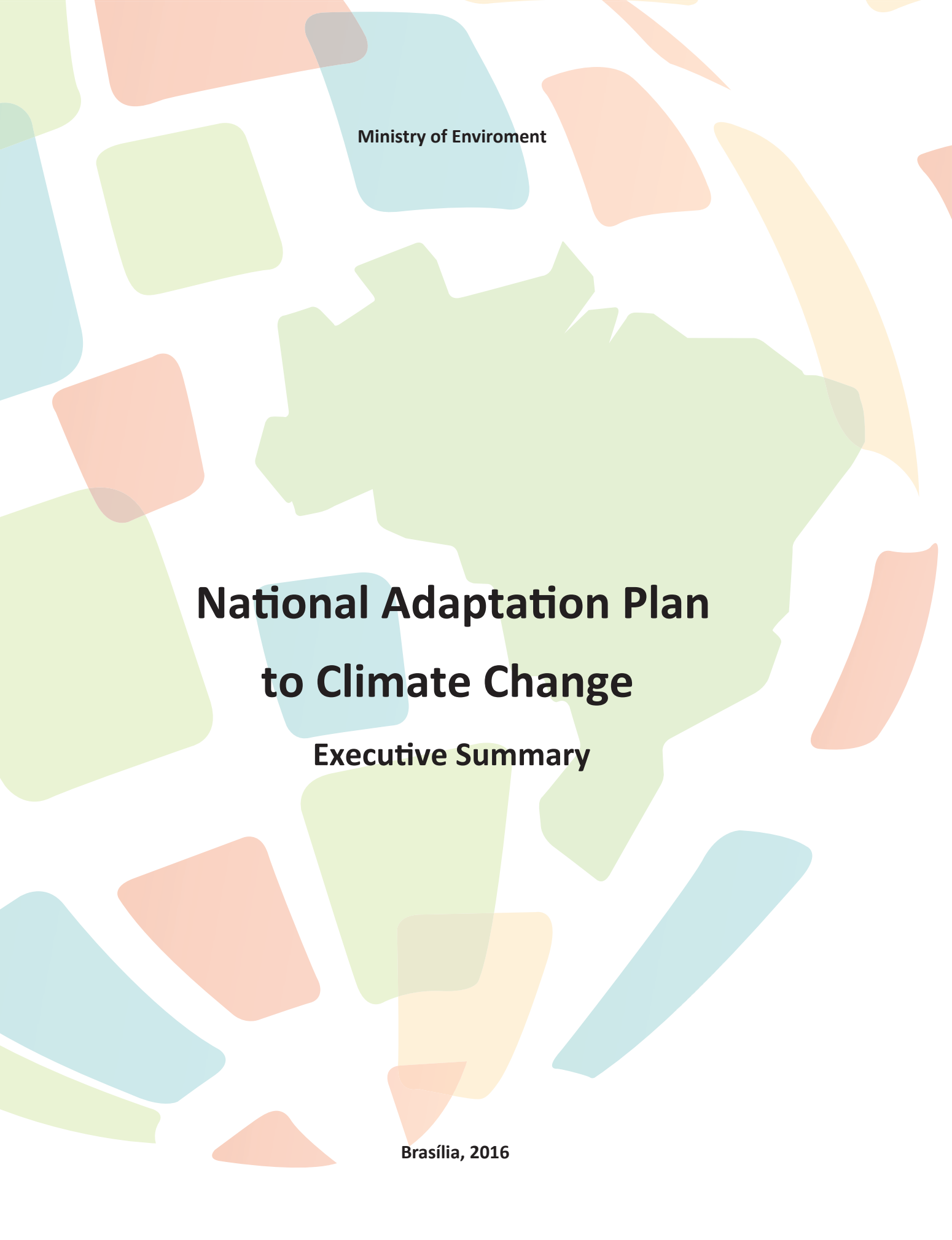


National Adaptation Plan to Climate Change

Executive Summary





Ministry of Environment

National Adaptation Plan to Climate Change

Executive Summary

Brasília, 2016

Federative Republic of Brazil

Dilma Vana Rousseff

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Ministry of Environment

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Minister

Executive Secretariat

Carlos Augusto Klink

Secretary

Secretariat for Climate Change and Environmental Quality

José Domingos Gonzalez Miguez

Secretary

General Coordination of the Working Group on Adaptation to Climate Change

Director for Licensing and Environmental Assessment (MMA)

Karen de Oliveira Silverwood-Cope

General Coordinator for Global Climate Change (MCTI)

Márcio Rojas da Cruz

MMA Technical Team

Adriana Brito da Silva, Jaqueline Leal Madruga, Juliana Faria Nunes, Luiz Gonçalves da Motta, Mariana Egler, Nelcilândia Pereira de Oliveira Kamber, Pedro Christ

MCTI Technical Team

Andrea Araújo, Lidiane Melo, Ricardo Pavan, Sonia Bittencourt

Federal Government Institutions participants of the National Adaptation Plan to Climate Change

ANA	National Water Agency	MCTI	Ministry of Science, Technology and Innovation
CAISAN	Inter-ministerial Chamber for Food and Nutritional Security	MI	Ministry of National Integration
Casa Civil/PR	Staff of the Presidency of the Republic	MCid	Ministry of Cities
Cemaden	National Centre for Monitoring of Natural Disasters	MRE	Ministry of External Relations
EMBRAPA	Brazilian Agricultural Research Corporation	MME	Ministry of Mines and Energy
FBMC	Brazilian Forum on Climate Change	MDA	Ministry of Agrarian Development
FUNAI	National Indian Foundation	MDS	Ministry of Social Development and Combating Hunger
FioCruz	Oswaldo Cruz Foundation	MDIC	Ministry of Development, Industry and Foreign Trade
IBAMA	Brazilian Institute for Environment and Natural Renewable Resources	MMA	Ministry of Environment
ICMBio	Chico Mendes Institute for Biodiversity Conservation	MPOG	Ministry of Planning, Budget and Management
INPE	National Institute for Space Research	MS	Ministry of Health
MAPA	Ministry of Agriculture, Livestock and Food Supply	MT	Ministry of Transport
		SFB	Brazilian Forestry Service
		CPRM	Geological Survey of Brazil

State, civil-society and private-sector representatives also contributed to the drafting of this plan. See the complete list on the Ministry of Environment website.

