



Strategy for Vulnerable Populations



**National Adaptation Plan
to Climate Change**

7

Strategy for Vulnerable Populations

7.1 Introduction

Intensification of extreme weather events associated with climate change is likely to affect many of the day-to-day activities of human populations. Such effects include fewer job opportunities in a number of economic sectors. They are also likely to increase migration²² flows, as entire population groups flee the effects of climate change or seek to adapt to them. The distribution of such impacts, however, will occur unevenly throughout the country and the principle effects will be borne by more socially and economically underprivileged groups.

The poorest groups will tend to be more heavily affected, as they have fewer alternatives for ensuring livelihoods than wealthier segments of the population

(COEP²³, 2011).

The latest IPCC report (AR5, 2014) states that poorer populations (especially those in tropical countries) will be the most affected by climate change. Poverty is associated with socioeconomic fragilities that prevent resilience to adverse weather events. Thus, climate change is likely to result in increased exposure to disease, higher food insecurity and malnutrition, material losses, housing deficits, and fewer livelihood and income opportunities. Other factors associated to such vulnerabilities include: inappropriate land use, precarious housing, lack of access to basic sanitation and other public services, such as education and healthcare (COEP, 2011 b).

In Brazil, a vast country of great environmental and physical diversity, characterised by huge social and regional disparities, poverty²⁴ is among the main factors underlying the population's sensibility to climate change. Indeed, according to the IPCC (2007) poverty must be considered an important aspect for the assessment of the vulnerability of the population.

Currently, roughly 80 million Brazilians can be considered poor (MDS, 2014)

²² The International Organization for Migration (IOM) defines Migration as "the movement of a person or a group of persons, either across an international border, or within a State. It is a population movement, encompassing any kind of movement of people, whatever its length, composition and causes; it includes migration of refugees, displaced persons, economic migrants, and persons moving for other purposes, including family reunification" (IOM, 2011 apud IOM, 2014, p. 23)."

"Environmental migrants are persons or groups of persons who, for compelling reasons of sudden or progressive changes in the environment that adversely affect their lives or living conditions, are obliged to leave their homes or choose to do so, either temporarily or permanently, and who move either within their country or abroad" (IOM, 214, p. 6).

Adaptation (linked to migration): in human systems, the process of adjustment to actual or expected climate and its effects, which seeks to moderate harm or exploit beneficial opportunities. Migration and mobility are adaptation strategies in all regions of the world that experience climate variability" (IPCC, 2014 apud IOM, 2014, p. 23)

²³ National Social Mobilisation Network.: <www.coepbrasil.org.br>

²⁴ The poor are those lacking security of fulfilment of basic human needs such as food, shelter, clothing, schooling, health care, etc. (MONTEIRO, 1995).

a condition that substantially reduces their adaptive capacity. Thus, the environmental impacts, both of extreme weather events and of gradual climate change, are likely to undermine improvements in living standards achieved in recent years and may even contribute toward a reversion to the former less favourable *status quo*. (COEP, 2011a). Other contributing factors to such social vulnerabilities include: issues of race and gender (particularly relating to the status of women²⁵); traditional populations; Specific Traditional Population Groups (STPGs - GPTEs) including blacks, all of which reflect deeply ingrained structural disparities (COEP, 2011).

The persistence of such disparities justifies an effort to identify the social groups most vulnerable to climate change in Brazil, with a view to reducing negative impacts and promoting social-policy actions and strategies, in line with Brazilian regional sustainable-development and climate-change adaptation goals. Gaps in the data on the vulnerabilities and adaptation capacities of specific groups and their distribution in the various regions and biomes of Brazil, require further research, in support of furthering the country's social-agenda goals.

This chapter is a collaborative effort, prepared jointly by the Ministry of Environment (MMA), the National Indian Foundation (FUNAI) and the Ministry of Social Development (MDS) with the aim of supporting contextualization and identification of the population groups

most vulnerable to climate change, and of promoting their adaptation to new climate conditions.

To this end, the following premises and approaches were established.

Vulnerability to climate change and adaptation to its effects by peoples and communities are examined from different standpoints. Firstly, from a territorial municipality-based approach; next, an analysis prepared especially for this Chapter, examines vulnerability from a biome approach; and lastly, the Chapter focuses on the vulnerabilities of Brazil's indigenous peoples.

