the agencies responsible for promoting fisheries activities.[126]

On the 2014 International Day for Biological Diversity (22 May), the federal government announced that, as a result of the successful implementation of governmental actions combined with civil society initiatives, the threat classification of the humpback whale will be changed from threatened to almost threatened in the Brazilian list of threatened species. While only 500 individuals were estimated to live in the wild in the 1980's, the current estimate is ranging from 14,000 to 15,000. This was a result of long term measures such as the prohibition of hunting, redefinition of vessel routes to avoid collisions, and the creation of the Abrolhos Marine National Park. During the event, it was announced that Brazil will present to the International Whaling Commission (IWC) a proposal for the creation of the International South Atlantic Whale Sanctuary, with the objective to prevent whale hunting in this area of the ocean where the international moratorium on humpback hunting is still in force.[127]

---

[125] SBF/MMA 2013. Internal Management Report.

[126] Viana, J.P. 2013. Boletim regional, urbano e ambiental, vol. 7, Jan-Jun 2013. Brasília: IPEA.

[127] http://www.mma.gov.br/informma/item/10143-governo-comemora-resultados-e-amplia-a%C3%A7%C3%B5es-em-defesa-da-fauna; Instituto Baleia Jubarte http://www.baleiajubarte.org.br

In 2012, to support discussions at the Rio +20 Conference the Federal Court of Accounts (TCU – *Tribunal de Contas da União*) carried out an audit to assess the level of mainstreaming of Rio-92 commitments into national public policies. Regarding the administration of the sustainable use of fisheries resources, TCU recognized that the legislation currently in place has created a reference model for the shared management of fisheries resources involving government and civil society, and based on environmental sustainability principles. However, compromising difficulties were pointed out by the audit regarding the functionality of the shared management model where the institutional structure was not fully implemented, given that the development of measures for the sustainable use of fisheries resources was being carried out by the government alone. Cases were also found where managers did not base decisions on existing technical and scientific data, or failed to adopt precautionary principles in the absence of such data, thus not complying with legal requirements. Various structural barriers were also pointed out by TCU, among which the low level of use of available technical and scientific knowledge to inform decision making; the dichotomy between political agendas in governmental agencies; the lack of continuous scientific and technical data generation on aquatic habitats and fisheries resources; and the lack of adequate monitoring and control mechanisms for enforcing policy measures. As a result of the audit, among other measures TCU ordered the Ministry of Fisheries and Aquaculture (MPA) and the Ministry of the Environment (MMA) to present a joint proposal of an Action Plan for the implementation of the 21 Permanent Management Committees (CPGs – *Comitês Permanentes de Gestão*) foreseen in the shared management system and their respective scientific advisory subcommittees, within deadlines that span from 2012 and 2016.[128]

A study[129] evaluated two important policy actions that benefit extractive workers: the Minimum Price Policy for Sociobiodiversity-based Products – PGPMBio, and the Environmental Conservation Support Program, known as "Green Stipend" (*Bolsa Verde*). The main findings of this study are summarized below.

*Sociobiodiversity products*. Extractive activities of non-timber forest products in Brazil are associated to a diffuse and informal economy practiced mainly, though not exclusively, at remote regions of the country and by diverse social groups composed by poor or extremely poor workers, who are heavily dependent on natural resources. In 2011, non-timber forest products generated R$935.8 million, or 5.1% of the total national primary forest production. Various policies have been developed and implemented in recent years to support these activities and social groups.

PGPMBio is part of the National Plan to Promote the Production Chain of Products from Sociobiodiversity (PNPSB), which seeks to structure sustainable production systems by supporting initiatives that promote the importance of traditional knowledge and involve the participation of several governmental agencies and sectors, the private sector and civil society. The National Supply Company (CONAB) implements this plan and defines the minimum price, being also responsible for operationalizing the payment of benefits. The benefit is the difference between the minimum price established by the government for a given product from extractive activities and the sale value of this

[128] Viana, J.P. 2013. Boletim regional, urbano e ambiental, vol. 7, Jan-Jun 2013. Brasília: IPEA.

[129] Viana, J.P. Chapter 15: Avaliação de duas ações governamentais recentes em apoio a extrativistas – Garantia de Preços Mínimos para Produtos da Sociobiodiversidade e Bolsa Verde. *In*: IPEA, 2013. Estado, planejamento e políticas públicas. Brasília.

product. The first payments of benefits occurred in 2009, and the study analyzed results of the 2009-2011 period (Table 26).

**Table 26:** Summary of benefit payments by CONAB through PGPMBio (2009-2011)

| | 2009 | 2010 | 2011 |
|---|---|---|---|
| Total benefit payments (R$) | 1,068,421 | 2,756,408 | 1,895,091 |
| Production (tons) | 944.8 | 3,368.2 | 2,663.6 |
| Number of beneficiaries (extractive workers) | 3,508 | 16,365 | 5,753 |
| Number of products under PGPMBio | 7 | 8 | 11 |
| Number of products for which payments were made | 3 | 4 | 4 |
| Number of operations carried out | 92 | 232 | 101 |
| Number of beneficiary states | 7 | 7 | 9 |
| Number of beneficiary municipalities | 35 | 38 | 32 |

**Source:** Viana, J.P. Chapter 15: Avaliação de duas ações governamentais recentes em apoio a extrativistas – Garantia de Preços Mínimos para Produtos da Sociobiodiversidade e Bolsa Verde. *In*: IPEA, 2013. Estado, planejamento e políticas públicas. Brasília.

During the 2009-2011 period, more than half of the benefit payment operations occurred in 2010, when the largest amount of resources were invested. The first 7 products initially supported were: assai (fruit), babassu (nut), natural rubber, Brazil nut, pequi (fruit), piassava (fiber), and carnauba wax type B. In 2010, carnauba wax type 4 was also included on the list, and in 2011 three other fruits were included: baru, umbu and mangaba. Although all products supported under the policy were selected based on studies and consultations, only half, or less, of the listed products presented a demand for the benefits under this policy in any given year. Also, although approximately R$29 million had been allocated by CONAB for the payment of benefits in the 2009-2011 period, only R$19.7 million were actually paid.

Both positive and negative factors can be associated to the low execution of earmarked resources: (i) for some years, benefits were not paid for Brazil nut and assai because the market sale price was actually higher than the minimum price established by the policy; and (ii) the bureaucratic operationalization of the policy may present an obstacle, as it does not account for the fact that, for the extractive workers, it is a challenge to obtain some of the required documentation such as the Eligibility Certificate (DAP – *Declaração de Aptidão*) to access public policies, personal identification and a bank account, and official invoices to present in exchange of receiving the benefit.

The policy to-date has benefitted only a fraction of the Brazilian extractive workers and of the national production of the selected products, sometimes as low as 2% of total production for babassu nut and piassava fibers and 27% for rubber, despite the increasing trend in the period. Considering the year 2011 and the same three products (babassu, piassava and rubber), a little over R$95 million would be necessary to benefit the entire production, in contrast to the R$29 million actually allocated. The study thus concludes that, in addition to the operational difficulties, PGPMBio still has a limited reach in regard to the national extractive production. There is therefore much room for extending this reach in order to effectively function as a production inclusion policy for extractive workers and representing a significant contribution to reduce poverty and improve quality of life in this sector.

*Community-based environmental conservation*. The Green Stipend (*Bolsa Verde*) program started implementation in July 2011 and targets approximately 16.2 million people in extreme poverty who implement natural resource conservation activities in rural areas, priority sustainable use protected areas, and resettlement projects of the agrarian reform (see section 1.2.1.2.). Between October 2011 and November 2012, the program paid R$30,725,100 in stipends to 32,526 families. The program initially

prioritized the North region, which holds a higher concentration of federal protected areas and eligible target population, although the number of states benefitting from the program increased along the analyzed period. Pará, with several sustainable use protected areas (extractive reserves, sustainable development reserves and national forests) has by far the highest number of beneficiary families and invested resources (72.8% of total resources), followed by Amazonas, Acre, Bahia and Minas Gerais, with the other states housing smaller numbers of beneficiaries.

After 14 months of implementation, the program achieved 44.6% of its target with 32,526 beneficiary families. With 73,000 beneficiary families by the end of 2014, the Green Stipend program represents an expenditure of R$87.6 million per year. According to governmental estimates, there are 213,000 families living in 145 million hectares of priority areas targeted by the program. If the program reaches all families, this would represent an investment of R$255.6 million per year, or only R$1.72 per hectare per year, which is a low price to pay for the conservation of natural resources accompanied by social and economic benefits. Nevertheless, the operationalization of the program is complex, and the location of the central coordination in Brasília, far from the beneficiaries, adds to the complexity of the operation. The decentralization of operations to regions or states may contribute to the agility of program implementation and to reduce the distance between target population and program coordination.

*Tax incentives to local governments*. By 2013, 17 of the 27 Brazilian states were already implementing the Ecological VAT (*ICMS Ecológico*), through which municipalities that follow ecological criteria established by the state, such as containing protected areas and/or indigenous lands within their territories, solid waste management, wastewater treatment systems, among others, receive an extra share of the state's value-added tax on services and circulation of goods (ICMS).[130] This increase in budgetary revenues gives municipalities the opportunity to invest in services for which budget is insufficient, such as education, health and solid waste management. However, May et al. (2012)[131] identify an important shortfall for this tax incentive to actually enhance environmental protection and benefits within municipalities: as the Ecological VAT revenues are not earmarked for environmental expenditures unless specific local legislation is passed, municipal governments invest this extra resource according to their own criteria and not necessarily in environmental management or for the creation of new protected areas. Nevertheless, the authors show that in the case of Paraná state, for example, the implementation of the Ecological VAT scheme led to the adoption of a quality index which is sensitive to the efforts of municipalities towards protected area establishment and maintenance. On the other hand, in Mato Grosso the initial incentive for protected area creation observed in early implementation of the scheme later experienced a sharp drop, following the decision by local governments to prioritize the creation of sustainable use protected areas, which receive a lower weight in the revenue allocation formula.

[130] IBGE, 2013. Perfil dos estados brasileiros 2013. IBGE: Diretoria de Pesquisas. www.ibge.gov.br

[131] May, Peter H. et al., 2012. The "Ecological" Value Added Tax (ICMS-Ecológico) in Brazil and its effectiveness in State biodiversity conservation: a comparative analysis. In: Proceedings of the 12th Biannual Conference of the International Society for Ecological Economics, Rio de Janeiro. 2012.

### 1.4.2 Protected areas[132]

The creation and maintenance of protected areas is one of the main strategies to protect biodiversity. During the past 10 years, Brazil was one of the top contributors for increasing the total area under official protection in the world, particularly due to the expansion of the Brazilian system of protected areas, the National System of Protected Areas – SNUC[133].

In 2010, the terrestrial area covered by protected areas in Brazil corresponded to 16% of the total national territory, while the total marine protected area was limited to 1.5% of the coastal and marine region under national jurisdiction, which has not changed much in the past four years. Although the number of protected areas recorded in the National Registry of Protected Areas – CNUC (*Cadastro Nacional de Unidades de Conservação*) increased from 1,724 in 2010 to 1,829 in February 2014, there was no substantial increase in the total geographical area under protection (Figure 28).

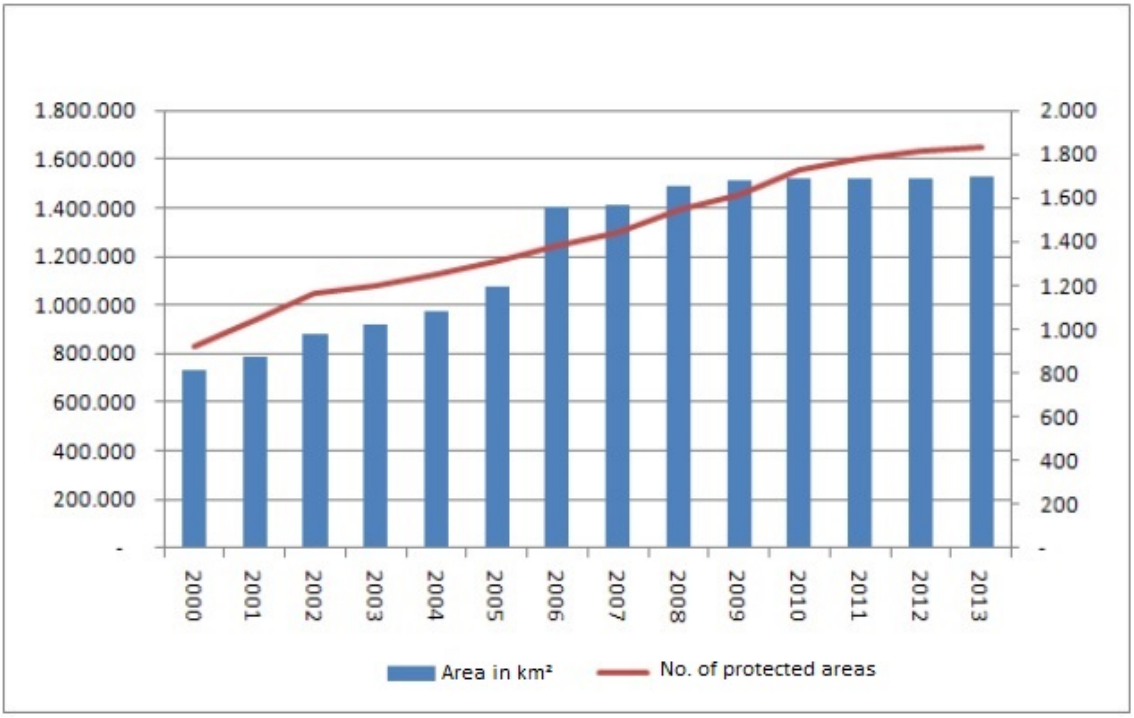



**Figure 28:** Evolution of the national protected areas system (2000 – 2013) under SNUC.
**Source:** MMA/DAP, April 2014. Internal Information Note to support the preparation of the 5th National Report to the CBD.

Although Brazil only partially achieved the 2010 National Target of protecting at least 30% of the Amazon and 10% of all other terrestrial biomes and coastal and marine zone under officially protected areas under SNUC (Figure 29), in 2013 new National Targets were set based on the global Aichi Targets, maintaining the concern of preserving

[132] MMA/DAP, April 2014. Internal Information Note to support the preparation of the 5th National Report to the CBD. In this report, the term "protected areas" refer exclusively to the definition under SNUC and do not include Permanent Protection Areas (APP) or Legal Reserves (RL) under Law 12.651/2012 (revised Forest Code).

[133] SNUC was established by Law nº 9.985, of 18 July 2000 and comprises 12 categories of protected area management separated in two groups with specific characteristics (full protection and sustainable use). There are 5 categories of full protection protected areas, which have the main objective of preserving nature and where only the indirect use of natural resources is allowed. The remaining 7 management categories are sustainable use protected areas, which have the main objective of harmonizing nature protection with the sustainable use of part of their natural resources. The Brazilian Federal Constitution ensures that the alteration or suppression of protected areas may only be approved through the publication of a specific law, preventing any use of the designated protected areas that may compromise the integrity of the characteristics that justify their protection.

ecological representativeness. The new National Target 11 establishes that, by 2020, at least 30% of the Amazon, 17% of the Caatinga, Cerrado, Atlantic Forest and Pantanal biomes, as well as 10% of the coastal and marine areas, shall be protected under protected areas, respecting demarcation, regularization and effective and equitable management, with a view to achieving management integrity, habitat connectivity and ecological representativeness (see National Target 11 in section 3.1).

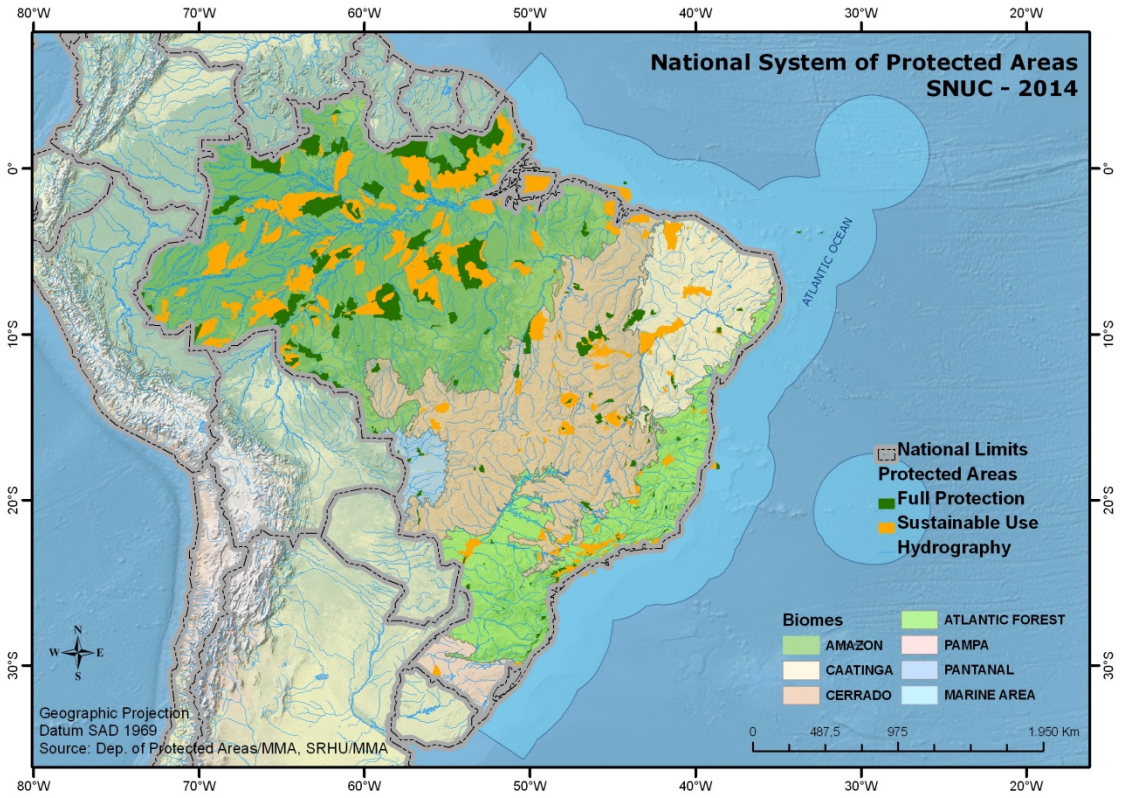



**Figure 29:** Protected areas under SNUC, as of April 2014.
**Source:** Prepared by MMA/Department of Protected Areas in April 2014.

Although national target percentages for environmental protection were increased for achievement by 2020 in comparison to the National Targets for 2010, the new targets propose a different accounting of the total area considered as under protection for target achievement[134]: the new methodology also takes into account, in addition to the protected areas under SNUC, other areas that also contribute to nature protection, although in a less strict or effective manner, such as permanent preservation areas and legal reserves in private properties, and indigenous lands containing native vegetation. Given the new accounting methodology for target achievement, it will be necessary to wait until the process of recording permanent protection areas and legal reserves in private rural properties into the new Rural Environmental Registry – CAR is at least nearing completion to adequately measure the degree of target achievement. Nevertheless, estimate data from a modelling study are presented in section 1.4.1.

When only the protected areas under SNUC are considered, currently 26.1% of the Amazon, 7.5% of the Caatinga, 8.3% of the Cerrado, 9.3% of the Atlantic Forest, 2.7%

[134] The National Strategic Plan on Protected Areas – PNAP (Decree n° 5.758/2006) recognizes since 2006 the importance of Permanent Preservation Areas and Legal Reserves as instruments to increase or maintain connectivity among and within ecosystems. These areas, as well as existing ecological corridors, to-date have been considered as landscape integration elements and were previously not accounted for in the calculations to determine the extention of protected areas.

of the Pampas, 4.6% of the Pantanal, and 1.5% of the marine area are protected. In all biomes, except for the Pantanal, the sustainable use protected area category predominates, i.e., most of their protected areas have the objective of harmonizing nature protection with the sustainable use of part of their resources. Table 27 below presents the current protection status of each biome regarding protected areas under SNUC, according to the official national database (CNUC), and discriminating between the categories of sustainable use and full protection protected areas.

**Table 27:** Current area under protection according to information included in CNUC, as of April 2014.

| Protected areas (considering overlaps) | Amazon | | Caatinga | | Cerrado | | Atlantic Forest | |
|---|---|---|---|---|---|---|---|---|
| | Area ($km^2$) | % | Area ($km^2$) | % | Area ($km^2$) | % | Area ($km^2$) | % |
| Full Protection | 395,619 | 9.4% | 10,457 | 1.2% | 59,654 | 2.9% | 21,802 | 2.0% |
| Sustainable Use | 686,994 | 16.4% | 52,846 | 6.3% | 105,541 | 5.2% | 75,233 | 6.8% |
| Overlaps FP/SU | 13,616 | 0.3% | 163 | 0.0% | 3,221 | 0.2% | 5,757 | 0.5% |
| **Total in the biome** | **1,096,229** | **26.1%** | **63,466** | **7.5%** | **168,416** | **8.3%** | **102,793** | **9.3%** |

| Protected areas (considering overlaps) | Pampas | | Pantanal | | Total Continental | | Marine Area | |
|---|---|---|---|---|---|---|---|---|
| | Area ($km^2$) | % | Area ($km^2$) | % | Area ($km^2$) | % | Area ($km^2$) | % |
| Full Protection | 578 | 0.3% | 4,404 | 2.9% | 492,514 | 5.8% | 4,678 | 0.1% |
| Sustainable Use | 4,223 | 2.4% | 2,551 | 1.7% | 927,388 | 10.9% | 47,520 | 1.3% |
| Overlaps FP/SU | 26 | 0.0% | 0 | 0.0% | 22,783 | 0.3% | 106 | 0.0% |
| **Total in the biome** | **4,827** | **2.7%** | **6,954** | **4.6%** | **1,442,685** | **16.9%** | **52,304** | **1.5%** |

**Source:** MMA/DAP, April 2014. Internal Information Note to support the preparation of the 5th National Report to the CBD.

**Note:** Information presented on total extension of protected areas in the 4th National Report to the CBD included IBGE data on municipal protected areas, most of which are not yet recorded in CNUC, as well as other protected areas at the federal, state and municipal levels created before 2000 and that do not belong to any protected area category defined by the SNUC Law. As data presented here refer only to information already inserted in the official database CNUC, analyses on the evolution of total area under protection are not perfectly comparable between 2010 and 2014 data presented to the CBD.

According to CONABIO Resolution nº 6, of 03 September 2013, Indigenous Lands may also contribute to the national accounting towards the achievement of the Aichi Targets. The Ministry of the Environment is still debating on the adequate methodology to be applied, as these areas must undergo previous assessments of their ecological integrity, effective management, demarcation and regularization to verify eligibility to integrate the conservation target accounting. As mentioned in section 1.2.4.2, the ongoing project on Indigenous Environmental and Territorial Management – GATI should enhance the capacity of indigenous lands to contribute towards the Aichi Targets by strengthening indigenous practices for the management, sustainable use and conservation of natural resources in their lands. The GATI supports actions in the Brazilian forest biomes (Amazon, Atlantic Forest, Cerrado, Caatinga and Pantanal).

According to 2011 data, Brazil has 552 Indigenous Lands, which cover a total area of 111,485,296 hectares. Most (359) of the Indigenous Lands are located in the Amazon Region, where these lands tend to be larger than in other regions of the country: 98.4% of the surface area covered by Indigenous Lands is located in this biome. Proposals are still being analyzed for the creation of other 197 Indigenous Lands (Figure 30).[135]

[135] Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis, 2013. Relatório de Qualidade do Meio Ambiente – RQMA: Brasília, IBAMA/Diretoria de Qualidade Ambiental, 268 p.

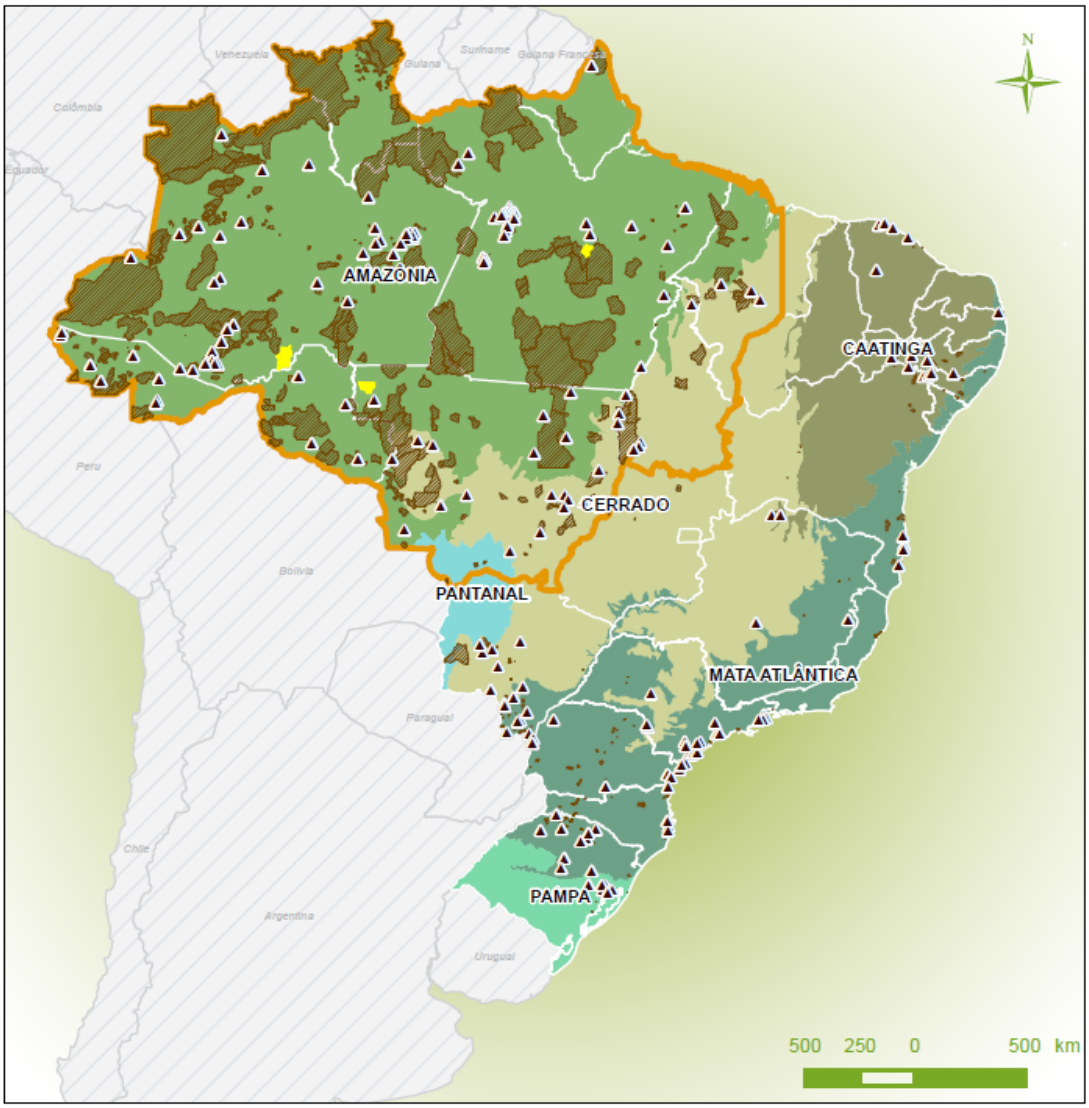



**Figure 30:** Distribution of Indigenous Lands in Brazil.
**Key:** orange outline – Legal Amazon; olive-green polygons – existing Indigenous Lands; triangles – proposed Indigenous Lands; bright yellow – halted process for the creation of Indigenous Lands.
**Source:** Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis, 2013. Relatório de Qualidade do Meio Ambiente – RQMA: Brasília, IBAMA/Diretoria de Qualidade Ambiental, 268 p.

*Ecological Corridors*. The SNUC Law officially recognized ecological corridors as territorial management instruments to maintain ecological processes in the landscape scale. From 2010 to 2013, ICMBio implemented the Jalapão Ecological Corridor Project[136] in partnership with Tocantins and Bahia state agencies and with support from the Japan International Cooperation Agency – JICA. The project had the objective to strengthen the conservation of regional ecosystems by improving the integration among federal and state protected areas, to be achieved through the involvement of local communities in the participatory planning of strategies and actions to re-establish the ecological connectivity among protected areas in the Jalapão region. The project resulted in the construction of social and political arrangements for territorial management, as well as stronger environmental protection in the region. Among its

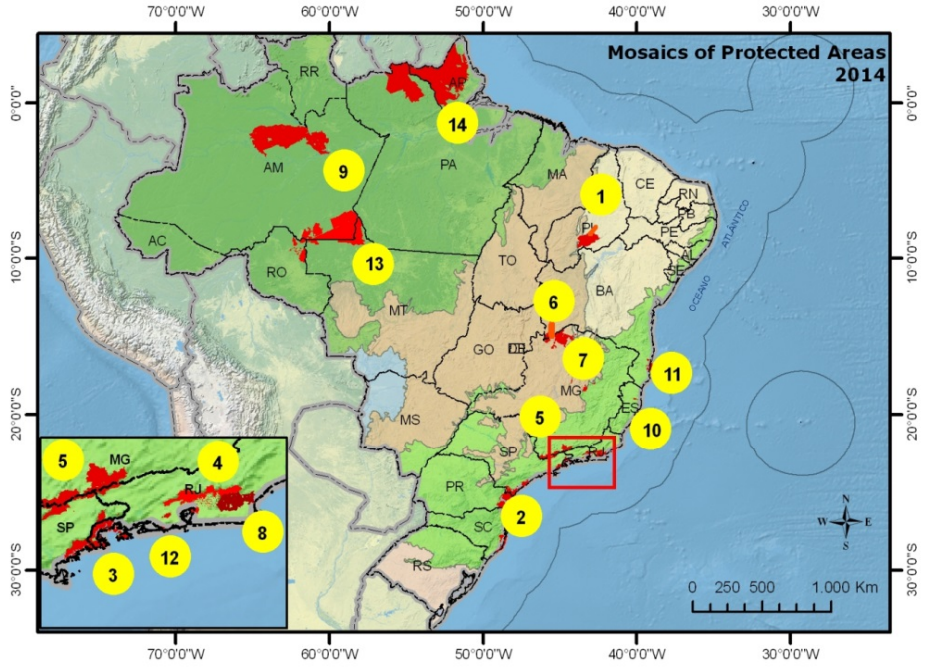
[136] Projeto Corredor Ecológico da Região do Jalapão. http://www.icmbio.gov.br/projetojalapao/pt/quem-somos.html

main results are: (i) the dissemination of information and production of publications on the Jalapão region (available at www.icmbio.gov.br/projetojalapao); (ii) development of a proposal for the Jalapão Mosaic and creation and training of the Jalapão Mosaic Management Council, development of studies on the steps needed to achieve ecological connectivity among regional protected areas, and preparation of the Strategic Plan of the Jalapão Mosaic; (iii) capacity building and integration of the technical teams in the federal, state and municipal agencies responsible for the regional protected areas management, including exchange visits to other protected areas mosaics; (iv) structuring of six municipal environmental councils and the management council of the Serra Geral do Tocantins Federal Ecological Station; (v) creation of the first full protection protected area in the state of Tocantins – the Canyons e Corredeiras do Rio Sono Natural Monument, including the creation of its management council and preparation of its management plan; (vi) structuring of the Integrated Program on Environmental Management under universities in Tocantins state; and (vii) development of municipal regulations for the use of resources from Ecological VAT – Terms of Cooperation between Municipal Councils and Municipal Governments for the use of Ecological VAT and preparation of the Ecological VAT Operations Manual.[137]

*Mosaics*. The SNUC Law also disposes on the creation of mosaics of protected areas with the purpose of harmonizing, integrating and optimizing activities developed in the protected areas comprising the mosaic, particularly regarding: land and resource use in the border zone between protected areas; access to the protected areas; enforcement; monitoring and evaluation of management plans; scientific research; and allocation of resources from environmental licensing of investments with significant environmental impact. The Ministry of the Environment is responsible for officially recognizing the mosaics of protected areas according to proposals presented by governmental agencies responsible for protected areas management.

Up until early 2010, six mosaics had been recognized: Capivara-Confusões; São Paulo and Paraná Coastline (*Litoral de São Paulo e Paraná*); Bocaina; Central Fluminense Atlantic Forest (*Mata Atlântica Central Fluminense*); Mantiqueira; and Sertão Veredas-Peruaçu. From 2010 to 2014, eight other mosaics were recognized: Espinhaço – Upper Jequitinhonha-Cabral Ridge (*Alto Jequitinhonha-Serra do Cabral*); Golden Lion Tamarin Mosaic (*Mico-Leão-Dourado*); Lower Negro River (*Baixo Rio Negro*); Doce River Estuary (*Foz do Rio Doce*); Extreme South of Bahia (*Extremo Sul da Bahia*); Carioca; Southern Amazon (*Amazônia Meridional*); and North of Pará-West of Amapá (*Norte do Pará-Oeste do Amapá*) (Figure 31).

[137] http://www.icmbio.gov.br/portal/comunicacao/noticias/20-geral/4433-projeto-corredor-ecologico-do-jalapao-e-concluido.html?highlight=WyJyZWxhdFx1MDBmM3JpbyIsImRlliwiZ2VzdFx1MDBlM28iLCJyZWxhdFx1MDBmM3JpbyBkZSIsInJlbGF0XHUwMGYzcmlvIGRl




1. Capivara-Confusões; 2. Litoral de São Paulo e Paraná (Lagamar); 3. Bocaina; 4. Mata Atlântica Central Fluminense; 5. Mantiqueira; 6. Sertão Veredas-Peruaçu; 7. Espinhaço: Alto Jequitinhonha-Serra do Cabral 8. Mico-Leão-Dourado; 9. Baixo Rio Negro; 10. Foz do Rio Doce; 11. Extremo Sul da Bahia; 12. Carioca; 13. Amazônia Meridional; 14. Norte do Pará-Oeste do Amapá

**Figure 31:** Mosaics of protected areas.
**Source:** Prepared by MMA/Department of Protected Areas in April 2014.

*Value of protected areas*. In 2011, the Ministry of the Environment and the UNEP World Conservation Monitoring Center, with technical and financial support from other partners, developed a study on the "Contribution of Brazilian Protected Areas to the National Economy"[138]. Its objective was to evaluate and disseminate the role of protected areas in the provision of environmental goods and services that contribute to the economic and social development of the country. The study evaluated the current impact and economic potential of five environmental goods and services: forest products, public use, carbon sequestration, water services, and tax benefits. The study assessed the economic potential of only two forest products (timber and Brazil nuts) in the protected areas of the Amazon biome and estimated an economic potential varying from US$700 million to US$1.23 billion annually, in addition to the contribution to reduce the demand for timber products of illegal origin. Certification of these products can increase their market price, and processed products can also increase this estimate. The study also points out the significant contribution to local economies represented by protected areas' tourism income generation, such as at the Serra dos Órgãos National Park (Rio de Janeiro state), where an estimated local economic impact of US$3.74 to US$4.28 million was generated in 2009. Although a better balance could be sought between the resources invested in conservation management (often lower) and the contribution of specific protected areas to tourism income, it should be noted that not all protected areas are accessible enough to allow a significant flow of visitation.

138 Medeiros, R., Young, C.E.F., Pavese, H.B. and Araújo, F.F.S., 2011. Contribuição das Unidades de Conservação Brasileiras para a Economia Nacional: Sumário Executivo. Brasília: UNEP-WCMC, 44 p. This study was carried out under the technical coordination of researchers from the Rio de Janeiro Rural Federal University, technical support from the German government – GIZ and Brazilian Government Applied Economics Research Institute – IPEA, and financial support from DEFRA-UK. The Executive Summary of this study is available at http://www.mma.gov.br/estruturas/sbf2008_dap/_publicacao/149_publicacao07062011122228.pdf.

Nevertheless, the study also presents a preliminary and conservative estimate of the economic potential of carbon reserves in protected areas, according to which the Brazilian protected areas system has already prevented the release of approximately 2.8 billion tons of carbon into the atmosphere, which in monetary terms would correspond conservatively to nearly US$53.5 billion. Additionally, the protected areas contribute significantly with various ecosystem services that positively impact on the production and conservation of water resources, where approximately 34.7% (1.3 million $m^3$) of the non-seasonal annual volume of water intake for public supply comes from capture sources located within or downstream of federal protected areas. These areas also contribute to the protection of about 4% of the water supplied for agriculture and irrigation. Furthermore, as the existence of protected areas within the territory of municipalities provides them access to a larger share of the distribution of tax revenues (Ecological VAT, or *ICMS Ecológico*), the study shows that this additional income can represent significant amounts for municipal governments, which can then invest in services for which budget is usually insufficient, such as solid waste management, health and education. In 2009, 11 states that have Ecological VAT legislation in place each received between US$312.1 million and US$41.5 billion to be distributed among municipalities according to the size of their protected areas; and the estimated value of potential Ecological VAT for 12 other states that in 2009 still did not have specific legislation would be some US$6.4 billion.

*ARPA Program*. The Amazon Protected Areas Program – ARPA was initiated in 2002 with the purpose of contributing to the protection of the world's largest tropical forest. Currently on its second phase, the program receives financial support from the Global Environmental Facility – GEF through the World Bank; the German Government through the German Development Bank – KfW; and from Fundo Amazônia through the National Bank for Economic and Social Development – BNDES. WWF-Brazil and the German agency GIZ provide technical support since the beginning of the program.

On its 7-year first phase (2003-2010), 64 federal and state protected areas (32 under full protection and 32 of sustainable use) in the Amazon biome received support from the ARPA program, protecting 32 million hectares. This means that 27% of the 239 existing protected areas in the Brazilian Amazon were created and/or supported through the program until 2010, corresponding to 33% of all area covered by protected areas in the biome. The second phase of the ARPA program (2010-2015) has the following targets: (i) support the creation of 13.5 million hectares of new protected areas under the eligible full protection and sustainable use categories; (ii) consolidating 23 million hectares of protected areas in Consolidation Level I, and 6.5 million hectares in Consolidation Level II; and (iii) increase the Protected Areas Fund – FAP (*Fundo de Áreas Protegidas*) by US$70 million. Up to April 2014, the intermediate target for Consolidation Level I were already achieved, while 2 million hectares of protected areas had achieved Consolidation Level II. The second phase of the ARPA program is supporting 95 protected areas covering approximately 52 million hectares.

The third phase, initially planned for 2016-2018, was launched on 21 May 2014, in parallel to the implementation of the second phase, and is known as the "ARPA for Life" initiative. A Memorandum of Understanding (MoU) was signed among the Ministry of the Environment, ICMBio, the German Ministry for Cooperation and Development – BMZ, The Inter-American Development Bank – IAD, FUNBIO, the Gordon and Betty Moore Foundation, WWF-Brasil, WWF-US, and the GEF. This initiative creates a transition fund, into which the FAP will be merged, to ensure the necessary financial support for the transition from donation support to the protected

areas to a self-support system for ARPA supported protected areas. The MoU formalized the partners' commitment to donate a minimum of US$ 250 million to compose the ARPA for Life fund, as well as the new strategy to provide financial support to the program's protected areas along 25 years, along which the resources provided by the Brazilian government to these areas should gradually increase. At the end of this 25-year period, it is expected that the government will have developed and put in place a strategy to fully support these protected areas.

*SNUC Consolidation*. Inspired by the ARPA program, which focuses solely on Amazon protected areas, the Brazilian government initiated a new project addressing the enhancement of protected areas implementation and management in other biomes. The SNUC Consolidation Project should operate through two components with different funding sources: (i) LifeWeb, and (ii) GEF Terrestrial. The first resulted from the Brazilian proposal recorded under the CBD LifeWeb and has already obtained a US$20 million commitment from the German Environmental Ministry, while US$95 million remain to be raised. The LifeWeb component should focus on management structuring and coordination of the SNUC and agencies responsible for protected areas management, particularly the federal agency ICMBio.

The GEF Terrestrial component should operate through a proposal presented by the Ministry of the Environment to the GEF through the InterAmerican Development Bank. This component already obtained US$33.3 million in donation commitments to be applied in the strengthening of existing protected areas in the Pantanal, Pampas and Caatinga biomes. The project will also invest in the restoration of degraded areas, monitoring of threatened species and preventive fire management.

*In situ biodiversity monitoring program*.[139] Until recently, *in situ* biodiversity monitoring in Brazil was limited to marine species through the ReefCheck program (see section 1.2.1.4). In 2010, ICMBio launched an *in situ* biodiversity monitoring program for federal protected areas (PAs) on land. Implementation was initiated in 2010 in three federal PAs in the Caatinga biome, expanding in 2014 to include seven PAs in the Amazon, six in the Cerrado and six in the Atlantic Forest (Figure 32). Additional PAs are gradually joining the program, which is still undergoing testing and adjustments. Monitoring results obtained to-date will be evaluated, and the revised protocols and procedures will be applied at a larger scale, including all 95 PAs under the ARPA Program. Brazil has pioneered in the development and implementation of deforestation monitoring methodologies and systems, but still has much to advance regarding biodiversity monitoring in order to adequately assess impacts on biodiversity and conservation effectiveness.

The greatest challenge is to establish a feasible *in situ* biodiversity monitoring system capable of addressing a broad range of PA size and degree of accessibility, which can be adapted to managerial decisions, and that ensures comparability with information in other databases. To ensure effectiveness, it will also be necessary to improve data exchange among various actors and adjust complementary monitoring systems. To address these challenges, the process of developing the biodiversity monitoring system includes the integration of biodiversity and climate change data from different information systems, and the provision of capacity building on biodiversity monitoring. It is expected that after completing its test phase, this monitoring system will allow the generation of cheap and accurate data on Brazilian biodiversity indicators to enhance

[139] Information provided by ICMBio in July 2014.

protected area management, in addition to providing information required for PES/REDD+ projects. The biodiversity monitoring data can also inform and assist in the evaluation of public policies related to environmental protection and adaptation to climate change. The biodiversity monitoring program is supported by the National Biodiversity Mainstreaming and Institutional Consolidation Project – PROBIO II, Deutsche Gesellschaft für Internationale Zusammenarbeit – GIZ, and Fundo Clima.

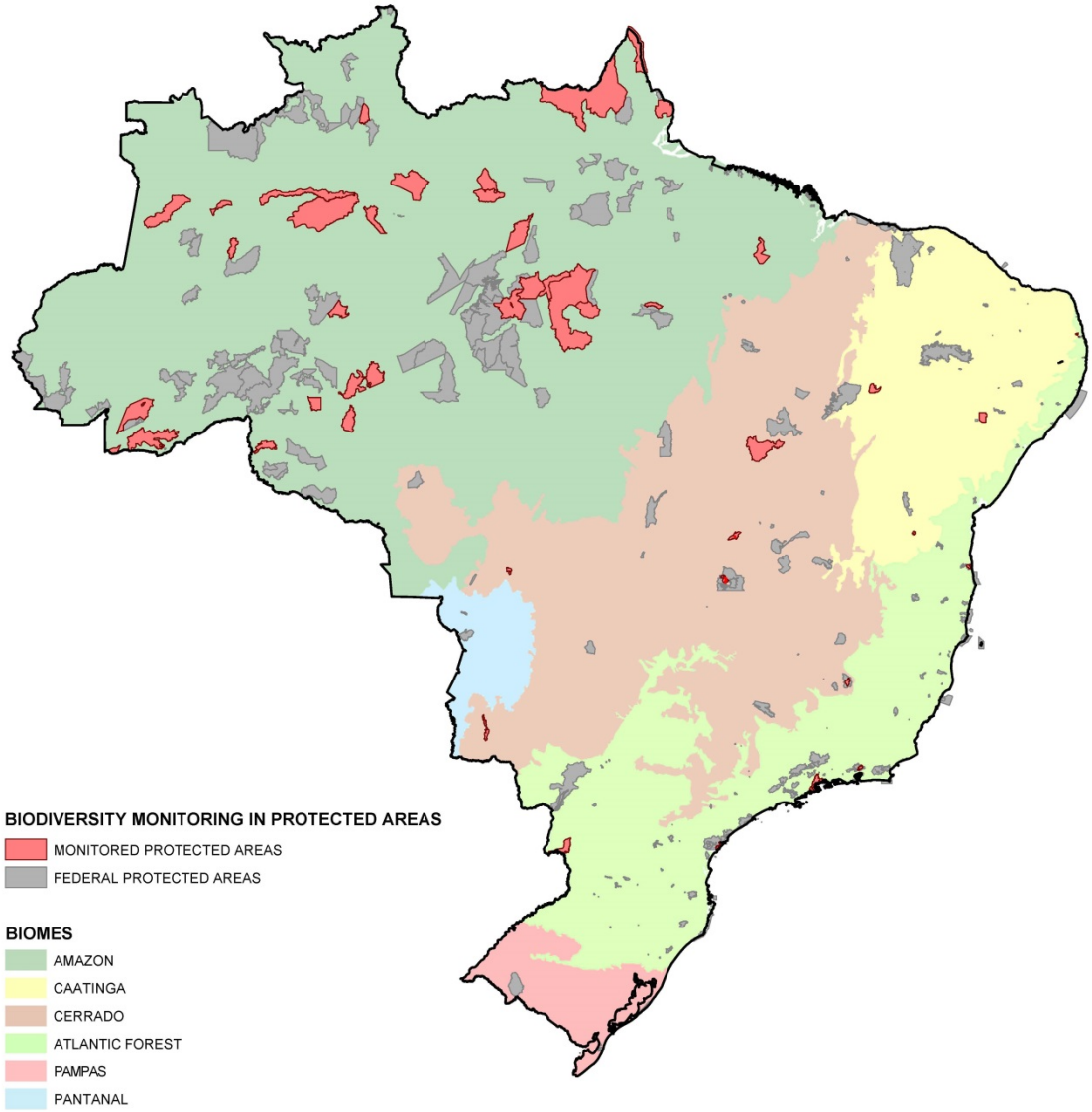


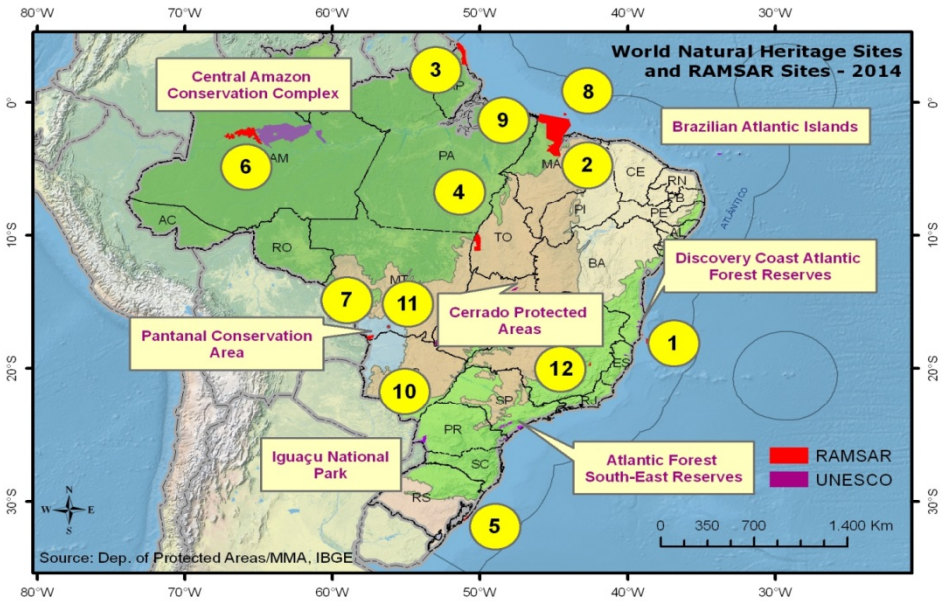

**Figure 32:** Protected areas participating in the biodiversity monitoring program (2014).
**Source:** Prepared by ICMBio in July 2014.

*Marine protected areas*. The GEF approved the Project to Support Representative and Effective Systems of Coastal and Marine Protected Areas (GEF-Mar), which focuses on the creation and implementation of coastal and marine protected areas to reduce biodiversity loss. The project is in its final negotiation phase and implementation should initiate in 2014, with 5-year duration. In addition to increasing the number and extension of marine protected areas, the project should develop financial mechanisms to ensure the long term sustainability of the coastal and marine protected areas system.

Where the planned creation of marine protected areas may partially overlap with or be located next to areas that are considered by the National Defense Council as indispensable for the security of the national territory, it is necessary to consider the criteria and use conditions proposed by that Council for the relevant area. The collaboration of the Brazilian Navy is also of fundamental importance, given its role as Maritime Authority responsible for assessing the safety of vessel traffic and navigation, nautical signs, and for safeguarding human life at sea. The Brazilian Navy is also responsible for including information on marine protected areas in nautical charts, and can provide valuable contribution to the definition of the location and borders of the ecologically sensitive areas. These latter are regions of marine or continental waters, defined by the government, where the prevention and control of pollution and the maintenance of ecological balance require special measures for the protection and preservation of the environment regarding vessel traffic. Additionally, the Brazilian Navy is also a partner for the protection and management of marine protected areas, as exemplified by its effective monitoring of the Alcatrazes Archipelago, which is home to significant marine biodiversity.

#### 1.4.2.1 Global designation

Brazil has seven protected areas designated by UNESCO as Global Natural Heritage Sites. These sites of global extraordinary natural importance are located in the Atlantic Forest, Pantanal, Amazon and Cerrado biomes, and also protecting coastal and marine ecosystems. The Brazilian Global Natural Heritage Sites are shown in Figure 33 below, together with Ramsar Sites (see next section).




1. Abrolhos Marine National Park; 2. Baixada Maranhense Environmental Protection Area; 3. Cabo Orange National Park; 4. Bananal Island – Araguaia National Park; 5. Lagoa do Peixe National Park; 6. Mamirauá Sustainable Development Reserve; 7. Pantanal Matogrossense National Park; 8. Manoel Luís State Marine Park including the Baixios do Mestre Álvaro and Tarol; 9. Reentrâncias Maranhenses Environmental Protected Area; 10. Private Reserve of Natural Heritage Fazenda Rio Negro; 11. Private Reserve of Natural Heritage SESC Pantanal; 12. Rio Doce State Park

**Figure 33:** Global Natural Heritage Sites and Ramsar Sites in Brazil.
**Key:** Numbers in yellow circles indicate the Ramsar Sites, while names in labels indicate the UNESCO Global Natural Heritage Sites.
**Source:** Prepared by MMA/Department of Protected Areas in April 2014.