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Executive Summary



**National Adaptation Plan
to Climate Change**

1

Executive Summary

The National Adaptation Plan (NAP) was established by Ministry of Environment (MMA) Order 150 of 10th May 2016, published in the Official Gazette (DOU) of 11th May 2016. Coordination of the Plan is entrusted to the Technical Group for Adaptation, established to provide technical and political guidance, to monitor, assess and review its actions, and to establish operational routines and mechanisms for its management.

General objective, vision and principles

The **general objective** of the Plan is to promote reduction and management of climate risk in Brazil and considering the effects of climate change, by taking full advantage of emerging opportunities, avoiding losses and damages, and building instruments to enable adaptation of natural, human, productive and infrastructure systems.

The **vision** underlying the Plan is that all government-policy sectors considered vulnerable to the impacts of climate change must have strategies in place for climate-risk management. The Plan aims to ensure satisfactory and coordinated deployment of sectoral and thematic risk-management strategies, especially in the fields of food and nutritional security, water and electric power. Measures for adaptation need also to be aligned with national socioeconomic development goals, and with coordinated federal, state and municipal public policies for reduction of inequalities. From a long-term perspective, by 2040, the NAP aims to have systemically contributed toward augmenting the Federal Government's capacity to adapt, and to have reduced risks associated with climate change.

Effective adaptation entails assimilation of climate-change risk-management into current public policies, thematic and sectoral plans, and into national development strategies, observing the following **principles**:

Inter-governmental Coordination
Intra-governmental Coordination
Sectoral, thematic and territorial approach
Social, cultural, economic and regional scope
Co-benefits between Adaptation and Mitigation
Incorporation of adaptation to climate change into governmental planning
Basing of adaptation actions on scientific, technical and traditional knowledge
Promotion of Ecosystems based Adaptation (EbA) ¹ in public policies
Promotion of regional cooperation.

Specific objectives

Federal Government activities to promote adaptation to climate change shall seek to provide structure for a sustainable development process that increases resilience from various sectoral and thematic perspectives.

Based upon observation of current domestic and international best practices, and through dialogue with society, governmental bodies and the private sector, the following specific objectives were established:

- Guide the expansion and dissemination of scientific, technical and traditional knowledge in support of the production, management and dissemination of information on climate risks, and develop capacity-building measures for governmental bodies and society in general;
- Promote coordination and cooperation among public agencies for climate-risk management, by means of public-participation processes, with a view to fostering continuous improvement of climate risk-management actions;
- Identify and propose measures to promote adaptation to and reduction of climate risk.

¹ The Concept of Ecosystems based Adaptation (EbA) used in this Plan, implies “management, conservation and restoration of ecosystems, with the aim of providing ecosystem services to enable society to adapt to the impacts of climate change”.

Sectoral and thematic strategies

Mapping of vulnerability to climate change requires the development of sectoral and thematic strategies and consideration of territorial dynamics.

Eleven sectors and themes are encompassed by the NAP namely: Agriculture*, Biodiversity and Ecosystems, Cities and Urban Development, Natural Disasters, Industry* and Mining*, Infrastructure (Electric Power*, Transport and Urban Mobility*), Vulnerable Populations, Water Resources, Health*, Food and Nutritional Security, and Coastal Zones. The sectoral and thematic approach adopted is in line with legal provisions for sharing of responsibilities, priorities and urgencies regarding vulnerability, at the federal level.

There follows a description of each of the main sectorial or thematic strategy goals:

- **Agriculture** – This chapter aims to examine the vulnerabilities of agriculture to climatic change; provide support for the farm sector in implementing actions to promote resilience of agro-ecosystems; foster pursuit of technology transfers; furnish inputs for a review of the Low-Carbon Agriculture Plan (Plano ABC), especially for its Adaptation Programme and for actions to be carried out by 2020.

* Sectoral Plans for Mitigation of and Adaptation to Climate Change for these sectors are contemplated by Law 12187 of 2009, and Decree 7390 of 2010.

- **Biodiversity and Ecosystems** –

Analysis of the impacts of climate change on Brazilian biodiversity and assessment of potential adaptation measures to reduce its vulnerability. Evaluation of the role of biodiversity and of ecosystems in reducing socioeconomic vulnerabilities through provision of ecosystem services.

- **Cities and Urban Development**

– Approach public policies for urban planning and development from a climate standpoint. Identify “no regrets”² actions that contribute directly to reducing vulnerability to climate change and the development of resilient cities.

- **Disaster Risk Management**

– Foster activities targeted at development of risk-reduction capabilities, readiness and prompt response to climate-change related disasters.

- **Industry and Mining**

– Submit basic concepts and guidelines to complement treatment of issues relating to adaptation to climate change, through the Low-Carbon Industry Plan and Low-Carbon Mining Plan, highlighting the cross-cutting nature of actions required and persistent gaps.

- **Infrastructure**

– Present the impacts and vulnerabilities associated to climate change for the Transport, Urban-Mobility and Electric-Power sectors, and suggest guidelines for addressing them.

2 These adaptation actions promote benefits for the sectors regardless of whether the foreseen impacts of climate change come about.

- **Vulnerable Populations** – Identify the population groups most vulnerable to climate change, with a view to fostering their adaptation.
- **Water Resources** – Assess the impacts of climate change on water resources and the main water-user sectors, identifying adaptation measures that best prepare water-resources management and governance for facing up to a scenario of greater climate variance.
- **Health** – Present the vulnerabilities, impacts and risks of climate change to human health, and propose guidelines and strategies for the Unified Health System (SUS) in consonance with the National Policy for Climate Change (PNMC).
- **Food and Nutritional Security** – Assess vulnerabilities, impacts and risks of climate change to Brazilian food and nutritional security and propose

guidelines and practices that contribute toward reducing such vulnerabilities.

- **Coastal Zone** – Identify the current level of exposure to climate change of the Brazilian coastal zone, including the main related impacts and vulnerabilities, and propose actions necessary for development of climate resilience.

Goals agreed upon by objective

The following table presents targets for objectives 1 and 2, to be implemented within the first cycle of the NAP. Under objective 3, the table presents targets for the main sectoral and thematic strategies pursued. Long-standing institutional knowledge and the accumulation of actions for addressing climate change in the sectors involved have enabled close collaboration in the definition of these goals.