#### 1.4.2.2 Wetlands[140]

The importance of wetlands is so extraordinary that although they occupy only between 5 to 8% of the globe they are responsible for 46% of all estimated global ecosystem services. Most communities living close to wetlands are heavily dependent on these ecosystems and are directly affected by their degradation. Despite their importance, it is estimated that wetlands are being altered and lost at a faster pace than the other ecosystems. Therefore, the Ministry of the Environment – MMA develops specific actions directed at the conservation of wetlands, particularly where conflicts exist on the use of water resources, as well as where degradation impacts are more significant.

The National Wetlands Committee – CNZU (*Comitê Nacional de Zonas Úmidas*) approved in 2012 the CNZU Recommendation nº 05/2012 on the criteria for the designation of Ramsar Sites, which also provides a list of additional protected areas to be proposed to the Ramsar Convention as potential Ramsar Sites of International Importance (Table 28). That Recommendation also establishes the target to obtain the designation of at least 10 new Ramsar Sites in Brazil within the next five years.

**Table 28:** List of priority protected areas to be indicated as potential Sites of International Importance – Ramsar Sites. The list does not represent the order of priorities.

| Protected Area | State | Type of predominant wetland | Protected area management |
|---|---|---|---|
| **Protected areas containing representative continental wetlands** | | | |
| ESEC Anavilhanas | AM | Rivers | Federal |
| ESEC Niquiá | RR | Floodplain | Federal |
| PN do Viruá | RR | Rivers | Federal |
| PN de Ilha Grande | PR | Rivers | Federal |
| REBIO Guaporé | RO | Floodplain | Federal |
| PE Araguaia 2 | MT | Rivers | State |
| PE do Cantão | TO | Floodplain | State |
| RVS Corixão da Mata Azul | MT | Rivers | State |
| RVS Banhados dos Pachecos | RS | Marshes | State |
| PE Corumbiara | RO | Floodplain | State |
| RESEX Pedras Negras | RO | Floodplain | State |
| **Protected areas containing representative marine and coastal wetlands** | | | |
| APA de Cananéia-Iguape e Peruíbe | SP | Mangroves | Federal |
| ESEC de Guaraqueçaba | PR | Mangroves | Federal |
| RESEX Marinha do Delta do Parnaíba | MA | Mangroves | Federal |
| ESEC do Taim | RS | Marshes | Federal |
| PN do Cabo Orange | AP | Mangroves | Federal |
| APA de Fernando de Noronha – Rocas – São Pedro e São Paulo | PE | Marine | Federal |
| ESEC de Maracá-Jipióca | AP | Mangroves | Federal |
| PN Marinho de Fernando de Noronha | PE | Marine | Federal |
| REBIO do Atol das Rocas | RN | Coral reefs | Federal |
| REBIO do Lago Piratuba | AP | Lagoons | Federal |
| RESEX Marinha de Soure | PA | Mangroves | Federal |
| RESEX Terra Grande Pracaúba | PA | Floodplains | Federal |
| ESEC da Ilha do Mel | PR | Mangroves | State |
| APA Baía de Todos os Santos | BA | Estuaries | State |
| APA Plataforma Continental do Litoral Norte | BA | Coral reefs | State |

[140] Ministério do Meio Ambiente/GBA, 2013 and 2014. Unpublished. Information Note to support the Presidential Message.

| | | | |
|---|---|---|---|
| APA das Ilhas de Tinharé e Boipeba | BA | Mangroves | State |
| APA Foz do Rio Preguiças / Pequenos Lençóis | MA | Floodplains | State |
| APA Upaon-açu / Miritiba / Alto Preguiça (Oeste) | MA | Mangroves | State |
| APA Costa do Urumajó | PA | Mangroves | Municipal |
| TI Juminá | AP | Floodplains | Federal |

**Type of protected area:** ESEC = Ecological Station; PN = National Park; REBIO = Biological Reserve; PE = State Park; RVS = Wildlife Refuge; RESEX = Extractive Reserve; APA = Environmental Protection Area; TI = Indigenous Land.
**State:** AM = Amazonas; RR = Roraima; PR = Paraná; RO = Rondônia; MT = Mato Grosso; TO = Tocantins; RS = Rio Grande do Sul; SP = São Paulo; MA = Maranhão; AP = Amapá; PE = Pernambuco; RN = Rio Grande do Norte; PA = Pará; BA = Bahia.
**Source:** Modified from: CNZU Recommendation No. 5/2012

Following a request presented by CNZU, the Ramsar Convention recognized in 2013 the National Park of Cabo Orange as a new Ramsar Site, in the state of Amapá. With this new designation, Brazil currently has 12 internationally recognized wetlands, comprising over 6.5 million hectares. This recognition enhances the possibility to obtain international financial support for developing research and/or other projects to improve wetlands protection, and creates a favorable environment for international cooperation on the sustainable use of wetlands. In 2014, CNZU intends to propose the recognition of six additional protected areas as Ramsar Sites, with the purpose of strengthening conservation actions in these areas.

CNZU also approved in 2012 its Recommendation n$^{o}$ 06/2012, on planning procedures for the sustainable use of natural resources in the Upper Paraguai River Watershed, with a special note to the expansion of hydroelectric projects in detriment of the conservation of the flood regime of the Pantanal biome in Mato Grosso state.

Additionally, Brazil will take over the coordination of the Regional Initiative for the Conservation and Sustainable Use of Wetlands of the Prata Watershed, under the Ramsar Convention. This initiative has the participation of Argentina, Bolivia, Brazil, Paraguay and Uruguay and seeks to enhance the integration and cooperation among regional forums active in the watershed with similar agendas, such as the Inter-governmental Coordination Committee of the Prata Watershed Countries – CIC-Prata. The participating countries are currently discussing under this Committee the development of the inventory of the existing wetlands in the watershed.

*Wetland identification and classification*. The Secretariat of Biodiversity and Forests of the Ministry of the Environment, as national Administrative Authority of the Ramsar Convention in Brazil, is currently coordinating the development of the inventory of Brazilian wetlands with the participation of experts from the National Wetlands Committee. The inventory will: (i) revise and organize available information, (ii) agree on the concept and system to be adopted for the classification of wetlands, (iii) define the protocol of minimum information necessary for the inventory, and (iv) prepare an outlook on Brazilian wetlands based on the previous steps. Information generated by this inventory will represent the first step of a process to quantify the existing wetlands in Brazil, assess the conservation status of these ecosystems, identify areas that need to be restored and areas that are unprotected; assess the risks and vulnerabilities affecting these wetlands; and map their ecosystem services.

*Mangroves*. Mangroves and other coastal ecosystems are still being significantly impacted by coastal development and other habitat conversion, and pollution and sediment discharge, among other factors. Although the original extension of Brazilian

mangroves is not known, it is estimated that approximately 25% of this ecosystem have already been lost in the country, mainly due to shrimp farming and coastal development for housing and tourism facilities. Currently, 61.9% of remaining mangroves are located within Environmental Protection Areas – APA (*Área de Proteção Ambiental*), a SNUC category of sustainable use protected area with limited effectiveness of protection. And, 13.1% of remaining mangroves are located in full protection protected areas.[141]

ICMBio implements two interconnected initiatives to enhance mangrove protection: the Brazilian Mangroves Project (*Projeto Manguezais do Brasil*) and the National Action Plan for the Conservation of Threatened and Socio-economically Important Species of Mangroves – PAN Manguezal. The Brazilian Mangroves Project[142] initiated in 2006 to enhance national capacity to promote effective conservation and sustainable use of mangrove resources, through the strengthening of protected areas under SNUC. It is expected that actions under this project will significantly contribute to conserve 568,000 hectares of globally important mangroves, in addition to positively impacting the ways of life of communities that depend on mangrove resources. The PAN Manguezal[143] is implemented in the south and southeast regions of Brazil, promoting the conservation of socio-economically important and threatened species in mangroves. A total of 52 target species were selected for those two regions, 17 of which are threatened species according to both national and state threatened species lists. Eleven priority areas were selected for ecosystem conservation actions in the states of Rio de Janeiro, São Paulo, Paraná and Santa Catarina.

### 1.4.3 Restoration of vegetation cover

#### 1.4.3.1 Restoration initiatives

In human-modified landscapes in developing countries, tropical forest restoration projects must not only assist the recovery of ecosystems that have been degraded, damaged or destroyed; they must also bring economic rewards to land owners. Forest restoration should be seen not as a competitor but, rather, as a way of assisting the increase in food production and improve of livelihoods, and as a way of providing land owners with an economic return. Restored tropical forests can potentially help increase crop productivity, since they harbor crop pollinators and natural enemies of pests[144].

Ecological restoration can be implemented in extensive, low-productivity pasture lands. Since the average return obtained by cattle ranchers in those areas is approximately US$100 per hectare per year, the production of native timber in restored lands could potentially cover the opportunity costs of reducing the availability of land for livestock. However, an important limitation to the production of native timber in restoration plantings is the time required for obtaining an economic return. Three approaches could be used to address this limitation: (i) mixed plantings – i.e., planting a mix of slow-growing and fast-growing species, to allow timber production to begin within about ten

[141] MMA, 2010. Panorama da conservação dos ecossistemas costeiros e marinhos no Brasil. SBF/GBA, Brasília: 148p. ; and MMA, 2012. Panorama da conservação dos ecossistemas costeiros e marinhos no Brasil. SBF/GBA, Brasília: 156 p.

[142] www.icmbio.gov.br/portal/o-que-fazemos/programas-e-projetos/projeto-manguezais-do-brasil.html

[143] www.icmbio.gov.br/portal/comunicacao/noticias/20-geral/4565-pan-manguezal-planeja-acoes-nas-regioes-sul-e-sudeste.html

[144] BRANCALION, P.H.S. et al. Finding the money for tropical forest restoration. Unasylva 239, Vol. 63, 2012.

years of planting; (ii) combining various sources of income, such as non-timber forest products and payments for ecosystem services, to generate regular income for land owners; and (iii) providing long-term credit at attractive rates. The diversification of income sources helps to reduce risk, a very important decision factor for land owners. Therefore, a key challenge is to create conditions that will bring together the various income-generating opportunities in such a way that restoration projects produce crops, timber and non-timber products and one or more ecosystem service. The various opportunities to transform marginal lands into sustainably managed forests that are economically viable and not in competition with land for food production are, in effect, income opportunities for entrepreneurs who wish to profit from supplying the multiple products and services provided by restored forests.[145]

Pact for the Restoration of the Atlantic Forest[146]

Launched in 2009, the Pact is a collective effort for the large scale restoration of the Atlantic Forest, involving the participation of non-governmental organizations, governmental agencies at the three administrative levels, rural land owners, traditional communities, cooperatives and associations. The target established for the Pact is to restore 15 million hectares of forest by 2050, increasing the vegetation cover of the Atlantic Forest to over 30% of the original biome. This would also result in the removal of approximately 200 million tons of atmospheric $CO_2$ per year, storing over 2 billion tons of $CO_2$ by 2050. Along the first three years of implementation, the partner organizations produced technical documents to guide actions under the Pact: the Reference Document on Forest Restoration Concepts and Actions, and the Map of Potential Areas for Restoration, which mapped 17 million hectares of areas to be restored. In March 2014 the Monitoring Protocol for Programs and Projects on Forest Restoration[147] was published as one more tool for implementation of the Pact.

Over the past four years, the Pact has contributed to the dissemination of information on the Atlantic Forest through their communications channels, which include a website in Portuguese and English, social networks and bulletins on forest restoration, as well as the Pact's strategies and actions. The website includes an online records system used by Pact participants to input their restoration initiatives. Data is continuously updated and, by May 2014, a total of 54,704.39 hectares were recorded as under restoration. New tools and partnerships are being built to assist in achieving the Pact's target, and partners are working on the establishment of networks linking restoration projects, associations, seed and seedling producers, as well as others who can contribute to reaching the target.

[145] BRANCALION, P.H.S. et al. Finding the money for tropical forest restoration. Unasylva 239, Vol. 63, 2012.

[146] Information available at: http://www.pactomataatlantica.org.br/noticia-completa.aspx?p=124&lang=pt-br/, http://www.pactomataatlantica.org.br/, http://www.pactomataatlantica.org.br/pdf/conceito_do_pacto.pdf/, http://www.pactomataatlantica.org.br/noticia-completa.aspx?p=119&lang=pt-br

[147] Available at: http://www.pactomataatlantica.org.br/pdf/_protocolo_projetos_restauracao.pdf

## Pampas regeneration

A study[148] carried out in 2009 compared a 2002 vegetation cover map of the state of Rio Grande do Sul, which contains the entire Brazilian portion of the Pampas biome, with the earlier broad mapping exercise RADAM Brasil 1986. This study verified that, although the analysis of the changes in vegetation cover show a decrease of 20.7% (22,816 $km^2$) in vegetation cover occurred in the period from 1976 to 2002, corresponding to a rate of loss of 845 $km^2$/year, this change in natural vegetation cover was very different among types of vegetation formations. Most of the loss occurred in the regions covered with natural grasslands, representing 27,350 $km^2$ (or 15.63% of the original vegetation cover) that were converted to agriculture in a 27-year period, at a rate of 1,012 $km^2$/year. The forest phytoecological regions, however, presented an increase of 3,412 $km^2$ of native vegetation cover in the same period, and areas of ecological transition followed the same pattern (Table 29).

**Table 29:** Comparison of area covered by natural and semi-natural vegetation in 1976 (RADAM Brasil) and 2002, by different phytoecological regions of the Rio Grande do Sul state.

| Phytoecological Region | Area ($Km^2$) | Natural vegetation cover ($Km^2$) | | Natural vegetation cover (%) | | Variation | |
|---|---|---|---|---|---|---|---|
| | | 1976 | 2002 | 1976 | 2002 | $Km^2$ | % |
| Broadleaf Evergreen Forest | 1,218 | 387 | 725 | 31.7 | 59.5 | 339 | 87.6 |
| Mixed Broadleaf Forest | 29,875 | 3,084 | 3,836 | 10.3 | 12.8 | 752 | 24.4 |
| Seasonal Semideciduous Forest | 13,297 | 1,908 | 2,495 | 14.4 | 18.8 | 588 | 30.8 |
| Seasonal Deciduous Forest | 48,692 | 7,015 | 8,748 | 14.4 | 18.0 | 1,734 | 24.7 |
| Steppe-like Savanna | 65,780 | 51,198 | 29,759 | 77.8 | 45.2 | -21,439 | -41.9 |
| Steppe | 65,314 | 36,399 | 33,828 | 55.7 | 51.8 | -2,571 | -7.1 |
| Pioneer Formations | 43,761 | 10,031 | 6,716 | 22.9 | 15.4 | -3,315 | -33.1 |
| Ecological Tension | 13,155 | 1,000 | 2,097 | 7.6 | 16.0 | 1,098 | 109.8 |
| **Total** | **281,092** | **111,021** | **88,062** | **39.5** | **31.4** | **-22,816** | **-20.6** |

**Source:** Modified from Cordeiro, J.L. & Hasenack, H., 2009. Cobertura vegetal atual do Rio Grande do Sul. Pag. 285-299. In: Campos sulinos: conservação e uso sustentável da biodiversidade (Valério De Patta Pillar, Sandra Cristina Müller & Zélia Victor Ávila Jacques, eds.). Brasília: MMA.

## Watershed Revitalization Program[149]

The Program for the Revitalization of Vulnerable and Environmentally Degraded Watersheds was initially implemented as a project (2003-2007) and later institutionalized with the creation of the Department for the Revitalization of Watersheds under the Ministry of the Environment. Watershed revitalization actions are included in the 2012-2015 Federal Multi-Year Plan (PPA) and currently activities are being implemented in the watersheds of the São Francisco, Tocantins-Araguaia, Paraíba do Sul, and Upper Paraguai (Pantanal) rivers. This Program represents an effort for coordinating and integrating various governmental agencies at all levels and society to effectively implement a combination of actions that contribute to the restoration of watershed ecosystems.

[148] Cordeiro, J.L. & Hasenack, H., 2009. Cobertura vegetal atual do Rio Grande do Sul. Pag. 285-299. In: Campos sulinos: conservação e uso sustentável da biodiversidade (Valério De Patta Pillar, Sandra Cristina Müller & Zélia Victor Ávila Jacques, eds.). Brasília: MMA.

[149] www.mma.gov.br/agua/bacias-hidrograficas/revitalização-de-bacias-hidrográficas ; Presidência da República, 2014. Mensagem ao Congresso Nacional, 2014: 4ª Sessão Legislativa Ordinária da 54ª Legislatura. Brasília: 468.

Actions supported in 2014 include: (i) support to activities carried out by the Centers for the Restoration of Degraded Areas – CRAD (*Centros de Recuperação de Áreas Degradadas*), which implement models for the restoration of degraded areas, seed conservation and seedling production, and capacity building and mobilization of communities for vegetation restoration and biodiversity conservation; (ii) integrated and preventive enforcement operations with the participation of federal and state environmental agencies and the District Attorney's Office; (iii) expansion of sanitation investments under the Federal Program to Accelerate Development – PAC, implementing water sanitation and distribution systems and sewage collection and treatment systems at river side communities, as well as establishing inter-municipal consortia for solid waste management; and (iv) financial and technical support to city- and state-level actions for watershed and ecosystem restoration and biodiversity conservation in the Amazon and Pantanal.

Federal vegetation restoration initiative[150]

The Ministry of the Environment – MMA is currently leading discussions on a proposed large scale vegetation restoration strategy to proactively face the challenge of implementing Law 12.651/2012 (which resulted from the revision of the former Forest Code, and rules on the protection of native vegetation). To support this process, a Memorandum of Understanding was signed in 2013 between MMA and the World Resources Institute – WRI, which is a member of the Global Partnership on Forest Landscape Restoration – GPFLR. Under this partnership, workshops were held in São Paulo, Rio de Janeiro and Brasília in September 2013 to promote discussions and information sharing on the best practices for restoration of degraded or altered landscapes in Brazil. Over 45 organizations were represented in these discussions by 70 participants of governmental and non-governmental organizations, private sector, research and technical extension institutions that work on this theme. Participants discussed the opportunities and challenges for the development of a national strategy for the restoration of native vegetation, as well as international best practices and historical examples, to identify existing obstacles and success factors for such restoration in Brazil and in other countries.

Suggestions and recommendations resulting from those workshops were combined with complementary research and discussions to form the basis for the development of a proposal on a national-level strategy for native vegetation restoration. The proposed objectives of such a strategy would be to expand and strengthen agriculture and livestock public policies, financial incentives, markets and good practices, in addition to other measures necessary for the restoration of native vegetation cover in at least 12.5 million hectares within the next 20 years. This restoration should occur primarily in Permanent Preservation Areas (APP – *Áreas de Preservação Permanente*) and Legal Reserves (RL – *Reservas Legais*), but also in degraded or low productivity areas. Such a strategy would allow Brazil to fulfill some of its major national and international commitments regarding environmental conservation.

Eight strategic initiatives were proposed to compose this strategy, grouped under three pillars to motivate, facilitate and implement the restoration of native vegetation cover, as presented in Table 30.

[150] Information provided by DCBio/SBF/MMA in July 2014.

**Table 30:** Proposed initiatives for a national level vegetation restoration strategy.

| Initiative | Actions |
|---|---|
| **Motivation Pillar** | |
| 1. Awareness | Launch a multi-year communications initiative targeting farmers, agribusiness, urban citizens, and opinion leaders to build awareness regarding what the restoration of native vegetation consists of, the benefits it brings about, and how to get involved and support this process. |
| **Facilitation Pillar** | |
| 2. Seeds and seedlings | Promote a value chain for the restoration of the native vegetation cover by increasing the capacity of greenhouses and other structures for the production of seedlings and seeds of native species, and streamline policies to improve the quantity, quality and affordability of seeds and seedlings of native species. |
| 3. Markets | Build robust markets through which landowners may generate income through the commercialization of timber, non-timber products, protection of watersheds, among other goods and services produced with the restoration of native vegetation. |
| 4. Institutions | Define roles and responsibilities for governmental agencies, companies and civil society, and align and coordinate new and existing public policies to ensure they mutually support the recuperation of native vegetation. |
| **Implementation Pillar** | |
| 5. Financial mechanisms | Develop innovative financial mechanisms designed to encourage the restoration of native vegetation, including preferential loans, donations, environmental compensation, specific tax exemptions, and forest bonds. |
| 6. Rural extension | Expand rural extension services (public and private) to equip landowners with the most advanced knowledge and low cost methods for native vegetation restoration. |
| 7. Spatial planning and monitoring | Implement a national spatial planning and monitoring system to support the decision making process for native vegetation restoration. |
| 8. Research and development | Increase the scale and focus of investment in research, development and innovation to reduce costs, enhance quality, and increase efficiency in the restoration of native vegetation, considering environmental, social and economic factors. |

**Source:** Information provided by DCBio/SBF/MMA in July 2014.

The proposed strategy and its structure were presented and discussed at the Capacity-building Workshop for South America on Ecosystem Conservation and Restoration to Support Achievement of the Aichi Biodiversity Targets, held in Linhares, ES – Brazil, in March 2014. The event was organized by the CBD Secretariat in partnership with MMA, and was attended by 50 participants from 10 South American countries, international organizations, traditional communities and indigenous peoples, academia and research institutions.

As the next steps under this initiative, the MMA proposes the creation of an Inter-ministerial Committee to coordinate the preparation of a national strategy or plan for the restoration of native vegetation cover. The construction of this strategy or plan would include broad consultation and discussion to engage all the relevant sectors in the initiative.

#### 1.4.3.2 Action Plans for deforestation reduction

As deforestation rates in the Amazon and the Cerrado biomes represent the largest contribution in the forest sector to total emissions (see section 1.3, Deforestation), Action Plans for these biomes were prioritized and are being implemented under the National Policy on Climate Change – PNMC: the PPCDAm for the Amazon (currently in its third phase) and the PPCerrado for the Cerrado.

PPCDAm

The Action Plan for the Prevention and Control of Deforestation in the Legal Amazon – PPCDAm[151] has been implemented since 2004 and is currently in its third phase (2012-2015), for which the main objectives are: (i) Promote land tenure regularization of public lands and enhance land management; (ii) Enhance efficiency of monitoring and control of deforestation, improve licensing procedures for forest management and concessions, enhance enforcement to reduce illegal activities and increase compliance with environmental legislation, particularly in the productive sector; and (iii) Promote the viability of sustainable production chains that represent alternatives to deforestation, promote good practices on agriculture and livestock production, increase production and trade of legal timber through sustainable forest management, and generate technology and innovation for sustainable development in the Amazon.

The first and second phases of PPCDAm produced important results which, combined with other positive events and measures such as the Central Bank Resolution (BACEN No. 3.545/2008) binding public bank financing of agriculture operations to a clean environmental record of the rural property with IBAMA, as well as fluctuations of commodity prices and in the Real exchange rate (which functioned for a period as a disincentive to deforestation for grain production)[152], contributed significantly to reduce deforestation rates in the Amazon. Under the territorial planning and regularization theme, 25 million hectares of federal protected areas were created, most of which along the "deforestation arc" to detain the advance of deforestation, and 10 million hectares of indigenous lands were homologated. Additionally, close to other 25 million hectares of state and municipal protected areas were also created within the Legal Amazon. Additionally, the Macro Ecological-Economic Zoning of the Legal Amazon was prepared and 25,618 rural land holdings were geo-referenced under the Legal Land Program (*Programa Terra Legal*).

Under the monitoring and control theme, hundreds of enforcement operations were carried out based on technical criteria and territorial priorities, and the environmental monitoring systems were significantly enhanced, such as the PRODES and DETER systems that monitor deforestation, and more recently the DETEX system (*Sistema de Detecção da Exploração Seletiva de Madeira*) to monitor selective timber extraction, and the DEGRAD system (*Sistema de Mapeamento da Degradação Florestal na Amazônia Brasileira*) that monitors forest degradation, in addition to the TerraClass analysis on land use change in previously deforested areas.

Under the sustainable development theme, initiatives to promote forest economy in the Amazon involved the participation of 13,852 families in natural resource management projects in settlements of the agrarian reform and in sustainable use protected areas. Additionally, concessions were granted to the sustainable forest management of approximately 225,000 hectares of forests (focusing mostly timber management), and the Sustainable Forest District of Highway 163 (*Distrito Florestal Sustentável da BR 163*) was created.

---

[151] http://www.mma.gov.br/images/arquivo/80120/PPCDAm/_FINAL_PPCDAM.PDF

[152] Fearnside, P.M., 2014. Conservation research in Brazilian Amazonia and its contribution to biodiversity maintenance and sustainable use of tropical forests. pp. 12-27. In: *1st Conference on Biodiversity in the Congo Basin, 6-10 June 2014, Kisangani, Democratic Republic of Congo*. Consortium Congo 2010, Université de Kisangani, Kisangani, Democratic Republic of Congo. 221 pp. Available at: http://philip.inpa.gov.br/publ_livres/2014/Conservation_Research-in-Brazilian-Amazonia_Kisingani.pdf

Since implementation of PPCDAm began, deforestation rates in the Legal Amazon have reduced significantly, particularly between 2005 and 2009 (Figure 34). Estimates suggest that these policies avoided the deforestation of 62,000 km$^2$ of forests, which represents between 32 and 52% of the area that would have been deforested in the absence of these policies[153].

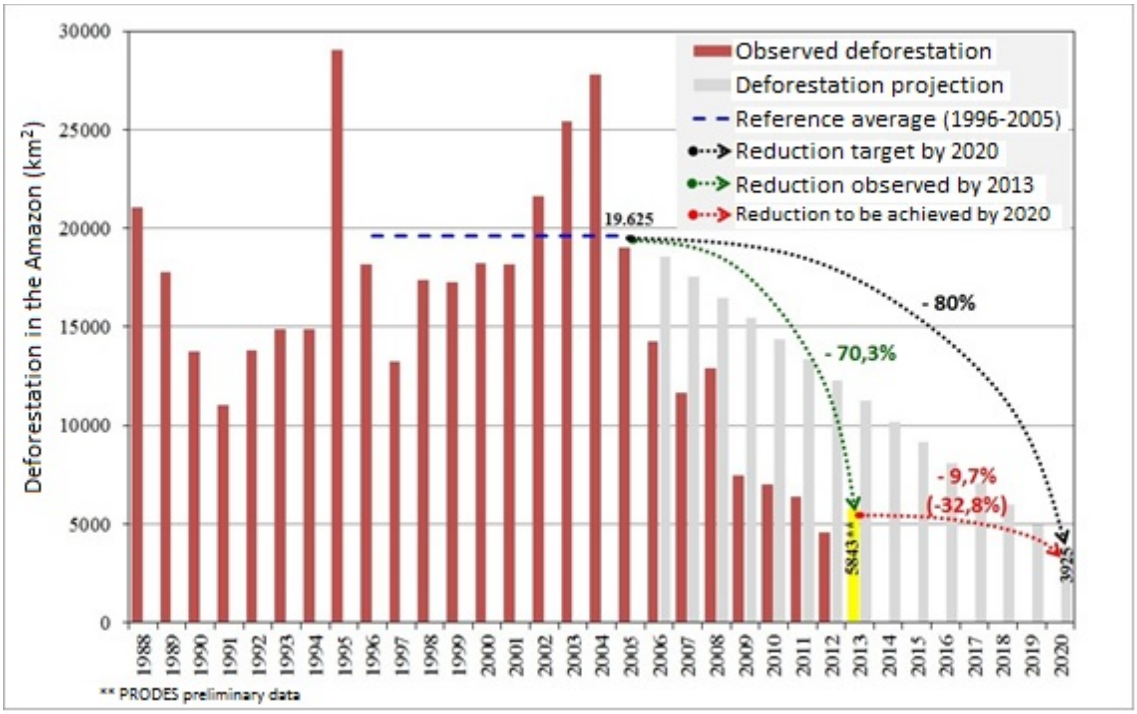



**Figure 34:** Deforestation rates in the Legal Amazon measured by PRODES/INPE and the emissions reduction target of the National Policy on Climate Change (PNMC).
**Source:** INPE and MMA; National Policy on Climate Change (PNMC).

PPCerrado

The Action Plan for the Prevention and Control of Deforestation and Fire in the Cerrado – PPCerrado[154] was established to face the advancing deforestation of the biome, which had already lost 48.5% of its natural vegetation cover to agriculture by 2010. Vegetation monitoring data show that the Cerrado has been losing natural vegetation cover at a faster rate than all other biomes. Implementation of PPCerrado started in 2009, initially only with the participation of the Ministry of the Environment and its implementing agencies, and with the involvement of several other governmental agencies since early 2010, after its insertion in the National Policy on Climate Change. In 2013 was initiated the process of revision and updating of the PPCerrado for the 2014-2015 period.

As the PPCDAm, the PPCerrado is structured along three main themes: (i) monitoring and control, involving environmental enforcement and satellite monitoring of vegetation cover; (ii) protected areas and territorial regularization, involving territorial planning and sustainable land use, creation of protected areas and demarcation/homologation of indigenous lands, planning of water resources use, and the preparation of the biome's

[153] Assunção, J., Gandour, C., Rocha, R., 2012 Deforestation Slowdown in the Legal Amazon: Prices or Policies? Rio de Janeiro: Climate Policy Initiative 2012. http://climatepolicyinitiative.org/publication/deforestation-slowdown-in-the-legal-amazon-prices-or-policies

[154] http://www.mma.gov.br/estruturas/201/_arquivos/ppcerrado_201.pdf

Macro Ecological-Economic Zoning; and (iii) promotion of sustainable activities, which intends to promote the transition from the current deforestation-based and conventional agriculture development model to a sustainable model of intensive land use applying soil conservation techniques and diversification of economic activities in rural properties, respecting local and regional specific characteristics.

Among the initiatives being carried out in connection with the PPCerrado are the following international cooperation actions: (i) the Forest Investment Program (FIP), addressing (a) the Rural Environmental Registry (CAR – *Cadastro Ambiental Rural*), (b) improvement of systems for monitoring the vegetation cover and preventing forest fires, (c) the National Forest Inventory of Brazil, and (iv) the Low Carbon Agriculture plan – ABC (*Plano de Agricultura de Baixa Emissão de Carbono*); (ii) the Cerrado-Jalapão Project, which counts on German technical and financial support and is aimed at improving integrated management of forest fires; and (iii) the Cerrado Program, which is financed by a trust fund created by the World Bank with a grant provided by the United Kingdom, with the objective to support the implementation of the CAR and forest fire management, prevention and control. These three initiatives are coordinated by MMA and implemented in priority municipalities and protected areas for the prevention and control of deforestation and forest fires in the Cerrado.

Another important action that was completed under the PPCerrado is the publication of MMA Ruling (*Portaria*) n$^{o}$ 97, of 22 March 2012, listing 52 priority municipalities for monitoring and control of illegal deforestation, territorial regularization actions, maintenance of native vegetation and restoration of degraded areas, and promotion of environmentally sustainable economic activities. The selection of the 52 municipalities was based on the analysis of deforestation observed in 2009 and 2010, remaining native vegetation cover in the municipality, and presence of protected areas (including indigenous lands and quilombola territories), and resulted in the concentration of federal government efforts in strategic areas where the critical deforestation polygons are located. Although the 52 municipalities correspond to only 4% of the total number of municipalities in the biome, they contain 44% of deforestation events in the biome and 22% of the remaining native vegetation cover in the period 2009/2010[155].

Considering the available data for the Cerrado biome, there was a reduction by 60.5% in deforestation in 2010 (6,469 km$^2$), in comparison with the mean rate for the 1999-2008 period (15,701 km$^2$) (Figure 35).

[155] Information organized by MMA, based on Cerrado deforestation data from PMDBBS/Ibama, available at: http://siscom.ibama.gov.br/monitorabiomas/cerrado/index.htm

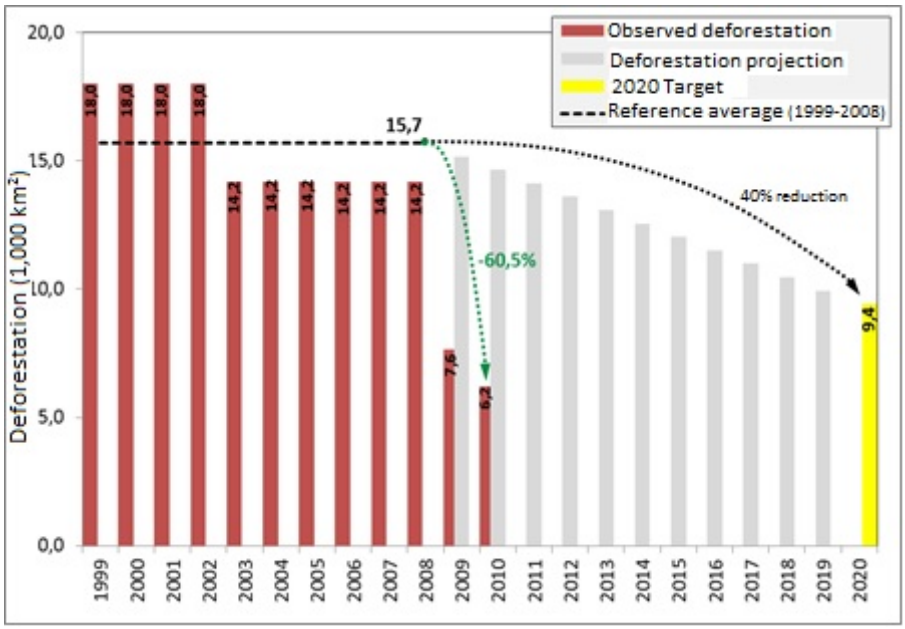



**Figure 35:** Deforestation reduction in the Cerrado between 1998 and 2010.
**Source:** 1999-2002 data: mean value estimated based on data from the National Biodiversity Mainstreaming and Institutional Consolidation Project – PROBIO; 2002-2008 data: mean value estimated based on data from the Project on Satellite Monitoring of Deforestation in Brazilian Biomes – PMDBBS; 2009-2010 data: absolute values taken from PMDBBS; emissions reduction targets: National Policy on Climate Change (PNMC).

As there is still no systematic monitoring in place for deforestation in the biome comparable to the PRODES[156] system for the Amazon, or a reliable baseline to define the dynamics of Cerrado deforestation, data on deforestation reduction in the Cerrado still requires revision with the assistance of the most recent technology. As mentioned in section 1.2, IBAMA and INPE are working on the construction of a baseline for the Cerrado and on the enhancement of the vegetation monitoring system.

In addition to integrated enforcement actions to enhance environmental compliance, the reduction of deforestation rates in the biome will depend largely on the promotion and adoption of sustainable activities to value Cerrado biodiversity, as well as on the monitoring of rural properties through the Rural Environmental Registry (CAR). Significant efforts will also be necessary to implement shared and sustainable forest management with state governments, and to obtain state support to the objective of reducing deforestation and forest degradation, as well as increasing afforestation in coordination with the Steel Mill Plan (*Plano Siderurgia*) and the Low Carbon Agriculture Plan.

### 1.4.4 Sustainable forest management[157]

*Community-based forest management*. In Brazil, this category of forest management occurs in forests earmarked for use by traditional communities, indigenous peoples, family rural producers, and rural producers in settlements of the agrarian reform. Currently, approximately 49% of public forests are available for community-based forest management, encompassing 313 million hectares. To strengthen the right of the

[156] http://www.obt.inpe.br/prodes/index.php

[157] Serviço Florestal Brasileiro – SFB, April 2014. Internal Information Note to support the preparation of the 5th National Report to the CBD.

traditional groups to the use of these forests, in 2009 the Presidential Decree nº 6.874/2009 instituted the Federal Program on Community-based and Family-based Forest Management (PMCF – *Programa Federal de Manejo Florestal Comunitário e Familiar*), which is implemented through the Annual Plan on Community-based Forest Management. In addition to various actions supported in the Amazon, the community-based forest management is being strengthened in the Caatinga biome through the provision of technical assistance for the sustainable production of firewood and charcoal, thus contributing to the conservation of over 15,000 hectares of native Caatinga. The increasing offer of public policies focusing on community-based forest management creates a favorable environment for strengthening the sustainability of community management of timber and non-timber products in the coming years.

*Forest concessions*. Since 2006, Brazil instituted the forest concession system to promote the sustainable management of timber and non-timber products by the private sector. Concession contracts allow the use of forest resources through low-impact forest management techniques aiming at the continuous and sustainable use of timber (most targeted product) and non-timber products. Timber removal is limited to 4 to 6 trees per hectare every 30 years, to allow regeneration of remaining trees and the conservation of forest diversity.

Since 2008, 319,000 hectares of public forests have been placed under forest concessions, 70% of which concentrated in the period between 2010 and March 2014. Over 1,000,000 hectares of public forests are available for forest concessions in 2014, and other 800,000 hectares should be offered for concessions in 2015, totaling over 2 million hectares of forests being placed under sustainable management since the onset of forest concessions. Between 2010 and 2013, the Brazilian Forest Service – SFB (*Serviço Florestal Brasileiro*) authorized the extraction of 166,000 $m^3$ of managed timber from public forest concessions, increasing the offer of legal timber in the market and contributing to reducing pressure over native timber.[158]

Nevertheless, some authors emphasize the need to enhance sustainability assessments and monitoring of proposed and ongoing forest management operations to ensure actual ecological sustainability of explored ecosystems and of the environmental services they provide.[159]

*National Forest Inventory*. The National Forest Inventory – IFN (*Inventário Florestal Nacional*) was instituted in 2012 as a planning instrument for forest management, under the coordination of the SFB. The objective of the IFN is to continuously collect forest data in 5-year iterations, including biophysical data on forests (tree structure, diameter and height, species identification, sanitary status), socio-environmental data (relations between population and forest), in addition to information on landscape and soil analyses. When fully operational, the IFN will be an important tool for data generation and production of knowledge on forest resources, which will be made available to different institutions working on the forest theme.

---

[158] Data provided by the Brazilian Forest Service (SFB – *Serviço Florestal Brasileiro*) in May 2014.

[159] Fearnside, P.M. 2013. A exploração de áreas sob floresta amazônica e a ruptura do equilíbrio do ambiente. pp. 91-100 In: L.P.M. Plese, S.T. Teixeira, A.M.L. Garcia, C. Roweder, C.G. da Silva, C.S. de Farias, E.C.O. Sanchez, J.M.P.R. de Alcântra & M.A.C. Teixeira (eds.) *Áreas Degradadas da Amazônia: Perspectivas Sustentáveis para Exploração Econômica*. Instituto Federal de Educação, Ciência e Tecnologia do Acre (IFAC), Rio Branco, Acre. 100 pp. http://philip.inpa.gov.br/publ_livres/2013/A%20exploração%20de%20áreas%20sob%20floresta%20Amazônica-IFAC.pdf

The state of Santa Catarina and the Federal District carried out their field inventory in 2009/2010 and 2011, covering their entire territories. Santa Catarina inventoried 123 sampling sites, while the Federal District inventoried other 66 sampling sites. In 2013, IFN was implemented in the states of Paraná, Rio Grande do Sul, Ceará, Rio de Janeiro, and Sergipe, resulting in the inventory of 995 sampling sites to-date. In Paraná, three meso-regions were inventoried: Central-east, Central-south, and Southeast; while only the Northeast meso-region was inventoried in Rio Grande do Sul. IFN will be completed in 2014 for the states of Ceará and Rio de Janeiro, covering the complete extension of their territories. Also in 2014, IFN will initiate in Rio Grande do Norte, Sergipe, Espírito Santo, Amazonas, Mato Grosso, Pará, Tocantins, Mato Grosso do Sul, Minas Gerais, and São Paulo, totaling 8,882 sampling sites.

*National Forest Information System – SNIF*. The SNIF (*Sistema Nacional de Informações Florestais*) is being built and coordinated by the Brazilian Forest Service with the purpose of producing, concentrating, organizing, storing, processing and disseminating data and knowledge on Brazilian forests and the forest sector. SNIF should become the main source of information on this theme to support the development and implementation of projects and policies that harmonize the use and the conservation of Brazilian forests.

The SNIF is structured around four main themes: Forest Resources, Forest Production, Forest Studies and Research, and Forest Management. The Forest Management portion of SNIF was already developed in the National Portal on Forest Management – PNGF (*Portal Nacional da Gestão Florestal*), with the objective of concentrating and making available the most relevant information on forest control activities carried out by Brazilian environmental agencies.

*Forest certification*. The certification of forests and product chains in Brazil is carried out by several certifying agents, through two certification systems: (i) the Brazilian Forest Certification Program (CERFLOR – *Programa Brasileiro de Certificação Florestal*), connected to the Program for the Endorsement of Forest Certification Schemes (PEFC), and (ii) the Forest Stewardship Council (FSC).

CERFLOR grants certification according to the standards established by the Brazilian Association of Technical Standards – ABNT, which are integrated to the Brazilian Compliance Assessment System, where Compliance Assessment Programs are managed by the National Metrology Institute – INMETRO. While FSC seeks to disseminate global standards on good practices in forest management that follow ecological and social sustainability safeguards, as well as economic viability criteria.

The total number of certified hectares of forests has been increasing steadily, as shown in Table 31 below, with more hectares being certified by FSC than CERFLOR. The evolution of forest management certification granted by FSC is further illustrated in Figure 36.

**Table 31:** Area under certified forest management in Brazil

| Certification system | Certified Forest Area (hectares) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2014 |
| CERFLOR | 4,839,640 | 5,385,810 | 5,331,210 | 5,169,330 | 6,382,950 | 6,479,540 | 1,695,077 |
| FSC | 882,650 | 1,114,410 | 1,285,220 | 2,183,010 | 1,858,880 | 2,204,670 | 7,843,780 |

**Source:** Data provided by the Brazilian Forest Service (FSC) and INMETRO (CERFLOR) in April 2014.

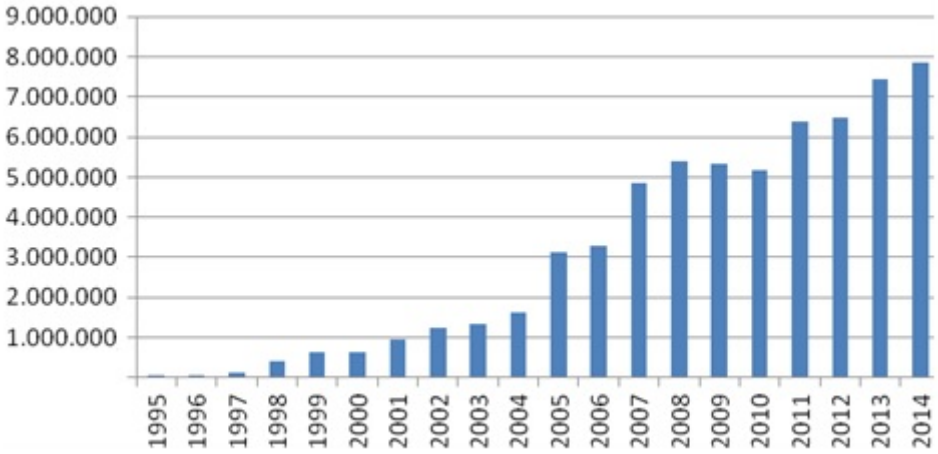



**Figure 36:** Evolution of FSC-certified forest management in Brazil (hectares).
**Source:** FSC 2014 data, provided by the Brazilian Forest Service – SFB in May 2014.

### 1.4.5 Integrated landscape management[160]

The complex and diverse combination of high biological diversity, different ecosystem types at various conservation stages, and the variety of social and economic characteristics found in Brazil present a challenge than requires a complex integration process to achieve functioning landscape management. The dynamics of economic and commodities demands where agriculture and mineral extraction weigh heavily in the national economy, and the need to diversify the national energy matrix, among other aspects, tend to lead to an increasing demand for natural resources and potential conflicting interests among sectors regarding the use of these resources.

With the objective to reduce potential conflicts over resource use and prevent excessive impact on ecosystems and biodiversity, the Ecological-Economic Zoning (ZEE – *Zoneamento Ecológico-Econômico*) instrument was created as a landscape-scale planning and management tool under the National Environment Policy (PNMA, Law n$^{o}$ 6.938/1981) and also foreseen under the National Plan on Coastal Management (Law n$^{o}$ 7.661/1988). A multi-sector Coordination Commission – the CCZEE – established by Decree n$^{o}$ 99.540/1990, chaired by the Ministry of the Environment and with representatives from 14 Ministries[161], leads since 2002[162] the integration of this ecosystem approach into economic development, by coordinating and promoting the development of Ecological-Economic Zoning initiatives focusing on significant geographical planning units. Resulting maps and guidelines are made available as territorial planning tools to guide the development of policies, infrastructure and economic development investments, and land use with a view to the sustainable use of natural resources. The ZEE instrument seeks to overcome the dichotomy often perceived between economic development and environmental conservation, offering a

[160] MMA/Ecological-Economic Zoning Division, April 2014. Internal Information Note to support the preparation of the 5$^{th}$ National Report to the CBD.

[161] CCZEE is composed by the Ministries of: Justice; Defense; Agriculture, Livestock and Food Supply; Development, Industry and Foreign Trade; Mines and Energy; Transport; Agrarian Development; Planning, Budget and Administration; Science, Technology and Innovation; Environment; National Integration; Social Development and to Combat Hunger; and Cities; in addition to the Secretariat of Special Affairs of the President's Office.

[162] Although PNMA has been in place since 1981, the Ecological Economic Zoning instrument was regulated by Decree 4.297, of 10 July 2002.

solid technical basis and an opportunity for building dialogue among sectors and public and private agents, with a view to reach results that are negotiated and agreed upon, thus enhancing their viability.

The National Environment Policy defined the ZEE as the instrument to support planning and management decision making on land use and occupation with a sustainable basis, applying a development approach that seeks to maintain and recover ecosystem capacity to produce goods and services that are essential for development processes. The ZEE can thus bring the advantages of an instrument that allow the recognition of ecosystem potential and vulnerabilities, adding sustainability and competitiveness to socioeconomic development processes. To strengthen the adoption of this important tool, the new Law (Law n$^{o}$ 12.651/2012) that replaced the former Forest Code establishes a 5-year deadline for all Brazilian states to develop and approve their ZEEs, according to the federal guidelines for ZEE preparation.

ZEE processes are carried out in a decentralized manner, and coordination is shared among federal, state and municipal agencies, where sub-national ZEEs shall take into consideration the broader planning exercises, such as national, regional and state zonings. The CCZEE, headed by the Ministry of the Environment, has already led the preparation of the Macro-ZEE for the Legal Amazon, legally established in 2010 by Decree n$^{o}$ 7.378/2010 (Figure 37), and is currently working on the development of the Macro-ZEE for the Cerrado biome, and the Macro-ZEE for the São Francisco River Watershed.

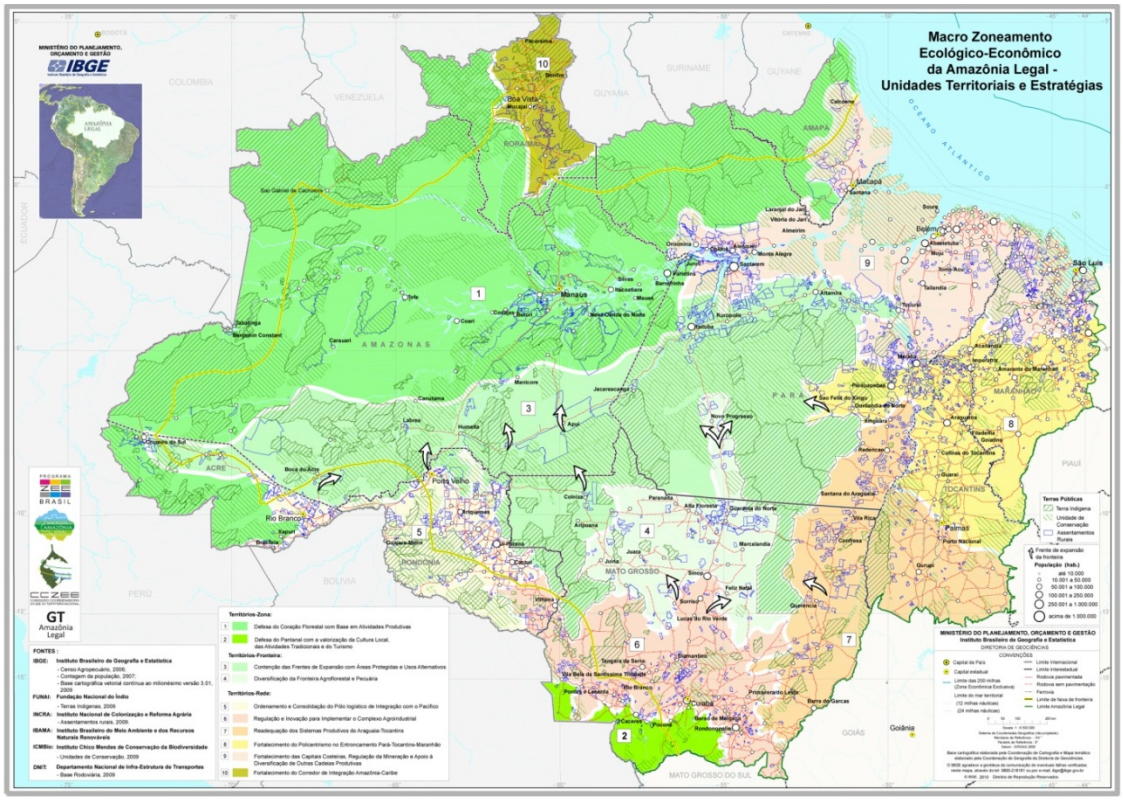



**Figure 37:** Territorial units and strategies of the Macro Ecological-Economic Zoning of the Legal Amazon.
**Source:** Brasil: MacroZEE da Amazônia Legal: Estratégias de transição para a sustentabilidade. Brasília: MMA, 2010. Available at: http://www.mma.gov.br/gestao-territorial/zoneamento-territorial/macrozee-da-amazônia-legal/item/8201-mapa-principal

Several Brazilian states are also developing and implementing their state-level ZEEs with support from the CCZEE. The status of state ZEE development is shown in Figure 38 below. Considering only the ZEE projects that were established by legal instruments, their coverage represented 13.4% of the national territory in 2000 (1,140,000 km$^2$). This coverage expanded to approximately 28% of the country by 2005 (2,390,000 km$^2$) and 73% by 2013 (6,209,000 km$^2$). By 2013, ZEEs addressed the entire Amazon and Pantanal biomes, approximately 62% of the Cerrado and 22% of the Atlantic Forest, but only 1.6% of the Caatinga.

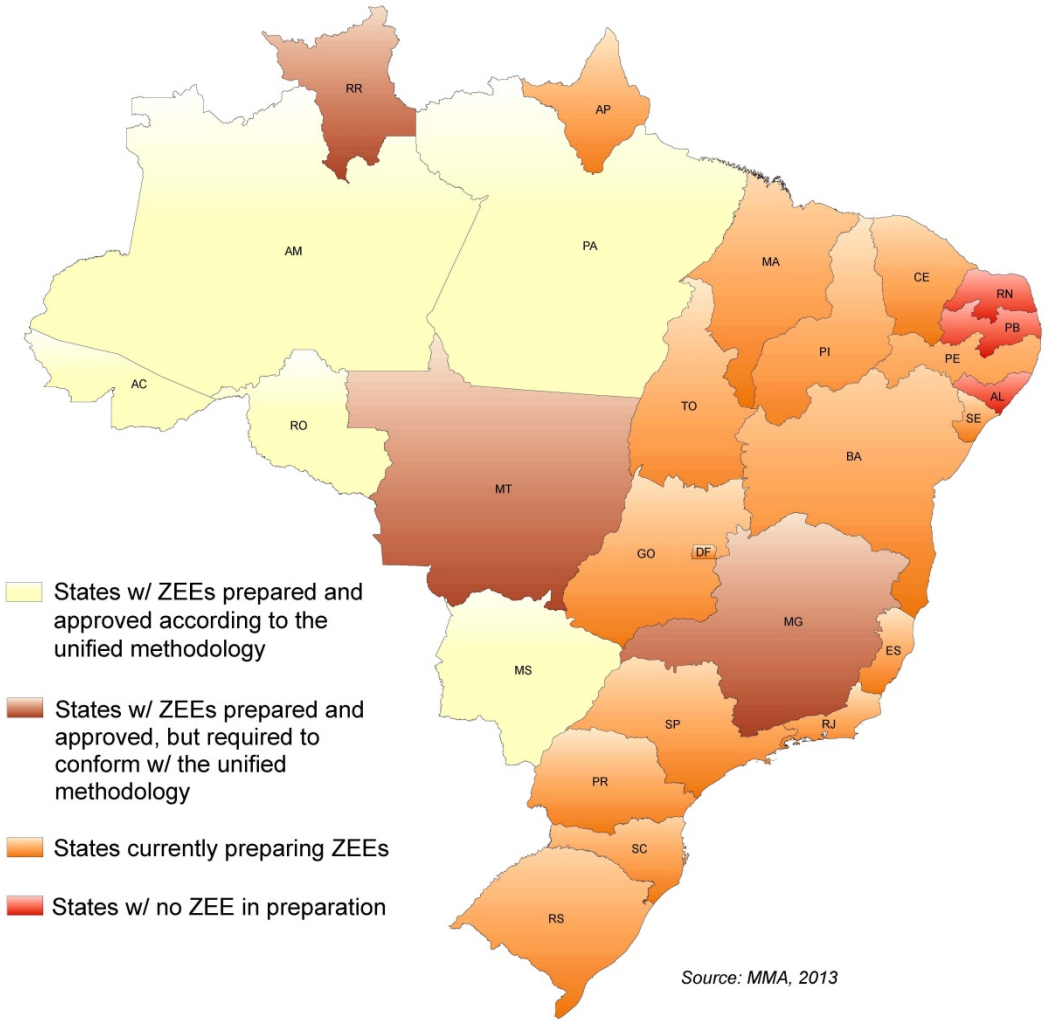



**Figure 38:** Status of state ZEE development in Brazil.
**Source:** MMA/Ecological Economic Zoning Division, April 2014. Internal Information Note to support the preparation of the 5th National Report to the CBD.

To collaborate with the integration of ZEEs with other territorial planning instruments such as Municipal Master Plans and Water Resources Plans, the CCZEE published in 2013 a methodological guide for the preparation of Ecological Economic Zonings at the local level: "Methodological references for local territorial planning and regularization" (*Referências metodológicas para o ordenamento territorial local*). Additionally, the original 2006 methodology for ZEE preparation is being revised to incorporate new fundamental themes to the territorial planning processes.

Existing ZEE information is also being made available by the Ministry of the Environment through the I3Geo free software, such as the interactive atlas on the

Macro-ZEE of the Legal Amazon[163], published in 2012. The intention is to consolidate a shared database to answer to strategic demands such as guidance to specific credit lines based on categories established by ZEE, or an integrated database with territorial information to adequately support decision making and the coordination of the various governmental actions that are carried out on a same territory.

### 1.4.6 Conservation Action Plans[164]

Brazilian mega-biodiversity is already common knowledge: the country houses over 130,000 species of invertebrates and approximately 9,000 species of vertebrates, among which 712 mammals, 1,900 birds, 751 reptiles, 978 amphibians, 3,287 freshwater fish and 1,380 marine fish.[165]

On the other hand, growing pressures and threats suggest uncertainty on the perpetuity of the populations of Brazilian animal species. With this in mind, the Brazilian government listed those species suffering the highest degree of threat, indicating the actions that need to be taken to minimize or eliminate those threats. The Ministry of the Environment Rulings n$^{o}$ 03 (26 May 2003) and n$^{o}$ 05 (21 May 2004, amended by IN MMA n$^{o}$ 52/2005) combined, list 627 threatened species of birds, reptiles, amphibians, mammals, fish, and aquatic and terrestrial invertebrates of the Brazilian fauna.

The most affected biomes are the most populated and that have been occupied the most, therefore presenting a variety of land use pressures related to occupation and agriculture, such as the Atlantic Forest and the Cerrado. On the positive side, 58.8% of the 627 species listed as threatened are present in federal protected areas. Conversely, the presence of threatened species was recorded in 242 (or 77.3%) of the 313 federal protected areas, indicating the need to integrate specific conservation actions in the protected areas' management plans. It is, however, naturally impossible to ensure that all populations and sub-populations that secure the genetic viability of these species are safeguarded in protected areas. In order to maintain and protect population viability a strategic conservation process must be established and agreed upon among different sectors of society, thus addressing species populations both inside and outside federal, state and municipal protected areas, including private lands. In Brazil, this strategy took the form of Conservation Action Plans.

The Action Plans define, through a participatory process, strategies to enhance the conservation status of threatened species, establishing pacts with the various sectors of society for their implementation. The national strategy for restoring and conserving threatened species also has a component to assess the conservation status of other species that are not currently classified as threatened, with a view to identify and implement preventive actions to reduce pressures that may threaten their populations.

Until December 2013, a total of 48 Action Plans had been prepared (Table 32), addressing individual species or groups of species, and comprising 49% of all listed threatened species (Figure 39).

[163] http://www.mma.gov.br/atlaszeeamazonia

[164] ICMBio, March 2014. Internal Information Note to support the preparation of the 5$^{th}$ National Report to the CBD.

[165] ICMBio, in press. Diagnóstico da Fauna: Resultados parciais 2012-2014.

**Table 32:** Action Plans prepared until December 2013.

| National Action Plan | Taxonomic group | No. of species | Biome | Year of preparation |
|---|---|---|---|---|
| Red-billed Curassow | *Crax blumenbachii* | 1 | Atlantic Forest | 2004 |
| Albatrosses and Petrels | Diomedeidae & Procellariidae | 15 | Marine | 2006, revised in 2012 |
| Brazilian Merganser | *Mergus octosetaceus* | 1 | Cerrado and Atlantic Forest | 2006 |
| Lear's Macaw | *Anodorhynchus leari* | 1 | Caatinga | 2006 |
| Birds of Prey | Falconiformes, Strigiformes and Cathartiformes | 18 | Pampas, Cerrado, Atlantic Forest, Pantanal, Amazon | 2006 |
| Threatened Galliforms (wildfowl) | Cracidae and Odonthophoridae | 6 | Atlantic Forest, Amazon, Caatinga, Cerrado, Pantanal | 2008 |
| Alagoas Curassow | *Pauxi mitu* | 1 | Atlantic Forest | 2008 |
| Aquatic Mammals Large Cetaceans and Pinnipeds | Cetaceans and Pinnipeds | 6 | Marine | 2009 |
| Threatened Island Reptiles | Genera: Bothrops, Dipsas, Scinax | 4 | Atlantic Forest | 2009 |
| Maned Wolf | *Chrysocyon brachyurus* | 1 | Cerrado, Atlantic Forest, Pampas, Pantanal | 2009 |
| Restinga Antwren | *Formicivora littoralis* | 1 | Atlantic Forest | 2010 |
| Small Cetacean Franciscana Dolphin | *Pontoporia blainvillei* | 1 | Marine | 2010 |
| Woolly Spider Monkeys | *Brachyteles arachnoides*<br>*Brachyteles hypoxanthus* | 2 | Atlantic Forest | 2010 |
| Sirenians | *Trichechus inunguis*<br>*Trichechus manatus* | 2 | Amazon and Marine | 2010 |
| Threatened Lepidoptera | Lepidoptera | 57 | Amazon, Caatinga, Cerrado, Atlantic Forest, Pampas, Pantanal | 2010 |
| Araripe Manakin | *Antilophia bokermanni* | 1 | Caatinga | 2010 |
| Threatened Aquatic Species of the Paraíba do Sul Watershed | Genera: Atya, Brycon, Pogonopoma, Phallotorynus, Taunayia, Diplodon | 19 | Atlantic Forest | 2010 |
| Thin-spines Porcupine | *Chaetomys subspinosus* | 1 | Atlantic Forest | 2010 |
| Aquatic Mammals – Small Cetaceans | Genera: Inia, Orcinus, Sotalia, Stena, Tursiops, Stenella | 7 | Marine | 2010 |
| Jaguar | *Panthera onca* | 1 | Amazon, Caatinga, Cerrado, Atlantic Forest, Pantanal | 2010 |
| Parrots of the Atlantic Forest | *Amazona vinacea*, *A. pretrei*, *A. brasiliensis*, *A. rhodocorytha* | 4 | Atlantic Forest | 2010 |
| Threatened Cervidae | *Blastocerus dichotomus*<br>*Mazama nana* | 8 | Cerrado, Pantanal, Atlantic Forest | 2010 |
| Mammals of the Central Atlantic Forest | Some genera: Alouatta, Callicebus, Leontopithecus, Rhagomys, Trinomis & other | 27 | Atlantic Forest | 2010 |
| Marine Turtles | Genera: Caretta, Chelonia, Dermochelys, Eretmochelys, Lepidochelys | 5 | Marine | 2010 |
| Dekeyser's Nectar Bat | *Lonchophylla dekeyseri* | 1 | Cerrado | 2010 |
| Giant River Otter | *Pteronura brasiliensis* | 2 | Amazon, Caatinga, Cerrado, Atlantic Forest, Pampas, Pantanal | 2010 |
| Spix Macaw | *Cyanopsitta spixii* | 1 | Caatinga | 2011 |
| Cave Heritage of the Karst Areas of the São Francisco Watershed | Some genera: Anapistula, Charinus, Coarazuphium, Eigenmannia & other | 11 | Cerrado, Caatinga, Atlantic Forest | 2011 |
| Bare-faced Tamarin | *Saguinus bicolor* | 1 | Amazon | 2011 |
| Threatened Passeriformes of the Southern Grasslands | Some genera: Alectrurus, Anthus, Coryphistera, Limnoctites, Sporophila, Xanthopsar & other | 23 | Atlantic Forest, Pampas | 2011 |

| | | | | |
|---|---|---|---|---|
| Threatened Birds of the Caatinga | Some genera: Augastes, Crypturellus, Lepidocolaptes, Sclerurus, Sporagra & other | 15 | Caatinga | 2011 |
| Primates of Northeastern Brazil | *Alouatta belzebu*, *Callicebus barbarabrownae*, *C coimbrai*, *Cebus flavius*, *C. xanthosternos* | 5 | Caatinga, Atlantic Forest | 2011 |
| Threatened and Endemic Fauna of the Lower and Middle Xingu Region | Some genera: Anodontites, Ateles, Chiropotes, Ossubtus, Pteronura, Trichechus & other | 20 | Amazon | 2011 |
| Ecosystems Mogi-Pardo, and Grande | *Brycon natteri, Myleus tiete, Steindachneridion scriptum, Phallotorynus jucundus, Chasmocranus brachynema* | 14 | Cerrado, Atlantic Forest | 2011 |
| Threatened Reptiles and Amphibians of Southern Brazil | Genera: Anisolepis, Cnemidophorus, Liolaemus, Melanophryniscu | 50 | Cerrado, Atlantic Forest, Pampas | 2011 |
| Threatened Reptiles and Amphibians of Espinhaço Mountain Range | *Placosoma cipoense Heterodactylus lundii Phyllomedusa ayeayea* | 21 | Cerrado, Atlantic Forest | 2011 |
| Puma | *Puma concolor* | 1 | Cerrado, Atlantic Forest, Caatinga | 2011 |
| Bush Dog | *Speothos venaticus* | 1 | Amazon, Cerrado, Atlantic Forest, Pantanal | 2012 |
| Threatened Reptiles of the Northeastern Atlantic Forest | *Agalychnis granulosa*, *Adelophryne baturitensis*, *A. maranguapensis*, *Cnemidophorus native*, *C. abaetensis*, *Bothrops pirajai* | 14 | Atlantic Forest, Caatinga | 2012 |
| Threatened Birds of the Amazon Biome | Some genera: Neomorphus, Campylorhamphus, Pyrrhua, Dendrocolaptes, Xiphocolaptes & other | 46 | Amazon | 2012 |
| Threatened Brazilian Killifish (Rivulidae) | Some genera: Ophthalmolebias, Austrolebias, Spectrolebias, Cynolebias, Maratecoara, & other | 53 | Caatinga, Cerrado, Atlantic Forest, Pampas | 2012 |
| Migratory Shorebirds | Some genera: Charadrius, Pluvialis, Phalaropus, Calidris, Tryngites, Oreopholus | 28 | Amazon, Cerrado, Marine, Atlantic Forest, Pampas, Pantanal | 2012 |
| Threatened Small Cats | *Leopardus tigrinus*, *L. wiedii*, *L. colocolo*, *L. pardalis* | 4 | Amazon, Caatinga, Cerrado, Atlantic Forest, Pampas, Pantanal | 2013 |
| Birds of Cerrado and Pantanal | Some genera: Columbina, Pyrrhua, Tigrisoma, Piculus, Sporophila, Culicivora & other | 46 | Cerrado, Pantanal | 2013 |
| Threatened Aquatic Fauna of the Sâo Francisco Watershed | Fish and aquatic invertebrates (species still to be defined) | 30 | Caatinga, Cerrado, Atlantic Forest | 2013 |
| Cactaceae | Some genera: Arthrocereus, Cipocereus, Melocactus, Pilosocereus, Rhipsalis, Uebelmannia, Tacinga & other | 28 | Atlantic Forest, Pampas, Cerrado, Pantanal, Amazon, Caatinga | 2010 |
| *Sempre-vivas* | Some genera: Comanthera, Actinocephalus & other | 14 | Cerrado, Caatinga, Atlantic Forest | 2011 |
| Flora of the Lower and Middle Xingu Region | Some genera: Aspidosperma, Bertholletia, Cedrela, Manilkara, Swietenia & other | 15 | Amazon | 2012 |

**Source:** Modified from ICMBio, March 2014. Internal Information Note to support the preparation of the 5th National Report to the CBD.

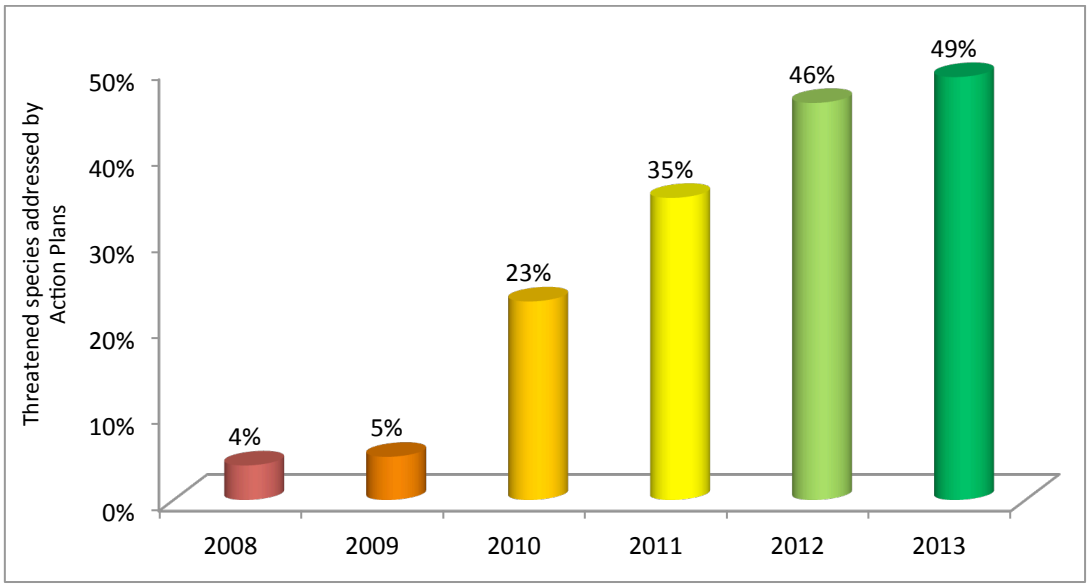



**Figure 39:** Percent of threatened species addressed by Action Plans from 2008 to 2013.
**Source:** ICMBio, March 2014. Internal Information Note to support the preparation of the 5th National Report to the CBD.

The number of threatened species addressed by Action Plans varies when each taxonomic group is considered separately. While 85% of threatened reptile species are addressed, only 15% of listed threatened aquatic invertebrates are addressed by Action Plans (Figure 40). Nevertheless, it should be considered that the number of threatened species in each taxonomic group also varies widely, with birds and fish being the groups with the highest numbers of threatened species, and reptiles presenting the lowest numbers. It should, however, be also noted that the current official lists of threatened species are not updated, and recent assessments carried out by ICMBio and partner institutions indicate much higher numbers. The revised numbers will be reflected in the revised list of threatened species to be published by the end of 2014.

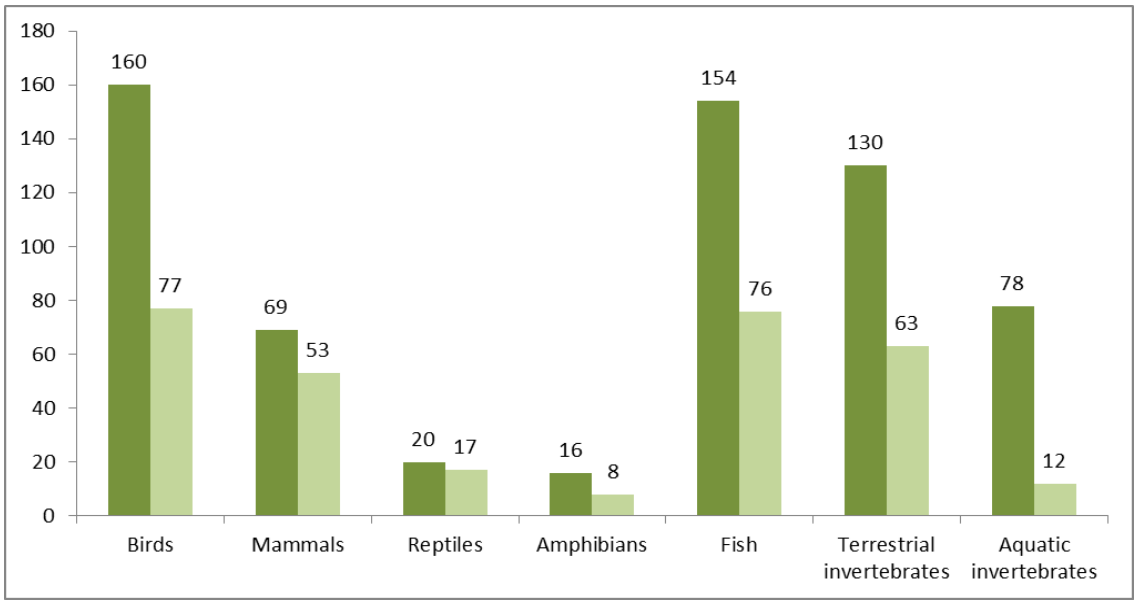



**Figure 40:** Number of threatened species (dark green) and number of threatened species addressed by Action Plans (clear green) by taxonomic group of the Brazilian fauna.
**Source:** ICMBio, March 2014. Internal Information Note to support the preparation of the 5th National Report to the CBD.

The Chico Mendes Institute for Biodiversity Conservation – ICMBio, as the federal agency responsible for the development of these conservation Action Plans, is also monitoring the implementation of planned actions. Until December 2013, a total of 60 monitoring events had been carried out to verify the status of implementation of 34 Action Plans, some of which have already gone through three monitoring events. Of the 2,173 monitored actions to-date, 9% have been concluded, 48% are ongoing, 36% have not yet been initiated or concluded within the planned deadline, and 7% are planned to start at a future date. Of the ongoing actions, 70% present satisfactory implementation, while 30% are facing implementation difficulties (Figure 41).

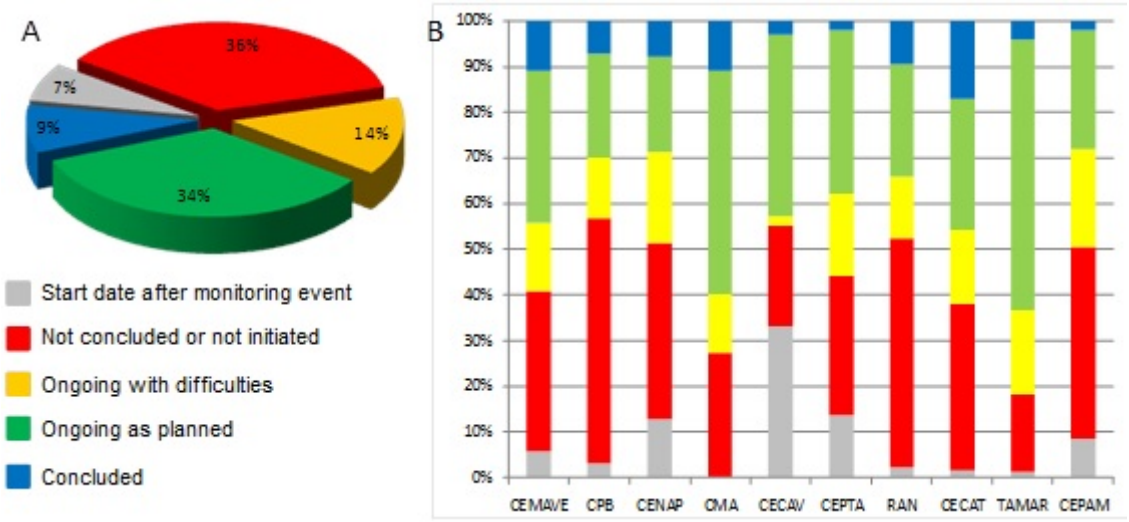



**Figure 41:** Implementation status of actions under all current Action Plans (A) addressing animal species, distributed by ICMBio research centers (B).
**Key:** CEMAVE = National Research and Conservation Center for Wild Birds; CPB = National Research and Conservation Center for Brazilian Primates; CENAP = National Research and Conservation Center for Carnivorous Mammals; CMA = National Research and Conservation Center for Aquatic Mammals; CECAV = National Research and Conservation Center for Caves; CEPTA = National Research and Conservation Center for Continental Fishes; RAN = National Research and Conservation Center for Reptiles and Amphibians; CECAT = National Research and Conservation Center for Cerrado and Caatinga Biodiversity; TAMAR = National Research and Conservation Center for Marine Turtles; CEPAM = National Research and Conservation Center for Amazon Biodiversity.
**Source:** ICMBio, March 2014. Internal Information Note to support the preparation of the 5th National Report to the CBD.

The success of the preparation of Action Plans is not only due to the significant efforts applied by ICMBio, but also to the extraordinary participation of partner institutions. During the past several years, the preparation and implementation processes have been adjusted and improved with lessons learned by the ICMBio Research Centers and partner institutions from the experience obtained to-date. In addition to various sectors and centers within ICMBio, the Action Plans currently count with approximately 300 partner institutions among universities, non-governmental organizations, environmental agencies, private companies, civil society organizations, and international organizations, among others.

When Action Plans first started to be prepared in 2004, each plan addressed only one species, such as the maned wolf (*Chrysocyon brachyurus*), the Brazilian merganser (*Mergus octosetaceus*), and the Franciscana dolphin (*Pontoporia blainvillei*), among other individual threatened species. Although the individual Action Plan design proved effective it was noted that, in general, threats were common to groups of species,

sometimes even for species of different taxonomic groups, and therefore conservation actions that were effective in one specific case could also be effective for other Action Plans. Thus, ICMBio adopted the new strategy to design Action Plans with broader taxonomic scope and broader geographical area, whenever possible.

Despite the advantages of the new approach, this more encompassing strategy for Action Plan development and implementation is proving rather challenging, as the particularities of each region and each taxon have to be taken into consideration. Additionally, the adoption of more extensive geographical areas requires the definition of priority areas for action implementation. Therefore, since 2013 some Action Plans started to apply a new tool for spatial prioritization through modelling. This tool allows the prioritization of areas based on opportunities and pressure, rather than on arbitrary decisions, and takes into consideration factors such as the number of threatened and endemic species, the number of protected areas, and the existence of pressure sources and conflicts with development investments, among various other aspects.

*Sharks and rays*. The 16th Conference of the Parties of the CITES convention held in March 2013 approved a proposal sponsored by Brazil on the inclusion of three hammer shark species (*Sphyrna lewini, S. mokarran* and *S. zygaena*) in CITES Appendix II, which was supported by Colombia, Costa Rica, Ecuador, Honduras, Mexico, and European Union. Brazil also co-sponsored a German proposal, also approved, for the inclusion of porbeagle (*Lamna nasus*), the Colombian proposal to include the oceanic whitetip shark (*Carcharhinus longimanus*), as well as the Ecuadorian proposal to include the manta rays (*Manta* spp.). In face of their vulnerability to industrial fisheries and particularly to the demand of the international trade on shark fins, the protection of sharks is of fundamental importance, given their role as key species and indicators of ocean quality, as well as regulators of ecosystem balance.

Following this initiative that enhances the control of the international trade on these endangered species, Brazil published still in 2013 the Inter-ministerial Ruling INI nº 2, signed by the Ministry of the Environment and the Ministry of Fisheries and Aquaculture, forbidding the capture of manta rays in the Mobulidae family[166] within Brazilian jurisdictional waters. Brazil also published the Inter-ministerial Ruling INI nº 1 in 2013, following the recommendation of the International Commission for the Conservation of Tuna and Tuna-like Species of the Atlantic, forbidding the capture and commercialization of the ocean whitetip shark, given their vulnerability to fisheries activities.

### 1.4.7 Sustainability of agricultural production and use of native biodiversity

#### 1.4.7.1 Native biodiversity

Promotion of the use of native biodiversity

To disseminate and promote a wider use of foods from Brazilian biodiversity among producers and consumers, the MMA participated in the 10th Week of Organic Foods in Brasília (26 May – 01 June 2014, organized by MAPA) with three events strategically located to reach the target public: at the central urban park (Parque da Cidade), at the central food supply distributor (CEASA), and at an association of producers

[166] Locally known as: *raia-manta, raia-diabo, manta-diabo, jamanta-mirim,* or *diabo-do-mar*.

(ASPROESTE). A *chef* was hired to develop recipes containing at least one ingredient from native biodiversity, focusing mainly on local species from the Cerrado, but also including some species from the Amazon and Caatinga biomes. Consumers and producers tasted and learnt to prepare at least 15 different recipes such as cakes, desserts, juices, pies, quiches, cookies and breads prepared with over 15 species of regional fruits, nuts, heart of palm, greens and spices. Examples of the species used are: pequi (*Caryocar brasiliense*), baru (*Dipteryx alata*), buriti (*Mauritia flexuosa*), cagaita (*Eugenia dysenterica*), mangaba (*Hancornia speciosa*), cupuaçu (*Theobroma grandiflorum*), pupunha (*Bactris gasipaes*), umbu (*Spondias tuberosa*), gueiroba (*Syagrus oleracea*), araticum (*Annona crassiflora*), jatobá (*Copaifera cearensis* var. *arenicola*), taioba (*Xanthosoma taioba*), and babassu (*Attalea speciosa*).

To follow up on this effort, the MMA, the Brasília Botanical Garden and the Pro-Organics Project under MAPA are jointly planning a differentiated and permanent weekly producers' market, which will focus on the promotion and commercialization of products and produce from organic production and from native biodiversity. This market will be located at the Brasília Botanical Garden and should start operating by August 2014. The ultimate objective of this initiative is to raise awareness among the general public, producers and decision makers to the importance and value of native biodiversity and its conservation, as well as to promote a wider use of plant species from Brazilian biodiversity. This effort connects two important initiatives implemented by MMA: Plants for the Future, which assesses and inventories native plant species of actual or potential economic value and of local or regional use; and Biodiversity for Food and Nutrition – the BFN Project, which seeks to demonstrate the nutritional value of native plant species from Brazilian biodiversity. When established, this market will represent the 27th producers' market of organic products registered and monitored by MAPA in the city of Brasília.

Native biodiversity and organic products[167]

During the 2014 FIFA World Cup, the Ministry of Social Development and Fight against Hunger – MDS coordinated the Organic and Sustainable Brazil Campaign, which installed kiosks at most host cities[168] for the commercialization of organic and biodiversity-based products supplied by family producers from different biomes. Approximately 60 producers' groups and associations were selected through a public bid to participate in this initiative, representing 25,000 rural producer families from different regions. The kiosks were installed in areas easily accessed by tourists, and were also integrated into local organic producers' markets.

A different diversity of produce and products was offered at each kiosk, such as baru, cashew and Brazil nuts; juices, desserts and jams of various native and cultivated fruits; organic wine and coffee; and a variety of other organic and biodiversity-based products. In Brasília, one of the host cities, approximately 500 people per day visited the kiosk, among Brazilians and foreign tourists.

Another initiative of the Organic and Sustainable Brazil Campaign involved the provision of snack boxes for approximately 18,000 voluntaries working during the World Cup. Snack boxes were distributed in all host cities, containing organic nuts,

[167] http://www.mds.gov.br/saladeimprensa/noticias/2014/junho/quiosque-brasil-organico-sustentavel-e-vitrine-para-expositores

[168] The following Brazilian cities hosted the World Cup soccer games: Brasília, Curitiba, Fortaleza, Manaus, Natal, Porto Alegre, Recife, Rio de Janeiro, Salvador, and São Paulo.

honey, juices, whole-wheat cookies, cassava starch cookies, dried bananas, and cereal bars made with baru nuts and assai pulp. The items for the snack boxes were acquired by MDS through the federal Food Acquisition Program – PAA, from organic producers' cooperatives and associations.

#### 1.4.7.2 National Agroecology and Organic Production Plan – PLANAPO[169]

Brazil established in 2012 the National Policy on Agroecology and Organic Production – PNAPO (Decree n° 7.794, of 20 August 2012), to support effectiveness of sustainable rural development and as response to growing concerns from social organizations connected to rural and forest environments, and the general public, regarding the need to produce healthy foods in harmony with the conservation of natural resources. The main instrument to implement this Policy, the National Agroecology and Organic Production Plan – PLANAPO (*Plano Nacional de Agroecologia e Produção Orgânica*) was jointly prepared by 10 Ministries and the civil society[170]. Its first phase (2013-2015) seeks to implement programs and actions to promote the transition from conventional farming to agroecology, the agroecological and organic production, as well as social control of Plan implementation, to increase the supply of healthy foods and the sustainable use of natural resources.

To implement PLANAPO, integration was sought among existing programs and initiatives under the Ministries and other agencies involved, adding new actions as needed, which resulted in a set of 125 initiatives, distributed among 14 targets in four strategic themes: (i) Production; (ii) Use and conservation of natural resources; (iii) Knowledge; and (iv) Commercialization and Consumption. These actions were integrated into the Federal Multi-year Plan (PPA) 2012-2015 and resources were allocated in the Annual Federal Budget to enable implementation.

The target beneficiaries of PLANAPO are family farmers, rural producers in resettlement projects of the agrarian reform, traditional peoples and communities, rural youth, and their economic organizations, that wish to strengthen or modify their productive practices by adopting agroecological or organic production systems. The adoption and dissemination of such systems require coordination with other public services and initiatives, such as agricultural research results, targeted rural credit, adequate technical assistance, supporting infrastructure for storage and market access, among others.

There are several other federal initiatives that also support agroecology and organic production, among which: (i) the National Program for the Conservation, Management and Sustainable Use of Agrobiodiversity and the National Program to Combat Desertification; (ii) the National Programs of Technical Assistance and Rural Extension, on Strengthening Family Agriculture, on Agroindustry and Agrarian Reform; (iii) the Program on Production Organization for Rural Women Producers; (iv) the Program for

[169] www.mda.gov.br/planapo

[170] The National Commission on Agroecology and Organic Production – CNAPO worked on the preparation of PLANAPO and monitors its implementation. It is comprised by: (i) governmental representatives from the General Secretariat of the President's Office; MAPA; Conab; Embrapa; MDA; Incra; MS; Anvisa; MEC; FNDE; MCTI; MDS; MMA; MPA; and (ii) civil society representatives from FETRAF Brasil; ANA; MST; ABA; CONTAG; UNICAFES; Rede Ecovida de Agroecologia; ASA; CTAO; STPOrg; MMC; MPA; Rede Cerrado; ASBRAER; Abrabio.

Organic Agriculture Development; (v) the research and technology themes related to agroecology developed by Embrapa, state research organizations and universities; (vi) formal courses promoted by the Ministry of Education focusing agroecology; (vii) the General Policy on Minimum Prices; (viii) the institutional acquisition programs targeting family farmers (independent of production system), such as the Food Acquisition and the National Program for School Nutrition; (ix) the National Policy on Environmental Education and the Program on Environmental Education and Family Agriculture; and (x) the Cisterns Program.

Successful examples of organic and agroecological production exist in all regions of Brazil, such as: the Ecovida Agroecology Network in the south region; the Xique-Xique Network of Solidary Commercialization in the northeast region; the Cerrado Network in the central region; and the National Agroecology Coordination (ANA), which congregates thousands of families, social organizations and movements of agricultural producers, extractive workers, and traditional peoples and communities. Additionally, the number of commercialization sites for products from organic and agroecological systems has been growing throughout the country, with the strong characteristic of using farmers' markets as the means of commercialization with fairer prices, establishing direct links between producers and consumers. This type of product is also being increasingly commercialized through consumers' cooperatives, health food stores in urban centers, grocery stores, among others.

Nevertheless, some challenges must be addressed for achieving full implementation of PLANAPO. Rural exodus and succession are issues of concern: in 2000, the Brazilian rural population comprised 31,835,143 inhabitants, of which approximately 9 million were youth; while in 2010, rural population decreased to 29,830,007, of which 8,060,454 youth according to IBGE 2010. Additionally, it would be strategic for PLANAPO to consider in its initiatives the important role played by women in food production and in the preservation of natural resources, as they are often the main protagonists regarding food security and are responsible for the agroecological production in backyards. Women also preserve and transmit to the next generations their experience and knowledge on the management of water, food production, forest resources, soils, seeds, energy resources, and the corresponding conservation and preservation techniques. Women have greater participation in the activities of raising domestic fowl and small animals, tending crops, production of greens and flowers, and silviculture. Nevertheless, although they constitute almost half of the rural population (47.9%), represent 52.3% of the economically active population and 18% of all household heads, the valuation and recognition of women's production in agriculture remain a challenge.

## 1.5 Impacts of the changes in biodiversity

Along the past 20 years or so, a consensus has almost been reached among all sectors of society on the need and importance to conserve biodiversity and use its components sustainably – not only each species for their intrinsic value, but also their interactions and diverse roles within ecosystems, which result in ecosystem services that are essential for the maintenance of all life on Earth, as well as for directly or indirectly supporting all economic activities. Biodiversity loss, and/or changes in an ecosystem's biodiversity composition inevitably result in some level of impact on ecosystem balance and provision of services.

Several authors have assessed the main drivers of biodiversity loss and changes in biodiversity. Investing in regional and national studies on the resulting impacts on ecosystems, biodiversity and human society will be increasingly important to support the development and implementation of public policies capable of effectively addressing these impacts. Additionally, the capacity to predict species loss over time is useful for directing conservation investments and policies. Wearn et al. (2012), for example, used the Brazilian Amazon as a basis to develop a method for predicting extinctions over time, and the resulting scenarios suggested that the region would lose an average of nine vertebrate species and have a further 16 committed to extinction by 2050 if deforestation trends from 1978 to 2008 were maintained. Such information could strengthen political decisions and better focus investments to avoid unwanted scenarios.

In a broader analysis, Davidson et al. (2012)[171] discuss how unchecked agricultural expansion and climate variability have become important agents of disturbance in the Amazon basin, leading to a certain level of transition to a disturbance-dominated climate regime. The authors demonstrate how deforestation and fires alter forest characteristics, climate, and river discharge, directly affecting human activities and economies, which in turn aggravate the previous factors in a complex set of interactions among global and local climate, land use, fire, hydrology, ecology and human dimensions (Figure 42).

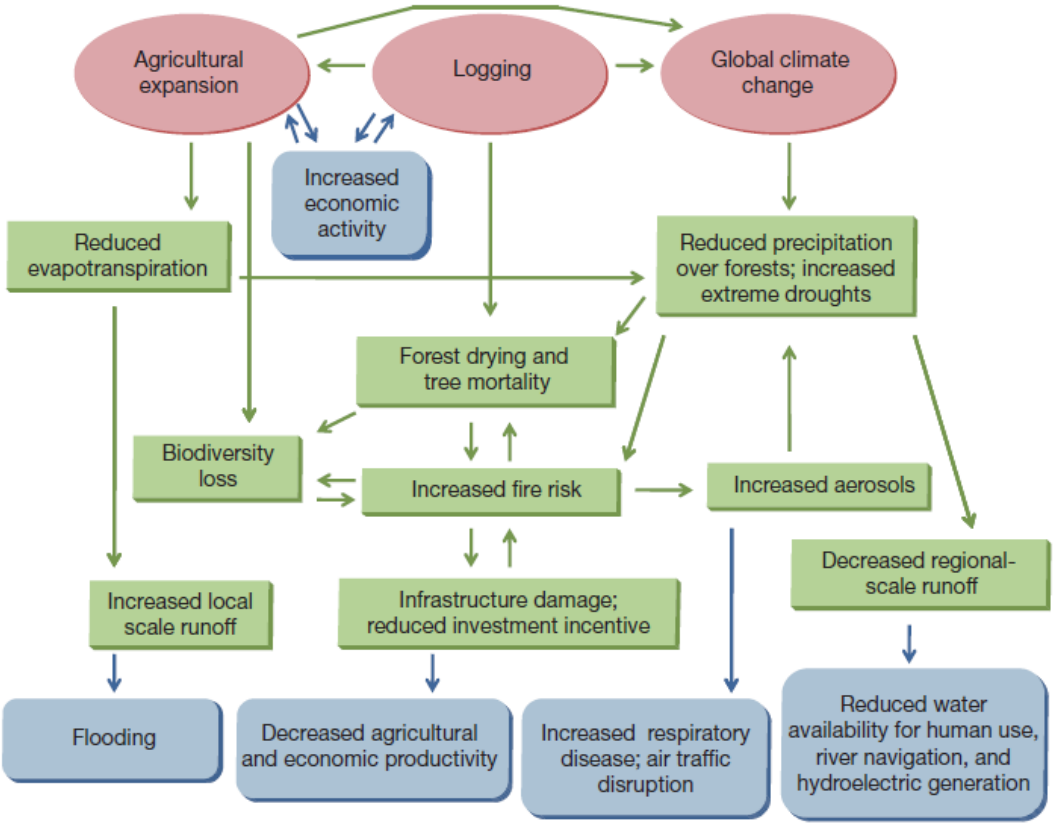



**Figure 42:** Interactions between global climate, land use, fire, hydrology, ecology and human dimensions.
**Key:** Forcing factors are indicated with red ovals; processes are indicated by green boxes and arrows; and consequences for human society are indicated by blue boxes with rounded corners.

[171] Davidson, Eric A. et al., 2012. The Amazon basin in transition. Nature, Jan 19, 2012, Vol. 481(7381), p.321.

**Source :** Davidson, Eric A. et al., 2012. The Amazon basin in transition. Nature, Jan 19, 2012, Vol. 481(7381), p.321.

Another example of the complex interactions that are often not readily perceived is given by a study that assessed the production chain of 15,000 products to understand how one country's consumption patterns affects biodiversity around the world. The study compared threat records in IUCN Red List to 15,000 products produced in 187 countries and concluded that, excluding invasive species, 30% of global species threats originate from international trade, indicating that local threats to species can be driven by economic activity and consumer demand across the world.[172]

Hydroelectric facilities, roads and other infrastructure act as incentives to expand agriculture, fisheries and mining, thus contributing to impacting biodiversity[173] and local communities, and demand effective compliance with required environmental licensing procedures and the adoption of best practices to reduce impacts. For example, despite the generation of renewable energy, the environmental changes caused by large-scale hydroelectric projects interfere with hydrological regimes and ecosystem balance, and also influence the ways of life of local communities, often dependent on small-scale agriculture and extractive activities, hunting and fishing. A comparative study[174] on the hydroelectric projects of Tucuruí (Brazil) and James Bay (Canada) collected lessons learned as a contribution to enhance the sustainable management of future large infrastructure investments, and pointed out that the assessed projects resulted in a domino effect of social, health, environmental and cultural impacts, including impacts on indigenous peoples (Table 33). This information can be applied in future similar infrastructure investments as a reference for the preparation, during the investment planning stage, of impact assessments and action plans for the early identification of measures for the prevention, mitigation and compensation of environmental and social impacts.

**Table 33:** Social impacts resulting from environmental changes in the Tucuruí hydroelectric project.

| Impact | Effects |
|---|---|
| Creation of the reservoir. Flooded area foreseen: 2,875 $km^2$ in phase 1; 2,800 $km^2$ in phase 2; reaching a total of 3,513 $km^2$ | Isolation of river-side communities during the flooding process to fill the reservoir.<br>Financial compensation, through the Royalties Law, for municipalities that lost part of their territories to flooding, excluding those located downstream.<br>Internal migration, particularly involving downstream communities.<br>Irregular and disorganized land occupation.<br>Land and water use conflicts.<br>Absence of infrastructure.<br>Mosquito plagues.<br>Risk of occurrence of water-borne diseases.<br>Changes in water quality.<br>Loss of subsistence and income.<br>Flooding of back roads during the rainy season.<br>Contamination of the food chain with methyl-mercury.<br>Transportation difficulties between areas and difficulties in accessing services. |
| Water quality | Downstream water and food supply jeopardized, w/ consequent drilling of wells.<br>Decrease in downstream water quality.<br>Risk of occurrence of water-borne diseases. |
| Fish stocks | Loss of downstream fishing zones with the reduction of fish stocks.<br>Adaptation to artisanal fisheries to the detriment of traditional production practices. |
| Compulsory resettlement, | Resettlement into inadequate areas (lack of fertile soils compromising agriculture). |

[172] Lenzen, M. et al., 2012. International trade drives biodiversity threats in developing nations. Nature, Vol.486. 109-112 (07 June 2012).

[173] May, P.H. and Weiss, J. 2014. Brazil's response to Aichi Goal 3 to reduce subsidies and perverse incentives harmful to biodiversity and ecosystem service provision. Contribution to SBSTTA-18.

[174] Queiroz, A.R.S. and Motta-Veiga, M. 2012. Analysis of the social and health impacts of large hydroelectric plants: lessons for a sustainable energy management. Ciência & Saúde Coletiva, Vol. 17(6), p. 1387(12). June, 2012.

| | |
|---|---|
| initially involving 4,407 people and ultimately reaching 10,000 families. | Economic instability.<br>Improvised camping grounds or over-crowded housing in urban areas in the process of urbanization.<br>High rate of land plot abandonment or commercialization.<br>Pressure on local land tenure structure.<br>Economic and social organization jeopardized.<br>Conflicts of interest and community mobilization.<br>Migration process into other areas, particularly to the islands. |
| Epidemic profile | Multiplication of mosquitoes / increase in malaria occurrences.<br>Increased risk of mercury methylation and its introduction in the food chain, resulting in intoxication cases among river-side communities and indigenous peoples in the region.<br>Increased risk of occurrence of water-borne diseases.<br>Increased risk of appearance of new emerging diseases, including arboviral diseases.<br>Increase in disease occurrences downstream of the dam. |
| Urban infrastructure | Demand higher than the availability of basic social services.<br>Abandonment of resettlement land plots. |
| Indigenous communities | Relocation of the Parakanã Community.<br>Social relations and structures jeopardized among indigenous communities in the Tucuruí region.<br>Increase in disease occurrences.<br>Pressure on Indigenous Lands. |
| Economy | Creation of job opportunities.<br>Reduced fisheries production.<br>Changes in the agricultural-extractive production structure.<br>Decrease in traditional production and economic stagnation, particularly downstream of the dam, where productivity decrease was observed in the extraction of native cocoa and assai on the river banks due to the changes in water quality.<br>Disorganized urbanization processes.<br>Commercial fisheries activities in the reservoir.<br>Conflicts between artisanal and commercial fishermen.<br>Decreased production in traditional activities developed in the floodplains observed by local producers.<br>Conflicts of interest as a result of increased land prices.<br>Expansion of predatory timber exploitation.<br>Land tenure conflicts. |

**Source:** Queiroz, A.R.S. and Motta-Veiga, M. 2012. Analysis of the social and health impacts of large hydroelectric plants: lessons for a sustainable energy management. Ciência & Saúde Coletiva, Vol. 17(6), p. 1387(12). June, 2012.

Planted forests can contribute to reduce the demand for timber products from native forests, including firewood and charcoal, and generate employment and income. In 2012, for example, the forest sector employed an estimated 4.4 million people and generated an estimated gross income of R$56.3 billion in Brazil[175]. The use of non-native species for silviculture is widespread in Brazil, and at least one of these species requires strong responsible management to reduce impacts on native habitats. The Brazilian pine forests (mixed broadleaf forests) of southern Brazil were extensively logged for approximately 150 years, resulting by the 1960's in a significant reduction of native forests and heavily affecting the populations of the native Brazilian pine (*Araucaria angustifolia*). In the early 1980's, the introduction of the faster-growing North American *Pinus* pine in monoculture afforestation programs to supply the timber sector began to replace the native forests, increasing forest fragmentation and the degradation of riparian habitats and of other areas that should be of permanent preservation. The southern mixed broadleaf forests now need significant efforts for the implementation of ecological corridors to re-establish enough habitat connectivity and genetic flow to enable restoration of this vegetation formation.[176]

[175] ABRAF, 2013. Anuário Estatístico ABRAF 2013 ano base 2012. Brasília, 148p.

[176] Reis, A., Tres, D.R., Scariot, E.C., 2007. Restauração na Floresta Ombrófila Mista através da sucessão natural. Pesq. Flor. Bras., Colombo, n.55, p. 67-73, jul./dez. 2007.

Habitat modification also occurs through the introduction of invasive alien species, which can lead to the transformation of entire landscapes, such as in the case of *Pinus* species that are replacing steppe habitat in the south of Brazil with simplified forest habitats. Various alien grass species were also introduced purposefully in pastures of the Pampas biome, before the unsuitability of some for cattle grazing became apparent. The introduction of the *Eragostis plana* grass, unsuitable as cattle forage, resulted in the current estimated invasion of over three million hectares of the existing 15 million hectares of natural grasslands in Rio Grande do Sul, causing an economic loss of US$75 million annually for livestock producers. In Brazil, the productive sector estimates an annual loss of US$43 billion as a result of the presence of invasive species.[177]

Animal invasive species other than insect pests also cause economic losses in the rural productive sector in addition to ecological impacts, such as the European wild boar (*Sus scrofa*), which is currently widely spread throughout southern and part of southeastern Brazil. Crop losses to the wild boar have become economically significant, and attacks on humans and on domestic and wild animals have been recorded in the country. These factors, together with other impacts such as competition and risk of cross-breeding with native wild species and domestic pigs, and risk of disease transmission, among other aspects, led in 2013 to the official recognition of this animal as a noxious species through IBAMA Administrative Ruling IN n$^{o}$ 03/2013. This IN rules on the management and control of this alien species and created the Permanent Inter-institutional Committee for Managing and Monitoring Populations of the European Wild Boar within the National Territory. This Committee is currently discussing the viable methodologies for controlling this species and their compatibility with national regulations, including those regarding hunting activities.[178]

Important ecological impacts also result from the introduction of alien animal species. Two examples among various existing occurrences are the introduction of a primate species of the Cerrado and Caatinga biomes into the Atlantic Forest biome, the marmoset *Callithrix* spp., and the introduction of a highly invasive alien aquatic species, the freshwater golden mussel (*Limnoperna fortunei*), now broadly established in Brazilian continental waters.

The *Callithrix jacchus* and *C. penicillata* marmosets are common victims of illegal wildlife trade throughout the Caatinga and Cerrado biomes, often taken into other regions of the country out of their natural range. These animals often escape or are purposefully released into the wild, where they interact with native species such as the *Callithrix aurita* in the Serra dos Órgãos National Park in Rio de Janeiro state, or the endangered golden lion tamarin (*Leontopithecus rosalia*) in northern Rio de Janeiro state, both natural inhabitants of the Atlantic Forest. Interaction among the native and introduced species often results in competition for resources and exchange of parasites, and may even result in cross-breeding, all of which can affect the survival or re-

[177] Zenni, R.D.; Ziller, S.R., 2011. An overview of invasive plants in Brazil. Revista Brasileira de Botânica, Vol. 34(3), p.431; and Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis, 2013. Relatório de Qualidade do Meio Ambiente – RQMA: Brasília, IBAMA/Diretoria de Qualidade Ambiental, 268 p.