Table 1. Goals of the National Adaptation Plan, broken down by specific objective

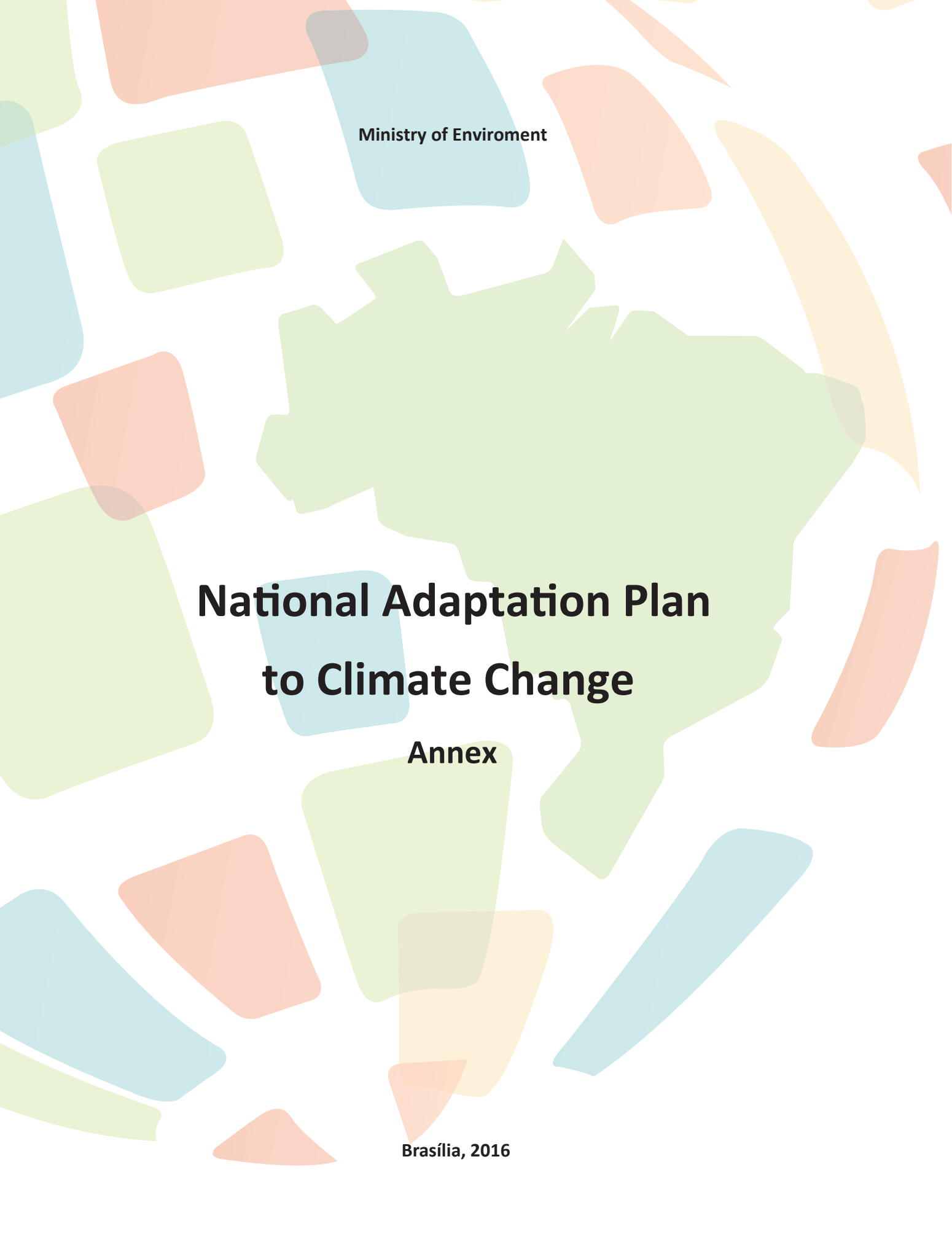
Specific Objectives	Goals	Responsible
Objective 1: Expansion and dissemination of scientific, technical and traditional knowledge: production, management and dissemination of information on climate risk	1.1 Strategy to enhance the quality of climate projections, as inputs for public policies for adaptation, drafted and implemented.	MMA /MCTI
	1.2 Plan of action to implement Technological Needs Assessment (TNA) for adaptation, drafted.	MCTI
	1.3 Online Platform for management of knowledge on adaptation, established and made available to society.	MMA
	1.4 Strategy to expand and strengthen the Climate Network (Rede Clima), drafted and implemented.	MCTI
	1.5 The data integration project for monitoring and observation of impacts of climate change (SISMOI) prepared and implemented.	MCTI
Objective 2: Coordination and cooperation among public agencies and civil society	2.1 Capacity-building strategy for adaptation developed and implemented for various target publics.	MMA
	2.2 NAP monitoring and evaluation system developed and implemented.	MMA
	2.3 Study with systematised information on funding and economic incentives for adaptation made available.	MMA
	2.4 Strategies to promote formulation of public policies for adaptation at the federal, state and municipal levels, drafted.	MMA

Table 1. (CONTINUED) Goals of the National Adaptation Plan, broken down by specific objective

Specific Objectives	Goals	Responsible
<p>Objective 3: Identify and propose measures to promote adaptation to and reduction of climatic risk</p>	Agriculture	
	3.1 Agricultural Risk and Vulnerability Monitoring and Simulation System developed and implemented.	Embrapa
	3.2 Climate Intelligence Centre for Agriculture, designed to assess climate risk for planning and development of Brazilian Agricultural Policies, established.	MAPA
	Biodiversity and Ecosystems	
	3.3 Ecosystem based Adaptation (EbA) Strategy for areas at risk of occurrence of extreme events and other impacts of climate change, drafted.	MMA
	3.4 Modelling of the impact of climate change on biodiversity prepared for use in public policies for conservation, recovery and sustainable use of biodiversity.	MMA
	3.5 Monitoring deployed in 50 Federal Conservation Units, for in situ evaluation and monitoring of current and future impacts of climate change on biodiversity.	ICMBIO
	Vulnerable Populations	
	3.6 Diagnosis of Vulnerability to Climate Change of target populations of the National Policy for Territorial and Environmental Management for Indigenous Lands (PNGATI), drafted.	FUNAI
	3.7 Diagnosis of Vulnerability to Climate Change of target populations of the National Plan for Food and Nutritional Security (PLANSAN), drafted.	MDS
3.8 Diagnosis drafted and Vulnerability to Climate Change of poor populations, beneficiaries of agro-extractivist public policies, reduced.	MMA	