[178] IBAMA, 2013. Instrução Normativa IBAMA n$^{o}$ 03/2013, de 31 de janeiro de 2013. D.O.U. de 01 de fevereiro de 2013, seção I, pág. 88-89. Decreta a nocividade do Javali e dispõe sobre o seu manejo e controle. Brasil, 2013. And: IBAMA/MMA, 2013. Ata de Reunião do Comitê Permanente Interinstitucional de Manejo e Monitoramento das Populações de Javalis no Território Nacional. Segunda reunião do comitê, 06 de junho de 2013. Brasil, 4p.

establishment of populations of the native species.[179] The golden lion tamarin is endemic to the Atlantic Forest of Rio de Janeiro state, and may become further threatened by the recent introduction, close to its natural range, of the golden-headed lion tamarin (*Leontopithecus chrysomelas*) in the Serra da Tiririca State Park, in the municipality of Niterói. The golden-headed lion tamarin is endemic to the Atlantic Forest of southern Bahia state, where it is also a threatened species, and became an invasive species in the state of Rio de Janeiro also as a result of wildlife traffic. Their fast-growing population is currently being translocated back to Bahia.[180]

The freshwater golden mussel is an Asian species of high invasive capacity that was accidentally introduced into South American waters in the early 1990's through the ballast water of merchant ships. The species has spread rapidly since it was first detected in Rio Grande do Sul state (in 1998[181]), now affecting vast areas of the south and central regions of Brazil. Several socio-economic impacts have already resulted from the introduction of this alien species, such as: clogging of water distribution pipelines; clogging of filters and refrigeration systems of hydroelectric power plants and industries; clogging of urban drainage systems; damage to the engines of vessels; alteration of aquatic habitats; and damage to the fishing gear of artisanal fishermen. Additionally, heavy metals such as mercury, which is accumulated by the filter-feeding mussels, can be directly transferred to native fish which feed on them, and in turn humans feed on the contaminated fish. Scientists have also observed the golden mussel attached to the shells or even soft parts of native mollusks, although the impact of this interaction is still little known.[182] In 2005, a report[183] was produced as result from the work of a Task Force coordinated by MMA to address the golden mussel issue, containing recommendations for combating and managing this invasive species. In 2014, responding to a formal request of the São Paulo State Ministry of Justice (MP-SP), a Working Group was formed by MMA, MPA, ANA, IBAMA, MP-SP and CESP to define mitigation, monitoring and control actions to contain the dispersion of the golden mussel and map invaded areas in the state of São Paulo.

In the marine environment, the alien sun coral or cup corals (*Tubastrea coccinea* and *T. tagusensis*), originally from the Pacific Ocean, have invaded sessile biological communities in Brazilian waters, modifying the structure of invaded communities and changing the relative abundance and richness of native species.[184]

---

[179] Ruiz-Miranda, C. R. et al., 2006. Behavioral and ecological interactions between reintroduced golden lion tamarins (*Leontopithecus rosalia* Linnaeus, 1766) and introduced marmosets (*Callithrix* spp, Linnaeus 1758) in Brazil's Atlantic Coast forest fragments. Braz. Arch. Biol. Technol. Vol.49 no. 1 Curitiba Jan. 2006. http://www.scielo.br/scielo.php?pid=S1516-89132006000100012&script=sci_arttext&tlng=es; and: Pereira, D.G., 2005. Impactos de espécies exóticas invasoras sobre espécies nativas: o caso dos calitriquídeos no Parque Nacional da Serra dos Órgãos, RJ. http://www.mma.gov.br/estruturas/174/_arquivos/174_05122008105901.pdf

[180] Information provided by the Rio de Janeiro State Secretariat of the Environment – SEA, in August 2014.

[181] Mansur, M.C.D. et al., organizadores, 2012. Moluscos límnicos invasores no Brasil: biologia, prevenção e controle. Porto Alegre: Redes Editora, 412 p.

[182] EMBRAPA, 2003. Oliveira, M.D. Ocorrência e impactos do mexilhão dourado (*Limnoperna fortunei*, Dunker 1857) no Pantanal Mato-Grossense. Circular Técnica 38. http://www.cpap.embrapa.br/publicacoes/online/CT38.pdf and: MMA, informative folder on the golden mussel.

[183] Available at: file:///D:/Downloads/Relatorio_Forca_Tarefa_Nacional_Mexilhao-dourado.pdf ; www.ibama.gov.br/areas-tematicas/mexilhao-dourado

[184] Mangelli, T.S. & Creed, J.C., 2012. Análise comparativa da abundância do coral invasor *Tubastrea spp*. (Cnidaria, Anthozoa) em substratos naturais e artificiais na Ilha Grande, Rio de Janeiro, Brasil. Iheringia, Sér. Zool. Vol.102 no.2, Porto Alegre, Junho 2012. www.scielo.br/scielo.php?script=sci_arttext&pid=S0073-47212012000200002

***

# Part II – The national biodiversity strategy and action plan (NBSAP), its implementation, and the mainstreaming of biodiversity

## 2.1 Status and updating of the Brazilian NBSAP

### 2.1.1 Brazilian NBSAP background and status

Responding to the CBD Strategic Plan for 2010 and its targets, Brazil adopted a National Biodiversity Strategy comprised of several previously existing environmental policies, later complemented by additional policies and programs (see Brazil's 4th National Report to the CBD). The first effort to define Brazilian National Biodiversity Targets resulted in a set of 51 targets, some of which more restrictive than the global targets for 2010. As documented in the 4th National Report to the CBD, two of those targets were fully achieved, and notable progress was obtained for 14 others. The main conclusion was that advances in all remaining areas would benefit from more focused criteria and processes to define the national targets, a set of indicators and monitoring systems to effectively measure their implementation.

Following the definition of 20 new Global Biodiversity Targets at COP-10 (Nagoya, 2010) and in an attempt to go beyond the results achieved in the previous period, the need arose to design a different strategy to review and update the Brazilian NBSAP and 2010 targets, sharing responsibility with stakeholders of all sectors. This new approach could be considered as the first step in the construction of a new National Strategy for 2011-2020.

Implementation of the new approach began with a broad consultation effort to achieve a collective construction of the revised NBSAP and new National Biodiversity Targets 2011-2020 in an initiative known as Dialogues on Biodiversity, which resulted in the definition of a more concise set of 20 National Targets (see section 2.1.2). In parallel, various other initiatives are being carried out, one of which is the development of a Governmental Action Plan for the Conservation and Sustainable Use of Biodiversity (see section 2.1.3), complemented by the construction of the Brazilian Panel on Biodiversity – PainelBio (see section 2.1.4) to assist in the definition of indicators and in the implementation and monitoring of the National Biodiversity Targets. Initial steps were taken to design a national strategy for the mobilization of resources and capacity (see section 2.1.5).

### 2.1.2 Dialogues on Biodiversity and National Biodiversity Targets 2020

In 2013 the National Biodiversity Commission – CONABIO, complying with its legal duties and the international commitment with the CBD, approved the National Biodiversity Targets for the period of 2011-2020, as spelled out in the annex of its Resolution nº 06/2013 and further down in this section, and proposed their implementation by the Federal Government.

To define these new targets, the Ministry of the Environment, in partnership with various environmental institutions, launched in 2011 the initiative "Dialogues on Biodiversity: building the Brazilian strategy for 2020". The initiative had as its main

objective to establish, through an intense participatory process, the national biodiversity targets related to the Biodiversity Strategic Plan 2011-2020 of the Convention on Biological Diversity. On the course of 2011, five broad face-to-face consultation events were held, in addition to numerous preparation and qualification meetings with five sectors of society: the business sector, civil environmental society, academia, government (federal and state), and indigenous peoples and traditional communities. At those meetings, participating sectors prepared proposals for the national biodiversity targets according to sector-specific stands and needs, taking into consideration the 20 Global Biodiversity Targets, known as the "Aichi Targets".

To coordinate the complex consultation process, a broad governing structure was established involving representatives of all sectors in two levels: five sectoral committees and a smaller strategic committee. The five sectoral committees supported the technical organization of the consultation events by defining lists of participants, identifying speakers, the methodology and dynamics of the meetings, products expected from the meetings, among other technical details. On the other hand, the strategic committee was composed by a smaller group of representatives of each sector and was responsible for the strategic decisions of the initiative. In addition to the four organizing institutions (MMA, IUCN, WWF-Brasil, and Instituto de Pesquisas Ecológicas), a total of 19 institutions of the five sectors were involved in the Dialogues and over 400 participants attended the consultation meetings. It could be said that, in addition to the results achieved and documents produced, this strong participatory governance structure was one of the most notable aspects of the process.[185]

Twenty-five documents were generated from the work of the sectoral meetings (5 for each of the 5 meetings), containing proposals for the national biodiversity targets for the 2011-2020 period, as well as 517 intermediate sub-targets to be achieved on the course of the 2013-2017 period. All proposals were consolidated in a single document, which was named "Base document for public consultation". This document was posted online for public consultation by the Ministry of the Environment from 19 December 2011 to 31 January 2012. The public consultation process had the objective to obtain additional contributions from the Brazilian society for the preparation of the national biodiversity targets 2011-2020, as well as a critical analysis of the targets proposed by the consulted sectors.

A final meeting was held with representatives of all five sectors to discuss the final document containing 20 proposed national targets, as well as general recommendations to improve the national CBD implementation process. The final meeting also indicated the need to carry out continuous periodic assessment of the achievement status regarding the national targets.[186]

Taking these contributions as a starting point, the National Biodiversity Commission – CONABIO discussed the national targets during five ordinary meetings: the 47th Meeting, held on 26 April 2012; the 48th Meeting, held on 27 June 2012; the 49th Meeting, held on 20 August 2012; the 51st Meeting, held on 25 April 2013; and the 52nd Meeting, held on 26 and 27 June 2013; as well as during the 15th extraordinary meeting held on 01 June 2012.

[185] Machado, F.S. et al, 2012. Metas brasileiras de biodiversidade para 2020: exemplo de construção participativa no marco da Convenção de Diversidade Biológica – CDB/ONU. In: Bahia Análise & Dados, vol. 22, No. 3.

[186] Machado, F.S. et al, 2012. Metas brasileiras de biodiversidade para 2020: exemplo de construção participativa no marco da Convenção de Diversidade Biológica – CDB/ONU. In: Bahia Análise & Dados, vol. 22, No. 3.

At the end of the 52nd Meeting, CONABIO approved the final version of the text of the national targets (Table 34) and the proposal for the preparation of supporting text containing CONABIO considerations on the background of the preparation process and on the implementation of the approved targets, to be presented in the form of directives for the internalization and implementation of the national biodiversity targets 2011-2020 (see Annex I).

**Table 34:** National Biodiversity Targets 2011-2020

| **Strategic Objective A – Address the underlying causes of biodiversity loss by mainstreaming biodiversity considerations across government and society** |
|---|
| **National Target 1:** By 2020, at the latest, Brazilian people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably. |
| **National Target 2:** By 2020, at the latest, biodiversity values, geo-diversity values, and socio-diversity values have been integrated into national and local development and poverty reduction and inequality reduction strategies, and are being incorporated into national accounting, as appropriate, and into planning procedures and reporting systems. |
| **National Target 3:** By 2020, at the latest, incentives harmful to biodiversity, including the so-called perverse subsidies, are eliminated, phased out or reformed in order to minimize negative impacts. Positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the CBD, taking into account national and regional socio economic conditions. |
| **National Target 4:** By 2020, at the latest, governments, private sector and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption to mitigate or prevent negative impacts from the use of natural resources. |
| **Strategic Objective B – Reduce the direct pressures on biodiversity and promote sustainable use** |
| **National Target 5:** By 2020, the rate of loss of native habitats is reduced by at least 50% (in comparison with the 2009 rate) and, as much as possible, brought close to zero, and degradation and fragmentation is significantly reduced in all biomes. |
| **National Target 6:** By 2020 all stocks of any aquatic organism are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overharvesting is avoided, recovery plans and measures are in place for depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems, and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits, when scientifically established. |
| **National Target 7:** By 2020 the incorporation of sustainable management practices is disseminated and promoted in agriculture, livestock production, aquaculture, silviculture, extractive activities, and forest and fauna management, ensuring conservation of biodiversity. |
| **National Target 8:** By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity. |
| **National Target 9:** By 2020, the National Strategy on Invasive Alien Species is fully implemented, with the participation and commitment of states and the elaboration of a National Policy, ensuring the continuous and updated diagnosis of species and the effectiveness of Action Plans for Prevention, Contention and Control. |
| **National Target 10:** By 2015, the multiple anthropogenic pressures on coral reefs, and other marine and coastal ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning. |
| **Strategic Objective C: To improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity** |
| **National Target 11:** By 2020, at least 30% of the Amazon, 17% of each of the other terrestrial biomes, and 10% of the marine and coastal areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through protected areas foreseen under the SNUC Law and other categories of officially protected areas such as Permanent Protection Areas, legal reserves, and indigenous lands with native vegetation, ensuring and respecting the |

| |
|---|
| demarcation, regularization, and effective and equitable management, so as to ensure ecological interconnection, integration and representation in broader landscapes and seascapes. |
| **National Target 12:** By 2020, the risk of extinction of threatened species has been significantly reduced, tending to zero, and their conservation status, particularly of those most in decline, has been improved. |
| **National Target 13:** By 2020, the genetic diversity of microorganisms, cultivated plants, farmed and domesticated animals and of wild relatives, including socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing the loss of genetic diversity. |
| **Strategic Objective D: Enhance the benefits to all from biodiversity and ecosystem services** |
| **National Target 14:** By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, traditional peoples and communities, indigenous peoples and local communities, and the poor and vulnerable. |
| **National Target 15:** By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced through conservation and restoration actions, including restoration of at least 15% of degraded ecosystems, prioritizing the most degraded biomes, hydrographic regions and ecoregions, thereby contributing to climate change mitigation and adaptation and to combatting desertification. |
| **National Target 16:** By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation. |
| **Strategic Objective E: Enhance the implementation through participatory planning, knowledge management and capacity building** |
| **National Target 17:** By 2014, the national biodiversity strategy is updated and adopted as policy instrument, with effective, participatory and updated action plans, which foresee periodic monitoring and evaluation. |
| **National Target 18:** By 2020, the traditional knowledge, innovations and practices of indigenous peoples, family rural producers and traditional communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, in accordance with their uses, customs and traditions, national legislation and relevant international commitments, and fully integrated and reflected in the implementation of the CBD, with the full and effective participation of indigenous peoples, family rural producers and traditional communities, at all relevant levels. |
| **National Target 19:** By 2020, the science base and technologies necessary for enhancing knowledge on biodiversity, its values, functioning and trends, and the consequences of its loss, are improved and shared, and the sustainable use of biodiversity, as well as the generation of biodiversity-based technology and innovation are supported, duly transferred and applied. By 2017, the complete compilation of existing records on aquatic and terrestrial fauna, flora and microbiota is finalized and made available through permanent and open access databases, with specificities safeguarded, with a view to identify knowledge gaps related to biomes and taxonomic groups. |
| **National Target 20:** Immediately following the approval of the Brazilian targets, resources needs assessments are carried out for the implementation of national targets, followed by the mobilization and allocation of financial resources to enable, from 2015 on, the implementation and monitoring of the Strategic Plan for Biodiversity 2011-2020, as well as the achievement of its targets. |

**Source:** CONABIO Resolution n$^{o}$ 06/2013, of 03 September 2013.

CONABIO also established the directives for the internalization and implementation of the National Biodiversity Targets 2011-2020, as follows:

i. Promote under CONABIO, whenever necessary, the definition of the concepts employed in the text of the targets, with the purpose of

establishing the clear and objective understanding of the intended meaning, including through the constitution of working groups, expert consultations, and technical workshops;

ii. Propose the establishment, under CONABIO, of analysis criteria and indicators for evaluating the implementation process of the national targets, in a participatory manner with different sectors of society;

iii. Propose the implementation of the national biodiversity targets 2011-2020 in a coordinated manner with a national strategy and an action plan for the conservation and sustainable use of biodiversity, recognizing the efforts and policies related to the national targets;

iv.a. Promote the adoption of incentives aimed at the implementation of the national targets;

iv.b. Promote the establishment of legislation and regulations aimed at the implementation of the national targets;

v. Consider a broad agenda, comprising inter-institutional and multidisciplinary actions to be developed by different agencies of the federal, state and municipal governments, in addition to various sectors of society;

vi. Consider the specific characteristics of each biome and macro geopolitical region of the country, in order to balance the actual risks to remaining ecosystems, technological viability, and economic, social and environmental aspects, taking into account the Ecological-Economic Zonings;

vii. Promote the permanent generation, updating, and incorporation of technical-scientific knowledge in the process of implementing the national targets.

In June 2012, during the Rio+20, an event was held to present the results of the Dialogues on Biodiversity, as well as the proposal of creation of the Brazilian Panel on Biodiversity – PainelBio, as one of the potential tools for the implementation, monitoring, generation of knowledge, and capacity building and development for achieving the national targets.

### 2.1.3 Governmental Action Plan for the Conservation and Sustainable Use of Biodiversity

In parallel to the process to define the National Biodiversity Targets 2011-2020, the Ministry of the Environment – MMA in partnership with the Ministry of Planning Budget and Administration – MPOG and the Brazilian Fund for Biodiversity – FUNBIO, started a dialogue with other sectors of the federal government to develop a Governmental Action Plan for the Conservation and Sustainable Use of Biodiversity, with the objective of minimizing or halting the loss of national biodiversity. This Action Plan also seeks to enhance the synergy among the Ministries and other federal agencies, in addition to optimize the use of resources, the achievement of targets established in

the Federal Multi-year Plan (PPA – *Plano Plurianual*) 2012-2015, the maintenance of social benefits, and the improvement in the society's understanding on the ecosystem services provided by biodiversity. The Plan should contribute to the internalization and achievement of the Global Aichi Targets.

In the first step to build the Governmental Action Plan, the causes related to the loss of biodiversity were identified in order to obtain the federal government's view of the problem. The analysis was based on the results of 40 interviews carried out with representatives from 17 Ministries and four federal agencies, focusing on the causes, consequences, expectations and vulnerabilities of the loss of biodiversity. The resulting information was used to build a "problem tree" with three themes, during six workshops involving MMA, MPOG and FUNBIO, which was then adjusted and validated in three additional inter-ministerial workshops held in November and December 2013 with the participation of 21 Ministries and 11 subordinate agencies. The problem tree organized the possible causes for biodiversity loss identified by all the participating federal agencies along three main themes: (i) Theme 1 – Conservation: sustainable production and consumption patterns; (ii) Theme 2 – Habitat: ecosystem conservation; and (iii) Theme 3 – Valuation: promotion of the value of biodiversity and associated traditional knowledge (Figures 43, 44, and 45).

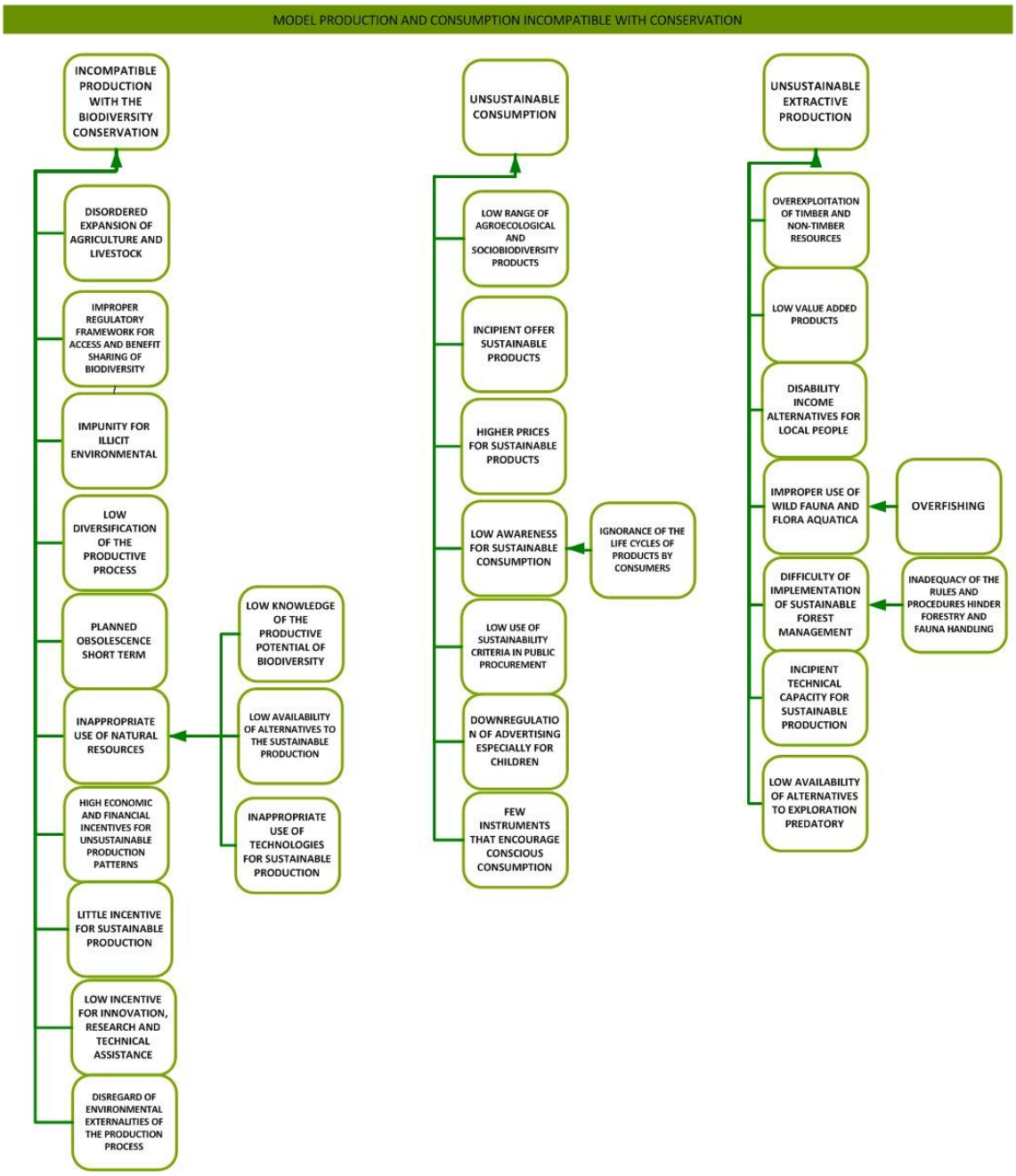



**Figure 43:** Problem tree for the causes of biodiversity loss, Theme 1 – Conservation: sustainable production and consumption.
**Source:** Draft Governmental Action Plan, 2014 unpublished.

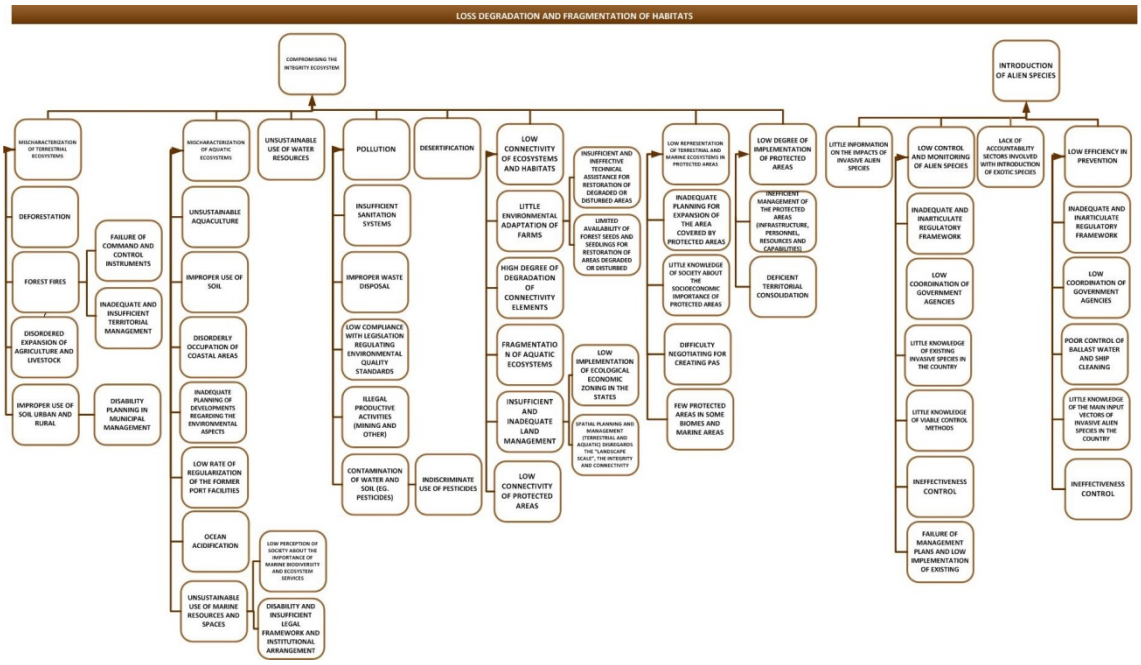



**Figure 44:** Problem tree for the causes of biodiversity loss, Theme 2 – Habitat: ecosystem conservation.
**Source:** Draft Governmental Action Plan, 2014 unpublished

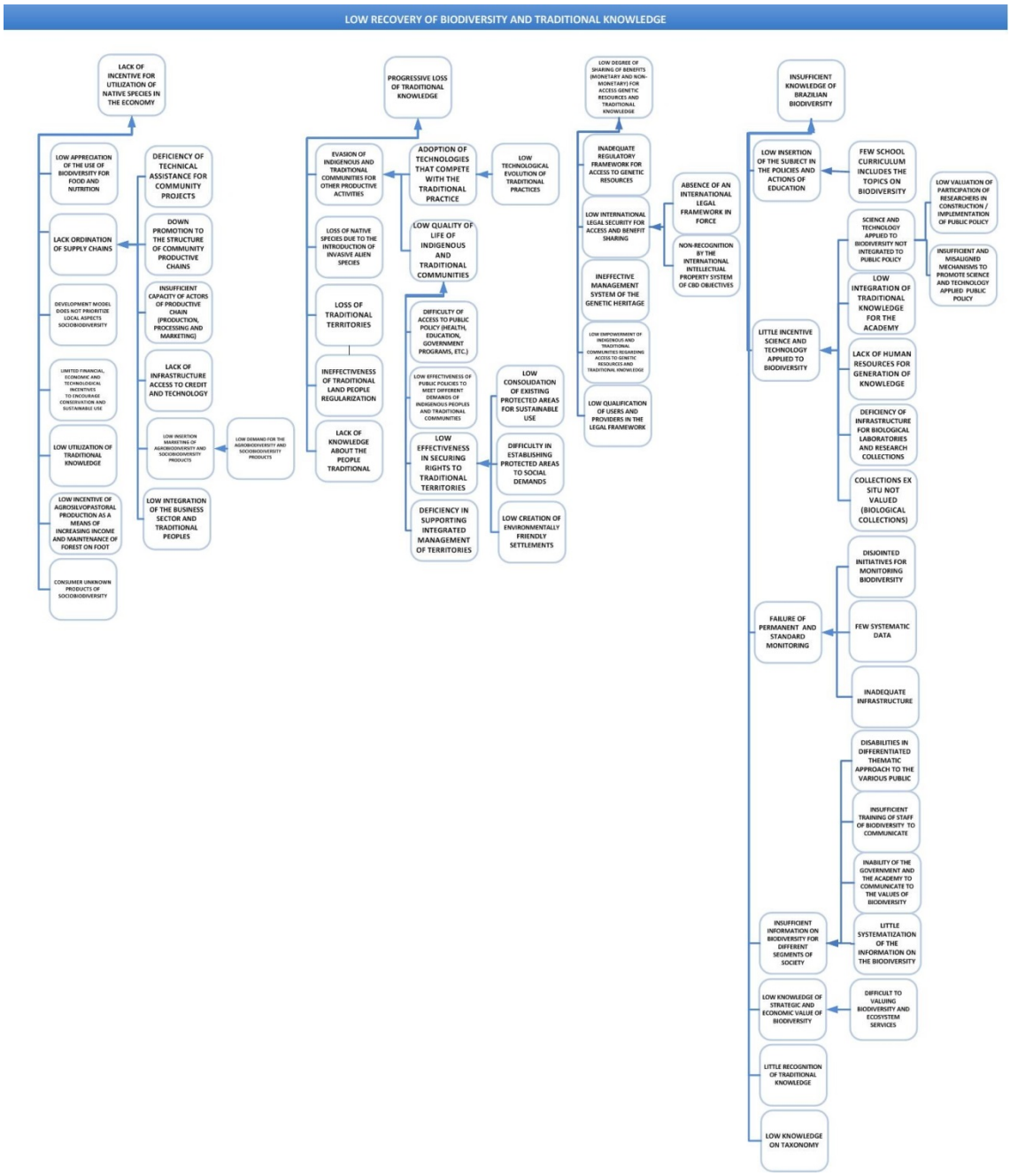



**Figure 45:** Problem tree for the causes of biodiversity loss, Theme 3 – Valuation: promotion of the value of biodiversity and associated traditional knowledge.
**Source:** Draft Governmental Action Plan, 2014 unpublished

The three strategic themes (conservation, habitat, and valuation) were broken down into 158 causes at six different levels. The problem tree lists 33 causes under Theme 1 – Conservation; 60 causes under Theme 2 – Habitat; and 65 causes under Theme 3 – Valuation. This schematic view of the causes of biodiversity loss represents a crucial starting point for the inter-ministerial dialogue necessary for agreeing and validating the Action Plan in preparation.

Once the set of causes for biodiversity loss was identified in a broad participatory manner, the Ministries and subordinated agencies were invited to join efforts and resources to revert this situation. With this aim, the second round of inter-ministerial workshops also identified the existing and planned initiatives under each agency that could contribute to combat the causes listed in the validated problem tree. The

participating agencies detailed their activities that could contribute to combat biodiversity loss as follows: degree of impact; current implementation status of the activity/initiative; national or regional scope; biome; target public/beneficiaries; expected products; targets (2013-2015 and up to 2020); other funding sources; total budget; and responsible agency listed in the PPA.

As this process was occurring in parallel to the definition and approval of the new set of National Biodiversity Targets, once CONABIO approved the new Targets in 2013, a methodology was defined to select priority causes of biodiversity loss among those identified in the problem tree.

In 2014, meetings were organized to discuss the structure of the Governmental Action Plan, and an analysis of information consistency and gaps was initiated. Additionally, as a large number of existing initiatives to combat biodiversity loss were identified, it was decided to prioritize some of them for monitoring actions. A final version of the Governmental Action Plan is expected to be available in late 2014.

### 2.1.4 PainelBio

At the end of the Dialogues on Biodiversity process in 2012, to complement the Governmental Action Plan and insure the necessary involvement of all sectors in order to achieve biodiversity conservation targets, a discussion was initiated among the sectors involved in the process to develop a multi-stakeholder panel to promote the achievement of the National Biodiversity Targets. This initiative was launched during the Rio+20 meeting (2012) and its proposed format has been discussed and detailed along 2012 and 2013. In the Biodiversity Panel (PainelBio) meeting held on 27 May 2014, a Constitution Agreement was agreed upon by the different sectors' stakeholders[187] that will compose the Panel. Some signatures were already obtained and the first meeting of the Panel's Board of Directors was held on 22 July 2014.

The Panel's mission is to "contribute for the conservation and sustainable use of Brazilian biodiversity by promoting synergy between institutions and knowledge, making scientific information available to society, promoting capacity building at various levels, and supporting decision making processes and public policies for the achievement of the Aichi Targets in Brazil". The IUCN-Brasil is the Executive Secretariat of the Biodiversity Panel. Resources for this initiative originated from the National Biodiversity Mainstreaming and Institutional Consolidation Project – PROBIO II, a GEF-funded project. Initially, the panel would be named Virtual Brazilian Biodiversity Institute, as mentioned in the 4th National Report to the CBD, but the concept and name of the initiative evolved to compose the PainelBio.

Another important result arising from this meeting was the establishment of a participatory process for building indicators to evaluate the implementation of the National Biodiversity Targets. This proposal involves capacity building with the assistance of the Biodiversity Indicators Partnership (http://www.bipindicators.net/), after which five workshops will be held, each addressing one of the five strategic objectives of the National Biodiversity Targets. These workshops should have the participation of various stakeholders important for the implementation of strategies for the integration of the National Targets in the multiple sectors, and involve the

[187] Participating institutions: MMA, ICMBio, MCTI, Fiocruz, IUCN, WWF-Brasil, GIZ, APRENDER, FUNDHAM, CI, IPE, Fundação Biodiversitas, ISA, Fórum do Mar, FNB, CNI, and CEBDS.

discussion and harmonization of concepts, as well as the development of indicators and a monitoring strategy. As agreed with CONABIO, the definition of indicators for the new National Biodiversity Targets became the first task assigned to the PainelBio. The proposed timeline indicates that these workshops should take place between September 2014 and May 2015.

### 2.1.5 Strategy for resource mobilization and capacity

As a crucial element for enabling the continuous efforts towards implementing the NBSAP and achieving the National and Aichi Biodiversity Targets, a national strategy for mobilizing resources and meeting capacity needs is being designed. The Ministry of the Environment started the process of hiring consultants to assist in the preparation of this strategy and provide an assessment of existing capacity at the state and federal levels to support strategy development. Results from these contracts should be available by mid-2015 and will be incorporated into the updated NBSAP.

The Ministry of the Environment is also currently negotiating with the Institute of Applied Economic Research – IPEA the national mapping of resources invested in biodiversity in Brazil. IPEA is already working on the quantification, analysis and monitoring of environmental expenditures within the federal government, with the objective of preparing a proposal for enhancing effectiveness of governmental environmental expenditures. This analysis will not only contribute to a better understanding of the management and operation of national environmental policies, but also support decision-making related to the need of adjusting the implementation of these policies and/or planning future actions. Negotiations between MMA and IPEA seek to broaden the scope of the analysis to include specifically the biodiversity theme, and both the state and federal levels.

IPEA is adopting the Classification of Environmental Activities – CEA methodology developed by the United Nations under the System of Economic and Environmental Accounts – SEEA. The CEA considers three criteria: (i) expenditures must be recorded in the official budget or within the implementing institutions (extra-budget expenditures); (ii) information collected should be comparable at the international level with other methodologies for assessing environmental expenditures; and (iii) data should compose continuous and comparable annual historical series. The planned phases of this analytical study are: (1) strategic planning for the study; (2) development of the methodology for defining the parameters for environmental expenditures; (3) classification of the budget lines for environmental expenditures; (4) establishment of cooperation agreements with institutions responsible for providing relevant data (MMA and Federal Budget Secretariat – SOF); (5) structuring of a database containing the classification of environmental expenditures, starting with PPA 2008-2011; and (6) data analysis and publication of the collected information.

In the future, IPEA intends to transform this study into a permanent research line, updating the data on environmental expenditures yearly, and expand it to include both the state and municipal levels. In 2014, IPEA is defining the method to classify environmental activities and structuring the database with federal budget expenditures.

In parallel, discussions are being carried out among MMA, the Brazilian Business Council for Sustainable Development – CEBDS, the National Confederation of Industries – CNI, and IPEA to establish a common methodology for inventorying environmental expenditures within the private sector. To this purpose, the classification

of environmental expenditures under IPEA's methodology will be applied, which will involve the analysis of items directly and indirectly related to biodiversity.

Additionally, Brazil hosted two international events in April 2014 on resource mobilization: (i) a regional capacity building workshop on mobilization of resources under the CBD for Latin America and the Caribbean; and (ii) a meeting of the High-Level Panel on Global Assessment of Resources for Implementing the Strategic Plan for Biodiversity 2011-2020 (see section 2.2.3).

### 2.1.6 Next steps in NBSAP updating

Several activities directly related to the NBSAP updating process have been initiated or planned following the adoption of the National Biodiversity Targets for 2020, some of which are ongoing and some are about to begin. The current plan and estimated timeline for NBSAP updating is shown below (Table 35).

**Table 35:** Planned actions and estimated timeline for NBSAP updating.

| **Concluded actions** | **Start** | **Conclusion** |
|---|---|---|
| Establishment of the National Biodiversity Targets 2011-2020 | 2011 | Sep/2013 |
| **On-going actions** | **Start** | **Conclusion** |
| Governmental Action Plan for the Conservation and Sustainable Use of Biodiversity | 2012 | 2014 |
| Preparation of the 5th National Report to the CBD | Feb/2014 | Sep/2014 |
| Establishment and operationalization of the Biodiversity Panel – PainelBio | 2012 | Jul/2014 |
| **Actions to be initiated** | **Start** | **Conclusion** |
| Definition of indicators and monitoring strategy for the National Biodiversity Targets | Sep/2014 | May/2015 |
| Development of the strategy for capacity and resources mobilization | 2014/2015 | 2015 |
| Final document of the updated NBSAP | end of 2014 | Jul/2015 |

**Source:** Ministry of the Environment/SBF/DCBio, June 2014.

### 2.1.7 Sub-national biodiversity strategies

A few Brazilian states have developed and started the implementation of sub-national biodiversity strategies and action plans or state programs with similar objectives, such as the states of São Paulo, Paraná and Rio Grande do Sul. At least two other states have initiated the development of sub-national strategies (Ceará and Espírito Santo), and at least three others have developed or are preparing a state policy on biodiversity (Minas Gerais, Bahia, and Tocantins).

*São Paulo*. The São Paulo Action Plan[188] (*Plano de Ação de São Paulo*) 2011-2020 was launched in 2013 and translates the Aichi Targets to the state level, proposing the development and implementation of projects, as well as specific products to contribute to the conservation and sustainable use of biodiversity. The Action Plan combines on-going actions under the São Paulo Environmental System and new strategies identified through the Action Plan preparation process. Seeking the financial viability for the implementation of its Action Plan, São Paulo state integrated Target 20 (financial resources) into all planed state actions. The São Paulo Action Plan was prepared before the adoption of the National Biodiversity Targets and contains seven main actions, each

[188] http://portaldabiodiversidade.sp.gov.br/files/2014/02/Aichi_impressao_06_02_15_pdf_final.pdf

one related to a specific project (ongoing or planned), as shown in the state's vision of the Aichi Targets (Figure 46).

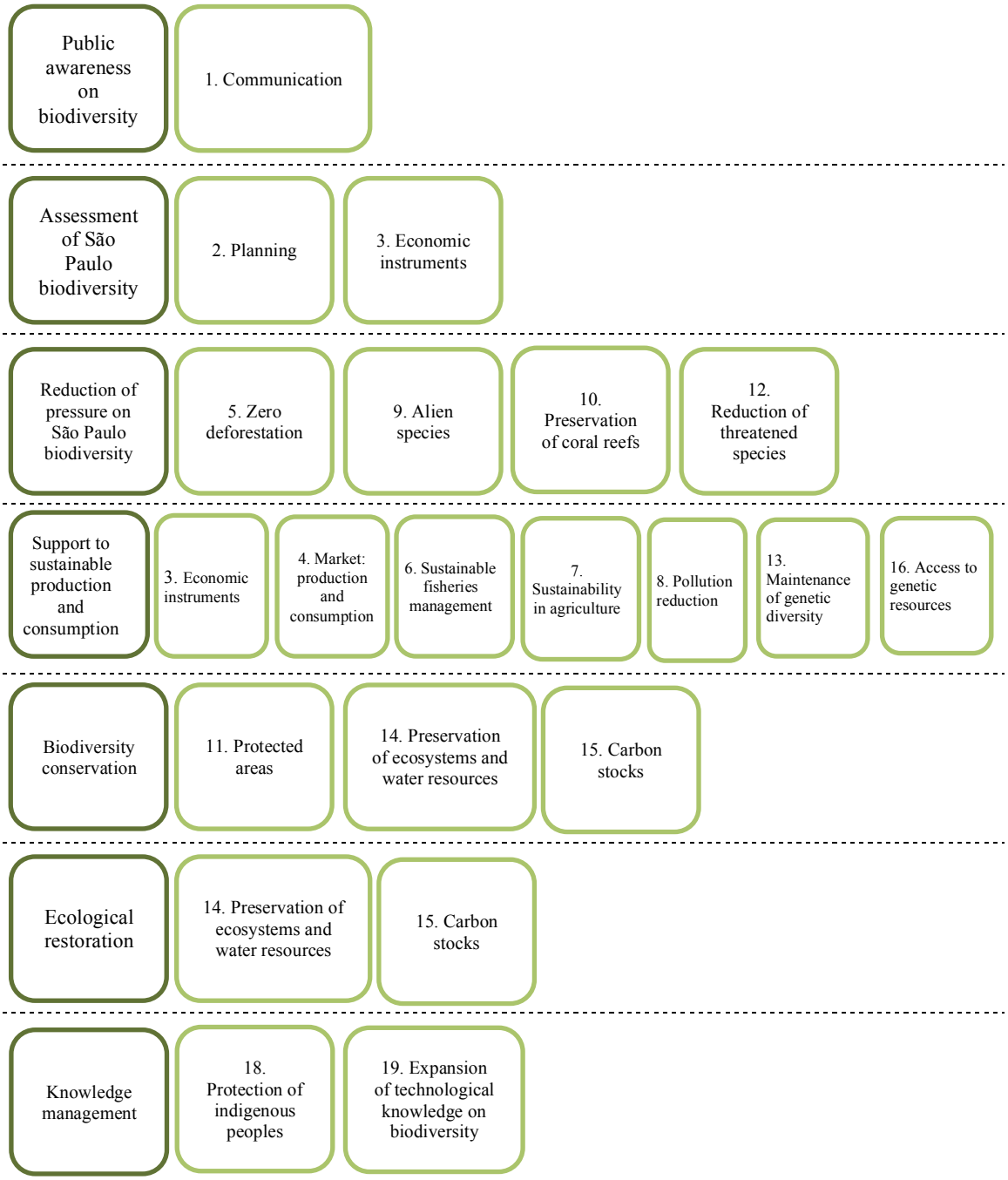



**Figure 46:** São Paulo state's vision of the Aichi Targets.
**Source :** http://portaldabiodiversidade.sp.gov.br/files/2014/02/Aichi_impressao_06_02_15_pdf_final.pdf

In 2011, São Paulo state created the São Paulo Biodiversity Commission (*Comissão Paulista da Biodiversidade*) with the objective of coordinating the development and implementation of the Aichi Targets within the entire state territory. The Commission acts through integrated actions involving various state agencies, business sector, academia and civil society, guided by the São Paulo Action Plan.[189] This Action Plan is

[189] http://portaldabiodiversidade.sp.gov.br/a-biodiversidade-no-estado-de-sao-paulo/

currently being updated through a participatory process that will result in its third version, expected to be submitted to the Commission by October 2014 for approval.

*Paraná*. The state of Paraná launched in 2012 the state program Bioclima Paraná[190] (state Decree nº 4.381/2012) with the objective of conserving and recuperating biodiversity as well as supporting climate change mitigation and adaptation interventions, by means of incentives and new environmental management mechanisms. Decree nº 4.381/2012 states that Bioclima Paraná was prepared taking into account the principles and directives given by the CBD and UNFCCC, with particular emphasis on the Global Aichi Biodiversity Targets. The State Secretariat for the Environment and Water Resources is responsible for preparing the 2020 Action Plan for Bioclima Paraná, tailoring the Conventions' objectives to the state's characteristics, establishing strategies and mechanisms to achieve the Aichi Targets, and developing monitoring indicators. The Decree also establishes as mechanisms for Bioclima Paraná, according to their specific regulations: the Ecological VAT (ICMS *Ecológico*); the state system for maintenance, recuperation and protection of Legal Reserves and Permanent Protection Areas (SISLEG); the regional and voluntary carbon markets; and the Payment for Environmental Services.

Bioclima Paraná is currently in its initial phase of implementation and its main challenge will be to engage the various sectors of society. As additional instruments to achieve the program's objectives, the state of Paraná intends to implement the state's system for Payment for Environmental Services (State Law nº 17.134/2012), and operationalize the mechanism on reduced emissions from deforestation and degradation (REDD+) and on compensation for carbon emissions, directing the resulting resources to fund biodiversity conservation actions.

*Rio Grande do Sul*. Since 2011, the state of Rio Grande do Sul has been implementing the GEF-supported Rio Grande do Sul Biodiversity Conservation project (RS Biodiversidade)[191] with the objective of promoting the conservation and restoration of biodiversity in the state's grassland ecosystem by mainstreaming biodiversity conservation within the forestry, agriculture, and livestock productive landscapes.

The implementation of RS Biodiversidade is coordinated by the State Secretariat for the Environment (SEMA) and is structured through the following main strategic lines of action: (i) promoting actions that assist farmers to restore and maintain priority areas for biodiversity conservation where ecosystems fragility and threats to biodiversity occur; (ii) conserving biodiversity by strengthening the implementation of public policies that enhance the development of improved management systems and production practices, including raising awareness and building institutional capacity; and (iii) securing the functions, dynamics and evolution of threatened ecosystems and endemic species while consolidating the network of protected areas within the biome.

The project focuses on four regions selected according to the national Map of Priority Areas for Biodiversity Conservation and Sustainable Use, and has already produced some results, among which: (i) preparation of the Ecological Economic Zoning of a priority section of the state coast, currently nearing completion; (ii) publication of the Administrative Ruling SEMA nº 79/2013 recognizing the state's List of Alien Invasive Species; (iii) completion of two Action Plans (restoration and conservation of ecosystems around the Espinilho State Park, and conservation of native bees through

[190] www.bioclima.pr.gov.br

[191] http://www.biodiversidade.rs.gov.br/ and information provided by the Project Management Unit in July 2014.

their sustainable use), and 5 ongoing projects with biodiversity restoration actions; (iv) completion of two rapid ecological assessments of priority areas, with two others under implementation; and (v) establishment of 17 demonstration plots and 260 projects in rural properties applying production practices that are compatible with the conservation and sustainable use of native biodiversity, in addition to capacity building of rural producers and rural technical assistance agents; among various other results.

It is expected that RS Biodiversidade strategies and actions will be incorporated into state's practices and policies for biodiversity conservation and sustainable development, enabling continuity of these important objectives.

## 2.2 Integration of biodiversity in sectoral strategies, plans and programs

### 2.2.1 Biodiversity and sectoral programs and initiatives

The federal Multi-year Plan (PPA – *Plano Plurianual*) prepared every four years by the federal government with inputs from all sectors contains all ongoing or planned sectoral programs and activities for a given four-year period. During the process to build the Governmental Action Plan for the Conservation and Sustainable Use of Biodiversity in 2012 (see section 2.1.3), a preliminary analysis was carried out on the current PPA (2012-2015) to identify the national public policies that contribute to reverse the causes of biodiversity loss listed in the problem tree and to the achievement of the Aichi Biodiversity Targets.

This analysis identified, with the assistance of 31 Ministries and subordinated federal agencies, a total of 1,303 activities, included or not in the PPA, and thus distributed among the three main themes: (i) 412 sectoral activities impacting Theme 1 – Conservation: sustainable production and consumption patterns; (ii) 430 sectoral activities impacting Theme 2 – Habitat: ecosystem conservation; and (iii) 461 sectoral activities impacting Theme 3 – Valuation: promotion of the value of biodiversity and associated traditional knowledge.

A few examples of existing initiatives and actions that contribute significantly to integrate biodiversity conservation into other sectors, as well as to develop cross-sectoral joint initiatives, would be: the Ecological and Economic Zoning – ZEE (landscape planning instrument, see section 1.4.5); the Brazilian Natural Capital Initiative – EEB (cross-sectoral biodiversity valuation initiative, see section 1.2.1.2); the PPCDAm, PPCerrado and PAS (public policies to combat deforestation, see section 1.3.3); among many others, including the use of public events to bring forward the biodiversity agenda (Box 4).

**Box 4 – Opportunity knocks:**

**Using public events to advertise the biodiversity cause**

Brazil concluded the 2014 FIFA World Cup taking sustainability to another level, having implemented a series of initiatives through a multi-sector partnership[192] that involved the environmental, sports, tourism, social development, and agriculture sectors, in addition to the host cities and states. These initiatives

[192] This partnership included: the Ministry of the Environment – MMA, Ministry of Sports – ME, Ministry of Tourism – MTUR, Ministry of Social Development – MDS, Ministry of Agrarian Development – MDA, and the United Nations Environment Programme – UNEP, in addition to the host cities and states.

sought to combine environmental sustainability, social inclusion and income generation, with actions that may have continuity after the World Cup and can be replicated for the next big sport events. Successful sustainability initiatives implemented during the World Cup include the environmental certification of the new stadiums built for the event, and the full compensation of directly generated GHG emissions: at the closing of the games, Brazil compensated 545,500 tons of $CO_2$eq, corresponding to over 10 times the estimated GHG emissions caused by construction works and energy and official transportation connected to the World Cup[193]. Initiatives to create awareness and promote the conservation of Brazilian biodiversity included the selection of a Brazilian threatened species of the semi-arid Caatinga, the three-banded armadillo (*Tolypeutes tricinctus*), as the official mascot of the 2014 event, and the promotion of organic agriculture and food products from native biodiversity, in addition to stimulating sustainable tourism through a special edition of the Green Passport[194] campaign. This campaign sought to create awareness among national and international tourists regarding their potential to contribute to local sustainable development, through responsible choices during their visit that can bring positive environmental and social impacts, and included the offer of 60 sustainable footprint itineraries around the 12 host cities.