Table 1. (CONTINUED) Goals of the National Adaptation Plan, broken down by specific objective

Specific Objectives	Goals	Responsible
Objective 3: Identify and propose measures to promote adaptation to and reduction of climatic risk	Water Resources	
	3.9 Incorporate measures for adaptation to climate change into actions carried out by the National Water Agency.	ANA
	3.10 Integrated climatic and hydrological modelling carried out and impacts on water-resources management evaluated.	ANA
	Health	
	3.11 Expand the scope of the National Drinking Water Quality Surveillance Program (Vigiagua) to 85% of Brazilian municipalities, by 2019.	MS
	3.12 A research, monitoring and communications network on climate and health established within the SUS.	MS/FIOCRUZ
	Coastal Zone	
	3.13 Reference Centres for Coastal Georeferencing established, providing and organizing information and tools for climate-risk modelling and generation of qualified responses in the Coastal Zone.	MMA
	3.14 Strategy to harmonize continental altimetry with marine bathymetry (AltBat) prepared and with funding earmarked for its execution.	IBGE/MMA
	3.15 Macro-diagnosis of the Coastal Zone (Macro-ZC) reviewed, considering vulnerabilities relating to climate change.	MMA

The background features a large, light green map of Brazil in the center. Surrounding the map are various overlapping, semi-transparent shapes in shades of light blue, light orange, and light green. The text is overlaid on these shapes.

Ministry of Environment

National Adaptation Plan to Climate Change

Annex

Brasília, 2016



ADAPTATION STRATEGY

AGRICULTURE

Objective

The adaptation strategy for agriculture aims to assess vulnerabilities to climate change of the farm sector; to provide support for the development of actions that promote resilience of agro-ecosystems; to foster technology transfers; to provide inputs for the review of the Low-Carbon Agriculture Plan (Plano ABC), in particular its Adaptation Program. The timeframe of this strategy is 2020.

Guidelines

Considering the proposed objectives presented to guide the construction and management of the Adaptation Programme from the Plano ABC, the following guidelines shall be considered:

1. The Agriculture Adaptation Programme will be coordinated by sectorial ministries, and a coordination effort between ministries, agencies and institutions related to the sector will be necessary for its implementation;

2. The Agriculture Adaptation Programme is part of a set of actions developed by the farm sector to address the challenges and impacts of climate change in agriculture in Brazil. Its expected also to contribute to the goal of increasing sustainability in the sector, to promote the achievement of synergies between mitigation of GHG and adaptation actions;

3. Adaptation measures must consider differential sensibilities and ecological needs of crops, the multiple possible changes in

climatic parameters and behaviour, including rise in temperature and higher thermal gradients, and changes in the amount and distribution of rainfall. The first premise is that the sustainability of agricultural systems (in the broadest sense, encompassing agricultural crops, livestock and forestry, as well as various types of integrated systems) must be achieved and guaranteed through development and use of existing and new applied knowledge;

4. It is acknowledged that development of an adaptation strategy needs to consider the best available information. The effectiveness of the Strategy depends on the development of an adequate framework for its implementation and on assured continuity over time, through constant review and improvement, and structured investments in science and technology, and institutions;

5. It's expected to develop initiatives and instruments that will enable and motivate farmers to frame and maintain sustainable production systems, on a variety of scales, using various types of technology, labour and marketing arrangements. Aside from development of suitable technologies, two main actions shall be pursued: establishment of an Agricultural Climate Intelligence Centre, and development of the Monitoring and Agricultural Risk and Vulnerability Simulation System, based upon currently existing and deployed instruments;

6. This strategy has a national geographical range, and considers that Agriculture is one of the most



important economic activities in Brazil, being susceptible to changes in climatic patterns. The Programme must thus entail discussion of structural and crosscutting actions at the federal level and also projects the establishment of local action strategies;

7. Regional Strategy: specification of regional goals shall be based on the elaboration of vulnerability maps representing spatial distribution of vulnerabilities. They should consider identification of opportunities, investments needs, and the social profile of each region, while priority must be given to family farmers. Based on the framework of Plano ABC, efforts must be done to recognize specificities of each region and state, encompassing them in the elaboration and revision of state-level Plano ABC. Institutional arrangements in this level includes the State Management Groups currently active in all states and municipalities, and responsible for local implementation and management of the Plano ABC;

8. The consideration of risks of climate change into sectoral policies is already an intrinsic practice for the agricultural sector. Assessment of its effectiveness, in a context of climate change, needs to take place within the context of a more detailed discussion of the Agriculture Adaptation Programme, with a view to appraise its relevance, possible gaps and antagonisms, and strategies for strengthening its effectiveness;

Goals

Two central activities of the adaptation programme were selected to comprehend the goals defined for the farm sector. These activities have crosscutting effects in several areas and enable the assessment of needs and set of priorities for a diverse array of adaptive measures, thereby adding to the effectiveness of the Adaptation Programme.

Goal:	Responsible:
1. Develop and deploy an Agricultural Risk and Vulnerability Monitoring and Simulation System.	EMBRAPA
2. Establish a Centre for Climatic Intelligence for Agriculture, for application of climate risk analysis in Brazilian Agricultural Policy	MAPA

For more information:
<http://www.mma.gov.br/clima/adaptacao/plano-nacional-de-adaptacao>



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ADAPTATION STRATEGY BIODIVERSITY AND ECOSYSTEMS

Objective

The objective of the adaptation strategy for Biodiversity and Ecosystems is to assess the impacts of climate change on biodiversity in Brazil and identify potential adaptation measures for reducing vulnerabilities; evaluates the role of biodiversity and ecosystems for the reduction of socio-economic vulnerabilities through the provision of ecosystem services.