Additional incentives and measures for biodiversity conservation were announced on the 2014 International Day for Biological Diversity (22 May)[195]: the Ministry of the Environment created the National Biodiversity Prize (*Prêmio Nacional da Biodiversidade*), with the objective of recognizing national public and private sector initiatives, projects and activities for relevant contribution to the conservation of biodiversity. The Humpback Whale Institute and Petrobras were the first recipients of the new Prize, in recognition of their work for the conservation of humpback whales in Brazilian waters. Two new legal instruments were also launched during the event: one establishing the financing of research and management programs targeting threatened species in protected areas as priority for the use of environmental compensation resources. The second established a Task Force for biodiversity conservation, with the participation of IBAMA, ICMBio and the Federal Police, to combat environmental crimes such as illegal hunting and wildlife trade. Initial target species are the Amazon manatee, pink dolphin, Lear's macaw, jaguar, three-banded armadillo, sharks, woolly spider monkey, and freshwater rays. States and municipalities were also invited to join the Task Force.

A notable initiative to integrate biodiversity issues into other sectors, and which produced significant results, was implemented through the GEF-funded National Biodiversity Mainstreaming and Institutional Consolidation Project – PROBIO II[196]. This six-year project is closing in 2014 and established strategic partnerships with: Ministry of Agriculture, Livestock and Food Supply – MAPA; Ministry of Health – MS; Ministry of Science, Technology and Innovation – MCTI; Oswaldo Cruz Foundation – FIOCRUZ; Chico Mendes Institute for Biodiversity Conservation – ICMBio; Rio de Janeiro Botanical Garden – JBRJ; and Brazilian Agriculture Research Company – Embrapa, in addition to the Brazilian Fund for Biodiversity – FUNBIO and Caixa Econômica Federal – CAIXA. The project had the objective of promoting biodiversity integration at the national level into planning strategies and practices of public and private sectors, as well as strengthening institutional capacity to produce and disseminate relevant information and concepts on biodiversity. Actions under PROBIO II contributed in a decisive manner to support MAPA's role in public policies and regulations for the Brazilian organic production, with the establishment of the National Policy and Plan on Agroecology and Organic Production (PNAPO and PLANAPO).

PROBIO II also provided support to MCTI and JBRJ activities under the Biodiversity Research Program – PPBio, and funded the preparation of the online version of 736 rare

[193] www.mma.gov.br/informma/item/10251-brasil-compensa-dez-vezes-mais-emissão-de-carbono-no-mundial

[194] www.passaporteverde.org.br

[195] http://www.icmbio.gov.br/portal/comunicacao/noticias/4-destaques/4813-governo-anuncia-novas-medidas-para-protecao-da-fauna-brasileira.html; http://www.mma.gov.br/informma/item/10143-governo-comemora-resultados-e-amplia-a%C3%A7%C3%B5es-em-defesa-da-fauna

[196] Information on PROBIO II provided by SBF/MMA in July 2014.

essential biodiversity references in partnership with the São Paulo Research Foundation – FapUnifesp and the Scientific Electronic Library Online – SciELO. Under PROBIO II, Embrapa carried out research projects in five Brazilian biomes on sustainable agriculture for small-scale rural producers, conservation and management of soil biodiversity, and conservation and sustainable use of agro-biodiversity. FUNBIO efforts were also supported to seek environmental compliance of select production sectors in priority territories, such as cacao, tropical silviculture, tourism, and sugar cane (sugar and alcohol), for which contracts with private companies were signed. Additionally, a study was completed on biodiversity conservation tools and economic instruments for the private sector. FIOCRUZ developed and launched, with project support, the Android version of the Wildlife Health Information System – SISS-Geo[197] and the Wildlife Health Information Center – CISS[198], through which FIOCRUZ collaborates with WHO/PAHO on Health and Environment. ICMBio received PROBIO II support for actions related to capacity building for the preparation and monitoring of species conservation plans; development and implementation of biodiversity monitoring protocols; and assessment of species conservation status for the revision of the national list of threatened fauna. On the same line, JBRJ prepared and published the red book on Brazilian plants and enhanced the online information system on threatened plant species – SisFlora, among other information dissemination and capacity building actions related to threatened plant species.

Among their mainstreaming efforts, MMA and its implementing agencies also seek to make relevant information more easily accessible to facilitate and promote the integration of biodiversity conservation and restoration themes into the various sectors through public awareness campaigns, publications, events and other actions. Among many others, examples are: the recent translation into Portuguese (to be published in 2014) of the CBD's Cities and Biodiversity Outlook, bringing biodiversity into the urban scenario; and the Plants for the Future publications, creating awareness on the importance of wild species for food and nutrition. In 2012, MMA published the translation of the Japanese publication on 'Directives for engaging the business sector with biodiversity'[199], addressing the importance of the business sector role in providing to society the environmental benefits in the form of produced goods and services, and the consequent need to integrate environmental sustainability principles into business sector activities.

### 2.2.2 Synergy among UN Conventions[200]

At the political level and particularly at the technical level, Brazil is implementing the three UN environmental conventions (Climate Change – UNFCCC, Biodiversity – CBD, and Desertification – UNCCD) in a manner that seeks to establish and strengthen communication, coordination and synergy among them.

The Ministry of the Environment is the national focal point for the CBD through its Secretariat of Biodiversity and Forests – SBF, and for the UNCCD through its

[197] http://www.biodiversidade.ciss.fiocruz.br/como-usar

[198] http://www.biodiversidade.ciss.fiocruz.br

[199] Ministério do Meio Ambiente, 2012. Diretrizes para o Engajamento do Setor Empresarial com a Biodiversidade: Tradução para o português da publicação japonesa *Directives for engaging the business sector with biodiversity*. Brasília, 162 p.

[200] Information provided by DCBio/SBF/MMA in July 2014.

Secretariat of Extractive Activities and Sustainable Rural Development – SEDR. The physical proximity and, to a great extent, the similarity of actions necessary to achieve these Conventions' objectives greatly facilitate technical cooperation on a daily basis, even though this interaction is not formalized. Teams responsible for coordinating the implementation of these two Conventions frequently work together to plan and implement joint actions that promote the restoration and sustainable use of biodiversity and forest or natural resources, particularly in the semi-arid Caatinga biome, on which most of UNCCD actions are focused.

For example, the two teams jointly prepared the terms of reference for a call for proposals launched in 2011, targeting the sustainable use of forest resources in three Caatinga regions that heavily deplete timber resources in the form of firewood for plaster production (Chapada do Araripe, in Pernambuco state), or ceramics/brick production (Baixo Jaguaribe, in Ceará state, and Xingó, in Alagoas state). The objective of this call for proposals is to promote the sustainable forest management, energy efficiency and sustainability in industries, and energy-efficient domestic cooking stoves. The latter objective also positively impacts on health and gender issues, in addition to environmental conservation. The selected projects, currently ongoing, are funded by the federal bank CAIXA through its Socio-environmental Fund and are monitored and receive technical support from MMA through the National Fund for the Environment – FNMA and the technical teams responsible for CBD and UNCCD implementation (see Box 5). These regional projects may also generate inputs for the development and implementation of public policies, as CAIXA is one of the major federal agencies that finance housing and public infrastructure construction and is striving to adopt more sustainable practices in its investments.

**Box 5 – Case Study:**

**Energy Efficiency and Environmental Sustainability in the Caatinga**[a]

Holding unique biodiversity and occupying approximately 11% of the national territory, the semi-arid Caatinga is the only biome entirely located within Brazil. The high diversity of endemic animal and plant species grants to the Caatinga the title of most biodiverse semi-arid biome in the planet.

Caatinga natural resources play a fundamental role in the economy of northeastern Brazil, where firewood from native vegetation represents 33% of the energy matrix, and non-timber products such as foraging plants for livestock, honey, wax, essential oils, fruits and fibers are fundamental items for the survival and income generation of a significant portion of the northeastern population, particularly in the rural areas. Both timber and non-timber products are of high economic potential, as long as they are extracted in a sustainable manner. Deforestation rates in the Caatinga have been increasing, particularly due to the growing demand for firewood, which for the most part is exploited for domestic and industrial use. Overgrazing by cattle and goats compound on the degradation, hindering natural regrowth of the semi-arid forests. According to MMA, 46.6% of the biome has already been deforested, contributing to desertification processes.

A relevant initiative led by a partnership between the Ministry of the Environment through the National Environment Fund – FNMA/MMA and Caixa Econômica Federal through its Socio-environmental Fund – FSA/CAIXA[b] seeks to address the pressing issue of deforestation for firewood to supply the industrial production of plaster and ceramics or bricks, as well as domestic use in three critical regions of the Caatinga: (i) the Chapada do Araripe and surrounding region, focusing on plaster production in Pernambuco state; (ii) the Lower Jaguaribe Watershed and surrounding region, focusing on ceramics production in Ceará state; and (iii) the Xingó region encompassing parts of the states of Alagoas, Sergipe, Bahia and Pernambuco, and focusing on ceramics production and domestic use. Through this partnership, MMA and CAIXA published in 2011 a public bid on 'Energy efficiency and sustainable use of the Caatinga', through which seven projects were selected to promote the sustainable use of Caatinga firewood and energy efficiency in domestic and industrial use.

The three regions selected for this initiative have as common characteristic the heavy dependence on Caatinga firewood for their energy matrix. The Chapada do Araripe produces 95% of the national demand for plaster, or 2.8 tons per year, with an energy matrix composed by 73% firewood (only 3% of legal origin), 10% shot coke, 8% heavy fuel oil, 5% diesel, and 3% electric energy[c]. Plaster production has been growing 25% per year and the Chapada do Araripe region holds approximately 40% of the world's gypsum, which is industrialized by numerous small and medium-size companies. The Lower Jaguaribe Watershed is located over clay soils, which propitiated the development of a strong regional economic segment based on the production of ceramics and bricks – approximately 491 million pieces are produced annually, most of which with the use of firewood. The Xingó region is also a large ceramics (bricks, tiles, utensils, etc.) producer zone, although here the most important firewood demand is for domestic use. Located in the confluence of the states of Bahia, Sergipe, Pernambuco and Alagoas, the Xingó is home to over 1.8 million people, most of which in low-income rural communities presenting one of the lowest HDI values in northeastern Brazil. As in the other two focus regions, the majority of this population uses precarious traditional wood stoves that produce indoor smoke and soot, resulting in a number of health impacts, particularly on women.

The seven projects selected for funding under the FNMA/FSA request for proposals address three lines of action: (i) Community-based and family-based forest management; (ii) Promotion of energy efficiency in the production of materials for the construction sector; and (iii) Enhancing energy efficiency of household wood stoves. All projects are currently under implementation and have already generated some interesting results.

Two of the seven projects focus on the dissemination of efficient domestic wood stoves in the Xingó and Araripe regions. The projects seek to mobilize the rural population and provide capacity building, often through hands-on training events, to disseminate more efficient technologies for domestic wood stoves. Firewood still represents 70% of fuel consumption in households of the Brazilian northeast region, or 36.2 million $m^3$/year, approximately 91% of which is consumed in the rural area. The high cost of gas or difficult access to gas cylinders lead the lower-income population to using mostly firewood for cooking, and more often than not in low-efficiency stoves. The efficiency technologies being disseminated reduce indoor smoke almost completely and promote a 40% reduction in the consumption of firewood, as the efficient stoves allow the use of thin branches and twigs, as well as vegetation and crop trimmings from around the rural households. The dissemination process includes the valuation and capacity building of stove builders (*mestres fogãozeiros*), and the multiplication of techniques and adaptations through workshops and hands-on events. To-date, at least 332 hands-on events for the construction of stoves have been carried out and over 830 energy efficient domestic wood stoves have already been built. Benefits brought by the efficient stoves are particularly important for women, who have historically been the most affected by indoor smoke from cooking and, as each stove is built to fit the individual household characteristics and needs, the ergonomic aspects of food preparation are also improved. Furthermore, as the efficient stoves use smaller-size firewood which is often available in the immediate vicinity of the household, the time saved from cutting and collecting firewood at greater distances (from 3-12 km from the household) can be applied in productive activities that can increase women's income, such as processing of agricultural or extractive products, production of jams and desserts, cakes, etc.

One of the projects on community-based and family-based forest management seeks to promote the adoption of sustainable forest management in 10,000 hectares on the Chapada do Araripe region. The objective is to offer a sustainable firewood supply to the plaster, ceramics and food industries in the region, while generating an alternative income and employment source in rural settlements of the agrarian reform, aiming at the economic, social and environmental viability of both ends of the production chain. While native Caatinga forest resources are still available within the 150 km economic radius of the plaster, ceramics and food industries in the Araripe region, alternative firewood sources are limited: despite the positive results of reforestation experiments with eucalyptus, their distribution is limited to the Chapada itself, competing with traditional agriculture and large-scale monoculture. This is an opportunity for rural settlements in the region to find productive and economic viability through the implementation of sustainable forest management for biomass energy production and insertion in the regional economy. The methodologies being disseminated seek to define medium and long term strategies for forest management, planning management activities for a cycle of 15 years. The project is currently in its third year of implementation and has already characterized 370 rural settlement projects spread over three states (Pernambuco, Piauí and Ceará). Of these, 23 were selected as viable for the implementation of sustainable forest management, with approximately 12.000 hectares of forest biomass production and the potential to benefit over 1,000 families. The project also carried out 37 participatory rural diagnoses and six capacity building workshops on sustainable forest management and co-existence with the semi-arid ecosystem. Two sustainable forest management plans are currently being

implemented; 10 other management plans have already been prepared and submitted to the state environmental agencies for approval, and 11 additional plans are currently being prepared. The implementation of the 23 plans should sustainably produce between 80,000 – 100,000 $m^3$ of firewood per year to supply regional industries.

One of the projects on energy efficiency in industrial production seeks to enhance energy efficiency and promote the adoption of more sustainable production practices for plaster production in the Chapada do Araripe. The project intends to promote a pact for sustainable production with regional industries, provide technical support, and implement a demonstration unit for sustainable production with the participation of all stakeholders (entrepreneurs of plaster production, rural producers who supply firewood, and public agencies). Among other expected results are: the establishment of individual pacts for a transition toward sustainable production with 20 plaster production companies and 30 pre-molded plaster plaques factories; the creation of a green seal; achieve 50% of firewood supply from sustainable forest management origin in participating industries; and enhanced energy efficiency in the production of plaster and plaques.

All seven projects positively impact themes that are highly relevant to the CBD, such as the conservation of Caatinga ecosystems, sustainable use of natural resources, reducing habitat loss and illegal deforestation, generating economic alternatives to vulnerable populations, energy efficiency in production chains, in addition to gender and health issues. A possible next step following the development of sustainable alternatives by these projects would be their transformation into public policies for environmentally and socially sustainable regional development in the Caatinga.

a: Information provided in August 2014 by: SBF/MMA; Associação Plantas do Nordeste – APNE; and Centro de Assessoria e Apoio aos Trabalhadores e Instituições Não-governamentais Alternativas – CAATINGA.

b: The CAIXA Socio-environmental Fund (*Fundo Socioambiental da CAIXA*) provides grants or partially repaid loans earmarked to social and environmental investments connected to sustainable development and targeted at low income population.

c: Campello, F.S.B., 2011. Análise do consumo específico de lenha nas indústrias gesseiras: a questão florestal e sua contribuição para o desenvolvimento florestal e sua contribuição para o desenvolvimento sustentável da região do Araripe – PE. Dissertação de mestrado, Universidade Federal Rural de Pernambuco. 66p.

The national CBD and UNCCD teams also prepared other similar terms of reference to promote conservation projects (creation of protected areas and conservation activities in protected areas), as well as projects on the sustainable management of biodiversity and natural resources through other funds, such as the National Climate Change Fund (*Fundo Clima*), Tropical Forest Conservation Act – TFCA, and National Fund for Forestry Development (*Fundo Nacional para o Desenvolvimento Florestal*). The ultimate objective of promoting such projects is to stimulate activities and sectors that maintain the Caatinga ecosystems, as well as to combat the causes of deforestation in this biome, which are mainly represented by firewood as a household and industry energy source, and non-sustainable livestock activities (overgrazing and planted pastures with invasive alien species). Additionally, SBF is a member of the National Commission on Combat to Desertification, a national body connected to UNCCD which defines the implementation of the National Plan under this convention, as well as the National Policy on Combat to Desertification, currently being discussed by Congress. The national UNCCD team was also invited to participate in the SBF exercise to revise the Priority Areas for the Conservation and Sustainable Use of the Caatinga.

Coordination between CBD and UNFCCC leans more towards the political than the technical side. The national focal point for the UNFCCC is the Ministry of Foreign Affairs – MRE, and the MMA's Secretariat of Climate Change and Environmental Quality – SMCQ is responsible for maintaining a working link with MRE on this theme. Through this link, the national focal point for the CBD (MMA's Secretariat of Biodiversity and Forests – SBF) was invited to write a Biodiversity chapter as part of the National Plan for Adaptation to Climate Change. The ongoing preparation of the

National Plan is being coordinated by the Adaptation Working Group, led by MMA. The Biodiversity chapter should include scenarios on current and future impacts of climate change on biodiversity; ecosystem status; vulnerability; adaptation capacity and ecosystem-based adaptation (how biodiversity and ecosystems can help with adaptation); estimated economic losses; as well as directives and recommended actions for public policies. The completed version of the National Plan for Adaptation to Climate Change should be available by late 2014.

Additionally, SBF also assists with the supervision and technical assistance to environment-related projects being implemented in the Caatinga and that receive funds from the Climate Fund. As the projects are located in the semi-arid region, this action could be seen as a form of cooperation among the three Conventions.

To enable the actions and initiatives described above, among others, as well as to enhance effectiveness in the implementation of the three Conventions, SBF/MMA manages the BRA/11/001 project[201], which has the objective of cooperating with national efforts to implement the CBD, the Ramsar Convention on Wetlands, the UNCCD and the Brazilian Antarctic Program – PROANTAR, in addition to promoting coordination between the CBD, the UNCCD and the UNFCCC. The project intends to achieve these objectives through: (i) contributing to the implementation of the commitments under the CBD and UNFCCC; (ii) integrating directives and programs of the CBD and UNFCCC into public policies that are being developed; (iii) support the preparation of the Biodiversity component of the National Plan for Climate Change Adaptation; and (iv) support the implementation of actions for the conservation, restoration and sustainable use of Brazilian biodiversity, with a view to adapt to climate change.

### 2.2.3 International and transboundary cooperation

By December 2011, Brazil was participating in the implementation of 233 bilateral and multi-lateral cooperation agreements, 22% of which on environmental themes (Figure 47).[202]

[201] The BRA/11/001 Project is entitled: Support to the Implementation of the Commitments under the International Conventions that Address Biodiversity (*Apoio para Implementação dos Compromissos das Convenções Internationais que Tratam da Biodiversidade*).

[202] http://www.abc.gov.br/Projetos/CooperacaoRecebida/ProjetoseAtividades

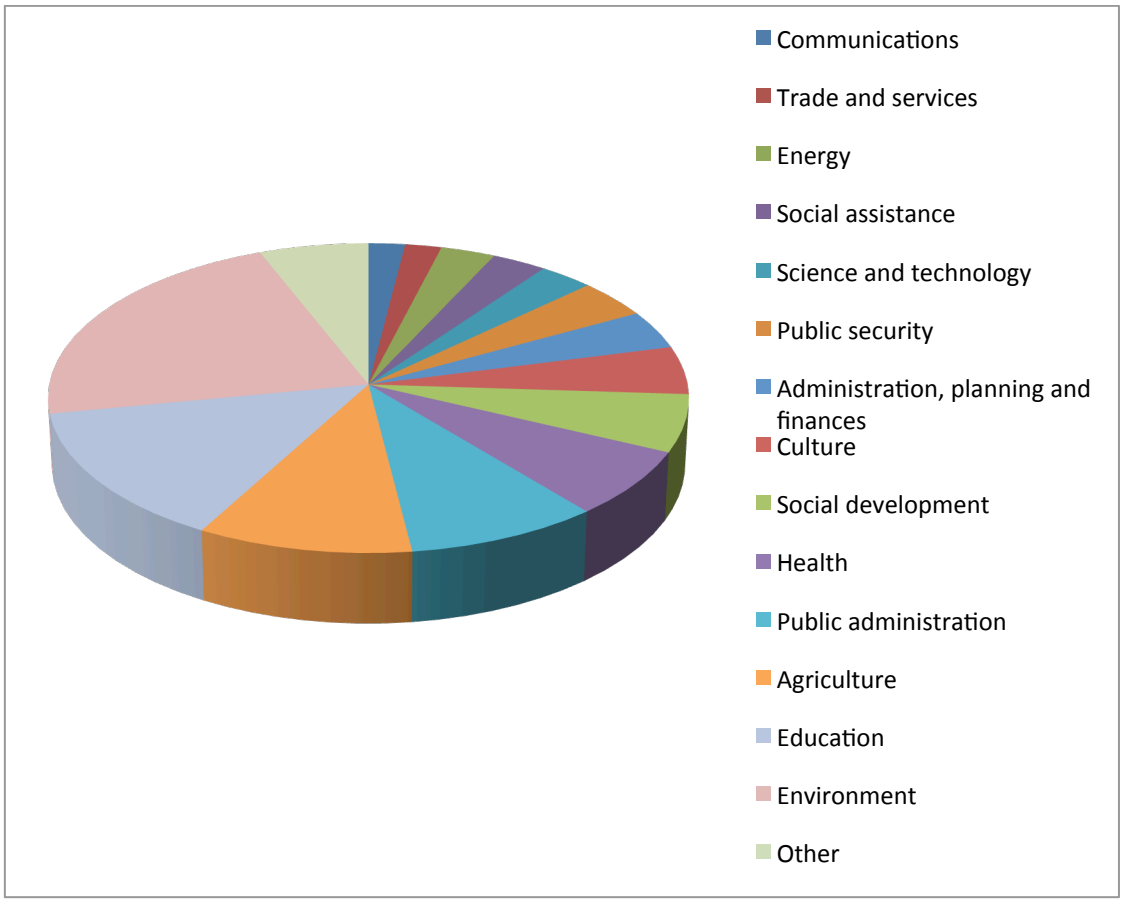



**Figure 47:** International cooperation projects under implementation in 2011, by sector.
**Source:** MRE information at http://www.abc.gov.br/Projetos/CooperacaoRecebida/ProjetoseAtividades

The priority focus of bilateral agreements with Germany, Spain, Japan and France is on environmental themes: (i) Brazil-Germany – conservation of tropical forests, renewable energy and energy efficiency; (ii) Brazil-Spain – environment, professional development, tourism, agriculture and aquaculture, and public administration; (iii) Brazil-France – agriculture and environment; (iv) Brazil-Japan – environment, transport and energy.[203]

Current international cooperation initiatives and projects coordinated by the Ministry of the Environment involve the following themes: Antarctic; Antarctic marine living resources; whales; biodiversity; biosafety; ozone layer; desertification; Law of the Sea; threatened species; migratory species; forests – tropical timber; climate change; chemicals – organic pollutants; chemicals – hazardous substances; waste – transportation of hazardous waste; waste – rubber tires; sea turtles; and wetlands.[204] Additionally, Embrapa participates in the PROCISUR Regional Cooperation Program[205], in which the participating countries (Argentina, Bolivia, Brazil, Chile, Ecuador, Paraguay, Uruguay and Venezuela) proposed complementary and coordinated strategies for the management and conservation of shared genetic resources.

[203] http://www.abc.gov.br/Projetos/CooperacaoRecebida/ProjetoseAtividades

[204] http://www.mma.gov.br/assuntos-internacionais/temas-multilaterais

[205] PROCISUR: Programa Cooperativo para o Desenvolvimento Tecnológico Agroalimentar e Agroindustrial do Cone Sul. Information available at: portaledit.sct.embrapa.br/programas_e_projetos/procisur

Four bi-lateral cooperation activities are implemented through MMA. Brazil-German cooperation on environmental themes has been continuous since 1990, involving mainly activities, initiatives, projects and studies to support the conservation of tropical forests, but also expanding to other environmental or biodiversity themes. Brazil-Norway cooperation on environmental themes has intensified since 2006, particularly regarding the constitution of the Fund for the Preservation and Conservation of the Amazon (*Fundo Amazônia*), and more recently with the support to the development of state plans for preventing and combating deforestation in the Legal Amazon as well as to the implementation of Extractive Reserves in the Amazon. Brazil-European Union cooperation was formally established in 1992 and current technical cooperation themes are forest management (sustainable production and social organization strengthening in the Amazon), and ecological corridors. Brazil-United States cooperation currently occurs under the Common Agenda on the Environment, with initiatives related to protected areas management, water resources management, and forest management.[206]

*Mobilization of resources*.[207] From 15 to 17 April 2014, Brazil hosted the Regional Workshop on Resource Mobilization for Latin America and the Caribbean, held in Brasília. The workshop was jointly organized by the CBD Secretariat, UNDP-BIOFIN and UNEP-WCMC, with support from the Brazilian government and financial support from the government of Japan. The workshop addressed the concern on the lack of sufficient resources to achieve CBD targets expressed in paragraph 27 under Decision XI/4 of COP-11 of the CBD. The workshop's objective was to assist the Parties in the identification of amounts invested in biodiversity, as well as in the preparation of reports on the national efforts for the mobilization of resources and the preparation of national plans for financing biodiversity conservation. The workshop was attended by 50 resource mobilization experts from Antigua and Barbuda, Bahamas, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, Grenada, Guatemala, Haiti, Honduras, Mexico, Nicaragua, Paraguay, Peru, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, and Uruguay. Several United Nations organizations as well as relevant international and national organizations were also represented.

Also in April 2014, Brazil hosted the Third Meeting of the High-Level Panel on Global Assessment of Resources for Implementing the Strategic Plan for Biodiversity 2011-2020. The High-Level Panel is comprised of 15 members, and ensures the fair and equitable geographical representation. The aim of the Panel is to develop an assessment of the benefits of meeting the Aichi Biodiversity Targets, examining both direct biodiversity benefits to society that result from the investments and the policy developments required to achieve biodiversity conservation targets. The Panel will also identify opportunities for improving the use of resources in the biodiversity sector and across economies in order to meet the Aichi Biodiversity Targets in a cost-effective manner.

***

[206] http://www.mma.gov.br/assuntos-internacionais/temas-multilaterais

[207] Information provided by MMA/DCBio/SBF in July 2014.

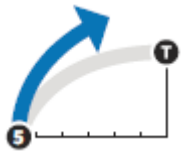
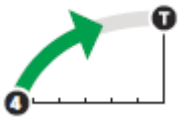
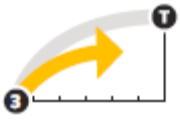
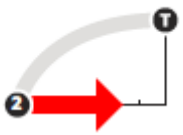
# Part III – Progress towards the 2015 and 2020 Aichi Biodiversity Targets and contributions to the relevant 2015 Targets of the Millennium Development Goals

## 3.1 Progress toward the National and Aichi 2020 Biodiversity Targets

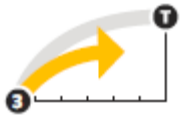
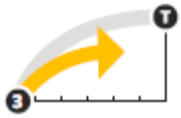
The intermediary assessment of the degree of achievements of the National Biodiversity Targets presented below represent a preliminary analysis carried out based on available quantitative and qualitative data, included in Parts 1 and 2 of this Report. Through a participatory process launched in 2014 and led by PainelBio (see section 2.1.4), Brazil is currently initiating the development of the necessary indicators and monitoring system to keep track of and assess progress towards target achievement with improved effectiveness. It is also important to consider that much of the relevant data for several targets are still being collected or revised, preventing a better grounded assessment of national progress.

However, as agreed during the 57th Ordinary Meeting of the National Biodiversity Commission – CONABIO held on 17 and 18 September 2014, an intermediary and predominantly qualitative assessment of the national progress to achieve the targets was carried out inspired by the scale system applied by the Global Biodiversity Outlook 4 – GBO 4, as shown in Table 36 below. It is important to note that the adoption of this scale system does not imply that the assessment presented here followed the same procedures adopted by GBO 4.

**Table 36:** Scale system applied for the intermediary and predominantly qualitative assessment of the degree of achievement of the National Biodiversity Targets.

| Scale levels | Description |
|---|---|
|  | Progress is on track to achieve the target, with indication that target will be exceeded and/or achieved before its deadline. |
|  | Progress is on track to achieve the target: if we continue on our current trajectory we expect to achieve the target by its deadline. |
|  | Progress is occurring towards target, but at insufficient rate to achieve it within the established deadline, unless we increase our efforts. |
|  | No significant overall progress. Overall, we are neither moving towards the target nor away from it. |
|  | We are moving away from the target, aggravating its status. |

**Source:** Modified from: Secretariat of the Convention on Biological Diversity, 2014. *Global Biodiversity Outlook 4*. Montréal, 155 pages. www.cbd.int/GBO4

| | | |
|---|---|---|
| **National Target 1** | **National Target 1:** By 2020, at the latest, Brazilian people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably. | |
| | **Elements of the National Target** | **Intermediary assessment** |
| | Brazilian people are aware of the values of biodiversity. |  |
| | Brazilian people are aware of the steps they can take to conserve and use it sustainably. |  |
| **Global Aichi Target 1:** By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably. | | |

Medium progress was obtained, as several initiatives have been or are being carried out by different sectors both to enhance the definition of biodiversity value and to raise awareness, but valuation results and total target public effectively reached and sensitized are still limited.

Various efforts are being led by the Ministry of the Environment, other governmental and non-governmental agencies and the private sector to generate and disseminate knowledge on biodiversity and biodiversity value, such as the Brazilian Natural Capital Initiative (see section 1.2.1.2), to contribute to promote and enhance the integration of biodiversity into sectoral policies and programs, as well as a better understanding on the importance and value of biodiversity and ecosystem services and their conservation and sustainable use.

A series of public opinion polls (1992, 1997, 2001, 2006 and 2012) commissioned by the Ministry of the Environment indicated that public awareness of the natural environment and biodiversity, as well as their importance to human lives and activities has increased in Brazil along the last 20 years (see section 1.1). The most recent poll (2012) indicates that 50% of Brazilians are aware of biodiversity loss in comparison to 43% in 2006. Additionally, the 2012 poll indicated that the environment holds the 6$^{th}$ place in the list of main concerns of the Brazilian population, after health, violence, unemployment, education, and politicians, in comparison to the 12$^{th}$ place in 2006 and no mention in 1992. This series of polls also demonstrated that Brazilians consider deforestation as the main environmental problem, and demonstrate concern with a number of other important environmental impacts, such as water pollution; air pollution; increase of solid waste generation; wasteful consumption of water; ozone layer; and climate change; among other aspects. These results are supported by the most recent poll carried out in 2014 by UEBT Biodiversity Barometer[208], which concluded that in Brazil, 90% of poll participants had already heard about biodiversity and, among the seven countries assessed by the poll (France, Germany, United Kingdom, USA, Brazil, Vietnam and Colombia), Brazil presented the higher number of correct definition on what is understood as biodiversity (50%). Additionally, UEBT's poll indicated that 96% of Brazilian consumers buy cosmetic products containing natural

[208] http://ethicalbiotrade.org/biodiversity-barometer

ingredients, 89% expect companies to comply with their policies on respecting biodiversity, and 88% of interviewees believe they should personally contribute to nature conservation.

Numerous initiatives at the federal and state level also seek to promote knowledge, production and use of native biodiversity, disseminate information on endangered species and the importance of environmental conservation, reforestation incentives and programs, environmental education programs, among other similar initiatives. A few examples would be: SiBBr; the Pact for the Restoration of the Atlantic Forest; the MDS Organic and Sustainable Brazil Campaign during the World Cup 2014; state, federal and private sector environmental education programs implemented through schools, TV and radio programs and other communications channels; among many others.

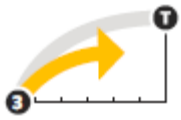
At the state level, Espírito Santo supports workshops and demonstration plots for sustainable forest management targeting local native products (nuts, fruits, pepper), as well as a reforestation project (*Projeto Reflorestar*) to promote the restoration and preservation of headwaters and native forests. The state of Pará is carrying out since 2012 actions to create awareness and disseminate information on local threatened species, initially focusing on an indigenous land. In the state of Rio Grande do Sul, in addition to actions implemented through its state biodiversity program (*RS Biodiversidade* – see section 2.1.7), the state environmental agency (SEMA) provides to applicants at every licensing process a complementary set of tools for promoting knowledge on biodiversity and the importance of its sustainable use and conservation, comprised of printed and electronic informative materials, incentives to the restoration of riparian forests and natural populations of native species, and certification programs for agroforestry and extractive activities. For the past two years, the state of Paraná has been implementing the *Programa Parque Escola* to promote environmental education in public schools, where classes are held in protected areas within Paraná – the program had reached by 2013 approximately 35,000 students and over 1,200 teachers, and developed the Ecosystems of Paraná (*Ecossistemas Paranaenses*) brochure on state programs and actions to achieve the Global Aichi Targets and to address climate change. Various other states also carry out specific environmental education and biodiversity awareness activities with varied scope and audiences, and maintain online sites on biodiversity information. The state of São Paulo maintains an online site on biodiversity, the *Portal da Biodiversidade* (www.portaldabiodiversidade.sp.gov.br) with a virtual library, courses and events announcements, relevant legislation, and institutional arrangements for biodiversity issues, among other information.

Various institutions also carry out specific activities that contribute to this target, among which the Oswaldo Cruz Foundation – FIOCRUZ, which among other initiatives promoted an event to contribute with a Brazilian view[209] distilled out of a diverse audience to the international project World Wide Views on Biodiversity, presented at COP-11 in India; and carried out the 6th edition of its Brazilian Games on Health and the Environment (OBSMA)[210] to recognize the work of teachers and students to improve the environmental and health conditions in Brazil: to-date, the OBSMA involved a total of 24,000 teachers and 120,000 students participating with 8,500 eligible projects, and representing 4,200 schools in 220 municipalities distributed through all Brazilian states. FIOCRUZ also carried out the First Brazilian Conference on Wildlife and Human

[209] http://www.museudavida.fiocruz.br/cgi/cgilua.exe/sys/start.htm?UserActiveTemplate=mvida&sid=322; http://www.museudavida.fiocruz.br/biodiversidade

[210] http://www.olimpiada.fiocruz.br/node/37

Health, with the participation of 274 experts, to contribute to the organization of information on emerging and re-emerging diseases that are communicable from wildlife to humans and vice-versa. Regarding dissemination of scientific information to both the general public and specific audiences, the Emílio Goeldi Museum (*Museu Paraense Emílio Goeldi*) made available in 2011 information on 130 new Amazon species described between 2000 and 2011[211], and in 2014 published information on 171 species described in the previous four years. The Museum also maintains an interactive online system[212] updated in real-time on knowledge on Amazon plant and animal species, currently featuring 4,733 species in 16 biological groups.

<table>
<tr><td rowspan="4">National Target 2</td><td colspan="2">National Target 2: By 2020, at the latest, biodiversity values, geo-diversity values, and socio-diversity values have been integrated into national and local development and poverty reduction and inequality reduction strategies, and are being incorporated into national accounting, as appropriate, and into planning procedures and reporting systems.</td></tr>
<tr><td>Elements of the National Target</td><td>Intermediary assessment</td></tr>
<tr><td>Integration of biodiversity values, geo-diversity values, and socio-diversity values into national and local development and poverty reduction and inequality reduction strategies.</td><td>  </td></tr>
<tr><td>Integration of biodiversity values, geo-diversity values, and socio-diversity values into national accounting, as appropriate, and into planning procedures and reporting systems.</td><td>  </td></tr>
<tr><td colspan="3">Global Aichi Target 2: By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems.</td></tr>
</table>

Commendable advances have been obtained in the creation and implementation of national policies and programs for local development, poverty reduction and inequality reduction that target a section of the population that depend heavily on natural resources, and therefore directly address the sustainability of natural resources and biodiversity (see below). Although several states have established state-level Ecological-Economic Zoning and policies for the Payment for Ecosystem Services, among other policies and initiatives relevant for this target, the limited available data (often due to initial stages of implementation) represent a challenge to the assessment of the scope and degree of implementation of these policies and initiatives. Nevertheless, efforts to define and disseminate biodiversity value are still in their early stages with limited scope, and modest advances were obtained in the incorporation of biodiversity, geo-diversity and socio-diversity values into national accounting, planning procedures and reporting systems.

As mentioned for Target 1, various efforts are being carried out to generate and disseminate knowledge on biodiversity value to different target audiences, such as the Brazilian Natural Capital Initiative, the Business Partnership for Ecosystem Services – PESE, and Trends in Ecosystem Services – TeSE (see section 1.2.1.2), which are now generating initial results and should significantly contribute, within the next few years, to a better understanding among private and governmental economic sectors of the

[211] http://issuu.com/museu-goeldi/docs/catalogo_milenio?e=2748846/3201389

[212] http://www.museu-goeldi.br/censo/

value of biodiversity. Additionally, in a health sector initiative to fill a related national gap, the Oswaldo Cruz Foundation – FIOCRUZ commissioned in 2012 a business plan to identify the national stand, status and prospects in the global market of biological resources, with a view to establish a health-related biological resources center.

Since 2002, Brazil is investing in the integration of an ecosystem approach into economic development, by coordinating and promoting the development of Ecological-Economic Zoning initiatives with the objective to reduce potential conflicts over resource use and prevent excessive impact on ecosystems and biodiversity. Resulting maps and guidelines are made available as territorial planning tools to guide the development of policies, infrastructure and economic development investments, and land use with a view to the sustainable use of natural resources (see section 1.4.5). The periodically updated Map of Priority Areas for the Conservation and Sustainable Use of Brazilian Biodiversity is another important tool to inform development policies. Taking a step further, the state of São Paulo is also promoting coordination among sectors in an attempt to integrate development planning with biodiversity issues, such as coordination among the State Secretariat for the Environment – SMA, ITESP Foundation and other partners for the strategic planning for land tenure issues and for the planning and management of rural settlements of the agrarian reform, to allow the establishment of ecological corridors.[213]

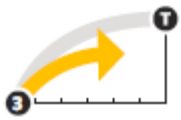
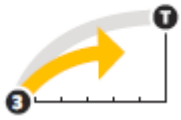
Additionally, various federal policies have been established and implemented in the past several years to promote biodiversity-based and socio-biodiversity products, extractive activities, family rural production, governmental food acquisition programs, agrobiodiversity, traditional knowledge and products, and other sectors and themes targeting the sustainable use of biodiversity and poverty and inequality reduction (see sections 1.2.1.2, 1.2.4 and 1.4.7).

Initial steps were taken to define methodologies to incorporate the value of water resources into national accounting. In 2012, an Inter-ministerial Administrative Ruling (Portaria MPOG MMA n$^{o}$ 236/2012) created the Committee on the Water Environmental Economic Accounting – CEAA (*Comitê das Contas Econômicas Ambientais da Água*) with the responsibility to develop the national water accounting system and methodologies, taking good international practices into account as recommended by the United Nations Statistical Commission. Several capacity building events have already been carried out to support the work of CEAA: (i) in 2009, a workshop was led by the United Nations Statistics Division and IBGE on the IRWS and SEEA-Water methodologies; (ii) in 2011, a IBGE-ANA workshop on Water Accounting was held in Brasília; (iii) in 2013, a workshop was led by UNSD on Water Statistics and Water Environmental Accounting for participants from Brazil and other countries. The construction of the national Water Environmental Economic Accounting system will provide an important tool for water resources planning and management, will allow the development of studies on Brazilian water exports and on the impact of regional and sectoral economic growth on water demand, and will allow statistical comparisons with other countries. In the future, it is expected that the accounting methodology will be expanded to the forest and energy sectors.[214]

[213] Information provided by the Executive Secretariat of the São Paulo Biodiversity Commission (CPB – *Comissão Paulista da Biodiversidade*) in August 2014 for the preparation of the 5$^{th}$ National Report to the CBD.

[214] Information provided by SRHU/MMA in July 2014.

Some Brazilian states are also developing or already implementing state-level efforts (subnational biodiversity strategies and action plans or other state programs and policies) that contribute to the achievement of this target (see section 2.1.7).

<table>
<tr><td rowspan="4">National Target 3</td><td colspan="2">National Target 3: By 2020, at the latest, incentives harmful to biodiversity, including the so-called perverse subsidies, are eliminated, phased out or reformed in order to minimize negative impacts. Positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the CBD, taking into account national and regional socio economic conditions.</td></tr>
<tr><td>Elements of the National Target</td><td>Intermediary assessment</td></tr>
<tr><td>Incentives harmful to biodiversity, including the so-called perverse subsidies, are eliminated, phased out or reformed in order to minimize negative impacts.</td><td>  </td></tr>
<tr><td>Positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the CBD, taking into account national and regional socio economic conditions.</td><td>  </td></tr>
<tr><td colspan="3">Global Aichi Target 3: By 2020, at the latest, incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio-economic conditions.</td></tr>
</table>

Low progress was obtained, with the development and application of a number of positive incentives; nevertheless, harmful incentives and subsidies still prevail. Examples of positive incentives would be the inclusion, in Law n° 12.651/2012 (as amended by Law n° 12.727 of 17 October 2012), of its Article 78-A, which binds the concession of rural credit by financial institutions to rural landowners to their enrollment in the Rural Environmental Registry – CAR; publication of the Central Bank Resolution n° 4.327, of 25 April 2014, which requires financial institutions in Brazil to establish and implement a Socio-environmental Responsibility Policy, and maintain an institutional governance body to ensure its implementation; and investments in the agriculture and livestock sector to increase productivity without expanding the land area occupied by these activities. Examples of some existing harmful incentives would be the exemption of taxes on industrial products (IPI – *Impostos sobre Produtos Industrializados*) as an incentive to the acquisition of new cars, launched in May 2012 and extended to the end of 2014; regulations for the approval of toxic products for agricultural uses, and Law n° 12.873, of 24 October 2013, which authorizes the import, production and commercialization of agricultural chemicals that have not yet been approved in Brazil for situations that are classified as temporary emergencies; and the governmental subsidy for diesel oil used by fishing vessels.

As a contribution to SBSTTA-18, May and Weiss (2014)[215] prepared an analysis of Brazil's initiatives addressing perverse subsidies and positive incentives for the conservation and sustainable use of biodiversity. The analysis concludes that Brazil is implementing several important initiatives in efforts to mainstream values of biodiversity and ecosystem services in fiscal and credit policies. These have included:

[215] May, P.H. and Weiss, J. 2014. Brazil's response to Aichi Goal 3 to reduce subsidies and perverse incentives harmful to biodiversity and ecosystem service provision. Contribution to SBSTTA-18.

the creation of a national initiative for the conservation and sustainable use of the Natural Capital (the national, regional and corporate TEEB programs); a GEF project for mainstreaming of biodiversity conservation and sustainable use in key economic sectors (PROBIO II); the Green Protocol (*Protocolo Verde*) to internalize environmental sustainability criteria within the public banking system; the creation of the Low Carbon Agriculture Plan (*Plano de Agricultura de Baixa Emissão de Carbono – Plano ABC*); a Resolution of the National Monetary Council – CMN (Resolution n$^{o}$ 3.545/2008) to restrict credit to producers that do not comply with environmental regulations in the Amazon biome; the Federal Prosecutors pact with slaughterhouses and supermarkets to avoid buying meat produced in deforested areas (winner initiative of the public policy innovation prize in 2013); the Amazon Fund for projects that contribute to protect Amazonian biodiversity; and the Ecological VAT (*ICMS Ecológico*) that reallocates tax revenues to municipalities according to the proportion of protected area in municipal territory and other environmental criteria; among others.

However, these exemplify positive initiatives which compensate, to some degree, the existing negative incentives. Governmental guidelines for the upcoming investment period favor structural change in the underlying forces that continue to stimulate habitat modification. Publicly supported investments in hydroelectric power plants, roads and other infrastructure, when not accompanied by effective and enforced strategic planning for land use/occupation and development, act as strong incentives to the unchecked expansion in deforestation and other changes in land use arising from increased accessibility, thus contributing to forces that reduce biodiversity. Brazil plans to invest in nearly 500 new hydroelectric dams, of which 182 are already in operation, and agriculture continues to impact land use conversion, climate, water availability, natural predators and pollinators. A number of incentive measures to the agricultural sector have been implemented whose results have been contrary to policies to combat the loss of biodiversity and habitats. Despite marine and coastal protected areas, fish stocks are also declining due to incentives to overfish, and riverine, wetland and mangrove biodiversity are being modified by dams and other changes in water regimes, aquaculture in mangrove areas, and coastal development. The Rural Land Tax (ITR), although not very significant, serves as a disincentive for the maintenance of natural habitats as ITR is higher for "unproductive" land than for land under agricultural production, even though the former may contribute significantly for the protection of natural capital. The tax exemption for legally required Permanent Protection Areas and Legal Reserves in rural properties and for Private Reserves of the Natural Heritage – RPPN, compensates in part for the opportunity cost associated with more intensive land uses, but it is so minuscule in value that its positive incentive is minimal.

Additional examples of Brazilian efforts to develop and implement tools to promote and enable the integration of environmental aspects in development projects and the production sector would be: the preparation of regional and state Environmental-Economic Zoning to guide development decision making; socio-environmental programs such as the Green Stipend (*Bolsa Verde*), Water Producer Program (*Produtor de Água*) and Amazonas state's Forest Stipend (*Bolsa Floresta*); the Minimum Price Policy for Sociobiodiversity-based Products – PGPMBio; and the federal Food Acquisition Program – PAA and National Program for School Nutrition – PNEA (see sections 1.2.1.2, 1.4.1.1, 1.4.7). Some states also established state policies for minimum prices to be paid for products from family agriculture, such as Espírito Santo and Paraíba, or incentives to organic agriculture and sustainable livestock production (Rio Grande do Sul). Paraíba also established a state policy on payment for ecosystem

services. São Paulo state established regulations (Decree nº 55.947/2010) for the payment for ecosystem services (PES) and has been implementing PES regarding water services and for environmental services provided by Private Reserves of the Natural Heritage (RPPNs – *Reservas Particulares do Patrimônio Natural*).

| National Target 4 | **National Target 4:** By 2020, at the latest, governments, private sector and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption to mitigate or prevent negative impacts from the use of natural resources. | |
|---|---|---|
| | **Elements of the National Target** | **Intermediary assessment** |
| | Governments, private sector and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption to mitigate or prevent negative impacts from the use of natural resources. |  |
| **Global Aichi Target 4:** By 2020, at the latest, Governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits. | | |

Medium progress was obtained as various important initiatives and policies for the achievement of this target have been developed and launched in the past several years at different governmental levels and by the private sector, although the degree and scope achieved to-date in implementation varies greatly.

The Action Plan for Sustainable Production and Consumption – PPCS (*Plano de Ação para Produção e Consumo Sustentáveis*) provides guidance for the governmental and production sectors, and general society actions to direct Brazil toward more sustainable production and consumption patterns. The Plan creates synergy between environmental and development policies, particularly the National Climate Policy, National Solid Waste Policy and *Brasil Maior* Plan, contributing to the achievement of their targets through sustainable production practices and consumer's engagement to this initiative. The following priorities were selected for the first phase of PPCS (2011-2014): Education for sustainable consumption; Sustainable public acquisitions; Environmental Agenda in Public Administration – A3P (*Agenda Ambiental na Administração Pública*); Increase solid waste recycling; Sustainable retail trade; and Sustainable construction.[216] Several states and municipalities are adopting A3P into administrative practices, such as Espírito Santo, Ceará and Tocantins.

In 2010, sustainable governmental acquisitions amounted to R$ 12.7 million, rising to R$ 40.4 million in 2013. These operations represented 0.06% of total public acquisitions[217]. In 2010, the publication of Administrative Ruling nº 1/2010 by the Ministry of Planning Budget and Administration (MPOG) represented an important advance by defining the environmental sustainability criteria to be applied in public procurement of goods and services, and contracts for public infrastructure works. For example, this legal instrument rules on criteria for the contracting of engineering services, with a view to save on the maintenance and operation of buildings, reduction of energy and water consumption, and use of technologies and materials that reduce environmental impact.[218]

[216] http://www.consumosustentavel.gov.br/

[217] Data provided by the Secretariat of Logistics and Information Technology (*Secretaria de Logística e Tecnologia da Informação*) under the Ministry of Planning, Budget and Administration.

[218] Weigand Jr., R. et al, 2011. Metas de Aichi: situação atual. UICN, WWF-Brasil and IPE.

The National Policy on Solid Waste (PNRS – *Política Nacional de Resíduos Sólidos*), established in 2010, has the objective of promoting the adoption of sustainable patterns of production and consumption as well as providing incentives to recycling industries. An Inter-ministerial Committee and an Advisory Committee for the Implementation of Reverse Logistics Systems assist in the implementation of this policy. The preceding Decree n° 5.940 published in 2006 is aligned with this policy, establishing the differentiated collection of recyclable waste from the federal public administration and its destination to recycling cooperatives and associations.[219]

An exponential growth of engagement with the Environmental Agenda in Public Administration (A3P) was observed in federal, state and municipal agencies: in 2007, 84 institutions had formally adopted A3P guidelines, increasing to 359 institutions in 2012. This dissemination of socio-environmental responsibility initiatives among public institutions demonstrate significant governmental advances in the commitment with principles preconized by the National Environment Policy, as well as with international recommendations, particularly those of the United Nations Conference on the Environment and Development (Eco 92)[220].

Additionally, the Business Biodiversity Initiative – MEBB (*Movimento Empresarial pela Biodiversidade – Brasil*), launched in August 2010, is a pioneer inter-sectoral initiative led by the private sector, with the objective of engaging the business sector in the conservation and sustainable use of biodiversity. The initiative also seeks to establish a dialogue with the government, academia and other sectors of society to improve the legal framework on themes such as the valuation and access to biodiversity; sharing of benefits; payment for environmental services; technological innovation; research; and other themes that influence the manner in which companies may enhance their business under the directives of a sustainable economy. By the end of 2010, over 60 companies and institutions had joined MEBB. Its members were represented in the Dialogues on Biodiversity in 2011, and in the same year MEBB became a partner of the Biodiversity Barometer and the Union for Ethical Bio Trade – UEBT.[221]

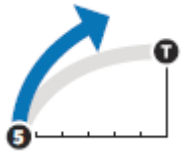
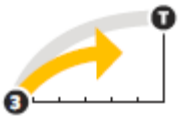
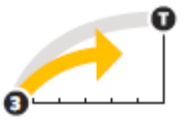
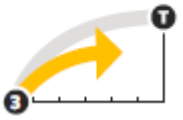
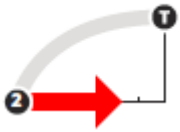
Under the Sustainable Production and Consumption Program coordinated by the São Paulo Biodiversity Commission, the state of São Paulo promotes voluntary agreements with the agribusiness production sectors for seeking economic development that is compatible with biodiversity conservation – the Agro-environmental Protocols. Producers that sign the Protocols present Action Plans to achieve the agreed targets and adopt technical directives, and the best practices applied by participating producers are recognized through the granting of annual certificates. Three Protocols have already been signed: two with the sugar and alcohol production sector (under the Green Ethanol Project), and one with the forest sector (Sustainable Silviculture). The state's goal is to have, by 2015, at least 50% of the state's productive territory applying good agro-environmental practices.[222]

[219] http://www.consumosustentavel.gov.br/

[220] MMA-PNIA 2012, in press. Painel Nacional de Indicadores Ambientais – PNIA.

[221] http://mebbrasil.org.br/

[222] Information provided by the Executive Secretariat of the São Paulo Biodiversity Commission (CPB – *Comissão Paulista da Biodiversidade*) in August 2014 for the preparation of the 5th National Report to the CBD.

<table>
<tr><td rowspan="8">National Target 5</td><td colspan="2">National Target 5: By 2020, the rate of loss of native habitats is reduced by at least 50% (in comparison with the 2009 rate) and, as much as possible, brought close to zero, and degradation and fragmentation is significantly reduced in all biomes.</td></tr>
<tr><td>Elements of the National Target</td><td>Intermediary assessment</td></tr>
<tr><td>Reduction in the loss of native habitats is reduced by at least 50% (in comparison with the 2009 rate) in the Amazon.</td><td>  </td></tr>
<tr><td>Reduction in the loss of native habitats is reduced by at least 50% (in comparison with the 2009 rate) in the Cerrado.</td><td>  </td></tr>
<tr><td>Reduction in the loss of native habitats is reduced by at least 50% (in comparison with the 2009 rate) in the Atlantic Forest, Caatinga, Pantanal and Pampas.</td><td>Official data from PMDBBS for 2010, 2011, 2012 and 2013 under revision.</td></tr>
<tr><td>Significant reduction in the degradation and fragmentation of the Amazon.</td><td>  </td></tr>
<tr><td>Significant reduction in the degradation and fragmentation of the other biomes.</td><td>  </td></tr>
<tr><td>Rate of loss of native habitats, as much as possible, brought close to zero.</td><td>  </td></tr>
<tr><td colspan="3">Global Aichi Target 5: By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.</td></tr>
</table>

The necessary national data to assess progress toward this target is still being revised and not yet available (see below), particularly to define trends for most biomes. Data from the DEGRAD mapping initiative for the Amazon (www.obt.inpe.br/degrad/) indicate a falling trend in degradation for that biome since 2011. Some states, such as Amazonas and Espírito Santo, are already monitoring deforestation at the state level. Nevertheless, it is possible to estimate that native habitat loss, degradation and fragmentation were still not significantly reduced at all biomes.

Although deforestation rates are in general lower than in previous years (see 4th National Report to the CBD), deforestation data from 2009 to 2013 is currently being revised for all biomes by the Project on Satellite Monitoring of Deforestation in Brazilian Biomes – PMDBBS. The most recent year for which revised data is available for all biomes is 2009. According to this data, deforestation in 2009 varied among biomes between 0.02% and 0.37% of total biome size, with the Atlantic Forest, for which the strictest anti-deforestation legislation is in place, being the least affected by deforestation and the Cerrado, where agricultural pressures are currently most intense, being the most affected (see section 1.3.3). The reducing trends in deforestation rates

observed in recent years suggest advances towards target achievement, even though the revised data is not yet available to allow an accurate analysis.

Nevertheless, the still high deforestation rates in the Amazon and Cerrado biomes underline the importance of the specific plans created under the National Policy on Climate Change (PNMC) to reduce greenhouse gas emissions from deforestation and land use change in these two biomes – respectively the PPCDAm and the PPCerrado (see section 1.4). In 2010, these two biomes combined were responsible for 89.4% of the greenhouse gas emissions of the forest sector. Deforestation in the Amazon has been showing a reducing trend since 2004, but efforts must continue to achieve deforestation reduction targets. Pará, Mato Grosso and Rondônia are the top contributors to Amazon deforestation rates.

Some states monitor deforestation at the sub-national level, such as the state of São Paulo with its Integrated Monitoring System (SIM – *Sistema Integrado de Monitoramento*) focusing on state protected areas, and the project on Reducing Pressure on São Paulo Biodiversity. Through this latter, the entire state territory is monitored at least three times per year with remote sensing and field verifications, focusing on vegetation patches larger than 2,000 $m^2$. These two projects are carried out in coordination with the São Paulo Mapping Project (*Mapeia São Paulo*), which regularly provides updated state maps to state agencies, to support territorial management in the state.[223]

On a different spatial and ecological perspective, an analysis of the Areas Susceptible to Deforestation (ASD – *Áreas Suscetíveis à Desertificação*) indicate that a total of 2.7% of ASD were deforested during the 2002-2008 period corresponding to an average annual rate of 0.45%, while a 0.33% deforestation rate was observed in the 2008-2009 period (Table 37).[224]

**Table 37:** Deforested areas and remaining native vegetation cover in ASD of the Caatinga, Cerrado and Atlantic Forest biomes.

| | **Area ($km^2$)** | **Area (%)** |
|---|---|---|
| **Deforested area** | | |
| Before 2002 | 555,532 | 41.10 |
| 2002 – 2008 | 36,576 | 2.71 |
| 2008 – 2009 | 4,510 | 0.33 |
| **Remaining native vegetation** | | |
| Before 2002 | 785,331 | 58.10 |
| 2002 – 2008 | 748,755 | 55.40 |
| 2008 – 2009 | 744,245 | 55.06 |

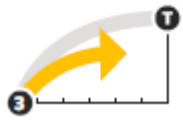
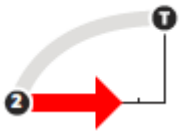
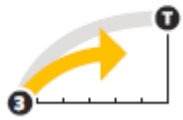
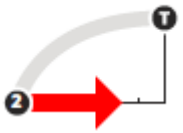
**Source:** IBAMA/PMDBBS data in: MMA-PNIA 2012, in press. Painel Nacional de Indicadores Ambientais – PNIA.

A relevant contribution to reduce the rate of habitat loss is the development of technologies that enhance agricultural and livestock productivity and that allow the recuperation and incorporation of degraded lands into productive systems, particularly degraded pastures (currently covering at least 30 million hectares in Brazil), thus reducing the need to open new areas. Embrapa Cerrados and other Embrapa research centers have developed precocious varieties, varieties adapted to specific regional climate conditions, more efficient livestock management, and integrated production

[223] Information provided by the Executive Secretariat of the São Paulo Biodiversity Commission (CPB – *Comissão Paulista da Biodiversidade*) in August 2014 for the preparation of the 5th National Report to the CBD.

[224] MMA-PNIA 2012, in press. Painel Nacional de Indicadores Ambientais – PNIA.

practices (e.g. agriculture-livestock-silviculture), and continue to work in the enhancement of varieties and production practices.

| | | |
|---|---|---|
| **National Target 6** | **National Target 6:** By 2020 all stocks of any aquatic organism are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overharvesting is avoided, recovery plans and measures are in place for depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems, and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits, when scientifically established. | |
| | **Elements of the National Target** | **Intermediary assessment** |
| | All stocks of any aquatic organism are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overharvesting is avoided. |  |
| | Recovery plans and measures are in place for depleted species. |  |
| | Fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems. |  |
| | The impacts of fisheries on stocks, species and ecosystems are within safe ecological limits, when scientifically established. |  |
| **Global Aichi Target 6:** By 2020, all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits. | | |

The limited advances obtained are still modest for target achievement. Although no updated national data has yet been made available since the REVIZEE 2006 program, recent data from Rio Grande do Sul indicate that fish stocks of economically important species along the state coast and the south region are largely over-exploited or exhausted[225].

The general understanding is that fish stocks, particularly in the coastal and marine zone, are at their limit, but the capacity of fishing vessels and tools has increased, as reflected in the increase in fisheries production (see section 1.2.1.4). Considering this limit, the substitution of part of extractive fisheries with the increasing aquaculture production seems to be an imperative strategy for conservation of fisheries resources. Nevertheless, this simple substitution by itself will not ensure sustainability: an effective network of coastal and marine protected areas that combine sustainable use favoring artisanal fisheries with the full protection regime is essential to allow the

[225] Rio Grande do Sul State Secretariat for the Environment – SEMA contribution to the 5th National Report to the CBD, April 2014.

conservation of highly sensitive or nursery areas, thus enabling the recovery of fish stocks within and around protected areas.[226]

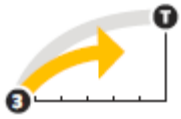
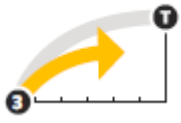
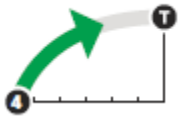
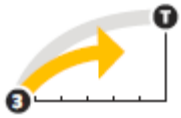
A number of legal instruments (e.g., Administrative Rulings) usually published by MMA also seek to establish more sustainable patterns in fisheries activities by defining the list of threatened aquatic species (marine and freshwater) and establishing no-fishing periods to protect reproduction of species targeted by fisheries activities. Joint efforts among federal and state agencies also seek to monitor and enforce compliance of fisheries activities with sustainability instruments. Additionally, IBAMA established Management Plans (*Planos de Gestão*) for a few over-exploited species of crab, lobster, shrimp, sardine, and seahorse, although much remains to be done to recover and sustainably manage the populations of the numerous aquatic species that are currently over-exploited and still targeted by fisheries activities.

Nevertheless, stronger support to actions planned under the REVIMAR Program (see section 1.2.1.4) would be strategic to obtain reliable (and currently lacking) up-to-date crucial data on the current status of living marine resources and the marine habitat which can support decision making, and significantly contribute to the adequate protection and sustainable use of the coastal and marine zone and its living resources. The continuation of complementary efforts for the conservation and monitoring of sensitive habitats and endangered species, such as the Species Conservation Action Plans and the ReefCheck Brazil Program under ICMBio (see section 1.2.1.4), is also crucial to ensure sustainability of these resources.

Continental aquaculture can be an important tool for the conservation of both marine and continental fisheries resources, but the widespread use of alien species, or Brazilian species outside of their original range, must be seen with caution. Increasing extractive production of alien species such as tilapia clearly indicates their strong presence in open natural habitats. The current success of aquaculture production or sustainable management of some native species (e.g. *pirarucu* and *tambaqui* in the Amazon) should encourage investments in research and development targeting other native fish species of current or potential economic value in each of the five biomes to diversify production and make local native species available as a viable economic option to aquaculture producers.

Some state initiatives collaborate toward this target, such as fisheries management and community agreements in Amazonas state; the State Forum on Mangrove Management in Espírito Santo state (Fórum ManguES) to organize and regulate the use of mangrove fisheries resources; the creation of state and municipal protected areas in Pará and Paraíba to protect wetlands of high importance for fisheries activities and for the maintenance of fish stocks.

[226] MMA-PNIA 2012, in press. Painel Nacional de Indicadores Ambientais – PNIA.

| | | |
|---|---|---|
| **National Target 7** | **National Target 7:** By 2020 the incorporation of sustainable management practices is disseminated and promoted in agriculture, livestock production, aquaculture, silviculture, extractive activities, and forest and fauna management, ensuring conservation of biodiversity. | |
| | **Elements of the National Target** | **Intermediary assessment** |
| | The incorporation of sustainable management practices is disseminated and promoted in **agriculture and livestock** production, ensuring conservation of biodiversity. |  |
| | The incorporation of sustainable management practices is disseminated and promoted in **aquaculture**, ensuring conservation of biodiversity. |  |
| | The incorporation of sustainable management practices is disseminated and promoted in **silviculture**, ensuring conservation of biodiversity. |  |
| | The incorporation of sustainable management practices is disseminated and promoted in **extractive activities, and forest and fauna management**, ensuring conservation of biodiversity. |  |
| **Global Aichi Target 7:** By 2020, areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity. | | |

Brazil is seeking the ways and means for the sustainability of both the medium scale agricultural production (with initiatives such as the Low Carbon Agriculture Plan) and the family and community-based production of small scale agriculture, extractive activities, and organic/agroecological production through a number of policies and initiatives (see sections 1.2.1.2, 1.4.1.1, and 1.4.7), capacity-building and rural technical assistance through MDA and MDS, and development of sustainable management practices for biodiversity products by Embrapa, among other actions, but advances must still gain significantly in scope and in the rate of adoption of sustainable practices.

Other notable initiatives also collaborate to Target 7 such as the Green Arc Operation (*Operação Arco Verde*) coordinated by MMA and the President's Office, which promotes sustainable production models in the priority municipalities for deforestation reduction in the Legal Amazon (those in the area previously known as the Deforestation Arc); provides incentives for the transition from resource-depleting production models to sustainable production models; promotes capacity building of rural producers; and complements actions for deforestation control.

The National Plan on Agroecology and Organic Production; the Minimum Price Policy for Sociobiodiversity-based Products – PGPMBio; the federal Food Acquisition Program – PAA; and the National Program for School Nutrition – PNEA, in addition to several other federal policies to promote sustainable extractive and agricultural production, are examples of initiatives with a national scope that also contribute to this target (see sections 1.2.1.2, 1.2.4 and 1.4.7).

Strategic investments are needed to enhance the use of local native species in aquaculture (see Target 6 above) and more efforts are also necessary to reduce impacts on native habitats from these activities. Nevertheless, some initiatives have been

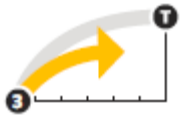
established with a view to improve aquaculture sustainability. Since 2009, the Ministry of Fisheries and Aquaculture – MPA coordinates the implementation of the Sustainable Development Plan for More Fisheries and Aquaculture (*Plano de Desenvolvimento Sustentável Mais Pesca e Aquicultura*)[227], which seeks to enhance management of fisheries and aquaculture activities through a territorial approach and five programs: (i) Sustainable development of fisheries, (ii) Sustainable development of aquaculture, (iii) Policies to support aquaculture and fisheries activities, (iv) Infrastructure, and (v) Strategic management of information on aquaculture and fisheries. The National Environment Council – CONAMA is contributing to the environmental sustainability of aquaculture through its Resolution n° 413/2009 (amended by Resolution n° 459/2013), which rules on the environmental licensing of aquaculture activities, among other subjects, and seeks to reduce environmental impacts of such activities, particularly when involving aquaculture of alien species in reservoirs.

The Brazilian silviculture sector has gained strength in the past several years. Since 2006, through Law n° 11.284 the government has been granting to businesses the right to manage public forests for the extraction of timber and non-timber products, and carry out tourism activities. Since 2008, total concessions encompassed 319,000 hectares of public forests, 70% of which within the period from 2010 to March 2014. Additionally, the land area of certified forests in Brazil has experienced significant growth in recent years. Several certifying agents use any of two certification systems for forest management: the Brazilian Program on Forest Certification (Cerflor), connected to the Program for the Endorsement of Forest Certification Schemes (PEFC); and the Forest Stewardship Council (FSC). An important planning instrument for the forest sector is the National Forest Inventory, which initiated its activities in 2012 (see section 1.4.4).

Several states also develop initiatives that contribute to this target, such as: the support to sustainable forest and fisheries (fish and freshwater turtles) management in Extractive Reserves in the Amazonas state; support through PES for the adoption of sustainable production practices such as agro-forestry systems, silviculture-livestock integration, and sustainable forest management in Espírito Santo; the on-going definition and regulation of thresholds for sustainable extraction of socio-biodiversity products (e.g., leaves, fruit, bark, roots, resins, timber) in Rio Grande do Sul for certification purposes; regulation and certification of biodiverse agro-forestry production systems in Rio Grande do Sul; support to 286 projects in rural properties of Rio Grande do Sul on the themes (i) sustainable use and conservation of native grasslands, (ii) agro-forestry systems with native species, and (iii) ecological agriculture and rural tourism; participation of Rio Grande do Sul in the international *Alianza del Pastizal* project (Brazil, Argentina and Paraguay) for the conservation of natural grasslands and their preservation in the livestock production systems; the establishment of demonstration plots for ecological pasture in Tocantins; implementation of a project (2001 – 2011) for supporting policy development and demonstration plots for the conservation and sustainable use of forest biodiversity in Mato Grosso; regulation of the forestry sector in Mato Grosso with a view to achieve sustainable timber management; support to sustainable community-based forest management in Sergipe; Roads with Araucaria Project (*Projeto Estradas com Araucária*) in Paraná, through which seedlings of the threatened native pine *Araucaria angustifolia* are planted along federal, state, municipal and private roads, and along the borders of rural properties for carbon sequestration, reconstitution of ecological corridors and reforestation of riparian vegetation, in

[227] www.mpa.gov.br/images/Docs/Publicidade/Cartilha_SEAP_final.pdf

addition to producing the edible pine nut; São Paulo Sustainable Rural Development project (*Microbacias II*) in the state of São Paulo, which seeks to improve environmental sustainability of small-scale agricultural production and improve access to markets; Organic São Paulo project (*São Paulo Orgânico*), which promotes the transition to organic production practices and the strengthening of market access to products from organic and sustainable production. São Paulo also published in 2014 its state Map of Sustainable Fisheries (www.sigam.ambiente.sp.gov.br/sigam2/Default.aspx?idPagina=13231).

<table>
<tr><td rowspan="3">National Target 8</td><td colspan="2">National Target 8: By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.</td></tr>
<tr><td>Elements of the National Target</td><td>Intermediary assessment</td></tr>
<tr><td>Pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.</td><td>  </td></tr>
<tr><td colspan="3">Global Aichi Target 8: By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.</td></tr>
</table>

Some recent but limited progress was obtained towards reducing polluting and nutrient loads from domestic wastewater, which nevertheless remains as an important source of excess nutrients, aggravated by agricultural and industrial runoff. In Brazil, the water quality monitoring system is currently the best pollution data provider, although the most recent data available refer to 2010. Most quality and pollution monitoring systems (air, soil, and water) have serious scope, continuity and technical limitations and recent reliable data are not readily available to carry out a more detailed assessment of degree of progress.

Despite some recent progress to expand the provision of domestic wastewater collection and treatment services, treated and untreated domestic wastewater are still an important source of water pollution, particularly in urban areas. This source is also a relevant contribution to organic loads in Brazilian water bodies, together with agriculture runoff (see sections 1.2.1.3 and 1.3.1). In 2010, 15.2% of the main Brazilian rivers presented some type of critical status: 10.9% faced critical conditions regarding water quantity, 1.5% regarding water quality, and 2.8% faced critical conditions regarding both water quantity and quality. In 2012, only 56% of the Brazilian urban population had access to wastewater collection systems, and 69% of the collected wastewater was treated. Furthermore, the current sewage treatment systems in Brazil are not capable of removing hormones or antibiotics, which end up in the water bodies, which has been demonstrated by research projects to cause harmful effects on human health and aquatic biota (see section 1.3.7).

The National Water Agency carries out three initiatives to reduce pollution, including excess nutrients in water: (i) the Watershed Decontamination Program – PRODES, to reduce water pollution in critical watersheds; (ii) enforcement of the use of water resources and dam safety, to reduce the non-regulated use and pollution of water resources; and (iii) water use license for the discharge of effluents, to control the discharge of pollutants into aquatic habitats.

The collection and treatment of solid waste is a responsibility of the municipality and historical data is very incomplete on this theme, with a varying number of municipalities providing data in different years. Nevertheless, available data for the period 2003-2011 indicate an increase in the number of municipalities that offer the

service of domestic solid waste collection from 95 in 2003 to 1,288 municipalities in 2011 (out of a total of 5,565 municipalities). The average *per capita* generation of solid waste seems to vary between 0.72 and 1.30 kg/habitant/day. Where present, the service of solid waste collection addresses between 95.3 to 100% of the urban population, although the reported rates of recycling compared to total waste collected have not yet surpassed 5.79% (see section 1.3.7).

The federal law nº 12.305/2010 established August 2014 as a deadline for the replacement of all open dumps with adequate sanitary landfills. Although this target will most likely not be met by all municipalities, most states have been applying efforts to advance in municipal solid waste management. One example is the state of Paraná, which created in 2013 the Paraná without Dumps (*Paraná sem Lixões*) program to eliminate open dumps and increase recycling rates. The state also provides guidance to municipalities on the constitution of consortia for economically viable solid waste management systems and for the implementation of selective solid waste collection and reverse logistics programs, and promotes debates and conferences on solid waste management, including waste that ends on the seabed.

Brazil still lacks efficient air pollution monitoring systems capable of providing continuous, sufficient and reliable data to allow the construction of adequate and comparable local or regional diagnoses on air quality.[228] Nevertheless, Brazil has already brought down to zero the consumption of CFCs in 2010, and of methyl bromide in 2006; and greenhouse gas emissions have reduced significantly (see section 1.3.7).[229]

At the end of 2013, the National Environment Council (CONAMA) created a working group to revise the CONAMA Resolution nº 03/1990 on air quality standards to prevent harm to human health. Considering the scientific and technological advances that occurred along the 24 years of this Resolution, its updating is crucial to enhance pollution reduction and control. Also under CONAMA, the Programs to Control Air Pollution by Automobiles (PROCONVE, created in 1986) and by Motorcycles (PROMOT, created in 2002), have obtained significant results in reducing air pollution from these sources. Before these Programs, the average emissions of carbon monoxide (CO), for example, from a small car was estimated at 54 g/km, and has currently fallen to 0.4 g/km. The National Inventory of Atmospheric Emissions by Automobiles for 2013 (based on 2012 data) indicated that the CO emissions from automobiles have fallen significantly since 1991, going from approximately 5.5 million tons of CO in 1991 to 1.3 million tons of CO in 2012 (see section 1.1.7).

Since 2004, the Industry's Social Service (SESI – *Serviço Social da Indústria*) has been implementing the "Cozinha Brasil" Program, with the objective of promoting food education to enhance health and life quality among the Brazilian population, by providing guidance and training on the preparation and consumption of food items of high nutritional value and low cost. The Program contributes to Target 8 by promoting the integral use of food items in diets, providing guidance on the use of stalks, seeds, leaves and peels of vegetables which are often wasted, thus providing an incentive to reduce waste. Between 2004 and 2014, the Program reached 2,000,000 people in 2,200 municipalities.[230]

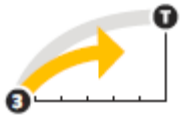
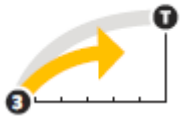
---

[228] Instituto de Energia e Meio Ambiente, 2014. 1º Diagnóstico da Rede de Monitoramento da Qualidade do Ar no Brasil. 277 p.

[229] MMA/SRHU data In: Weigand Jr., R. et al, 2011. Metas de Aichi: situação atual. UICN, WWF-Brasil and IPE.

[230] Information provided by the National Confederation of Industries – CNI in October 2014.

Several states participated in the First Diagnosis of the Air Quality Monitoring Network in Brazil[231]; and the Paraná state also initiated in 2013 the First Inventory of Greenhouse Gases in Paraná, which will also include an inventory of forest plantations that collaborate to compensate emissions.

<table>
<tr><td rowspan="4">National Target 9</td><td colspan="2">National Target 9: By 2020, the National Strategy on Invasive Alien Species is fully implemented, with the participation and commitment of states and the elaboration of a National Policy, ensuring the continuous and updated diagnosis of species and the effectiveness of Action Plans for Prevention, Contention and Control.</td></tr>
<tr><td>Elements of the National Target</td><td>Intermediary assessment</td></tr>
<tr><td>By 2020, the National Strategy on Invasive Alien Species is fully implemented, with the participation and commitment of states and the elaboration of a National Policy,...</td><td>  </td></tr>
<tr><td>... ensuring the continuous and updated diagnosis of species and the effectiveness of Action Plans for Prevention, Contention and Control.</td><td>  </td></tr>
<tr><td colspan="3">Global Aichi Target 9: By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated and measures are in place to manage pathways to prevent their introduction and establishment.</td></tr>
</table>

Progress towards the achievement of the national target still requires effective and proactive action. Progress refers to advances in the identification of invasive species and pathways, and the first administrative steps towards the creation of the necessary legal and policy framework. Additionally, a working group was created through MMA Administrative Ruling n° 37, of 27 January 2014, with the purpose of advising the MMA on wildlife management, including the analysis of existing regulations and development of proposals – the GT Fauna. Three lines of action involving wildlife were defined for the working group: (i) invasive species; (ii) threatened species; and (iii) *ex situ* management. The GT Fauna is composed by 15 experts, five of which from the technical body of MMA and its subordinate agencies, and 10 members from the scientific, business and civil society sectors, as well as from other governmental agencies.

Numerous alien species have been detected, are established or have become invasive in Brazilian terrestrial, freshwater and marine habitats (see Brazil's 4th National Report to the CBD and section 1.3.2 of the present Report).

Although this target is still a challenge, in 2013 a draft Ruling (*Portaria*) was prepared to institutionalize the priority marine invasive alien species to be targeted by management and control actions. When published, this instrument will represent the first time that Brazil officially recognizes a list of invasive alien species and an important step towards the implementation of the National Strategy on Invasive Alien Species, which has been in place since October 2009. The MMA is also revising and publishing inventories of actual and potential invasive alien species present in Brazil and the diagnosis of invasive alien species in protected areas was published in 2014 (see section 1.3.2).

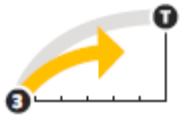
[231] Instituto de Energia e Meio Ambiente, 2014. 1º Diagnóstico da Rede de Monitoramento da Qualidade do Ar no Brasil. 277 p.

The state of Rio Grande do Sul published in 2013 a list of invasive alien species in the state (SEMA Administrative Ruling n° 79/2013), and is developing through the Biodiversity RS Project a set of specific regulations to address invasive species under Category 2 of this list, as well as a state program to address invasive alien species. Rio Grande do Sul is also carrying out some specific actions to restore forests in the state through the eradication of some invasive alien plant species (e.g. *Hoevenia dulcis*, *Ligustrum lucidum*, *Pinus* spp., and *Ulex europeus*). Preparation of four state plans to control specific invasive alien species was completed addressing *Pinus* spp., *Sus scrofa*, *Axis axis*, and alien species in the Quarta Colônia State Park, but implementation has not yet started. Actual control actions were carried out targeting the golden mussel (*Limnoperna fortunei*) and the wild boar (*Sus scrofa*), but were interrupted in 2012.

The state of Paraná implements since 2009 the State Program for Eradication of Alien Species in state protected areas. This program created the State Committee on Invasive Alien Species which, among other actions, periodically revises the state list of invasive alien species and identifies species with potential risk of becoming invasive in state habitats. A Working Group was also established to develop a resolution of the State Council of the Environment (CEMA) based on a Bill on State Invasive Alien Species. The Program also seeks to establish a dialogue with sectors that are essential for addressing the invasive species theme, such as the State Secretariats of Health, Agriculture and Supply, and Education, in addition to federal agencies and NGOs.

The state of São Paulo published in 2011 the official list of alien species with potential to become invasive in the state (Deliberação CONSEMA n° 30/2011), and population control actions are carried out, mainly by rural producers, targeting the European wild boar (*Sus scrofa*). Efforts have been carried out in 2012 and 2013 to assess the potential risks of invasive alien species in the state, and to enhance capacity to recognize these species in the field.

The Malacology Laboratory of FIOCRUZ carries out broad monitoring of invasive mollusks, particularly those in the Ampullariidae family (African snail), as well as their associated parasites. The Triatominae Laboratory of FIOCRUZ/MG studies the persistence of infestation pockets of the Bolivian *Triatoma infestans* (main transmitting agent of the human parasite *Trypanosoma cruzi*), and the control actions carried out achieved the eradication of the species in broad areas, although two pockets of infestation remain (in Bahia and Rio Grande do Sul). FIOCRUZ is also developing models for dengue-transmitting mosquitoes to support decision making. Additionally, the Insect Ecology Laboratories of the Goeldi Museum are monitoring the fly *Zaprionus indianus*, of African origin, which invaded Brazil in the beginning of this century and is a pest for fig production. Embrapa is also developing monitoring studies limited to two sites on the alien moth *Helicoverpa armigera*, an agricultural pest in Brazil.

<table>
<tr><td rowspan="3">National Target 10</td><td colspan="2">National Target 10: By 2015, the multiple anthropogenic pressures on coral reefs, and other marine and coastal ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.</td></tr>
<tr><td>Elements of the National Target</td><td>Intermediary assessment</td></tr>
<tr><td>By 2015, the multiple anthropogenic pressures on coral reefs, and other marine and coastal ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.</td><td>  </td></tr>
<tr><td colspan="3">Global Aichi Target 10: By 2015, the multiple anthropogenic pressures on coral reefs, and other</td></tr>
</table>

vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.

Although progress was obtained, additional efforts must be made to achieve effective protection of the integrity and function of coral reefs, mangroves and other coastal and marine ecosystems.

The best indicators for the control of pressures on coral reefs are the existence and effectiveness of protected areas to conserve these habitats. Prates (2003)[232] assessed the representativeness of coral reef protection in Brazil and the effectiveness of selected protected areas, concluding that over 80% of the top portions of shallow corals are already being protected by some type of protected area, over 30% of which are full protection protected areas. However, most of the other 70% are located in Environmental Protection Areas where protection, monitoring and control are limited. And, as there is a trend to create protected areas over the shallower and more visible reefs, the undetected submerged portion may be less represented in protected areas.[233]

Mangroves and other coastal ecosystems are still being significantly impacted by coastal development and other habitat conversion, and pollution and sediment discharge, among other factors. It is estimated that approximately 25% of Brazilian original mangroves have already been lost. Of remaining mangroves, 61.9% are located within Environmental Protection Areas – APA, where effectiveness of protection is limited. Only 13.1% of remaining mangroves are located in full protection protected areas.[234] The national monitoring of mangrove areas is being carried out by the Remote Sensing Center of IBAMA – CSR/IBAMA, where maps of all Brazilian mangrove areas (totaling 1,382,815 hectares in 2009, corresponding to 9% of global mangroves) are currently being produced based on revised 2010 and 2011 data. Updated maps from 2010 onward should be available by the end of 2014.

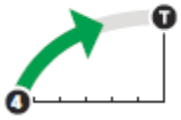
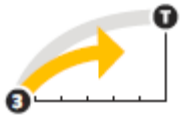
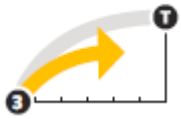
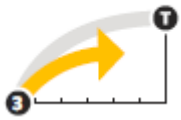
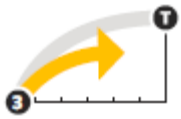
The continuous assessment of five protected areas containing coral reefs is being carried out by ICMBio through the National Program for Monitoring Coral Reefs (ReefCheck Brazil), which has been monitoring reef ecosystems inside and outside protected areas since 2002 with ReefCheck methodology. The 2002-2012 data series produced by this Program is currently being revised for publication by the end of 2014 and preliminary results suggest the trend that no-take areas tend to contain higher quantities of larger specimens and higher species diversity than areas where fishing activities are allowed (see section 1.2.1.4).

Some Brazilian states implement projects and actions directed at reducing impacts on coastal habitats and minimize conflicts between urbanization/coastal development and coastal ecosystems, such as Paraíba and Rio Grande do Sul, which participate in the national initiative *Projeto Orla* (Integrated Coastal Management). The Goeldi Museum carries out studies related to the effects of climate change on mangrove coastal ecosystems in the northeastern coast of Pará state.

[232] Prates, A.P.L. 2003. Recifes de coral e unidades de conservação costeiras e marinhas no Brasil: uma análise da representatividade e eficiência na conservação da biodiversidade. Brasília (DF): Universidade de Brasília.

[233] Weigand Jr., R. et al, 2011. Metas de Aichi: situação atual. UICN, WWF-Brasil and IPE.

[234] MMA, 2010. Panorama da conservação dos ecossistemas costeiros e marinhos no Brasil. SBF/GBA, Brasília: 148p.

<table>
<tr><td rowspan="6">National Target 11</td><td colspan="2">National Target 11: By 2020, at least 30% of the Amazon, 17% of each of the other terrestrial biomes, and 10% of the marine and coastal areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through protected areas foreseen under the SNUC Law and other categories of officially protected areas such as Permanent Protection Areas, legal reserves, and indigenous lands with native vegetation, ensuring and respecting the demarcation, regularization, and effective and equitable management, so as to ensure ecological interconnection, integration and representation in broader landscapes and seascapes.</td></tr>
<tr><td>Elements of the National Target</td><td>Intermediary assessment</td></tr>
<tr><td>Conservation of 30% da Amazon through protected areas foreseen under the SNUC Law and other categories of officially protected areas such as Permanent Protection Areas, legal reserves, and indigenous lands with native vegetation...</td><td>  </td></tr>
<tr><td>Conservation of 17% of each of the other terrestrial biomes through protected areas foreseen under the SNUC Law and other categories of officially protected areas such as Permanent Protection Areas, legal reserves, and indigenous lands with native vegetation...</td><td>  </td></tr>
<tr><td>Conservation of 10% of the marine and coastal areas through protected areas foreseen under the SNUC Law and other categories of officially protected areas such as Permanent Protection Areas, legal reserves, and indigenous lands with native vegetation...</td><td>  </td></tr>
<tr><td>... ensuring and respecting the demarcation, regularization, and effective and equitable management,...</td><td>  </td></tr>
<tr><td>... so as to ensure ecological interconnection, integration and representation in broader landscapes and seascapes.</td><td>  </td></tr>
<tr><td colspan="3">Global Aichi Target 11: By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes.</td></tr>
</table>

In 2010, the terrestrial area covered by protected areas in Brazil corresponded to 16% of the total national territory, while the total marine protected area was limited to 1.5% of the coastal and marine biome under national jurisdiction, which has not changed much since the previous national report to the CBD. Although the number of protected areas recorded in the National Registry of Protected Areas – CNUC (*Cadastro Nacional de Unidades de Conservação*) increased from 1,724 in 2010 to 1,829 in February 2014, there was no substantial increase in the total geographical area under protection. The previous 2010 National Targets (protecting at least 30% of the Amazon and 10% of all other terrestrial biomes and coastal and marine zone under SNUC protected areas) were partially achieved.

The new National Target for 2020 maintained the total target area under protection to be reached for the Amazon and coastal and marine zone, and increased the target for other terrestrial biomes. The criteria for measuring target achievement was also modified to include, in addition to SNUC protected areas categories, other legally protected areas

such as indigenous lands, and permanent preservation areas and legal reserves in private properties.

When only the protected areas categories under SNUC are considered, currently 26.1% of the Amazon, 7.5% of the Caatinga, 8.3% of the Cerrado, 9.3% of the Atlantic Forest, 2.7% of the Pampas, 4.6% of the Pantanal, and 1.5% of the marine area are protected (Figure 48). Given the new accounting methodology for target achievement, it will be necessary to wait until the process of recording permanent protection areas and legal reserves in private rural properties into the new Rural Environmental Registry – CAR is at least nearing completion to adequately measure the degree of target achievement. Nevertheless, achieving effective and equitable management of protected areas, and ensuring ecological interconnection, integration and representation in broader landscapes and seascapes still represent a significant challenge.

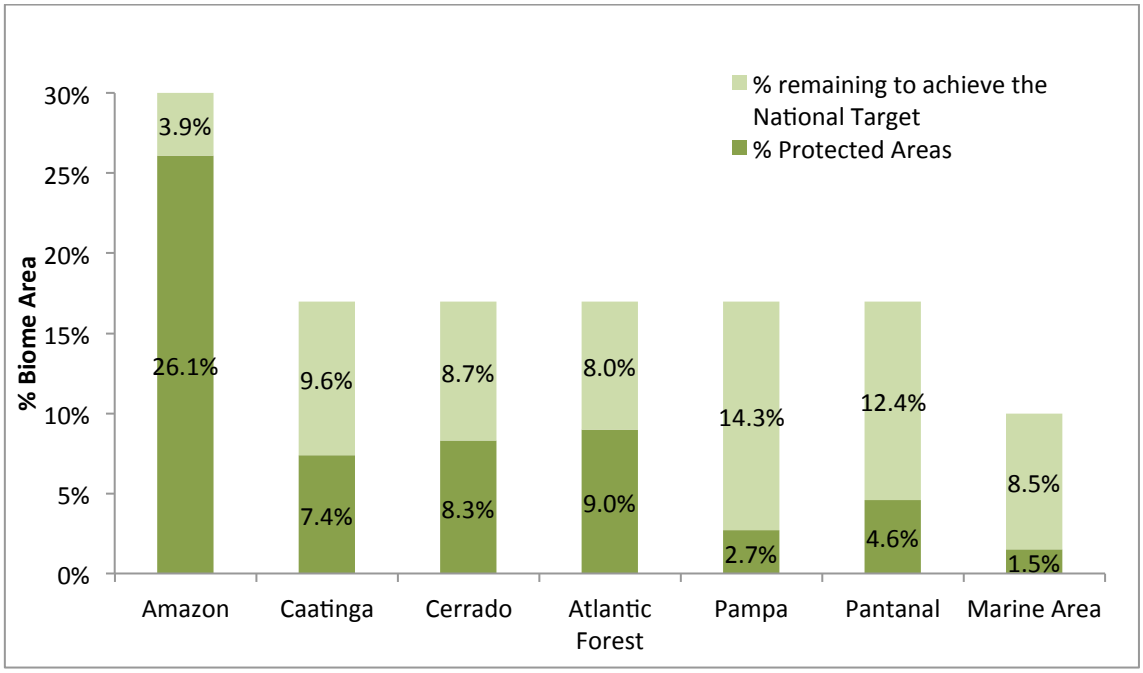
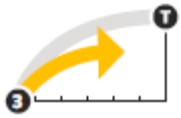



**Figure 48:** Contribution of SNUC protected areas to the achievement of the national target.
**Source:** Prepared by DAP/MMA in August 2014.

In all biomes, except for the Pantanal, and in the coastal and marine zone the sustainable use protected area category predominates, i.e., most of their protected areas have the objective of harmonizing nature protection with the sustainable use of part of their resources. For more details, please refer to section 1.4.2.

| National Target 12 | **National Target 12:** By 2020, the risk of extinction of threatened species has been significantly reduced, tending to zero, and their conservation status, particularly of those most in decline, has been improved. | |
|---|---|---|
| | **Elements of the National Target** | **Intermediary assessment** |
| | By 2020, the risk of extinction of threatened species has been significantly reduced, tending to zero... |  |

| | | |
|---|---|---|
| | ... and their conservation status, particularly of those most in decline, has been improved. |  |

**Global Aichi Target 12:** By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.

The risk of extinction of threatened species remains to be significantly reduced. On-going official assessments of threatened species, when completed, and results from the implementation of Action Plans should provide more substantial data for a national assessment of advances toward target achievement in the next few years.

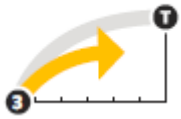
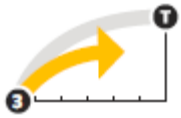
One important step forward towards achieving this target for threatened fauna is represented by the strategy adopted by ICMBio in the past few years to institute a conservation planning process comprised of the periodic updating of the official lists of threatened species, assessing the conservation status of all vertebrate species and selected groups of invertebrate species (focusing in indicator groups such as mollusks, crustaceans, corals, bees and butterflies), followed by the preparation of Conservation Action Plans.

Current data indicate that the most affected biomes are the Atlantic Forest and the Cerrado. On the positive side, 58.8% of the 627 species listed as threatened for Brazil are present in federal protected areas. Conversely, the presence of threatened species was recorded in 242 (or 77.3%) of the 313 federal protected areas, indicating the need to integrate specific conservation actions in the protected areas' management plans. As it is impossible to ensure that all populations and sub-populations that ensure the genetic viability of these species are safeguarded in protected areas, Conservation Action Plans address priority conservation activities for species populations both inside and outside federal, state and municipal protected areas, including private lands. By December 2013, a total of 48 Action Plans had been prepared addressing individual species or groups of species, and comprising 49% of all listed threatened species.

Regarding plant species, the Rio de Janeiro Botanical Garden published in 2013 the Red Book on Threatened Species of the Brazilian Flora. The conservation status of 4,617 plant species was assessed, of which 2,118 (45.9%) were classified as threatened under different risk categories. For more details referring to plant and animal threatened species, please refer to see section 1.4.6.

The state of Espírito Santo completed by the end of 2013 the preparation of the State Action Plan for the Conservation of the Wooly Spider Monkey (*muriqui*). Its 2005 lists of state threatened plant and animal species has not yet been updated. The state of Pará also has a state list of threatened species published in 2007 and since then has sought to increase visibility on threatened species through publications and events to disseminate information, and preparation of state conservation programs. The state of Rio Grande do Sul is currently revising its 2002 list of state threatened plant species and, although the revision process of the 2002 list of state threatened animal species was concluded in 2013, the new list has not yet been published. Nevertheless, information generated by the revision process was uploaded into the state online system Live on state threatened species. The state of São Paulo published in 2014 the official list of state threatened animal species (Decree n° 60.133/2014), and has a state list of threatened plant species published in 2008 (Resolution n° 48/2008). São Paulo also published SMA Resolution n° 14/2014 regulating the management of native plant species of the Atlantic Forest

habitats in the state, and is currently supporting projects on the *in vitro* production of seedlings of threatened plant species such as orchids and bromeliads.

<table>
<tr><td rowspan="4">National Target 13</td><td colspan="2">National Target 13: By 2020, the genetic diversity of microorganisms, cultivated plants, farmed and domesticated animals and of wild relatives, including socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing the loss of genetic diversity.</td></tr>
<tr><td>Elements of the National Target</td><td>Intermediary assessment</td></tr>
<tr><td>The genetic diversity of microorganisms, cultivated plants, farmed and domesticated animals and of wild relatives, including socio-economically as well as culturally valuable species, is maintained...</td><td>  </td></tr>
<tr><td>... and strategies have been developed and implemented for minimizing the loss of genetic diversity.</td><td>  </td></tr>
<tr><td colspan="3">Global Aichi Target 13: By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.</td></tr>
</table>

Medium progress was achieved, particularly due to advances in *ex situ* conservation. Nevertheless, significant additional steps are necessary to ensure the maintenance of the vast Brazilian genetic diversity, particularly regarding wild relatives and socio-economically and culturally valuable species, as well as to develop and implement strategies for minimizing the loss of genetic diversity.

Embrapa Genetic Resources and Biotechnology continuously develops several research projects on *ex situ* conservation activities targeted at native Brazilian species of actual or potential use, and maintains a national collection of genetic samples, as well as several active germplasm banks. The Germplasm-Seed Bank was created in 1976 to safeguard the seeds of economically relevant species, protecting the genetic resources that support nutrition and agriculture. Current capacity of the seed bank is 250,000 accesses and to-date its cold chambers house over 107,000 accesses of 661 species, subspecies and races. To enhance its capacity for the conservation of genetic resources, Embrapa Genetic Resources and Biotechnology inaugurated in 2014 the third largest gene bank of the world, with capacity to store some 750,000 seed samples, in addition to 10,000 *in vitro* plant samples. The bank can also store over 200,000 other cryopreserved samples of plants, animals or microorganisms. Total capacity of the new gene bank, built within the Embrapa campus in Brasília, is over 1,000,000 samples under different preservation methods. Additionally, in 11 February 2014, Embrapa shipped 514 accesses of beans (*Phaseolus vulgaris*) to the Global Seed Vault – GSV in Svalbard, located in the town of Longyearbyen, under Norwegian administration. Those seeds are part of Embrapa's Nuclear Bean Collection, and will join other 264 corn accesses and 541 rice accesses that were shipped to GSV in September 2012. Additionally, the Oswaldo Cruz Foundation – FIOCRUZ maintains 17 collections of micro-organisms that are treated for long-term maintenance through lyophilization, cryopreservation, and liquid nitrogen, in addition to genetic materials from organisms related to public health research.

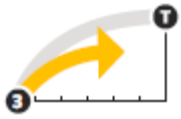
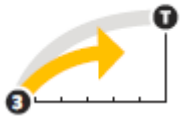
Research projects carried out by Embrapa also include an initiative (on-going since 1997) to collect samples of animal and plant species traditionally maintained by indigenous groups of the Parque Indígena do Xingu, in the state of Mato Grosso, with the objective to increase the genetic variability of crops, particularly those cultivated by traditional communities. The initiative also studies the traditional methods for species management used by those indigenous groups and in what ways these methods interfere in the dynamics of species evolution and genetic diversity. Additionally, the risks of diversity loss for species managed by those indigenous groups are also identified, as well as the causes leading to risk. *Ex situ* collections of the studied species are also maintained by Embrapa Genetic Resources and Biotechnology as a prevention measure against diversity loss. Regarding rural producers, an assessment was carried to identify how existing legislation is impacting on the conservation of local products, given that the implementation of public policies has been leading to a decrease in the seed/species exchange networks among rural producers. Embrapa Genetic Resources and Biotechnology implements efficient *ex-situ* and on-farm conservation of various native species of actual or potential value through the cultivation, *in vitro* reproduction, or cryogenic preservation of viable seeds. For additional information, please refer to sections 1.2.3.1 and 1.2.3.4.

Two other important inter-related initiatives to promote biodiversity conservation and sustainable use are the Biodiversity for Food and Nutrition (BFN) and the Plants for the Future project, this latter refers to an initiative started by MMA back in 2004. The wealth of information generated by Plants for the Future on over 750 species from the five Brazilian regions (north, northeast, center-west, southeast, and south) has been undergoing revision for the past several years and serves as input to actions under the BFN project. The first volume of results from Plants for the Future for the South Region was published in 2011. A similar volume on the Central-West Region is being finalized for publication in 2014, and the preparation of the volume for the North region is also under way. For more details, please refer to section 1.2.3.2.

The "Cozinha Brasil" Program under SESI (see Target 8) promotes the use and growth of local and community vegetable gardens, in addition to providing guidance on the integral use of food products (e.g. including peels, stalks and seeds), and on dietary diversification, which contributes to diversify family food production, including with the maintenance of traditional species and varieties. Program actions respect regional variations in diet components when promoting diet and recipes diversification.[235]

Most Brazilian states have botanical gardens and zoological parks and some federal and state research institutions or universities which hold a diversity of native species, although these institutions are not numerous or large enough to maintain significant genetic diversity within most species in their living collections.

[235] Information provided by the National Confederation of Industries – CNI in October 2014.

| National Target 14 | **National Target 14:** By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, traditional peoples and communities, indigenous peoples and local communities, and the poor and vulnerable. | |
|---|---|---|
| | **Elements of the National Target** | **Intermediary assessment** |
| | By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded... |  |
| | ... taking into account the needs of women, traditional peoples and communities, indigenous peoples and local communities, and the poor and vulnerable. |  |
| **Global Aichi Target 14:** By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable. | | |

Some of the most important ecosystems in terms of provision of essential services listed in this target are located in the Permanent Preservation Areas (APPs), which are mostly located along water bodies, steep slopes and hilltops, as well as in Legal Reserves (RLs), which are portions of native vegetation on private rural properties. A large deficit of compliance with legal conservation requirements had already been accumulated before the total area previously required to be set aside as RLs and APPs was reduced by changes introduced by the new Law nº 12.651/2012, which replaced the previous Forest Code (see section 1.4.1). The revised legislation also allows an additional 88 million hectares of legal deforestation of native vegetation on private properties in excess of conservation requirements, which opens up the possibility of further loss of natural habitats and biodiversity that may occur in compliance with legislation.[236] The new law differentiates between conservation and restoration requirements and, although large-scale forest restoration programs will be necessary to ensure compliance with restoration requirements, these latter do not conflict with current availability for agricultural production: a study[237] has shown that of the 4.5 million hectares of APPs to be restored only 0.6 million hectares are currently occupied with crops, representing less than 1% of all cropland in Brazil. Moreover, if restoration of the remaining RL debt was carried out exclusively in pastures that are unsuitable for agriculture, as little as some 550,000 hectares of the required restoration would have to occur in arable lands.

The Ministry of Agriculture Livestock and Food Supply estimates that the national production of grains alone should grow from the 184 million tons produced in 2012/2013 to 222 million tons in 2022/2023, which would be achieved through a combination of conversion of new areas for agriculture and productivity increase[238]. And, to sustain current levels of beef production while allowing forest restoration, it will be necessary to achieve a substantial increase in stocking densities in pastures. Nevertheless, increasing productivity of Brazilian cultivated pastures to 49% - 52% of their potential alone would suffice to meet the demand for meat and free enough agricultural land to meet the demand for crops, timber products and biofuels until at

[236] Soares Filho, B. et al. 2014. Cracking Brazil's Forest Code. Science vol. 344, pp363-364. www.sciencemag.org

[237] Soares-Filho, B. et al., 2014. Cracking Brazil's Forest Code. Science, vol.344, pp363-364. www.sciencemag.org

[238] MAPA, 2013. Projeções do Agronegócio: Brasil 2012/2013 a 2022/2023. Brasília: 96 p.

least 2040, without further conversion of natural ecosystems[239]. In addition to that, Brazil has created a national Low Carbon Agriculture (ABC) program aimed at increasing agricultural and livestock productivity while reducing the associated carbon emissions and supporting forest restoration.

Key for the success of the implementation of Law 12.651/2012 is the Rural Environmental Registry (CAR), a geo-referenced online system that will enable to record information on the compliance status of over five million rural properties, improving transparency and providing a pathway to environmental compliance. The CAR may also facilitate the operationalization of schemes on payment for ecosystem services, which will be critical to offset the costs of forest restoration, particularly for small land owners.

APPs are also the main target of governmental programs and initiatives related to the payment for their ecosystem services. Such initiatives contribute not only to the conservation of forests and sensitive habitats but also to their restoration, although their growing adoption at the sub-national levels is still limited. For example, the Water Producer Program (*Programa Produtor de Água*) coordinated by the National Water Agency – ANA is an important tool to promote the conservation and restoration of native vegetation in water recharge areas.