Guidelines

The strategy of Biodiversity and Ecosystems proposes the following guidelines:

1. Consideration of information on climate change impacts on biodiversity into planning and implementation of public policies for conservation, recovery and sustainable use of biodiversity;
2. Promotion the use of no-regrets measures reducing the vulnerability of biodiversity to climate change. Including as example:
 - Strengthening and expansion of current measures for the promotion of biodiversity conservation, recovery and sustainable use, based on a landscape perspective;
 - Implementation of programs for deforestation monitoring and control in all Brazilian biomes;
 - Strengthening of policies and actions for conservation of aquatic ecosystems; including increment of coastal and marine Conservation Units and areas; improvement of fisheries management programs for conservation and sustainable use of fish stock and implementation of the program for monitoring of coastal and marine ecosystems, incorporating the

impacts of climate change on such systems;

- Strengthening of the production, dissemination and application of knowledge to foster the consideration of ecosystem services in sectorial development plans as agriculture, energy, transport, and urban development, with a view of reducing sectorial and territorial vulnerability to climate change, and promoting and disseminating Ecosystem based Adaptation alternatives and principles (EbA);

3. Incrementing efforts and actions to improve the production, management and dissemination of scientific and traditional knowledge on climate change impacts on biodiversity, also considering possible adaptation measures, to support decision making;

4. Strengthening institutional arrangements in a view of creating an institutional coordination structure, capable of integrating the various information and policies for biodiversity management, such as reduction of deforestation, conservation of biodiversity and recovery of native vegetation, fire monitoring and prediction of occurrence and information on the future impacts of climate change in biodiversity.

Goals

For the biodiversity strategy, three measures were selected as priorities, between adaptation and no-regrets measures:



Goal:	Responsible:
1. Development of an Ecosystem-based Adaptation (EbA) strategy to areas at risk of extreme events and other climate change impacts.	MMA
2. Elaborate studies in climate change modelling addressed to predict impacts of climate change on biodiversity for use in policies for conservation, recovery and sustainable use of biodiversity.	MMA
3. Develop a monitoring programme in 50 Federal Conservation Units, for in situ evaluation and monitoring of the impacts of climate change on current and future biodiversity.	ICMBIO

For more information:
<http://www.mma.gov.br/clima/adaptacao/plano-nacional-de-adaptacao>

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ADAPTATION STRATEGY

CITIES

Objective

The adaptation strategy for Cities aims to apply a climate lens approach to the framework of public policies for urban planning and development and to identify no-regrets actions that contribute directly to reducing vulnerability to climate change and to the development of resilient cities.

Guidelines

1. Promotion of the coordination between the three levels of government with a view to foster the cooperation for the reduction of vulnerability to climate change through the integrated planning and management of the territory by states and municipalities, especially considering public common goods provided by areas located at metropolitan regions and conurbations;

2. Consideration of the adaptation to climate change in processes of rehabilitation of consolidated and degraded urban areas with infrastructure, to foster urban diversity and limit urban expansion, reducing exposure of the population to risks arising inadequate land-use and settlement patterns;

3. Consideration of adaptation to climate change into processes directed to promote urbanization of precarious settlements, aiming of improving housing and living conditions of the population through integrated approaches as installation of urban infrastructure, housing improvements, land-tenure regularisation, environmental restoration and social-welfare;

4. Consideration of adaptation to climate change into large-scale projects for production of social housing, ensuring conveniently-located housing for low-income families living in situations of vulnerability, through decent and resilient infrastructure, with access to urban, social and cultural goods and services and leisure opportunities;

5. Promotion of practices of urban planning integrated to policies and practices for the prevention of disasters and risks occurrences through careful urban-expansion projects, the establishment of standards for urban land-use and land subdivision procedures considering patterns to address to the risks posed by climate change;

6. Promotion of engineering works for containment of hillsides and formulation of Municipal Risk-Reduction Plans (PMRR), increase the number of municipalities benefited, particularly those listed on the National Register of Municipalities with Areas Susceptible to Landslides, Floods or related Geological or Hydrological Processes (CadRisco) as foreseen in Law 12.608, of 10th April 2012;

7. Incorporation of measures for adaptation to climate change into actions for implementation of the National Basic Sanitation Plan (PLANSAB);

8. Strengthening of actions for sustainable urban drainage targeted at reduction of flood, through works and services including containment-basins, heavy-runoff control structures, seepage-drainage systems, riverside parks, recovery of



floodplains, restoration of valley floors and other related measures. These sustainable drainage actions, whenever possible, should comply with Ecosystem-based Adaptation (EbA) principles;

9. Implementation and improvement of water-supply and wastewater services, taking into account socio-economic, public-health, ecological and infrastructural aspects of measures adopted, so as to achieve health and environmental benefits directly associated with such systems seeking, in particular, decontamination of water bodies, multiple use of water, greater energy efficiency, and use of biogas from wastewater and urban solid-waste treatment, and other renewable energy sources;

10. Development of actions for improvement of street cleaning and management of solid wastes, with the aim of expanding pre-sorting in municipalities, appropriate disposal of tailings and eradication of landfills, since more intense rainfall arising from climate change may exacerbate outflows of slurry from dumps that contaminate water bodies, exacerbating the effects of inadequate and disorderly disposal on water courses and dumps and in densely populated urban areas, aggravating flooding risks;

11. Promotion of management and dissemination of information related to climate changes, as inputs for the drafting of diagnostic studies and development of strategies for adaptation, in synergy with urban planning;

12. Development of studies on the impacts of climate change in different cities, as inputs for development of adaptation methodologies for urban infrastructure within urban development policies;

13. Promotions of capacity building for human resources and dissemination of information management technologies, to assist in implementation of strategies and methodologies;

14. Incorporation of adaptation to climate change into enhanced urban planning models, with a view to fostering management of land-use and settlement through approaches that respect environmental preservation and mitigate natural-disaster risks;

15. Coordination of initiatives for review of regulations and technical standards for buildings and urban-planning, with a view to promoting resilient buildings and urban infrastructure.

For more information:

<http://www.mma.gov.br/clima/adaptacao/plano-nacional-de-adaptacao>



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ADAPTATION STRATEGY DISASTER RISK MANAGEMENT

Objective

The main objective of the adaptation strategy for Disaster Risk Management is to promote actions targeted at developing capacities for reduction of risks and preparation and response to disasters in the context of climate change.