Several recent policies and projects seek to promote the sustainable use of biodiversity by traditional peoples and communities, thus contributing to support the conservation of standing forests from which non-timber products are extracted. Such policies also often provide incentives for the adoption of more sustainable agricultural practices such as agroecology and organic production, which support the maintenance of APPs. Some examples are: the PNPSB; PAA; PNAE; PNAN; PLANAPO; PGPMBio; and PNGATI. The Plants for the Future and Biodiversity for Food and Nutrition projects also seek to conserve and promote the sustainable use of native foods and wild relatives of cultivated crops, while the Green Stipend and Forest Stipend programs (see section 1.2.1.2) provide direct incentives to communities for the conservation of forests. For more details, please see sections 1.2.1.2, 1.2.3, and 1.2.4.2.

The "Cozinha Brasil" Program implemented by SESI since 2004 (see Targets 8 and 13) takes into account the needs of women, traditional communities, and the poor and vulnerable, by: (i) enhancing awareness of the population on the importance of reducing food waste and its impact on the environment; (ii) supporting capacity-building actions on the correct handling of food, combating food waste by promoting integral use of food items (e.g. including stalks, peels and seeds), and the use of high nutrition and low cost recipes, while respecting regional and local varieties in diets; and (iii) promoting the use of products from family agriculture in Brazilian diets and disseminating the use of regional products. Actions seek to enhance health and life quality of the Brazilian population, focusing particularly in vulnerable groups. From 2004 to 2014, actions have been implemented in all Brazilian states, reaching two million people in 2,200 municipalities, with a high social impact: for every R$1 invested, the average return is R$7.19 in terms of reducing waste and changing behavior.[240]

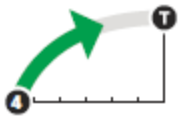
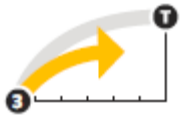
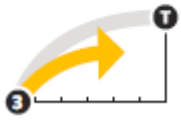
Other initiatives and programs for the restoration of native vegetation and to reduce deforestation also contribute to this target, such as the Pact for the Restoration of the

[239] Strassburg, B.B.N. et al., 2014. When enough should be enough: Improving the use of current agricultural lands could meet production demands and spare natural habitats in Brazil. Global Environmental Change, 28, pp. 84-97.

[240] Information provided by the National Confederation of Industries – CNI in October 2014.

Atlantic Forest, the federal initiative for vegetation restoration currently under preparation, and PPCDAm and PPCerrado (see section 1.4.3.1).

The state of Paraná established the Bioclima Paraná program to promote biodiversity conservation and mitigate the impacts of climate change (see section 2.1.7). The main instrument of the program is the payment for environmental services (PES) to rural landowners who contribute to the conservation of forests and water recharge areas that affect public water distribution systems. The state is developing the regulations for PES on water resources, carbon, and Private Reserves of the Natural Heritage (RPPNs) and plans to implement pilot initiatives by the end of 2014. The state of São Paulo created in 2014 a Riparian Forest Program (*Programa Mata Ciliar*, State Decree n$^{o}$ 60.521/2014) to provide incentives to the restoration of riparian forests and vegetation in water catchment areas, and is preparing the Green-Blue Municipality program (*Programa Município Verde-Azul*) expected to be launched still in 2014 to support over 500 municipalities in the state to develop local environmental agendas.

<table>
<tr><td rowspan="5">National Target 15</td><td colspan="2">National Target 15: By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks have been enhanced through conservation and restoration actions, including restoration of at least 15% of degraded ecosystems, prioritizing the most degraded biomes, hydrographic regions and ecoregions, thereby contributing to climate change mitigation and adaptation and to combatting desertification.</td></tr>
<tr><td>Elements of the National Target</td><td>Intermediary assessment</td></tr>
<tr><td>By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks have been enhanced through conservation and restoration actions (in the Amazon)...</td><td>  </td></tr>
<tr><td>By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks have been enhanced through conservation and restoration actions (in the other biomes)...</td><td>  </td></tr>
<tr><td>... including restoration of at least 15% of degraded ecosystems, prioritizing the most degraded biomes, hydrographic regions and ecoregions, thereby contributing to climate change mitigation and adaptation and to combatting desertification.</td><td>  </td></tr>
<tr><td colspan="3">Global Aichi Target 15: By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.</td></tr>
</table>

An important step forward for the achievement of this Target, and which is still under preparation, is the development of a proposed large scale native vegetation restoration strategy which seeks to strengthen and draw from the existing public policies, incentives, practices and other tools necessary to recover native vegetation. The initial target would be to recover deforested Permanent Preservation Areas (APPs) and Legal Reserves (RL), as well as degraded lands or areas of low agricultural productivity (see section 1.4.3.1). This strategy would complement the ongoing Action Plans to Prevent and Control Deforestation, which are being implemented in the Amazon (PPCDAm) and the Cerrado (PPCerrado) – the two biomes currently most affected by deforestation (see section 1.4.3.2).

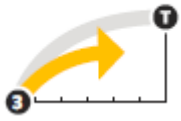
The Watershed Revitalization Program currently implements activities in the watersheds of the São Francisco, Tocantins-Araguaia, Paraíba do Sul, and upper Paraguai (Pantanal) rivers. Actions supported in 2014 include: (i) support to the implementation of models for the restoration of degraded areas, seed conservation and seedling production, and capacity building and mobilization of communities for vegetation restoration and biodiversity conservation; (ii) integrated and preventive enforcement operations; and (iii) expansion of sanitation investments (water sanitation and distribution systems and sewage collection and treatment systems) at river side communities, as well as establishment of inter-municipal consortia for solid waste management (see section 1.4.3.1).

Additionally, the multi-sectoral Pact for the Restoration of the Atlantic Forest, launched in 2009, is a collective effort for the large scale restoration of the Atlantic Forest, involving the participation of non-governmental organizations, governmental agencies at the three administrative levels, rural land owners, traditional communities, cooperatives and associations. The target established for the Pact is to restore 15 million hectares of forest by 2050, increasing the vegetation cover of the Atlantic Forest to over 30% of the original biome (see section 1.4.3.1). Complementarily, some states carry out other specific reforestation and restoration initiatives, such as: (i) Espírito Santo implements agroecological initiatives to recover degraded areas and land in process of desertification, and maintains an online information system (BARFES) on areas available in the state for the implementation of forest recuperation projects and monitor ongoing restoration projects; (ii) Rio Grande do Sul implements forest restoration projects focusing on local flag species; (iii) Mato Grosso completed an assessment of 131,537 micro-watershed to identify priority areas for recuperation of degraded lands, where 9,944 were considered degraded with very high priority for recuperation (7.56%), and 8,599 were classified as degraded with high priority for recuperation (6.46%); (iv) Sergipe implements the State Plan to Combat Desertification in collaboration with the federal program.

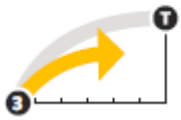
The Low Carbon Agriculture plan (*Plano de Agricultura de Baixa Emissão de Carbono - Plano ABC*) launched in 2010 and initiated in 2011 as part of the Brazilian commitments to reduce carbon emissions in agriculture provides incentives for the adoption of more sustainable and low emission practices by agriculture and livestock producers, such as recovery of degraded pasture land, and crop, livestock and forestry integrated systems, among others. One of the implementation instruments of Plano ABC is a credit line developed to motivate producers to incorporate the proposed technologies into their production processes. Since its onset and until August 2014, this credit line disbursed R$8 billion through approximately 30.000 contracts. Although the credit line is appealing as a tool to overcome the barriers to the adoption of sustainable practices by rural producers, the challenge of engaging rural producers throughout the national territory is still substantial, as well as the difficulty to develop adequate projects that incorporate the complexity of integrated production systems. Embrapa is also carrying out research projects and investing in the development and enhancement of satellite monitoring programs to support carbon stock and GHG emissions monitoring and mitigation in the Brazilian agricultural and livestock sector.

Regarding the urban scenario, the Urban Environmental Management Unit under MMA (in the Department for Territorial Zoning – DZT/MMA) is developing a proposal for urban environmental quality indicators to support strategies and actions to reduce pollution, avoid human occupation of risk areas (slopes and river banks, among others), and to conserve biodiversity. Complementarily, DZT is currently developing maps on

the Environmental Vulnerability in Metropolitan Regions, as well as on the existing urban and peri-urban protected areas, green areas, and river-side permanent preservation areas in 732 municipalities, to support the enhancement of environmental management in urban areas.

| National Target 16 | **National Target 16:** By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation. | |
|---|---|---|
| | **Elements of the National Target** | **Intermediary assessment** |
| | By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation. |  |
| **Global Aichi Target 16:** By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation. | | |

Although Brazil has not yet ratified the 2010 Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization, three important steps were taken: (i) the Brazilian government signed the Nagoya Protocol in February 2011 at the United Nations headquarters; (ii) political negotiations were carried out within the government Executive Body to obtain consensus on the presentation of a request to Congress for the ratification of the Nagoya Protocol; and (iii) the President of Brazil signed on 05 June 2012 a request to the National Congress for the analysis and approval of the Nagoya Protocol. As the request is still being analyzed, Brazil will miss the opportunity of actively participating in the first negotiations round on the Nagoya Protocol, to be held in October 2014, when the global instrument will officially enter into force. The Protocol was already ratified by 51 countries.

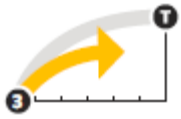
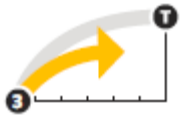
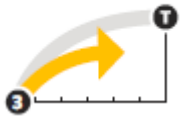
| National Target 17 | **National Target 17:** By 2014, the national biodiversity strategy is updated and adopted as policy instrument, with effective, participatory and updated action plans, which foresee periodic monitoring and evaluation. | |
|---|---|---|
| | **Elements of the National Target** | **Intermediary assessment** |
| | By 2014, the national biodiversity strategy is updated and adopted as policy instrument, with effective, participatory and updated action plans, which foresee periodic monitoring and evaluation. |  |
| **Global Aichi Target 17:** By 2015 each Party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan. | | |

Following the definition of 20 new Global Biodiversity Targets at COP-10 (Nagoya, 2010) and in an attempt to avoid the obstacles that prevented the achievement of most previous national and global targets, the need arose to design a different strategy to review and update the NBSAP and 2010 targets, this time effectively involving stakeholders of all sectors. This new approach could be considered as the first step in the construction of a new National Strategy for 2011-2020 in Brazil.

Implementation of the new approach began in 2011 with a broad consultation effort to achieve a collective construction of the revised NBSAP and new National Biodiversity

Targets for 2020 in an initiative known as Dialogues on Biodiversity, which resulted in the definition of a more concise set of 20 National Targets (see section 2.1.2). Also as part of the new approach, various other initiatives are being carried out in parallel in 2014, one of which is the development of a Governmental Action Plan for the Conservation and Sustainable Use of Biodiversity (see section 2.1.3), complemented by the construction of the PainelBio (see section 2.1.4) to assist in the implementation and monitoring of the National Targets. Initial steps are also being carried out to design a national strategy for the mobilization of resources and capacity (see section 2.1.5).

Sub-national efforts to develop and implement biodiversity strategies and action plans vary in degree and scope of progress, as described in section 2.1.7.

<table>
<tr><td rowspan="4">National Target 18</td><td colspan="2">National Target 18: By 2020, the traditional knowledge, innovations and practices of indigenous peoples, family rural producers and traditional communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, in accordance with their uses, customs and traditions, national legislation and relevant international commitments, and fully integrated and reflected in the implementation of the CBD, with the full and effective participation of indigenous peoples, family rural producers and traditional communities, at all relevant levels.</td></tr>
<tr><td>Elements of the National Target</td><td>Intermediary assessment</td></tr>
<tr><td>The traditional knowledge, innovations and practices of indigenous peoples, family rural producers and traditional communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, in accordance with their uses, customs and traditions, national legislation and relevant international commitments...</td><td>  </td></tr>
<tr><td>... and fully integrated and reflected in the implementation of the CBD...</td><td>  </td></tr>
<tr><td>... with the full and effective participation of indigenous peoples, family rural producers and traditional communities, at all relevant levels.</td><td>  </td></tr>
<tr><td colspan="3">Global Aichi Target 18: By 2020, the traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels.</td></tr>
</table>

Despite the significant advances among indigenous peoples and traditional communities in their political organization and representation of their agendas by the government and general society, it is still a challenge to find representative voices for the high diversity of these groups to effectively include their demands in public policies. The creation of the National Commission for the Sustainable Development of Traditional Peoples and Communities in 2006 was an important step to deal with such complexity, although other equally complex challenges remain, such as to build reliable processes and enough capacity to meet the commitment of informed consultation, informed consent and fair and equitable benefit sharing.[241] To deal with this challenge, the MMA is developing a methodology for the participatory preparation of community-specific Community

[241] Ronaldo Weigand Jr et al., 2011. Metas de Aichi: situação atual. UICN; WWF-Brasil and Ipê.

Protocols defining the conditions and terms for access to traditional knowledge or genetic resources and benefit sharing.

Several public policies, initiatives and projects have been established and are being implemented to support the sustainable development of indigenous peoples and traditional communities, and enhance their participation in decision making: the National Policy for the Sustainable Development of Traditional Peoples and Communities (PNPCT), under which the 1st National Plan for the Sustainable Development of Traditional Peoples and Communities of African Origin was launched in January 2013, and a Plan for Strengthening Extractive Activities (PLANAFE) is under preparation. In November 2013 the federal government supported the event 2nd Forest Call (2º Chamado da Floresta), organized by the National Council of Extractive Workers (CNS), to take stock and evaluate the implementation of public policies addressing extractive populations. Additionally, in 2012 the National Fund for the Environment (FNMA) supported the development of five Plans for the Sustainable Development of Traditional Peoples and Communities, three of which addressing conservationist community initiatives led by women (fisherwomen, mussel collectors, babassu coconut-crackers, and family farmers).

The National Plan to Promote Production Chains of Products from Socio-Biodiversity (PNPSB), the national Policy on Minimum Prices for Products from Socio-biodiversity (PGPMBio) and the national Program for Food Acquisition (PAA) promote the sustainable use of biodiversity by traditional peoples and communities and contribute to the formalization of commercialization of socio-biodiversity products, also promoting the rupture of economic exploitation and monopoly relations practiced by local buyers and middle-men. Additionally, in 2013 a partnership among MDA, FUNAI and Embrapa promoted the 1st National Market of the Indigenous Traditional Agriculture in the city of Cuiabá – MT with the participation of 15 indigenous communities that are considered models in the quest for food safety.

The National Policy on Territorial and Environmental Management of Indigenous Lands – PNGATI was enacted in 2012 and the PNGATI Management Committee became operational in October 2013. Since then, 16 projects were approved to develop, by the end of 2014, Territorial and Environmental Indigenous Land Management Plans – PGTA for indigenous lands in the Amazon. Public bids are currently in preparation for the elaboration of PGTAs for indigenous lands in the Cerrado and Caatinga biomes, and for the implementation of PGTAs in the Amazon biome. Six regional training courses to build management capacity for the implementation of the PNGATI policy are ongoing in the Legal Amazon (3), Cerrado and Caatinga (3), and the Atlantic Forest (1).

The MMA is also supporting an ongoing initiative for the development and launching of a database on existing organizations of traditional peoples and communities – the YPADÊ portal (www.caa.org.br/ypade). The portal contains information on traditional peoples and communities, as well as the initial mapping and database of their representative organizations.

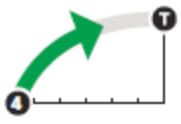
The Ministry of Culture (MinC) has also been carrying out various initiatives to promote and disseminate traditional knowledge and practices. To insert traditional knowledge into formal education, MinC and the University of Brasília are promoting since 2010 the participation of instructors from traditional cultures in the workshops of the project Knowledge Sharing and Cultural Diversity (*Encontro de Saberes e Diversidade Cultural*) in Brazilian Universities. In July 2013, MinC also supported the 13th Meeting of Traditional Cultures of Chapada dos Veadeiros, in Goiás state, which

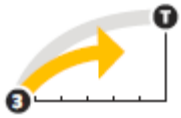
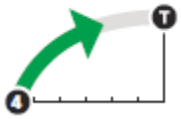
was attended by 30,000 people. This annual event features debates and conferences to build capacity and promote, value and protect the ways of living of the Brazilian traditional peoples. For more details, please refer to section 1.2.4.

Additionally, the Secretariat on Policies for Women (SPM) coordinates and monitors the implementation of the National Plan on Policies for Women (PNPM – *Plano Nacional de Políticas para as Mulheres*), which establishes links with actions implemented by almost all governmental agencies that impact on the lives of Brazilian women. Among actions under this Plan, there are several actions targeting the empowerment of women, conservation of traditional knowledge by women, and women in biodiversity conservation among small scale rural producers, traditional communities and indigenous peoples.

The state of Amazonas carried out a participatory process to prepare its state Indigenous Amazonas Program (*Programa Amazonas Indígena*) to support indigenous ethno-development. Among resulting actions, the state established the first official credit line for indigenous peoples, through a specially designated fund to finance small projects and sustainable production. Additionally, the Amazonas State University established a quota policy to set aside a percentage of seats for indigenous applicants. The state of Espírito Santo supported a successful case of community-based ecotourism and ethno-tourism under the Ecological Corridors Project, involving a quilombola community located within the Burarama-Pacotuba-Cafundó Priority Corridor. Furthermore, traditional knowledge and practices are commonly taken into account for the preparation and implementation of management plans in Extractive Reserves throughout the country. In addition, as a result of one of its research projects involving traditional knowledge and products, the Goeldi Museum will publish in 2014 a book on handcrafts produced by the Mebêngôkre-Kayapó people (*Me à yry Tekrejarotire: Os trabalhos artesanais dos* Mebêngôkre-Kayapó da aldeia Las Casas).

The state of Paraná created the Special Area of Regulated Use (ARESUR – *Área Especial de Uso Regulamentado*) as a category of state sustainable use protected area to protect faxinal communities. Faxinais are traditional communities that maintain an alternative production system where individuals hold the property of goods, animals and crops, but the property of the land is communal. The creation of ARESURs contributes to the protection of local ecosystems and natural resources, which are necessary to support the way of life of faxinal communities, and also allow the traditional communities to receive resources from the Ecological VAT (*ICMS Ecológico*). Paraná currently protects approximately 11,290 hectares in 16 ARESURs.

<table>
<tr><td rowspan="3">National Target 19</td><td colspan="2">National Target 19: By 2020, the science base and technologies necessary for enhancing knowledge on biodiversity, its values, functioning and trends, and the consequences of its loss, are improved and shared, and the sustainable use of biodiversity, as well as the generation of biodiversity-based technology and innovation are supported, duly transferred and applied. By 2017, the complete compilation of existing records on aquatic and terrestrial fauna, flora and microbiota is finalized and made available through permanent and open access databases, with specificities safeguarded, with a view to identify knowledge gaps related to biomes and taxonomic groups.</td></tr>
<tr><td>Elements of the National Target</td><td>Intermediary assessment</td></tr>
<tr><td>By 2020, the science base and technologies necessary for enhancing knowledge on biodiversity, its values, functioning and trends, and the consequences of its loss, are improved and shared...</td><td>  </td></tr>
</table>

| | | |
|---|---|---|
| | ... and the sustainable use of biodiversity, as well as the generation of biodiversity-based technology and innovation are supported, duly transferred and applied. |  |
| | By 2017, the complete compilation of existing records on aquatic and terrestrial fauna, flora and microbiota is finalized and made available through permanent and open access databases, with specificities safeguarded, with a view to identify knowledge gaps related to biomes and taxonomic groups. |  |
| **Global Aichi Target 19:** By 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied. | | |

The Information System on Brazilian Biodiversity (SiBBr, see section 1.2.2.1) is an initiative of the Ministry of Science Technology and Innovation (MCTI) to integrate information on Brazilian biodiversity and ecosystems, with the objective of supporting scientific research and public policies. The SiBBr is already available online, and the first set of scientific data is currently being uploaded.

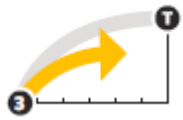
Various other programs implemented through the National Council for Scientific and Technological Development (CNPq) also contribute toward the achievement of this target: (i) the Long Term Ecological Research Program – PELD; (ii) National System of Research on Biodiversity – SISBIOTA Brasil; (iii) the Legal Amazon Network on Biotechnology and Biodiversity – BIONORTE; (iv) Taxonomy Capacity Building Program – PROTAX; (v) Brazilian Plants: Historical Recovery and Virtual Herbarium for Brazilian Flora Knowledge and Conservation; (vi) Biodiversity Research Program – PPBIO; (vii) Center-West Network of Post-Graduation, Research and Innovation – Rede Pró-Centro-Oeste; (viii) Archipelago and Oceanic Islands Program; and (ix) Brazilian Antarctic Program – PROANTAR. The Goeldi Museum maintains the SINBIO system, compatible with SiBBr, with information on biological inventories, and supports the development of numerous research projects on Brazilian biodiversity. The National Museum maintains databases on fish biodiversity (freshwater and marine). The foundation FAPESP supports, since 1999, the continuous Research Program on the Characterization, Conservation, Recuperation and Sustainable Use of São Paulo State Biodiversity – Biota-FAPESP. Since 2007 ICMBio maintains an electronic system – SISBio (*Sistema de Autorização e Informação em Biodiversidade*)[242] – which allows researchers to request permits online to collect biological material in federal protected areas and caves for research projects, and functions as a database for the generated information, which should be made available by the researchers within five years after collection. ICMBio also coordinates implementation of the Biodiversity Monitoring Program in federal protected areas, and combines the generated data with information in SISBio, for integration with SiBBr.

On the 2014 International Day for Biological Diversity (22 May) the Ministry of the Environment announced agreements with the Ministry of Science Technology and Innovation for: (i) inserting the threatened species theme into the MCTI's permanent biodiversity research programs such as the Biodiversity Research Program – PPBio; (ii) launching a call for proposals to support research on threatened species; and (iii) development of information technology tools to assess the risk of extinction, organize databases on threatened species, and to support action plans.

[242] www.icmbio.gov.br/sisbio/

Other federal and state institutions also implement numerous important initiatives and programs relevant for this target. A few examples are: (i) the Oswaldo Cruz Foundation – FIOCRUZ maintains biological and germplasm collections (microbes, animal species, and histopathological samples), and a Wildlife Health Information Center and System; (ii) FIOCRUZ Minas Gerais is structuring a database on the genetic bar code of parasites of medical and veterinary interest (livestock and wildlife); (iii) Farmanguinhos/ FIOCRUZ maintains since 2010 the National Phyto Networks System to contribute to the development of plant-based medicines using Brazilian biodiversity from all biomes; (iv) the laboratories of FIOCRUZ also carry out research for the characterization of environmental health indicators through the study of parasites and their hosts (humans and others), contributing to the control and prevention of endemicity and conservation of animal species; (v) the Emilio Goeldi Museum is developing the SINBIO System and the Biodiversity Census Database, to make available information on biological inventories and Amazon biodiversity; (vi) Embrapa Genetic Resources and Biotechnology and other research centers maintain the Network of Animal, Plant and Microbial Genetic Resources; the Alelo System; and numerous research projects that contribute to the sustainable use of biodiversity and genetic resources; and (vii) FAPESP implements since 1999 the Research Program for the Characterization, Conservation, Restoration and Sustainable Use of São Paulo Biodiversity – Biota-FAPESP, and maintains the Environmental Information System – SinBiota.

For more details, see section 1.2.2.1 and the 4th National Report to the CBD.

<table>
<tr><td rowspan="3">National Target 20</td><td colspan="2">National Target 20: Immediately following the approval of the Brazilian targets, resources needs assessments are carried out for the implementation of national targets, followed by the mobilization and allocation of financial resources to enable, from 2015 on, the implementation and monitoring of the Strategic Plan for Biodiversity 2011-2020, as well as the achievement of its targets.</td></tr>
<tr><td>Elements of the National Target</td><td>Intermediary assessment</td></tr>
<tr><td>Immediately following the approval of the Brazilian targets, resources needs assessments are carried out for the implementation of national targets, followed by the mobilization and allocation of financial resources to enable, from 2015 on, the implementation and monitoring of the Strategic Plan for Biodiversity 2011-2020, as well as the achievement of its targets.</td><td>  </td></tr>
<tr><td colspan="3">Meta Global de Aichi 20: By 2020, at the latest, the mobilization of financial resources for effectively implementing the Strategic Plan for Biodiversity 2011-2020 from all sources, and in accordance with the consolidated and agreed process in the Strategy for Resource Mobilization, should increase substantially from the current levels. This target will be subject to changes contingent to resource needs assessments to be developed and reported by Parties.</td></tr>
</table>

A national strategy for the mobilization of resources and for meeting capacity needs is currently being designed. The Ministry of the Environment is in the process of hiring consultants to assist in the preparation of this strategy and provide an assessment of existing capacity at the state and federal levels to support strategy development. Results from these contracts should be available by mid-2015 and will be incorporated into the updated NBSAP. The Ministry of the Environment is also currently negotiating with the Institute of Applied Economic Research – IPEA the national mapping of resources invested in biodiversity (see section 2.1.5).

Financial resources continue to be obtained from the GEF and other international sources to support projects related to the implementation of the National and Aichi

Targets, either directly or through environmental funds (e.g. Amazon Fund; National Biodiversity Fund – FUNBIO, Amazon Protected Areas Fund – FAP, among others). Nevertheless, additional resources will be required in order to achieve this target.

Additionally, Brazil hosted two international events in April 2014 on resource mobilization: a capacity building workshop and a meeting of the High-Level Panel on Global Assessment of Resources for Implementing the Strategic Plan for Biodiversity 2011-2020 (see section 2.2.3).

## 3.2 Progress toward the Millennium Development Goals

Based on the data gathered in this report, a preliminary assessment is presented below on how national actions taken to implement CBD in Brazil are contributing to progress towards the relevant 2015 Targets of the Millennium Development Goals.

### MDG 1 – Eradicate extreme poverty and hunger

The poor and extremely poor are the primary beneficiaries of the numerous policies, programs and initiatives developed and implemented with the objective of promoting sustainable extractive and agricultural production, promoting economic value chains of products from socio-biodiversity, and supporting the sustainable development of indigenous peoples and traditional communities. These actions are therefore also contributing to all three 2015 targets under MDG 1, as they contribute to strengthening social organization, empowerment of traditional and indigenous communities, enhance food security and life quality, and contribute to the formalization of commercialization of socio-biodiversity products, also promoting the rupture of economic exploitation and monopoly relations practiced by local buyers and middle-men.

Please refer to sections 1.2.1.2, 1.2.3.3, 1.2.4, 1.4.1.1 and 1.4.7, as well as National Targets 2, 16 and 18 in section 3.1 for information on these actions.

### MDG 6 – Combat HIV/AIDS, Malaria and other diseases

Brazilian mega-biodiversity has been for millennia the source of traditional medicines, the use of which has been largely preserved by the over 200 indigenous groups in the country. Nontraditional pharmaceutical companies and health research have long tapped these resources for the development of new drugs, vaccines and diagnosis kits, for example. Brazilian initiatives to increase knowledge on biodiversity and develop biodiversity-based technology, as well as to record traditional biodiversity-related knowledge and practices, all contribute to this MDG by identifying new opportunities for health research and treatments. Examples of such initiatives are listed in sections 1.2.2.1, 1.2.3.2, 1.2.3.4, 1.2.4, and 1.4.7, among others.

Additionally, the results of one of the research lines pursued by the Oswaldo Cruz Foundation – FIOCRUZ[243] strengthen evidence that habitat disturbance by human activities trigger complex direct and indirect relations between human health and biodiversity: ecosystem degradation and fragmentation lead to a rupture of local ecological balance and natural wildlife movements and cycles, and increase human

[243] Chame, M. (FIOCRUZ), 2014. Analysis of the working document. Contribution to SBSTTA-18.

pressure, thus increasing the intensity and frequency of contacts between humans and wildlife, particularly wildlife that is seeking to re-establish or replace normal life cycles. As many vectors and pathogens of human diseases also interact or infect wildlife, these interactions can increase disease emergence and transmission both ways: from wildlife to humans and from humans to wildlife. National actions related to CBD implementation that seek to promote ecosystem restoration, reduce deforestation, and promote sustainable biodiversity use (see sections 1.2.1.2, 1.2.4.3, 1.4.3, and 1.4.4, among others) ultimately contribute to enhance ecosystem balance and seek to reconcile human activities and biodiversity conservation.

Nevertheless, practical action focusing on the relationships between health and biodiversity is still very limited. Future progress toward the adoption and implementation of the Nagoya Protocol, for example, may contribute to bring forward the importance of national sovereignty over biodiversity, including pathogens that are the basis for biotechnological development in health and consequent financial and non-financial benefits to the country.

**MDG 7 – Ensure environmental sustainability**

All actions, policies, programs and initiatives mentioned in this Report contribute significantly to targets A and B under MDG 7 (see all sections of the Report). Some contribute moderately to targets C and D under MDG 7 (see sections 1.3.7, 1.4.3.1), which is strongly supported by governmental investments in sanitation that have been ongoing for the past four years.

## 3.3 Lessons learned with the implementation of the CBD

During the ongoing process of developing the Governmental Action Plan for Biodiversity Conservation and Sustainable Use (see section 2.1.3), some important lessons were learnt in the broad and complex consultation level at the federal level:

- The consultation process evidenced the need to enhance the management and synergy among existing public policies.
- Effectively facing the challenge of fulfilling the three objectives of the CBD and the Aichi Targets requires the joint efforts of all sectors of the government and society.
- The process also brought the recognition that the inter-institutional integration and coordination for biodiversity conservation within the federal government and other sectors is a viable and rewarding venture.
- The preparation of the previous national report to the CBD evidenced the difficulty of working with an excessive number of national biodiversity targets, particularly without adequate indicators and a monitoring system. The participatory construction of the new national targets, based on the Aichi Targets, sought to define a manageable set of targets and to obtain the engagement of all sectors that should contribute to target achievement and monitoring.

***

# Annexes and appendices

# Annex I
# CONABIO Resolution 06/2013: National Biodiversity Targets

## CONABIO Resolution No. 06, of 03 September 2013

*Rules on the National Biodiversity Targets for 2020*

The National Biodiversity Commission – CONABIO, complying with its legal duties provided by Decree No. 4.703, of 21 May 2003, and considering the rulings of Art. 10 of the Annex to the Ministry of the Environment's Administrative Ruling No. 153, of 23 June 2004, and

Considering that the Convention on Biological Diversity – CBD was ratified by Brazil through Legislative Decree No. 2, of 08 February 1994;

Considering CBD's decision X/2, which established the Strategic Plan for Biodiversity 2011-2020, including the Aichi Targets on Biodiversity, and which establishes in its paragraph 3 that Parties and other Governments, with the support of intergovernmental and other organizations, as appropriate, shall implement the Strategic Plan for Biodiversity 2011-2020;

Considering that CBD's decision X/2 in its paragraph 3b requests the preparation of national and regional targets, using the Strategic Plan and its Aichi Targets as a flexible framework, in accordance with national priorities and capacities;

Considering that CBD's decision X/2 in its paragraph 3b also requests that the national and regional targets should take into account both the global targets and the status and trends of biological diversity in the country, and the resources provided through the strategy for resource mobilization, with a view to contributing to collective global efforts to reach the global targets;

Considering the need for the Brazilian Government to establish the national biodiversity targets 2011-2010 in order to comply with the CBD request;

Considering Articles 2nd and 6th of Decree 4.703, of 21 May 2003, which assign to CONABIO the mandate to promote the national implementation of Brazilian commitments under the CBD;

Decides to:

Art. 1st Adopt the national biodiversity targets to 2011-2020, as spelled out in the annex, and propose their implementation by the Federal Government.

Art. 2nd This Resolution comes into effect on the date of its publication.

[signed]
**ROBERTO BRANDÃO CAVALCANTI**
Secretary of Biodiversity and Forests
President of CONABIO

ANNEX

1) Background

The Ministry of the Environment, in partnership with various environmental institutions, launched in 2011 the initiative on "**Dialogues on Biodiversity: building the Brazilian strategy for 2020**". The initiative had as its main objective to establish, through a participatory process, the national biodiversity targets related to the Biodiversity Strategic Plan 2011-2020 of the Convention on Biological Diversity. On the course of 2011, five broad face-to-face consultation events were held, in addition to numerous preparation and qualification meetings with five sectors: the business sector, civil environmental society, academia, government (federal and state), and indigenous peoples and traditional communities. At those meetings, participating sectors prepared proposals for the national biodiversity targets according to sector-specific stands and needs, taking into consideration the 20 Global Biodiversity Targets, known as the "Aichi Targets".

Twenty-five documents were generated from the work of the sectoral meetings (5 for each of the 5 meetings), containing proposals for the national biodiversity targets for the 2011-2020 period, as well as intermediate sub-targets to be achieved on the course of the 2013-2017 period. All proposals were consolidated in a single document, which was named "**Base document for public consultation**".

This **Document** was posted online for public consultation at the electronic site of the Ministry of the Environment from 19 December 2011 to 31 January 2012. The public consultation process had the objective to obtain additional contributions from the Brazilian society for the preparation of the national biodiversity targets 2011-2020, as well as a critical analysis of the targets proposed by the consulted sectors.

Taking these contributions as a starting point, CONABIO discussed the national targets during five ordinary meetings: the 47$^{th}$ Meeting on 26 April 2012; the 48$^{th}$ Meeting on 27 June 2012; the 49$^{th}$ Meeting on 20 August 2012; the 51$^{st}$ Meeting on 25 April 2013; and the 52$^{nd}$ Meeting on 26 and 27 June 2013; as well as during the 15$^{th}$ extraordinary meeting on 01 June 2012.

At the end of the 52$^{nd}$ Meeting, CONABIO approved the final version of the text of the national targets presented in section 2 and the proposal for the preparation of supporting text containing CONABIO considerations on the background of the preparation process and on the implementation of the approved targets, to be presented in the form of directives for the internalization and implementation of the national biodiversity targets 2011-2020 as presented in section 3.

2) National Biodiversity Targets 2011-2020

| **Strategic Objective A – Address the underlying causes of biodiversity loss by mainstreaming biodiversity considerations across government and society** |
|---|
| National Target 1: By 2020, at the latest, Brazilian people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably. |
| National Target 2: By 2020, at the latest, biodiversity values, geo-diversity values, and socio-diversity values have been integrated into national and local development and poverty reduction and inequality reduction strategies, and are being incorporated into national accounting, as appropriate, and into planning procedures and reporting systems. |
| National Target 3: By 2020, at the latest, incentives harmful to biodiversity, including the so-called perverse subsidies, are eliminated, phased out or reformed in order to minimize negative impacts. Positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the CBD, taking into account national and regional socio economic conditions. |
| National Target 4: By 2020, at the latest, governments, private sector and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption to mitigate or prevent negative impacts from the use of natural resources. |
| **Strategic Objective B – Reduce the direct pressures on biodiversity and promote sustainable use** |
| National Target 5: By 2020, the rate of loss of native habitats is reduced by at least 50% (in comparison with the 2009 rate) and, as much as possible, brought close to zero, and degradation and fragmentation is significantly reduced in all biomes. |
| National Target 6: By 2020 all stocks of any aquatic organism are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overharvesting is avoided, recovery plans and measures are in place for depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems, and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits, when scientifically established. |
| National Target 7: By 2020 the incorporation of sustainable management practices is disseminated and promoted in agriculture, livestock production, aquaculture, silviculture, extractive activities, and forest and fauna management, ensuring conservation of biodiversity. |
| National Target 8: By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity. |
| National Target 9: By 2020, the National Strategy on Invasive Alien Species is fully implemented, with the participation and commitment of states and the elaboration of a National Policy, ensuring the continuous and updated diagnosis of species and the effectiveness of Action Plans for Prevention, Contention and Control. |
| National Target 10: By 2015, the multiple anthropogenic pressures on coral reefs, and other marine and coastal ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning. |
| **Strategic Objective C: To improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity** |
| National Target 11: By 2020, at least 30% of the Amazon, 17% of each of the other terrestrial biomes, and 10% of the marine and coastal areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through protected areas foreseen under the SNUC Law and other categories of officially protected areas such as Permanent Protection Areas, legal reserves, and indigenous lands with native vegetation, ensuring and respecting the demarcation, regularization, and effective and equitable management, so as to ensure ecological interconnection, integration and representation in broader landscapes and seascapes. |
| National Target 12: By 2020, the risk of extinction of threatened species has been significantly reduced, tending to zero, and their conservation status, particularly of those most in decline, has been improved. |
| National Target 13: By 2020, the genetic diversity of microorganisms, cultivated plants, farmed |

| |
|---|
| and domesticated animals and of wild relatives, including socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing the loss of genetic diversity. |
| **Strategic Objective D: Enhance the benefits to all from biodiversity and ecosystem services** |
| National Target 14: By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, traditional peoples and communities, indigenous peoples and local communities, and the poor and vulnerable. |
| National Target 15: By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced through conservation and restoration actions, including restoration of at least 15% of degraded ecosystems, prioritizing the most degraded biomes, hydrographic regions and ecoregions, thereby contributing to climate change mitigation and adaptation and to combatting desertification. |
| National Target 16: By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation. |
| **Strategic Objective E: Enhance the implementation through participatory planning, knowledge management and capacity building** |
| National Target 17: By 2014, the national biodiversity strategy is updated and adopted as policy instrument, with effective, participatory and updated action plans, which foresee periodic monitoring and evaluation. |
| National Target 18: By 2020, the traditional knowledge, innovations and practices of indigenous peoples, family rural producers and traditional communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, in accordance with their uses, customs and traditions, national legislation and relevant international commitments, and fully integrated and reflected in the implementation of the CBD, with the full and effective participation of indigenous peoples, family rural producers and traditional communities, at all relevant levels. |
| National Target 19: By 2020, the science base and technologies necessary for enhancing knowledge on biodiversity, its values, functioning and trends, and the consequences of its loss, are improved and shared, and the sustainable use of biodiversity, as well as the generation of biodiversity-based technology and innovation are supported, duly transferred and applied. By 2017, the complete compilation of existing records on aquatic and terrestrial fauna, flora and microbiota is finalized and made available through permanent and open access databases, with specificities safeguarded, with a view to identify knowledge gaps related to biomes and taxonomic groups. |
| National Target 20: Immediately following the approval of the Brazilian targets, resources needs assessments are carried out for the implementation of national targets, followed by the mobilization and allocation of financial resources to enable, from 2015 on, the implementation and monitoring of the Strategic Plan for Biodiversity 2011-2020, as well as the achievement of its targets. |

3) Directives for the internalization and implementation of the national biodiversity targets 2011-2020

i. Promote under CONABIO, whenever necessary, the definition of the concepts employed in the text of the targets, with the purpose of establishing the clear and objective understanding of the intended meaning, including through the constitution of working groups, expert consultations, and technical workshops;

ii. Propose the establishment, under CONABIO, of analysis criteria and indicators for evaluating the implementation process of the national targets, in a participatory manner with different sectors of society;

iii. Propose the implementation of the national biodiversity targets 2011-2020 in a coordinated manner with a national strategy and an action plan for the conservation and sustainable use of biodiversity, recognizing the efforts and policies related to the national targets;

iv.a. Promote the adoption of incentives aimed at the implementation of the national targets;

iv.b. Promote the establishment of legislation and regulations aimed at the implementation of the national targets;

v. Consider a broad agenda, comprising inter-institutional and multidisciplinary actions to be developed by different agencies of the federal, state and municipal governments, in addition to various sectors of society;

vi. Consider the specific characteristics of each biome and macro geopolitical region of the country, in order to balance the actual risks to remaining ecosystems, technological viability, and economic, social and environmental aspects, taking into account the Ecological-Economic Zonings;

vii. Promote the permanent generation, updating, and incorporation of technical-scientific knowledge in the process of implementing the national targets.

# Appendix I

## Information on the national preparation of the 5th Report to the CBD

### Preparation process

The Ministry of the Environment hired two consultants according to detailed terms of reference to lead the preparation of the 5th National Report to the CBD, which was carried out in collaboration with the technical team of the Secretariat of Biodiversity and Forests – SBF/MMA. One technical staff of the SBF/MMA participated in the CBD workshop on capacity building for the preparation of the 5th national reports carried out in December 2013 in Cochabamba (Bolivia), and supervised the preparation of the Brazilian national report.

To collect the necessary information, five versions of a questionnaire based on the report structure recommended by the CBD Secretariat's guidelines for the preparation of the 5th national report were prepared and sent out to 178 institutions and experts. Each type of questionnaire was tailored for a specific sector: (i) federal agencies in all sectors; (ii) state environmental agencies, Secretaries of the Ministry of the Environment, and federal environmental agencies under MMA; (iii) members of the National Biodiversity Commission – CONABIO and research institutions; (iv) NGOs; and (v) financing institutions. Sixty responses were received. The information received was combined with data and information extensively searched on the internet sites of relevant governmental, non-governmental and private sector organizations, universities and research agencies, among other official and broadly recognized online sources.

A framework structure for the 5th national report was prepared based on the official guidelines to allow adequate response to the CBD Secretariat and include an update of previously provided information. The vast amount of information collected was analyzed and summarized to prepare a draft version of the national report, including an initial assessment of the degree of achievement of the 2020 National Biodiversity Targets. The draft version was sent for comments, adjustments or updates to the numerous agencies and technical staff who contributed with information, as well as to the members of the National Biodiversity Commission – CONABIO as a multi-sector representative body. The comments and additional contributions received were incorporated in a revised version, which was submitted to the final revision and approval of the Ministry of the Environment.

### List of collaborators

A large number of people contributed with information for the preparation of the 5th report to the CBD. We thank all of those listed below whom, among several others, provided valuable information and collaboration which made it possible to complete the preparation of this report.

| COLLABORATORS | INSTITUTION |
|---|---|
| Adalberto Eberhard | Departamento de Zoneamento Territorial/SRHU /MMA |
| Adriana Melo Alves | Secretaria de Desenvolvimento Regional / Ministério da Integração Nacional |
| Adriano Oliveira | DMC/SMCQ/MMA |
| Alexandra Luciana Costa | Ministério da Cultura / Secretaria da Cidadania e a Diversidade Cultural |

| | |
|---|---|
| Alexandre Tadeu M. Rodrigues | Secretaria de Meio Ambiente e Desenvolvimento Sustentável do Estado do Tocantins |
| Aloisio Lopes Pereira de Melo | Ministério da Fazenda / Secretaria de Política Econômica |
| Amable Alejandro Traviesa Zaragosa Neto | Superintendência Nacional de Previdência Complementar / Ministério da Previdência Social |
| Ana Carolina Lopes Carneiro | GCEco/DCBio/SBF/MMA |
| Ana Cristina Secchi Correia | Ministério da Fazenda / Secretaria de Política Econômica |
| Ana Ivone Salomon Marques | SEAMA – Espírito Santo |
| Ana Lidia Araújo Ramos | CSR/IBAMA |
| Ana Paula Prates | Subsecretaria de Desenvolvimento Sustentável, SAE/MMA |
| André Lima | DAP/SBF/MMA |
| André Vitor Fleuri Jardim | DCBio/SBF/MMA |
| Andrea Oncala | Gerência de Gestão Socioambiental/SEDR/MMA |
| Antonio Caetano de Paula Junior | Secretário de Estado do Meio Ambiente e Recursos Hídricos do Paraná |
| Bráulio Santiago Cerqueira | Secretaria de Planejamento e Investimentos Estratégicos / MPOG |
| Bruno Siqueira Abe Saber Miguel | DZT/SEDR/MMA |
| Camila Gomes Steiner | GCE/DCBio/SBF/MMA |
| Camila Neves Soares Oliveira | GCE/DCBio/SBF/MMA |
| Carla Leal Lourenço de Miranda | DPCD/SMCQ/MMA |
| Carlos Alberto de Mattos Scaramuzza | Diretor de Conservação da Biodiversidade, DCBio/SBF/MMA |
| Carlos Eduardo Guidorizzi de Carvalho | Coordenação de Avaliação do Estado de Conservação da Biodiversidade/DIBIO/ICMBio |
| Carlos Eduardo Martins de Proença | CACER/DAER/SEPOA/MPA |
| Carlos Potiara Ramos de Castro | Departamento do Patrimônio Genético – DPG/SBF/MMA |
| Carolina Fernanda de Souza Mendes | Serviço Florestal Brasileiro |
| Celso Lafer | Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP) |
| Celso Vainer Manzatto | Embrapa Meio Ambiente |
| Ceres Belchior | GCE/DCBio/SBF/MMA |
| Christina Fischer | Secretaria de Estado do Meio Ambiente e Desenvolvimento Sustentável do Amazonas – SDS |
| Claudia Rodrigues Carvalho | Museu Nacional/UFRJ |
| Cristiane de Queiroz Pinheiro | GCE/DCBio/SBF/MMA |
| Daniela América Suarez de Oliveira | DCBio/SBF/MMA |
| Daniel Moraes de Freitas | Centro de Sensoriamento Remoto (IBAMA) |
| Daniel Vieira | Embrapa Cenargen |
| David C. Oren | Ministério da Ciência, Tecnologia e Inovação |
| Daniele R. Silva | GCEco/DCBio/SBF/MMA |
| David G. Rocha | Departamento de Recursos Hídricos/SRHU/MMA |
| Denise de Oliveira | Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) |
| Denise Marçal Rambaldi | Superintendente de Biodiversidade e Florestas, Secretaria de Estado do Ambiente – SEA, Estado do Rio de Janeiro |
| Dennis Nogarolli M. Patrocínio | General Coordinator, RS Biodiversidade Project, Rio Grande do Sul State Secretariat of the Environment. |
| Departamento de Produtos e Destinos-DEPROD/SNPTur/Mtur | Ministério do Turismo |
| Drielle Martins | Coordenação de Avaliação do Estado de Conservação da Biodiversidade/DIBIO/ICMBio |
| Edson A.S. Karkará-Urú | Rede Cerrado |

| | |
|---|---|
| Edson Tadeu Iede | Embrapa Florestas |
| Eduardo dos Santos | Ministério das Relações Exteriores |
| Emma Lenny Carla Navarro Vasquez | DAP/SBF/MMA |
| Eneida Moura | Centro de Assessoria e Apoio aos Trabalhadores e Instituições Não-governamentais Alternativas – CAATINGA |
| Fábio Carvalho Vieira | DPG/SBF |
| Fábio Ricarti | DAP/SBF/MMA |
| Fátima Pires de Almeida Oliveira | Diretoria de Pesquisa, Avaliação e Monitoramento da Biodiversidade (DIBIO) – ICMBio |
| Faynara Camargo de Freitas Figueiredo | Superintendência de Administração do Meio Ambiente – SUDEMA, Estado da Paraíba |
| Fernanda Rodrigues | Forest Stewardship Council (FSC) – Brasil |
| Fernando da Costa Pinheiro | Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) |
| Gabriel Rangel Visconti | BNDES |
| Genival Nunes da Silva | Secretaria de Estado do Meio Ambiente e dos Recursos Hídricos do Sergipe |
| Geraldo Góes | DRH/SRHU/MMA |
| Gilvan Sacerdote Neto | Subsecretaria de Planejamento, Orçamento e Administração / Ministério da Previdência Social |
| Graciema R. Pinagé | Serviço Florestal Brasileiro |
| Gustavo Henrique Oliveira | GCE/DCBio/SBF/MMA |
| Gustavo Martinelli | CNCFlora/JBRJ |
| Henry P. I. de Novion | DPG/SBF |
| Inez Varoto Corrêa | Departamento de Geração de Renda e Agregação de Valor/Secretaria de Agricultura Familiar/ MDA |
| Isabella Mattos | Conselho de Políticas e Gestão do Meio Ambiente-CONPAM / Ceará |
| Janelane Coelho da Rocha | Superintendência Estadual de Meio Ambiente do Estado do Ceará |
| Jânio Oliveira Coutinho | Departamento de Extrativismo – DEX/SEDR /MMA |
| Jennifer Viezzer | GCEco/DCBio/SBF/MMA |
| João Arthur Soccal Seyffarth | GCEco/DCBio/SBF/MMA |
| João Paulo Viana | Instituto de Pesquisa Econômica Aplicada – IPEA |
| José Esteves de Lacerda Filho | Secretaria de Estado do Meio Ambiente de Mato Grosso |
| José Ricardo Araújo Lima | Superintendência Estadual de Meio Ambiente do Estado do Ceará |
| José Roberto Rodrigues Peres | Embrapa Cerrados |
| José Vicente de Freitas | Coordenação Geral de Educação Ambiental/ SECADI/Ministério da Educação |
| Juliana Carvalho Frota Mattos | GCEco/DCBio/SBF/MMA |
| Juliana Zancul | Fundação Nacional de Saúde (Funasa) |
| Karen de Oliveira Silverwood-Cope | SMCQ/MMA |
| Karen Schmidt de Carmargo | Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) |
| Katia Torres Ribeiro | Diretoria de Pesquisa, Avaliação e Monitoramento da Biodiversidade (DIBIO) – ICMBio |
| Keila Macfadem Juarez | DCBio/SBF/MMA |
| Krishna Bonavides | GCE/DCBio/SBF/MMA |
| Larissa Ribeiro da Cruz Godoy | DAP/SBF/MMA |
| Laura Maria Farias Barbosa | Superintendência de Administração do Meio Ambiente – SUDEMA, Estado da Paraíba |
| Leila G. Ollaik | Secretaria de Políticas para as Mulheres da Presidência da República |
| Leonardo Queiroz Correia | GCE/DCBio/SBF/MMA |
| Lidio Coradin | Gerente de Conservação de Espécies, |

| | |
|---|---|
| | DCBio/MMA |
| Luana Magalhães Duarte | DCBio/SBF/MMA |
| Luciana Alves de Souza | Gerência de Proteção da Fauna e Flora/DAP /Secretaria de Estado de Meio Ambiente do Pará |
| Luis Antonio Valois Morais | Departamento de Extrativismo – DEX/SEDR /MMA |
| Luís Henrique Piva | Secretaria de Estado do Meio Ambiente e Desenvolvimento Sustentável do Amazonas – SDS |
| Luiz Antonio de Souza Cordeiro | Ministério da Defesa |
| Luiz Fernando Schneider Loureiro | DAP/SBF/MMA |
| Luiz Marcelo Brum Rossi | Embrapa Amazônia Ocidental |
| Luiz Merico | IUCN Brasil |
| Luiz Paulo de Oliveira Silva | Secretaria de Desenvolvimento Regional / Ministério da Integração Nacional |
| Marcelo Soares Alves | Instituto Nacional do Seguro Social / Ministério da Previdência Social |
| Márcia Aparecida de Brito | Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) |
| Marcia Catarina David | Departamento de Extrativismo – DEX/SEDR /MMA |
| Márcia Chame dos Santos | Fundação Oswaldo Cruz (FIOCRUZ) |
| Mariana Chaubet | Forest Stewardship Council (FSC) – Brasil |
| Mariana Otero Cariello | Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) |
| Mario Henrique Rodrigues Mendes | DMC/SMCQ/MMA |
| Mario Wanderley Campos da Fonseca Marques | Associação Plantas do Nordeste – APNE |
| Marisa de Araujo Mamede | Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) |
| Mariusz Szmuchrowski | COMAG/CGCAP/DIMAN/ICMBio |
| Martin Mayr | Rede Cerrado |
| Mateus Batistella | Embrapa Monitoramento por Satélite |
| Mateus Motter dala Senta | DCBio/SBF/MMA |
| Mateus Samolé do Amaral | Assessoria Socioambiental / Ministério dos Transportes |
| Maurício dos Santos Pompeu | DMAR/SBF/MMA |
| Miguel Ávila Moraes | IUCN Brasil |
| Milton Marcondes | Instituto Baleia Jubarte |
| Morena Corrêa Santos | BNDES |
| Neio Lúcio Fraga Pereira | Secretaria Estadual de Meio Ambiente do Rio Grande do Sul |
| Nilson Gabas Jr. | Museu Paraense Emílio Goeldi |
| Nubia Silva | DMC/SMCQ/MMA |
| Onivaldo Randig | Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) |
| Patrícia Barcelos | Secretaria de Direitos Humanos da Presidência da República |
| Paul Joseph Dale | Governo do Estado de São Paulo |
| Paula Moraes Pereira | DMAR/SBF/MMA |
| Pedro Alexandre Rodrigues Christ | SMCQ/MMA |
| Pedro Luiz Simpson Junior | PNUMA |
| Pedro S. Castro | Pacto pela Restauração da Mata Atlântica |
| Pollyane Barbosa Rezende Martins | GCE/DCBio/SBF/MMA |
| Rafael Agrello Dias | GCEco/DCBio/SBF/MMA |
| Raphael Duarte | BNDES |
| Raquel de Oliveira Alves | Secretaria de Planejamento e Investimentos Estratégicos / MPOG |
| Renata Apoloni | Departamento de Extrativismo – DEX/SEDR/MMA |

| | |
|---|---|
| Roberto Gallucci | DMAR/SBF/MMA |
| Roberto Marinho Alves da Silva | Secretaria Nacional da Economia Solidária / Ministério do Trabalho e Emprego |
| Rodrigo Antônio de Souza | Centro de Sensoriamento Remoto (IBAMA) |
| Ronaldo Costa | Departamento de Revitalização de Bacias Hidrográficas/SRHU/MMA |
| Rosana Subirá | Coordenação de Avaliação do Estado de Conservação da Biodiversidade/DIBIO/ICMBio |
| Sebastião Morais de Carvalho Júnior – TC | Exército Brasileiro / Ministério da Defesa |
| Sérgio Basile | Coordenação de Relações do Trabalho e Responsabilidade Socioambiental / Ministério da Previdência Social |
| Sérgio Eustáquio de Noronha | Laboratório de Geoprocessamento – LGP/PBE, Embrapa Cenargen |
| Sergio Henrique Collaco de Carvalho | DAP/SBF/MMA |
| Sérgio Margulis | Subsecretaria de Desenvolvimento Sustentável/ Secretaria de Assuntos Estratégicos da Presidência da República |
| Sueli Ota | Coordenadora de Biodiversidade e Florestas, SEMARH – Paraná |
| Taciana B. Cavalcanti | Embrapa Recursos Genéticos e Biotecnologia (Cenargen) |
| Tatiani Elisa Chapla | GCE/DCBio/SBF/MMA |
| Teresa Cristina Cavalcanti Soares | Marinha do Brasil / Estado-Maior da Armada / Ministério da Defesa |
| Thiago César Farias da Silva | Superintendência de Administração do Meio Ambiente – SUDEMA, Estado da Paraíba |
| Vicente Andreu Guillo – Diretor Presidente | Agência Nacional de Águas |
| Willber da Rocha Severo | Secretaria de Portos da Presidência da República |

# Appendix II

## Information sources


ABRAF, 2013. Anuário Estatístico ABRAF 2013 ano base 2012. Brasília, 148p.