Guidelines

The following guidelines were listed as priorities from the context of the adaptation strategy for Disaster Risk Management:

1. Implementation of the National Policy for Protection and Civil Defence – Law 12.608;
2. Implementation of the Ecosystem-based Adaptation (EbA) Measures;
3. Consolidation of an Early Warning System;
4. Implementation of Mechanisms for insurance or transfer of risk;
5. Stimulus for research focused on the understanding of disaster risk.



Figure 1. Location of the 821 municipalities targeted for priority actions under the Programme for Management of Risks and Response to Disasters (PPA 2012-2015)

For more information:

<http://www.mma.gov.br/clima/adaptacao/plano-nacional-de-adaptacao>



ADAPTATION STRATEGY INDUSTRY AND MINING

Objective

The adaptation strategy for Industry and Mining aims to introduce concepts and basic guidelines to complement the approaches regarding adaptation to climate change in the Industry Plan and the Low-Carbon Mining Plan, highlighting the crosscutting nature of actions required and persistent gaps.

Guidelines

The guidelines proposed aim to foster the development of policies that facilitate the adoption of adaptation measures by the private sector and to promote the consideration of the adaptation perspective into decision-making from public and private stakeholders, thereby enabling coordination and convergence with policies of other sectors. These guidelines include:

1. Deepen the knowledge on climate change impacts and specific vulnerabilities on industrial subsectors;
2. Establish an institutional framework to facilitate implementation of adaptation measures;
3. Develop support tools to guide and support decision-making on adaptation by Industry and Mining;
4. Raise awareness among micro and small businesses of adaptation topics within the sustainability agenda;

5. Introduce climate-risk considerations into sectoral policies and encourage consideration of such risks in corporate decision-making;

6. Provide stimulus for the capital-goods segment so as to increase the resilience of society;

7. Alongside the National Confederation of Industry (CNI), promote a strategy for collaboration among Labour Unions and Industrial Employers' Federations for development of joint strategies for climate-risk management in industries located in sensitive regions;

8. Foster Ecosystem-based Adaptation (EbA) practices as tools for strengthening territorial and industrial resilience.

For more information:

<http://www.mma.gov.br/clima/adaptacao/plano-nacional-de-adaptacao>

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ADAPTATION STRATEGY INFRASTRUCTURE - TRANSPORT



Objective

The objective of this strategy is to assess impacts and vulnerabilities associated with climate change, from the standpoints of the Transport Sector and to propose guidelines for addressing them.

Guidelines

The following guidelines were listed as priorities from the context of the adaptation strategy of Transport Sector:

1. Promote greater involvement of the transport sector in issues relating to adaptation to climate change, through capacity building and dissemination of information;

2. Take into account, as appropriate, issues relating to adaptation to climate change in institutional plans, programmes and projects of the Transport sector;

3. Prepare studies and research on the relationship between climate change and the vulnerability of transport infrastructures, as inputs for public policies, planning and identification of solutions for the sector, through Ecosystem-based Adaptation (EbA) approaches;

4. Evaluate possible co-benefits and synergies between mitigation and adaptation strategies relating to different alternatives applied to the transport sector;

5. Improve production and availability of information on extreme events relating to the transport system;

6. Increase the capacity of the transport sector to respond to extreme climate events by means of plans, action protocols and preventative measures.

For more information:

<http://www.mma.gov.br/clima/adaptacao/plano-nacional-de-adaptacao>

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ADAPTATION STRATEGY

INFRASTRUCTURE - URBAN MOBILITY

Objective

The objective of this strategy is to assess impacts and vulnerabilities associated with climate change, from the standpoints of the Urban Mobility sector and to propose guidelines for addressing them.

Guidelines

The following guidelines were listed as priorities from the context of the adaptation strategy of Urban Mobility.

1. Promoting inter-institutional coordination among government institutions, to harmonize the adaptation plans and policies with local planning and actions, involving private-sector, civil-society and academic players;
2. Consideration of urban-mobility vulnerability studies for preparation of local-level adaptation and resilience programmes, in coordination with relevant sectors;
3. Incorporation of adaptation and resilience planning into urban-mobility plans, in coordination with urban land-use and settlement planning and in line with Ecosystem-based Adaptation (EbA) principles;
4. Strengthening of mass-transit infrastructure and popularisation of non-motorized individual transport, through facilitation of intermodal integration and flexibility in the system;
5. Stimulus to studies on the need to review technical standards, both for planning and maintenance of urban mobility infrastructure, incorporating an adaptation perspective;

6. Building awareness of climate change and its impacts on mobility, encouraging the population to prepare and contribute toward mitigation and adaptation measures;

7. Disseminate information related to urban transit networks;

8. Support innovative projects for reducing carbon emissions and increasing capacities for adaptation to climate change.

For more information:

<http://www.mma.gov.br/clima/adaptacao/plano-nacional-de-adaptacao>

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ADAPTATION STRATEGY INFRASTRUCTURE - ENERGY

Objective

The objective of this strategy is to assess impacts and vulnerabilities associated with climate change, from the standpoints of the Energy sector and to propose guidelines for addressing them.

Diretrizes

The following guidelines were listed as priorities from the context of the adaptation strategy of Energy:

1. Promote a greater engagement of electric power sector institutions in themes relating to adaptation, with a view to adapting institutional policies to new climatic parameters, when appropriate;
2. Deepen impact studies on specific areas of interest to the electricity sector in relation to climate-change trends;
3. Conduct studies on climate-change risks to energy-sector infrastructures, with a view to improving management of activities, with a focus on contingency planning for extreme events;
4. Evaluate potential co-benefits and synergies between mitigation and adaptation, relating to various alternatives applicable to the energy sector;

5. Assess, when relevant, interactions between adaptive measures for water, energy, land use and biodiversity, as a means for understanding and managing such interactions;

6. Conduct studies to define and improve planning tools, with a view to adapting parameters in response to scientifically verified climate change impacts.

For more information:

<http://www.mma.gov.br/clima/adaptacao/plano-nacional-de-adaptacao>

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ADAPTATION STRATEGY VULNERABLE POPULATIONS

Objective

The Adaptation Strategy for Vulnerable Populations has the aim of supporting contextualisation and identification of the population groups most vulnerable to climate change, and of promoting their adaptation to new climate conditions.

Guidelines

In view of the scarcity of data for measuring vulnerabilities of more sensitive populations within a biome, most of the guidelines proposed in this section are targeted at improvement of knowledge management.

1. Build cooperation strategies to link states and municipalities;
2. Build methodologies for identification and measurement of social vulnerabilities, taking into account the diversity of groups and territories in different biomes;
3. Promote multi-sectoral and crosscutting actions with the aim of promoting more synergistic government policies, especially for primary health infrastructure and mitigating climate change and associated extreme events;
4. Promote the social inclusion of more vulnerable peoples, with emphasis on training to foster autonomy among populations highly dependent on government subsidies;

5. Identify poverty hotspots in territories and where they intersect with areas of greatest physical, environmental and climatic vulnerability;
6. Promote territorial planning initiatives, ensuring access to territory and fostering of productive inclusion actions, in association with the sustainable management of territorial resources and recovery of degraded areas, when appropriate.

Goals

Consider Ecosystems based Adaptation (EbA) as an important tool for identification of adaptation measures.

Goal:	Responsible:
1. Diagnosis of Vulnerability to Climate Change of target populations of the National Territorial and Environmental Management Policy for Indigenous Lands- (PNGATI).	FUNAI
2. Diagnosis of Vulnerability to Climate Change of target populations of the National Food and Nutritional Security Plan (PLANSAN).	MDS SESAN CAISAN
3. Diagnosis prepared and vulnerability to climate change reduced for vulnerable populations and beneficiaries of public policies for agro-extractivism.	MMA

For more information:
<http://www.mma.gov.br/clima/adaptacao/plano-nacional-de-adaptacao>

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ADAPTATION STRATEGY WATER RESOURCES

Objective

The adaptation strategy for Water Resources aims to improve the assessment of the impacts of climate change on water resources and on the main categories of water users. Indeed some adaptation measures are proposed to improve adaptive capacity of water regulatory agencies, and to improve the governance framework of the sector, in a context of greater climatic variability.

Guidelines by user sectors:

Urban Water Supply:

1. Recognition of additional vulnerabilities associated with water availability changes;
2. Integration of water resources planning with that of other sectors;
3. Reduce losses; stimulate rational use and quantitative and qualitative monitoring of water sources;
4. Increase investment in wastewater collection and treatment, especially in basins subject to water scarcity, so poor quality does not pose an additional obstacle to use of water resources.

Irrigation Sector:

1. Capacity building and mobilisation of users for formulation and implementation of contingency plans;
2. Improvement in short and medium-term predictions of water availability for irrigation;
3. Replacement of irrigation technologies by more efficient methods of water and energy use;

4. Adoption of efficient management of irrigated areas;

5. Infrastructure to guarantee integrated supply with other uses and with water resources planning;

6. Strategies for soil conservation with an impact on water production, such as no-tillage, maintenance and restoration of Permanent Preservation Areas (APPs), promotion of conservation, and increased infiltration in aquifer replenishment areas.

Electric-Power Sector:

1. Increase inter-annual storage capacity of new hydropower investment Projects;
2. Better management of multiple uses of reservoirs;
3. Increased investment in local electricity generation solutions so as to complement the national Interconnected System (SIN);
4. Increased investment in conservation measures and recovery of APPs, with a view to reducing silting of reservoirs and extending their lifespans.

Industrial Sector:

1. Increase investments in water storage capacity;
2. Stimulate rational use and reuse of water;



3. Use alternative sources, or new energy, and relocate industrial plants;

4. Invest in technologies to increase water use efficiency for all types of industry;

5. Prepare contingency plans for extreme hydrological events; e.g., define procedures and mechanisms to be adopted in situations of prolonged drought.

Water quality and the environment:

1. Implement systematic water-quality monitoring;

2. Implement water safety plans, water-quality control and surveillance procedures for human water supply;

3. Invest in technologies to reduce discharges of pollution loads into water bodies;

4. Increase investment in treatment of effluents;

5. Ensure effectiveness of instruments for classification of water bodies in accordance with main categories of use;

6. Invest in recovery of Permanent Protection Areas (APPs).

Guidelines for Water Resources Governance

Potential adaptation measures are targeted at:

1. Increase the capacity of institutions to respond to uncertainties and changing future scenarios through: generation and provision of information and knowledge; creation or adaption of mechanisms for settlement of potential conflicts; setting of well-defined well-publicized rules for use of water resources; adequate physical infrastructure; learning and adaptation.

2. Increase coherence and consistency among the public policies for water resources and other related sectors through: establishment the necessary coordination to ensure that water-resources management is incorporated into on-going public-policy planning processes for related sectors; strengthening participation of municipalities in the National Water Resources Management System (SINGREH); clarification of concepts and principles relating to water-resources legislation, notably for treatment of critical events.

3. Increase the effectiveness of river-basin governance through: prioritization of the local approaches to problems; application of the principle of subsidiarity and strategic territorial approaches; consideration of targeted management models for the Amazon, semi-arid areas and the South, Southeast and Central-West regions; expansion of initiatives for integration of water-resources management among the three levels of government and for increasing the capacities of state-level management systems; seek alternatives water resources management tasks; approach collegiate deliberative structures and water-resources management agencies.

Goals

Goal:	Responsible:
1. Incorporate measures for adaptation to climate change into actions carried out by the National Water Agency.	ANA
2. Develop integrated climatic and hydrological models and assess their impact on water resources management.	ANA

For more information:
<http://www.mma.gov.br/clima/adaptacao/plano-nacional-de-adaptacao>



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Objective

The adaptation strategy for Health aims to present the vulnerabilities, impacts and risks of climate change on human health, and provides guidelines for the Unified Health System (SUS), in line with the National Policy for Climate Change (PNMC).