Agostinho, A.A., Thomaz, S.M., Gomes, L.C. 2005. Conservação da biodiversidade em águas continentais do Brasil. **Megadiversidade** vol. 1, No. 1. July 2005.

A Lista Brasileira de Anfíbios e Répteis [*The Brazilian List of Amphibians and Reptiles*]. Sociedade Brasileira de Herpetologia, 2010.

AmphibiaWeb: Information on amphibian biology and conservation. [web application]. 2014. Berkeley, California: AmphibiaWeb. Available at: http://amphibiaweb.org/. Accessed: 27 March 2014.

ANA, 2013. Conjuntura dos Recursos Hídricos no Brasil [*Status of Water Resources in Brazil*]. Brasília, 432p. http://arquivos.ana.gov.br/institucional/spr/conjuntura/webSite_relatorioConjuntura/projeto/index.html

Assunção, J., Gandour, C., Rocha, R., 2012 Deforestation Slowdown in the Legal Amazon: Prices or Policies? Rio de Janeiro: Climate Policy Initiative 2012. http://climatepolicyinitiative.org/publication/deforestation-slowdown-in-the-legal-amazon-prices-or-policies

Bérnils, R. S. e H. C. Costa (org.). 2012. Répteis brasileiros: Lista de espécies. Versão 2012.2. [*Species list. Version 2012.2*]. Available at: http://www.sbherpetologia.org.br/. Sociedade Brasileira de Herpetologia. Accessed on 26 March 2014.

Bioclima Paraná program: www.bioclima.pr.gov.br

Biodiversity Indicators Partnership: http://www.bipindicators.net/

Bolsa Floresta [*Forest Stipend*]: http://fas-amazonas.org/programa-bolsa-floresta/

Bolsa Verde [*Green Stipend Program to Support Environmental Conservation*]: http://www.mma.gov.br/desenvolvimento-rural/bolsa-verde; http://www.icmbio.gov.br/portal/comunicacao/noticias/4-destaques/4815-acoes-integradas-garantem-mais-eficencia-na-preservacao-das-especies.html

Bolsa Verde do Rio de Janeiro [*Rio de Janeiro Green Stock Market*]: www.bvrio.org ; www.bvtrade.org

Brancalion, P.H.S. et al. Finding the money for tropical forest restoration. Unasylva 239, Vol. 63, 2012.

Brasil, 2010. 4th National Report to the CBD. Available at: http://www.cbd.int/reports/nr4/default.shtml

Brasil. 2012. O que o brasileiro pensa do meio ambiente e do consumo sustentável: Pesquisa nacional de opinião: principais resultados [*What do Brazlians think about environment and sustainable consumption: National opinion poll: main results*]. Ministério do Meio Ambiente. Secretaria de Articulação Institucional e Cidadania Ambiental. www.conferenciameioambiente.gov.br/wp-content/uploads/2013/02/o-que-o-brasileiro-pensa-do-meio-ambiente-e-do-consumo-sustentavel.pdf

Brasil: MacroZEE da Amazônia Legal: Estratégias de transição para a sustentabilidade. Brasília: MMA, 2010. Available at: http://www.mma.gov.br/gestao-territorial/zoneamento-territorial/macrozee-da-amazônia-legal/item/8201-mapa-principal

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

Brazil – MMA/SBF, 2009. Informe sobre as Espécies Exóticas Invasoras Marinhas no Brasil [*Report on Invasive Alien Species Affecting the Brazilian Marine Environment*]. 439 p.

Brasil – MMA/SBF, 2014. Informe sobre as Espécies Exóticas Invasoras de Águas Continentais no Brasil [*Report on Freshwater Invasive Alien Species in Brazil*]. Série Biodiversidade 39. Brasília, 803 p.

Brasil, Ministério das Cidades, Secretaria Nacional de Saneamento Ambiental – SNSA, 2014. Sistema Nacional de Informações sobre Saneamento: Diagnóstico dos Serviços de Água e Esgotos. Brasília, 164 p. www.snis.gov.br

Cadastro Ambiental Rural [Rural Environmental Registry] – CAR: www.mma.gov.br/informma/item/10112-sistema-do-cadastro-ambiental-rural-já-vigora-em-todo-o-brasil, www.observatorioflorestal.org.br/?p=1338, www.institutocarbonobrasil.com.br/noticias6/noticia=737013

Cavalcante et al. (2012) Pollination requirements and the foraging behavior of potential pollinators of cultivated Brazil nut (*Bertholletia excelsa* Bonpl.) trees in Central Amazon rainforest. *Psyche* Article ID 978019, 9 p.

Cavalcanti, T .B. New taxa in Diplusodon (Lythraceae) from Brazil. Phytotaxa, v. 38, p. 29-35, 2011.

Chacon, R.G.; Yamamoto, K.; Cavalcanti, T. B. *Ouratea lancifolia* R.G. Chacon & K. Yamamoto (Ochnaceae), uma nova espécie do Cerrado, Brasil. Revista Brasileira de Botânica (Impresso) JCR, v. 34, p. 603-605, 2011.

Chame, M. (FIOCRUZ), 2014. Analysis of the working document. Contribution to SBSTTA-18.

Comitê Brasileiro de Registros Ornitológicos [*Brazilian Committee of Ornithological Records*] (2014). Listas das aves do Brasil [*Lists of Brazilian birds*]. 11ª Edição. Available at: http://www.cbro.org.br. Accessed on 29 July 2014.

Compensation of GHG emissions during the 2014 World Cup in Brazil: www.mma.gov.br/informma/item/10251-brasil-compensa-dez-vezes-mais-emissão-de-carbono-no-mundial

Confederação Nacional da Indústria, 2014. Decisões da CDB e o setor de negócios [*Impact Study of the Adoption and Implementation of the Nagoya Protocolo n the Brazilian Industry*]. Brasília, 184 p. file:///C:/Users/86948750125/Downloads/Nagoya_Protocol_on_the_Brazilian_Industry.pdf

Cordeiro, J.L. & Hasenack, H., 2009. Cobertura vegetal atual do Rio Grande do Sul. Pag. 285-299. In: Campos sulinos: conservação e uso sustentável da biodiversidade (Valério De Patta Pillar, Sandra Cristina Müller & Zélia Victor Ávila Jacques, eds.). Brasília: MMA.

Costa, L.C. ; Valls, J.F.M. *Stylosanthes* in Lista de Espécies da Flora do Brasil. Jardim Botânico do Rio de Janeiro. <http://floradobrasil.jbrj.gov.br/jabot/floradobrasil/FB29854>

Coutinho, A.C. *et al*., 2013. Uso e cobertura da terra nas áreas desflorestadas da Amazônia Legal [*Land use and cover in deforested areas of the Legal Amazon*] – TerraClass 2008. Brasília, DF: Embrapa e Belém, AM: INPE. 108p

Coutinho, L.M., 2006. O conceito de bioma. Acta Bot. Bras. 20(1):1-11.

Davidson, Eric A. et al., 2012. The Amazon basin in transition. Nature, Jan 19, 2012, Vol. 481(7381), p. 321.

Deprá et al. (2013) Pollination deficit in open-field tomato crops (*Solanum lycopersicon* L., Solanaceae) in Rio de Janeiro State, Southeast Brazil. Journal of pollination ecology 11: 8 p.

Development Plan for More Fisheries and Aquaculture: www.mpa.gov.br/images/Docs/Publicidade/Cartilha_SEAP_final.pdf

Deutsche Gesellschaft für Internationale Zusammenarbeit – GIZ, 2012. Integração de Serviços Ecossistêmicos ao Planejamento do Desenvolvimento: Um passo-a-passo para profissionais com base na iniciativa "TEEB" [*Integration of Ecosystem Services into Development Planning: A step-by-step guide for practitioners based on the TEEB Initiative*]. Brasília, 81 p.

EDUCARES online tool: http://educares.mma.gov.br/index.php/main

EMBRAPA, 2003. Oliveira, M.D. Ocorrência e impactos do mexilhão dourado (*Limnoperna fortunei*, Dunker 1857) no Pantanal Mato-Grossense. Circular Técnica 38. http://www.cpap.embrapa.br/publicacoes/online/CT38.pdf

Fearnside, P.M. 2013. A exploração de áreas sob floresta amazônica e a ruptura do equilíbrio do ambiente. pp. 91-100 In: L.P.M. Plese, S.T. Teixeira, A.M.L. Garcia, C. Roweder, C.G. da Silva, C.S. de Farias, E.C.O. Sanchez, J.M.P.R. de Alcântra & M.A.C. Teixeira (eds.) *Áreas Degradadas da Amazônia: Perspectivas Sustentáveis para Exploração Econômica*. Instituto Federal de Educação, Ciência e Tecnologia do Acre (IFAC), Rio Branco, Acre. 100 pp.

http://philip.inpa.gov.br/publ_livres/2013/A%20exploração%20de%20áreas%20sob%20floresta%20Amazônica-IFAC.pdf

Fearnside, P.M., 2014. Conservation research in Brazilian Amazonia and its contribution to biodiversity maintenance and sustainable use of tropical forests. pp. 12-27. In: *1st Conference on Biodiversity in the Congo Basin, 6-10 June 2014, Kisangani, Democratic Republic of Congo*. Consortium Congo 2010, Université de Kisangani, Kisangani, Democratic Republic of Congo. 221 pp. Available at: http://philip.inpa.gov.br/publ_livres/2014/Conservation_Research-in-Brazilian-Amazonia_Kisingani.pdf

Ferreira et al. (2013) What do we know about the effects of landscape changes on plant-pollinator interaction networks? *Ecological indicators* 31:35-40.

Filgueiras, T.S.; Longhi-Wagner, H.M.; Viana, P.L.; Zanin, A.; Oliveira, R.C.; Canto-Dorow, T.S.; Shirasuna, R.T.; Valls, J.F.M.; Oliveira, R.P.; Rodrigues, R.S.; Santos-Gonçalves, A.P.; Welker, C.A.D.; Ferreira, F.M.; Carvalho, M.L.S.; Silva, A.S.; Reis, P.A.; Dorea, M.C.; Silva, C.; Mota, A.C. *Poaceae* in Lista de Espécies da Flora do Brasil. Jardim Botânico do Rio de Janeiro. <http://floradobrasil.jbrj.gov.br/jabot/floradobrasil/FB193>

FIOCRUZ – Olimpíadas Brasileiras em Saúde e Meio Ambiente [*Brazilian Games on Health and the Environment*] – OBSMA: http://www.olimpiada.fiocruz.br/node/37

FIOCRUZ – Wide Views on Biodiversity: http://www.museudavida.fiocruz.br/biodiversidade; http://www.museudavida.fiocruz.br/cgi/cgilua.exe/sys/start.htm?UserActiveTemplate=mvida&sid=322

Fire occurrences data: http://www.dpi.inpe.br/proarco/bdqueimadas; http://sigma.cptec.inpe.br/ciman/; http://www.inpe.br/queimadas/estatisticas.php; http://www.obt.inpe.br/prodes/index.php

Gaglianone et al. (2010) Importância de Centridini (Apidae) na polinização de plantas de interesse agrícola: o maracujá-doce (*Passiflora alata* Curtis) como estudo de caso na região sudeste do Brasil [*Importance of Centridini (Apidae) to the pollination of plants of agricultural interest: the sweet passion fruit (*Passiflora alata *Curtis) as a case study in the southeast region of Brazil*]. *Oecologia australis* 14:152-164.

Garibaldi et al. (2013) Wild pollinators enhance fruit set of crops regardless of honey bee abundance. *Science* 339:1608-1611.

Gene bank – EMBRAPA CENARGEN: https://www.embrapa.br/busca-de-noticias/-/noticia/1663125/embrapa-inaugura-terceiro-maior-banco-genetico-do-mundo

Golden mussel: file:///D:/Downloads/Relatorio_Forca_Tarefa_Nacional_Mexilhao-dourado.pdf; www.ibama.gov.br/areas-tematicas/mexilhao-dourado

Graham, S. A.; Cavalcanti, T. B. Taxonomic Revision of Cuphea sect. *Euandra* subsect. *Oidemation* (Lythraceae). Phytotaxam v. 113, p. 1-86, 2013.

Green Passport: www.passaporteverde.org.br

Hydroelectric power plants data: www.aneel.gov.br/aplicacoes/capacidadebrasil/capacidadebrasil.cfm , accessed on 30 July 2014

IBAMA, 2010. Relatório do Projeto de Monitoramento do Desmatamento nos Biomas Brasileiros por Satélite: Monitoramento do Bioma Cerrado 2009-2010 [*Report on the Brazilian Biomes Deforestation Satellite Monitoring Program: Monitoring of the Cerrado Biome 2009-2010*]. siscom.ibama.gov.br/monitorabiomas/cerrado/RELATORIO%20FINAL_CERRADO_2010.pdf

IBGE, 2012. Censo Agropecuário 2006: Segunda Apuração. Rio de Janeiro, 774 p.

IBGE, 2013. Perfil dos estados brasileiros 2013. IBGE: Diretoria de Pesquisas. www.ibge.gov.br

ICMBio, in press. Diagnóstico da Fauna: Resultados parciais 2012-2014.

ICMBio, 2014. Diagnóstico da Fauna: Avaliação do Estado de Conservação de Espécies da Fauna Brasileira. Internal report to MMA.

ICMBio Assessment of the conservation status of Brazilian species: ICMBio, 2014. Diagnóstico da Fauna: Avaliação do Estado de Conservação de Espécies da Fauna Brasileira. Internal report to

MMA. http://www.icmbio.gov.br/portal/biodiversidade/fauna-brasileira/avaliacao-do-risco-de-extincao.html

IMAZON & FGV, 2012. Marco regulatório sobre pagamento por serviços ambientais no Brasil (*Regulatory framework for the payment for ecosystem services in Brazil*) / Organizado por Priscilla Santos; Brenda Brito; Fernanda Maschietto; Guarany Osório; Mário Monzoni. – Belém, PA: IMAZON; FGV. CVces, 2012.

Imperatriz-Fonseca et al. (2012) O desaparecimento das abelhas melíferas (*Apis mellifera*) e as perspectivas do uso de abelhas não melíferas na polinização [*The disappearance of honey bees (*Apis mellifera*) and the perspectives for the use of non-honey bees in pollination*]. *Embrapa Semiárido. Documentos*, 249:213-226.

Iniciativa Capital Natural do Brasil – EEB Brazil: http://teebnegociosbrasil.com.br/; http://www.mma.gov.br/publicacoes/biodiversidade/category/143-economia-dos-ecossistemas-e-da-biodiversidade; http://www.portaldaindustria.com.br/cni/iniciativas/eventos/2014/03/1,35239/workshop-internacional-negocios-e-capital-natural-dialogos-para-uma-parceria-sustentavel.html

Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis, 2013. Relatório de Qualidade do Meio Ambiente – RQMA: Brasília, IBAMA/Diretoria de Qualidade Ambiental, 268 p.

Instituto de Energia e Meio Ambiente, 2014. 1º Diagnóstico da Rede de Monitoramento da Qualidade do Ar no Brasil. 277 p.

Instituto LIFE: http://institutolife.org/ ; http://www.gazetadopovo.com.br/vidaecidadania/meio-ambiente/conteudo.phtml?tl=1&id=1430460&tit=Selo-Life-reconhece-empresas-verdes

International Biodiversity Day announcements: http://www.icmbio.gov.br/portal/comunicacao/noticias/4-destaques/4815-acoes-integradas-garantem-mais-eficencia-na-preservacao-das-especies.html; http://www.icmbio.gov.br/portal/comunicacao/noticias/4-destaques/4813-governo-anuncia-novas-medidas-para-protecao-da-fauna-brasileira.html; http://www.mma.gov.br/informma/item/10143-governo-comemora-resultados-e-amplia-a%C3%A7%C3%B5es-em-defesa-da-fauna

International cooperation projects under implementation in 2011: http://www.mma.gov.br/assuntos-internacionais/temas-multilaterais; http://www.abc.gov.br/Projetos/CooperacaoRecebida/ProjetoseAtividades

IPEA 2014. Políticas agroambientais e sustentabilidade: desafios, oportunidades e lições aprendidas. Brasília, 273 p.

Kennedy et al. (2013) A global quantitative synthesis of local and landscape effects on wild bee pollinators in agroecosystems. *Ecology letters* 16:584-589.

LEED – Liderança em Energia e Design Ambiental [*environmentally-friendly buildings*]: http://planetasustentavel.abril.com.br/noticia/desenvolvimento/conteudo_298573.shtml

Lenzen, M. et al., 2012. International trade drives biodiversity threats in developing nations. Nature, Vol.486. 109-112 (07 June 2012).

Lewinsohn, T. M. e P. I. Prado. 2005. How many species are there in Brazil? *Conservation Biology*, 19: 619-624.

Lewinsohn, T. M; Prado, P. I.. 2005. Quantas espécies há no Brasil? [*How many species are there in Brazil?*]. Megadiversidade. http://www.conservacao.org/publicacoes/megadiversidade/07Lewinsohn_Prado.pdf

Lista Anotada dos Mamíferos do Brasil [*Annotated List of Brazilian Mammals*]. Conservation Biology, 2012.

Lista das Aves do Brasil [*List of Brazilian Birds*]. Comitê Brasileiro de Registros Ornitológicos (CBRO), 2011; and Marini, M.A & Garcia, F.I., 2005. Conservação de Aves no Brasil [*Conservation of Birds in Brazil*]. Megadiversidade vol 1, nº1/2005.

Lista de Espécies da Flora do Brasil. [*Species List of the Brazilian Flora*] Jardim Botânico do Rio de Janeiro. Available at: http://floradobrasil.jbrj.gov.br/. Accessed on: 24 March 2014.

Longhi-Wagner, H.M.; Valls, J.F.M.; Oliveira, R.C.; Zanin, A.; Guglieri, A.; Oliveira, R.P.; Clark, L.G.; Canto-Dorow, T.; Boldrini, I.I.; Filgueiras, T.; Londoño, X. 2011. Checklist of Spermatophyta of

the São Paulo State, Brazil: Poaceae. Biota Neotropica v.11, n.1a, p.342-354. http://www.biotaneotropica.org.br/v11n1a/en/abstract?inventory+bn0131101a2011

Machado, F.S. et al, 2012. Metas brasileiras de biodiversidade para 2020: exemplo de construção participativa no marco da Convenção de Diversidade Biológica – CDB/ONU. In: Bahia Análise & Dados, vol. 22, No. 3.

Macro-ZEE da Amazônia Legal [*Macro-ZEE of the Legal Amazon*]: http://www.mma.gov.br/atlaszeeamazonia

Magalhães & Freitas (2013) Introducing nests of the oil-collecting bee *Centris analis* (Hymenoptera: Apidae: Centridini) for pollination of acerola (*Malpighia emarginata*). *Apidologie* 44:234-239.

Mangelli, T.S. & Creed, J.C., 2012.Análise comparativa da abundância do coral invasor Tubastrea spp. (Cnidaria, Anthozoa) em substratos naturais e artificiais na Ilha Grande, Rio de Janeiro, Brasil. Iheringia, Sér. Zool. Vol.102 no.2, Porto Alegre, Junho 2012. www.scielo.br/scielo.php?script=sci_arttext&pid=S0073-47212012000200002

Mangroves Project: www.icmbio.gov.br/portal/comunicacao/noticias/20-geral/4565-pan-manguezal-planeja-acoes-nas-regioes-sul-e-sudeste.html; www.icmbio.gov.br/portal/o-que-fazemos/programas-e-projetos/projeto-manguezais-do-brasil.html

Mansur, M.C.D. et al., organizadores, 2012. Moluscos límnicos invasores no Brasil: biologia, prevenção e controle. Porto Alegre: Redes Editora, 412 p.

Map of priority areas for the conservation and sustainable use of Brazilian biodiversity: http://www.mma.gov.br/biodiversidade/projetos-sobre-a-biodiveridade/projeto-de-conserva%C3%A7%C3%A3o-e-utiliza%C3%A7%C3%A3o-sustent%C3%A1vel-da-diversidade-biol%C3%B3gica-brasileira-probio-i/%C3%A1reas-priorit%C3%A1rias

MAPA, 2013. Projeções do Agronegócio: Brasil 2012/2013 a 2022/2023. Brasília: 96 p.

Margules, C.R. & Pressey, R.L., 2000. Systematic Conservation Planning methodology. Nature, v.405, pages 243-253.

Martinelli, G. & Moraes, M.A. 2013. Livro vermelho da flora do Brasil. Andrea Jakobsson: Instituto de Pesquisas Jardim Botânico do Rio de Janeiro, 1100p. Available online at: cncflora.jbrj.gov.br/LivroVermelho.pdf

May, Peter H. et al., 2012. The "Ecological" Value Added Tax (ICMS-Ecológico) in Brazil and its effectiveness in State biodiversity conservation: a comparative analysis. In: Proceedings of the 12th Biannual Conference of the International Society for Ecological Economics, Rio de Janeiro. 2012.

May, P.H. and Weiss, J. 2014. Brazil's response to Aichi Goal 3 to reduce subsidies and perverse incentives harmful to biodiversity and ecosystem service provision. Contribution to SBSTTA-18.

MCTI, 2013. Estimativas anuais de emissões de gases de efeito estufa no Brasil. SEPED/CGMC/MCTI. Brasília, 80 p.

Medeiros, M. B.; Walter, B. M. T.; Prereira-Silva, G.; Gomes, B.M.; Lima, I. L. P.; S.R. Silva; Moser, P.; Oliveira, W.L.; Cavalcanti, T. B.. Vascular Flora of the Tocantins River Middle Basin, Brazil. Check List (São Paulo. Online), v. 8(5), p. 852-885, 2012.

Medeiros, R., Young, C.E.F., Pavese, H.B. and Araújo, F.F.S., 2011. Contribuição das Unidades de Conservação Brasileiras para a Economia Nacional: Sumário Executivo. Brasília: UNEP-WCMC, 44 p. This study was carried out under the technical coordination of researchers from the Rio de Janeiro Rural Federal University, technical support from the German government – GIZ and Brazilian Government Applied Economics Research Institute - IPEA, and financial support from DEFRA-UK. http://www.mma.gov.br/estruturas/sbf2008_dap/_publicacao/149_publicacao07062011122228.pdf

Milfont et al. (2013) Higher soybean production using honeybee and wild pollinators, a sustainable alternative to pesticides and autopollination. *Environ Chem Lett* 11:335-241.

Ministério de Ciência, Tecnologia e Inovação – MCTI, 2013. Estimativas anuais de emissões de gases de efeito estufa no Brasil [*Annual estimate of greenhouse gas emissions in Brazil*]. Brasília, 80 p.

Ministério da Pesca e Aquicultura, 2014. Instrução Normativa Interministerial nº 6, de 17 de julho de 2014. http://pesquisa.in.gov.br/imprensa/jsp/visualiza/index.jsp?jornal=1000&pagina=13&data=18/07/2014

Ministério do Meio Ambiente, 2012. Diretrizes para o Engajamento do Setor Empresarial com a Biodiversidade: Tradução para o português da publicação japonesa *Directives for engaging the business sector with biodiversity* [Portuguese version of the Japanese publication *Directives for engaging the business sector with biodiversity*]. Brasília, 162 p.

Ministério do Meio Ambiente/GBA, 2013 e 2014. Unpublished. Information Note to support the Presidential Message.

Ministério do Meio Ambiente /DPCD/SMCQ, 2014. Unpublished draft of the National Plan on Climate Change.

MMA-PNIA 2012, in press. Painel Nacional de Indicadores Ambientais – PNIA [National Panel on Environmental Indicators].

MMA, 2010. Panorama da conservação dos ecossistemas costeiros e marinhos no Brasil. SBF/GBA, Brasília: 148p.

MMA, 2012. Panorama da conservação dos ecossistemas costeiros e marinhos no Brasil. SBF/GBA, Brasília: 156 p.

MMA, 2013. Mapeamentos para a conservação e recuperação da biodiversidade na Mata Atlântica: em busca de uma estratégia espacial integradora para orientar ações aplicadas [*Mapping for biodiversity conservaiton and recuperation in the Atlantic Forest: in search of a spatial integrating strategy to guide practical actions*]. André A. Cunha & Fátima B. Guedes, Editors. Brasília, 216 p.

MMA, 2013. Mortandade disseminada das abelhas devido ao uso de agrotóxicos. PowerPoint presentation for a Public Hearing held on 04 July 2013. file:///D:/Downloads/Audiência%20pública_polinizadores_4julho13.pdf

MMA, 2014. Inventário Nacional de Emissões Atmosféricas por Veículos Automotores Rodoviários 2013 (ano base 2012). Brasília, 114 p.

MMA, 2014. Nota Informativa nº 51/2014/DCBIO/SBF/MMA, de 17 de julho de 2014.

MMA, 2014. Inventário Nacional de Emissões Atmosféricas por Veículos Automotores Rodoviários 2013 (ano base 2012). Brasília, 114 p.

MMA, ICMBio, and IBAMA, 2014. Draft National Work Plan Proposal for the implementation of the REVIMAR. Internal Report, 24 p.

Movimento Empresarial pela Biodiversidade [*Brasil Business Biodiversity Initiative*] – MEBB: http://mebbrasil.org.br/

MPA, 2011. Boletim Estatístico da Pesca e Aquicultura – versão preliminar [*Statistical Bulletin on Fisheries and Aquaculture – draft version*]. Brasília, 60p.

Museu Paraense Emílio Goeldi [*Emílio Goeldi Museum*]: http://www.museu-goeldi.br/censo/; http://issuu.com/museu-goeldi/docs/catalogo_milenio?e=2748846/3201389

National opinion poll on environment and sustainable consumption: http://www.brasil.gov.br/meio-ambiente/2012/08/pesquisa-revela-o-que-o-brasileiro-pensa-do-meio-ambiente-e-do-consumo-sustentavel

Native biodiversity and organic products: http://www.mds.gov.br/saladeimprensa/noticias/2014/junho/quiosque-brasil-organico-sustentavel-e-vitrine-para-expositores

Neonicotinoids and pollinators: http://onlinelibrary.wiley.com/doi/10.1002/ps.3836/abstract; http://www.nature.com/nature/journal/vaop/ncurrent/full/nature13531.html; http://link.springer.com/article/10.1007/s11356-014-3180-5; http://www.nature.com/nature/journal/vaop/ncurrent/full/nature13642.html; http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0062374; http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0092821; http://onlinelibrary.wiley.com/doi/10.1002/etc.2201/abstract;jsessionid=7D179770D208D74961658788EE2E1698.f03t01?deniedAccessCustomisedMessage=&userIsAuthenticated=false; http://www.bulletinofinsectology.org/pdfarticles/vol67-2014-125-130lu.pdf

Nunes-Silva et al. (2013) The 228xclusiv of *Bombus impatiens* (Apidae, Bombini) on tomato (*Lycopersicon esculentum* Mill., Solanaceae) flowers: pollination and reward perception. *Journal of pollination ecology* 11:33-40.

Oliveira et al. (2012) Abelhas visitantes florais, eficiência polinizadora e requerimentos de polinização na cajazeira (*Spondias mombin*) [*Flower visiting bees, pollination efficiency and pollination requirements in cajá trees (*Spondias mombin*)*]. *Rev Acad Ciênc Agrár Ambient* 10:277-284.

Oliveira, R.C.; Santana, S.H.; Silva, A.S.; Maciel, J.R.; Valls, J.F.M. *Paspalum* L. (Poaceae) no Rio Grande do Norte. Rodriguésia, v.64, n.4, p.847-862, 2013.

Pacto para a Restauração da Mata Atlântica [*Pact for the Restoration of the Atlantic Forest*]: http://www.pactomataatlantica.org.br/noticia-completa.aspx?p=124&lang=pt-br/, http://www.pactomataatlantica.org.br/, http://www.pactomataatlantica.org.br/pdf/conceito_do_pacto.pdf/, http://www.pactomataatlantica.org.br/noticia-completa.aspx?p=119&lang=pt-br

Padovani Ferreira, B. & Coxey, M.S., 2012 unpublished report to the Ministry of the Environment to support the publication of a book on monitoring Brazilian coral reefs. 68p.

Paglia, A.P., Fonseca, G.A.B. da, Rylands, A. B., Herrmann, G., Aguiar, L. M. S., Chiarello, A. G., Leite, Y. L. R., Costa, L. P., Siciliano, S., Kierulff, M. C. M., Mendes, S. L., Tavares, V. da C., Mittermeier, R. A. & Patton J. L. 2012. *Lista Anotada dos Mamíferos do Brasil / Annotated Checklist of Brazilian Mammals.* 2ª Edição / 2nd Edition. *Occasional Papers in Conservation Biology*, No. 6. Conservation International, Arlington, VA. 76 p.

Parceria Empresarial pelos Serviços Ecossistêmicos [*Business Partnership for Ecosystem Services*] – PESE: cebeds.org.br/camaras_restrita/pese/pese

Pereira, D.G., 2005. Impactos de espécies exóticas invasoras sobre espécies nativas: o caso dos calitriquídeos no Parque Nacional da Serra dos Órgãos, RJ. http://www.mma.gov.br/estruturas/174/_arquivos/174_05122008105901.pdf

Plano de Ação de São Paulo [*São Paulo Action Plan*]: http://portaldabiodiversidade.sp.gov.br/a-biodiversidade-no-estado-de-sao-paulo/; http://portaldabiodiversidade.sp.gov.br/files/2014/02/Aichi_impressao_06_02_15_pdf_final.pdf

Plano de Ação para a Prevenção e Controle do Desmatamento e Queimadas no Cerrado [*Action Plan for the Prevention and Control of Deforestation and Fire in the Cerrado*] – PPCerrado: http://www.mma.gov.br/estruturas/201/_arquivos/ppcerrado_201.pdf

Plano de Prevenção e Controle do Desmatamento na Amazônia Legal [*Action Plan for the Prevention and Control of Deforestation in the Legal Amazon*] – PPCDAm: http://www.mma.gov.br/images/arquivo/80120/PPCDAm/_FINAL_PPCDAM.PDF

Plano Nacional de Agroecologia e Produção Orgânica [*National Agroecology and Organic Production Plan*] – PLANAPO: www.mda.gov.br/planapo

PMDBBS – Programa de Monitoramento do Desmatamento dos Biomas Brasileiros por Satélite [*Brazilian Biomes Deforestation Monitoring Program*]. http://siscom.ibama.gov.br/monitorabiomas/

Política Nacional de Desenvolvimento Sustentável dos Povos e Comunidades Tradicionais – PNPCT: http://www.mma.gov.br/desenvolvimento-rural/terras-ind%C3%ADgenas,-povos-e-comunidades-tradicionais

Política Nacional de Gestão Territorial e Ambiental de Terras Indígenas – PNGATI [*National Policy on Territorial and Environmental Management of Indigenous Lands*]: http://www.funai.gov.br/pngati/

Portal YPADÊ: www.caa.org.br/ypade

Prates, A.P.L. 2003. Recifes de coral e unidades de conservação costeiras e marinhas no Brasil: uma análise da representatividade e eficiência na conservação da biodiversidade. Brasília (DF): Universidade de Brasília.

PROCONVE: http://www.ibama.gov.br/areas-tematicas-qa/programa-proconve

Prodes/INPE and PMDBBS/IBAMA data accessed in June 2014: http://www.obt.inpe.br/prodes/index.php; http://siscom.ibama.gov.br/monitorabiomas/index.htm ; http://siscom.ibama.gov.br/monitorabiomas/mataatlantica/APRESENTACAO%20MATA%20ATLANTICA%202008%202009.pdf

Pró-Espécies – Programa Nacional de Conservação das Espécies Ameaçadas de Extinção [*Pro-Species – National Program for the Conservation of Species Threatened with Extinction*], created by Administrative Ruling 43/2014.

Programa de Revitalização de Bacias Hidrográficas [*Watershed Revitalization Program*]: www.mma.gov.br/agua/bacias-hidrograficas/revitalização-de-bacias-hidrográficas ; Presidência da República, 2014. Mensagem ao Congresso Nacional, 2014: 4ª Sessão Legislativa Ordinária da 54ª Legislatura. Brasília: 468.

Programa Produtor de Água [*Water Producer Program*]: produtordeagua.ana.gov.br/Principal.aspx ; www.abar.org.br/acontece-nas-agencias/2595-ana-apresenta-programa-produtor-de-agua-na-camara.html

Projeto Corredor Ecológico da Região do Jalapão: http://www.icmbio.gov.br/portal/comunicacao/noticias/20-geral/4433-projeto-corredor-ecologico-do-jalapao-e-concluido.html?highlight=WyJyZWxhdFx1MDBmM3JpbyIsImRlIiwiZ2VzdFx1MDBlM28iLCJyZWxhdFx1MDBmM3JpbyBkZSIsInJlbGF0XHUwMGYzcmlvIGRl; http://www.icmbio.gov.br/projetojalapao/pt/quem-somos.html

Projeto de Gestão Ambiental em Terras Indígenas [*Indigenous Environmental and Territorial Management Project*] – GATI: http://cggamgati.funai.gov.br/index.php/projeto-gati/o-que-e-o-gati/

Queiroz, A.R.S. and Motta-Veiga, M. 2012. Analysis of the social and health impacts of large hydroelectric plants: lessons for a sustainable energy management. Ciência & Saúde Coletiva, Vol. 17(6), p. 1387(12). June, 2012.

Ramos, D.M.; Valls, J.F.M.; Oliveira, R.C.; Graciano-Ribeiro, D. A New awned species of *Paspalum* (Poaceae: Paniceae) from Central Brazil. Novon: A Journal for Botanical Nomenclature, v.21, p.368-372, 2011. [*Paspalum rostratum* D. Ramos, Valls & R. C. Oliveira].

ReefCheck Brasil: http://www.mma.gov.br/biodiversidade/biodiversidade-aquatica/zona-costeira-e-marinha/recifes-de-coral and Padovani & Coxey, 2012 unpublished report to the Ministry of the Environment to support the publication of a book on monitoring Brazilian coral reefs. 68p.

Reis, A., Tres, D.R., Scariot, E.C., 2007. Restauração na Floresta Ombrófila Mista através da sucessão natural. Pesq. Flor. Bras., Colombo, n.55, p. 67-73, jul./dez. 2007.

Rizzardo et al. (2012) *Apis mellifera* pollination improves agronomic productivity of anemophilous castor bean (*Ricinus communis*). *An Acad Bras Cienc* 84:1137-1145.

Rosa, R.S. & Lima, F.C.T. 2010. Os peixes brasileiros ameaçados de extinção [*Brazilian threatened fish species*]. In: Machado, A.B.M.; Drummond, G.M. & Paglia, A.P. (Eds.). *Livro vermelho da fauna brasileira ameaçada de extinção*. Brasília, DF: MMA; Belo Horizonte, MG: Fundação Biodiversitas. 2v. (1420 p.).

Rosa et al. (2011) Honey bee contribution to canola pollination in Southern Brazil. *Sci Agric* 68:255-259.

RS Biodiversidade [*Rio Grande do Sul Biodiversity Conservation Project*]: http://www.biodiversidade.rs.gov.br/

Rua, G.H.; Valls, J.F.M. On the taxonomic status of the genus *Thrasyopsis* (Poaceae, Panicoideae, Paspaleae): new combinations in *Paspalum*. Phytotaxa, v.73, p.60-66, 2012.

Ruiz-Miranda, C. R. et al., 2006. Behavioral and ecological interactions between reintroduced golden lion tamarins (*Leontopithecus rosalia* Linnaeus, 1766) and introduced marmosets (*Callithrix* spp, Linnaeus 1758) in Brazil's Atlantic Coast forest fragments. Braz. Arch. Biol. Technol. Vol.49 no. 1 Curitiba Jan. 2006. http://www.scielo.br/scielo.php?pid=S1516-89132006000100012&script=sci_arttext&tlng=es

Sampaio, A.B. and Schmidt, I.B., 2014. Espécies Exóticas Invasoras em Unidades de Conservação Federais do Brasil. Biodiversidade Brasileira – 2ª Ed., pages 32-49. Brazil: ICMBio. file:///D:/Downloads/351-1751-1-PB.pdf

São Paulo State Map of Sustainable Fisheries: www.sigam.ambiente.sp.gov.br/sigam2/Default.aspx?idPagina=13231

SBF/MMA 2013. Internal Management Report

Secretariat of the Convention on Biological Diversity, 2014. *Global Biodiversity Outlook 4*. Montréal, 155 pages. www.cbd.int/GBO4

SiBBr – Sistema de Informação sobre a Biodiversidade Brasileira: http://www.sibbr.gov.br/

Silva, M.V. & Oliveira, M.A.B., 2013. Situação atual do processo de certificação orgânica no Brasil [*Current status of the organic certification process in Brazil*]. Revista Verde (Mossoró – RN – Brasi) vol. 8, n. 5, p. 20-30 (Edição Especial) dezembro 2013.

Silva-Neto et al. (2013) Native bees pollinate tomato flowers and increase fruit production. *Journal of pollination ecology* 11:41-45.

Silve, E.M. & Pompeu, P.S., 2011. Análise crítica dos estudos de ictiofauna para o licenciamento de 40 PCH no Estado de Minas Gerais. Revista PCH Notícias & SHP News – No. 37. http://www.cerpch.unifei.edu.br/arquivos/artigos/93d3a0cf0697dccba50ed88743d83aee.pdf

Siqueira Filho, J.A.; Conceição, A.A.; Rapini, A.; Coelho, A.O.P.; Zuntini, A.R.; Coutinho, A.J.; Vieira, A.O.S.; Prata, A.P.N.; Machado, A.F.P.; Alves-Araújo, A.G.; Melo, A.L.; Amorim, A.M.A.; Fontana, A.P.; Moreira, .D.R.; Lima, C.T.; Proença, C.E.B.; Luz, C.L.; Kameyama, C.; Caires, C.S.; Bove, C.P.; Mynssen, C.M.; Sá, C.F.C.; Melo, E.; Souza, E.B.; Leme, E.M.C.; Firetti-Leggieri, F.; Salimena, F.R.G.; França, F.; Rainer, H.; Faria Júnior, J.E.Q.; Maciel, J.R.; Lopes, J.C.; Braga, J.M.A.; Stehmann, J.R.; Jardim, J.G.; Pereira, J.F.; Pastore, J.F.B.; Valls, J.F.M.; Melo, J.I.M.; Pirani, J.R.; Silva, J.A.; Paula-Souza, J.; Cardoso, L.J.T.; Matias, L.Q.; Lohmann, L.G.; Queiroz, L.P.; Oliveira, M.A.; Sobral, M.E.G.; Silva, M.J.; Meiado, M.V.; Coelho, M.A.N.; Costa e Silva, M.B.; Mamede, M.C.H.; Lucena, M.F.A.; Pessoa, M.C.R.; Loiola, M.I.B.; Arbo, M.M.; Barbosa, M.R.V.; Marchioretto, M.S.; Buril, M.T.; Bovini, M.G.; Bueno, N.C.; Fiaschi, P.; Borges, R.A.X.; Forzza, R.C.; Sebastiani, R.; Mello-Silva, R.; Couto, R.S.; Lima, R.B.; Pereira, R.C.A.; Marquete, R.; Barreto, R.C.; Xavier, S.R.S.; Profice, S.R.; Cavalcanti, T.B.; Silva, T.R.S.; Pott, V.J.; Klein, V.L.G.; Souza, V.C. "A flora das caatingas do Rio São Francisco." In: Siqueira Filho, J.A. (org.). Flora das Caatingas: História natural e conservação. Rio de Janeiro: Andrea Jakobsson, 2012. 556 pp. [Cap.13, p.447-452].

Sistema de Autorização e Informação em Biodiversidade – SISBio: www.icmbio.gov.br/sisbio/

Sistema de Informações em Saúde Silvestre [*Wildlife Health Information System*] – SISS-Geo: http://www.biodiversidade.ciss.fiocruz.br/como-usar; http://www.biodiversidade.ciss.fiocruz.br

Sistema de Informações Gerenciais da Produção Orgânica – SigOrgWeb: sistemasweb.agricultura.gov.br/pages/SIGORGWEB.html

Sistema Nacional de Pesquisa em Biodiversidade – SISBIOTA [*National Biodiversity Research System*]: http://www.cnpq.br/web/guest/apresentacao11

Soares-Filho, B. 2013. Impacto da revisão do código florestal: como viabilizar o grande desafio adiante? [*Impact of the revision of the forest code: how to enable the great challenge forward?*] Subsecretaria de Desenvolvimento Sustentável, Secretaria de Assuntos Estratégicos da Presidência da República, 1-28p.

Soares-Filho, B.; Rajão, R.; Macedo, M.; Carneiro, A.; Costa, W.; Coe, M.; Rodirgues, H. & Alencar, A. 2014. Cracking Brazil's Forest Code. **Science** 344: 363-364.

Soares Filho, B. et al. 2014. Cracking Brazil's Forest Code. **Science** vol. 344, pp363-364. www.sciencemag.org

Strassburg, B.B.N. et al., 2014. When enough should be enough: Improving the use of current agricultural lands could meet production demands and spare natural habitats in Brazil. Global Environmental Change, 28, pp. 84-97.

Sustainable consumption: http://www.consumosustentavel.gov.br/

TEEB Setor Privado [*Brazilian Business Sector TEEB*]: http://www.conservation.org.br/noticias/noticia.php?id=734

Tendências em Serviços Ecossistêmicos [*Trends in Ecosystem Services*] – TeSE: www.fgv.br/ces

TerraClass 2010 http://www.inpe.br/cra/projetos_pesquisas/sumario_terraclass_2010.pdf

Tozzi, A.M.G.A.; Queiroz, L.P.; Miotto, S.T.S.; Lima, H.C.; Sartori, A.L.B.; Moreira, J.L.A.; Mansano, V.F.; Flores, A.S.; Klitgaard, B.B.; Valls, J.F.M.; Fortunato, R.; Semir, J.; Fortuna-Perez, A.P.; Meireles, E.C.; Carvalho, A.M.; Rodrigues, R.S.; Sciamarelli, A.; Filliettaz, A.M.; Saleh, E.O.L.; Neubert, E.E.; Neves, F.F.D.; Shimizu, G.; Prado, L.R.; Silva, M.J.; Pinheiro, M.; Fantz, P.R.; Pennington, R.T.; Silva, R.R.; Fernandes, A.G.; Brandão, M.; Lima, L.C.P.; Quieroz, R.T. 2011. Checklist of Spermatophyta of the São Paulo State, Brazil. Fabaceae – Faboideae. Biota Neotropica v.11, n.1a, p.267-274. http://www.biotaneotropica.org.br/v11n1a/en/abstract?inventory+bn0131101a2011

UEBT Biodiversity Barometer: http://ethicalbiotrade.org/biodiversity-barometer

Valls, J.F.M. *Arachis* in Lista de Espécies da Flora do Brasil. Jardim Botânico do Rio de Janeiro. <http://floradobrasil.jbrj.gov.br/jabot/floradobrasil/FB22797>

Valls, J.F.M.; Costa, L.C.; Custodio, A.R. A novel trifoliolate species of *Arachis* (Fabaceae) and further comments on the taxonomic section *Trierectoides*. Bonplandia, v.22, n.1, p.91-97, 2013. [*Arachis sesquijuga* Valls, L.C. Costa & Custodio]

van der Valk et al. (2012) Aspects determining the risk of pesticides to wild bees: risk profiles for local crops on three continents. *Julius-Kuhn-Archiv* 437:1-17.

Vegetation cover monitoring data (Amazon): http://www.obt.inpe.br/prodes/index.php

Viana et al. (2012). How well do we understand landscape effects on pollinators and pollination services? *Journal of pollination ecology* 7:31-41.

Viana, J.P. 2013. Boletim regional, urbano e ambiental, vol. 7, Jan-Jun 2013. Brasília: IPEA

Viana, J.P. Chapter 15: Avaliação de duas ações governamentais recentes em apoio a extrativistas – Garantia de Preços Mínimos para Produtos da Sociobiodiversidade e Bolsa Verde. *In*: IPEA, 2013. Estado, planejamento e políticas públicas. Brasília.

Viana, J.P.; Silva, A.P.M.; Roma, J.C.; Saccaro Jr., N.L.; Silva, L.R.; Sano, E.E. & Freitas, D.M. 2013. Avaliação do estado de conservação da biodiversidade brasileira: desigualdades entre regiões e unidades da federação [*Assessment of the conservation status of Brazilian biodiversity: inequalities among regions and states*]. In: Rogério Boueri, Marco Aurélio Costa.(eds.). Brasil em desenvolvimento 2013: estado, planejamento e políticas públicas / Instituto de Pesquisa Econômica Aplicada. Brasília: Ipea, 2013. 3 v. 757-791 p.

Water pollution: www.unicamp.br/unicamp/ju/590/estudo-avalia-impactos-de-efluentes-em-etes; Agencia.fapesp.br/contaminantes_emergentes_na_agua/12846/

Weigand Jr., R. et al, 2011. Metas de Aichi : situação atual [*Aichi targets: current status*]. UICN, WWF-Brasil e IPE.

Witter et al. (2012) Desempenho de cultivares de morango submetidas a diferentes tipos de polinização em cultivo protegido [*Performance of strawberry varieties subjected to different forms of pollination in protected beds*]. *Pesq agropec Bras* 47:58-65.

Zenni, R.D.; Ziller, S.R., 2011. An overview of invasive plants in Brazil. Revista Brasileira de Botânica, Vol. 34(3), p.431.

Zimbres et al (2012) Uso da terra e fragmentação de habitat: efeitos sobre o serviço ecológico dos polinizadores nativos e a produtividade econômica no Cerrado [*Land use and habitat fragmentation: effects on the ecosystem services of native pollinators and economic productivity in the Cerrado*]. *Anais do IV Seminário de Pesquisa e Iniciação Científica do ICMBIO*, p. 103.