Guidelines:

In view of the impacts of climate change and their effects on human health, SUS guidelines and strategies were drawn up to orient formulation of public policies, in compliance with the National Policy for Climate Change (Law 12.187/2009), such as:

1. Improve the quality of information and processes for risk reporting to assist with SUS activities in public-health emergencies associated with climate change;
2. Promote and foster studies and research on the effects of climate change on human health, considering popular and traditional knowledge, regional characteristics and ecosystems;
3. Promotion of actions for orientation, awareness and capacity-building of the population and of SUS professionals on the effects of climate change on human health and the importance of sustainable development, and encouragement of community participation in definition of mitigation and adaptation policies;

4. Strengthening inter-sectoral and inter-institutional coordination, targeted at crosscutting actions, including provision of data and information for knowledge production, technology transfer to promote adaptation and mitigation in the health sector;

5. Fostering the improvement of security of infrastructure for health attentions and supplementary health facilities, to ensure continuity of health services in disasters relating to water and energy-insecurity scenarios; promote sustainable development among the many segments of the health sector; and contribute to reducing GHGs;

6. Formulation specific policies to increase resilience of social groups with greater vulnerability to climate change in rural areas and among forest populations, indigenous peoples and the homeless;

7. Strengthening of the implementation of the national policies for sanitation and health, with the aim of universalization of access to drinking water and sanitation services;

8. Strengthening Health Surveillance for identification of human-health risks associated with climate change, with a view to supporting adoption of adaptation measures within the SUS context.



Goals

For the Health Strategy, two priority actions were selected for implementation during the term of this Plan:

Goal:	Responsible:
1. Expand the scope of the National Drinking-Water Quality Surveillance Program (Vigiagua) to 85% of Brazilian municipalities, by 2019.	MS
2. A research, monitoring and communications network on climate and health established within the SUS.	MS FIOCRUZ

For more information:
<http://www.mma.gov.br/clima/adaptacao/plano-nacional-de-adaptacao>



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ADAPTATION STRATEGY FOOD AND NUTRITIONAL SECURITY

Objective

The adaptation strategy for Food and Nutritional security aims to assess vulnerabilities, impacts and risks of climate change to Brazilian food and nutritional security and propose guidelines and practices that contribute toward reducing such vulnerabilities.

Guidelines

1. Strengthen programs for access to safe drinking-water and for food production in semiarid regions;
2. Reduce poverty and vulnerability of rural social groups through the strengthening of policies for rural productive inclusion;
3. Enhance participation of family-farming in agroecology and organic production systems through the Policy and the National Agroecology and Organic Production Plan (PlanApo) and the National Plan for the Promotion of Sociobiodiversity Products (PNBSB);
4. Strengthen the implementation of the National Policy for Territorial and Environmental Management of Indigenous Lands (PNGATI);
5. Contribute for mainstreaming the climate change theme in the National System for Food and Nutritional Security - (SISAN);
6. Increase the public storage capacity and stocks of food.

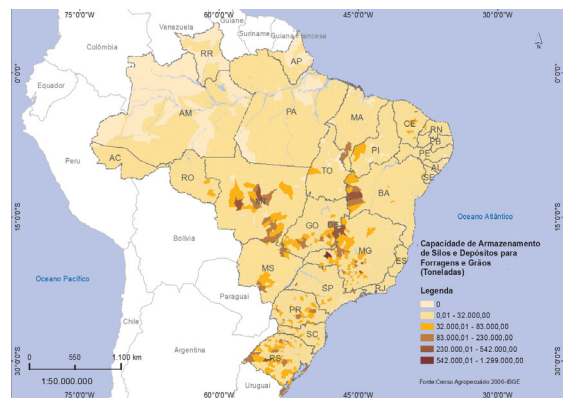


Figure 1. Distribution of silos and warehouses in Brazil

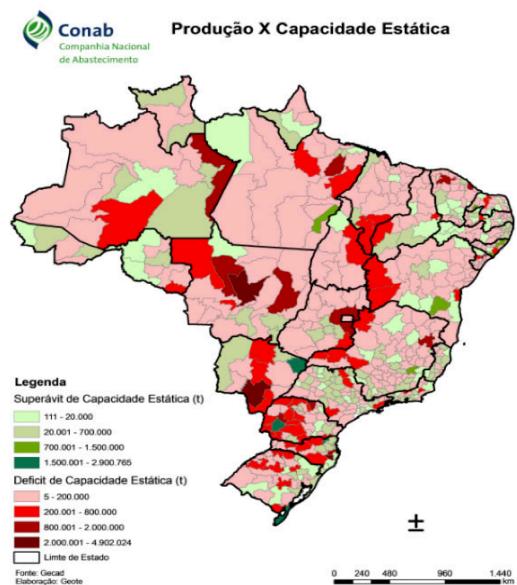


Figure 2. Comparison of grain production vs. static storage capacity in Brazil

For more information:
<http://www.mma.gov.br/clima/adaptacao/plano-nacional-de-adaptacao>

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ADAPTATION STRATEGY COASTAL ZONE

Objective

The adaptation strategy for coastal zones aims to assess the current level of exposure to climate change of the Brazilian coastal zone, identifying the main related impacts and vulnerabilities, and propose actions necessary for development of climate resilience.

Guidelines

The following guidelines are applied to the adaptation strategy for Brazilian coastal zone:

1. Conduction of the Planialtimetric mapping of the Brazilian coastal zone;
2. Development of a program of production and systematization of continuous and standardized data;
3. Integration of systems of information and monitoring;
4. Integration of territorial planning instruments among municipalities and states, focusing on coastal erosion;
5. Establishment of priority areas for intervention;
6. Development of contingency plans for the coastal zone;
7. Improvement of the integration of measures for coastal management and watershed management;
8. Generate knowledge for diagnosis, monitoring and prediction of impact and responses to climate change in coastal zones;

9. Integrate policies to enhance preventive and corrective actions;
10. Insert climate lens in the Brazilian coastal management framework;
11. Generate knowledge;
12. Promote the conservation and management of carbon sinks.

Goals

Considering the process and effort required for develop adaptation measures for the Brazilian coastal zone, the following goals are proposed for the next four years:

Goal:	Responsible:
1. Reference Centres for Coastal Georeferencing established, providing and organizing information and tools for climate-risk modelling and generation of qualified responses for the Coastal Zone.	MMA
2. Strategy to harmonize continental altimetry with marine bathymetry (AltBat) prepared and with funding earmarked for its execution.	IBGE MMA
3. Macro-diagnosis of the Coastal Zone (Macro-ZC) reviewed, considering vulnerabilities relating to climate change.	MMA

For more information:
<http://www.mma.gov.br/clima/adaptacao/plano-nacional-de-adaptacao>

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