The focal points, responsible for coordination, promotion and implementation of actions and guidelines proposed in this Chapter, are MMA, MDS, FUNAI, and the Brazilian Forum on Climate Change (FBMC).

7.2 Historical and institutional framework

In mid-2010, under the coordination of the Committee of Entities in the Fight against Hunger and for Life (COEP), the FBMC's Working Group on Climate Change, Poverty and Inequality proposed a set of principles, objectives and guidelines to be observed during preparation of the National Adaptation Plan to Climate Change. Drafting of this Plan entailed a participatory and innovative process to identify and address the main issues, drawing upon the experience and expertise of various public and private organisations, namely: ASA, CARE, the

²⁵ Women, owing to the nature of some of their tasks and double workload, are among the most disadvantaged.

National Food and Nutritional Security Council (CONSEA), FASE, FIOCRUZ, IBAMA, IBASE, the Brazilian Network for Integration of Peoples (REBRIP), OXFAM, Vitae Civilis, and WWF-Brasil)(COEP, 2011). Members of the Working Group concurred that a significant number of measures were being undertaken on the part of governments at the various levels to assist vulnerable populations, for example, the policies related with the Unified Registry for Social Programmes of the Brazilian Federal Government (CadÚnico²⁶).

For coordination of such measures, the CadÚnico assists the Federal Government in identification of Specific Traditional Population Groups (STPGs). In recent years, the government has become accessible to the demands of different social groups, through its policy of creating and strengthening councils and national conferences such as the National Food and Nutritional Security Council (CONSEA), the Secretariat for the Promotion of Racial Equality (SEPPIR), and the Secretariat of Human Rights. Another example of institutionalization, that represents an important achievement for the traditional people that is vulnerable to climate change, is the institution of the National Council for Sustainable Development of Traditional Peoples and Communities (CNPCT). The role of this Council is to guide public policies targeted at traditional populations, by contributing

toward measures for mitigation of poverty and extreme poverty among these groups (DIREITO and LICIO, s/d). Decree 6040²⁷ of February 2007, established the National Policy for Sustainable Development of Traditional Peoples and Communities (PNPCT) (MDS, 2014) and provided definitions for the terms 'traditional peoples' and 'traditional communities' within the scope of the policy.

In another recent milestone, Decree 7747/2012, established the National Policy for Territorial and Environmental Management of Indigenous Lands (PNGATI) for the purpose of ensuring: protection, restoration, conservation and sustainable use of natural resources in indigenous lands and territories, while ensuring the integrity of indigenous heritage, improving quality of life and of conditions for physical and cultural reproduction of current and future generations of indigenous peoples, respecting their socio-cultural autonomy.

The National Plan for Strengthening Extractive and Riparian Communities (PLANAFE)²⁸ was launched in 2015 for the purpose of "adapting, coordinating, integrating and proposing actions to promote access to health, education and social infrastructure,

²⁶ The Single Registry for Social Programmes of the Brazilian Federal Government (*CadÚnico*) identifies and classifies low-income families, thereby facilitating understanding of the socioeconomic realities of this population. It records information such as: characteristics of residence, personal identification, schooling, employment and income status, etc.

²⁷ Traditional Peoples and Communities: culturally differentiated groups recognised as such, that possess their own forms of social organisation, that occupy and use territories and natural resources as part of their cultural, social, religious, ancestral and economic heritage, comprising knowledge, innovations and practices generated and transmitted by tradition (Decree N°. 6040, 7/2/2007).

²⁸ Established by Inter-ministerial Order 380, of 11 December 2015, signed by the Ministers of Environment (MMA), Agrarian Development (MDA) and Social Development and Combatting Hunger (MDS).

with a view to promoting sustainable production, generating income, and fostering environmental and territorial management of areas for traditional use and occupation, to ensure quality of life, access to and sustainable use of natural resources, environmental conservation and promotion of human rights for extractive and riparian communities.”

7.3 Identification of the populations most vulnerable to climate change in Brazil

7.3.1. Proposal for selection of Brazilian population groups most vulnerable to climate change

The approach for identification of the more vulnerable populations was chosen on the basis of available data and public-policy instruments. This strategy aims to serve as a tool for establishment of measures for identification and monitoring of vulnerable populations.

7.3.2. Social vulnerability in Brazil

Social vulnerability in Brazil is equated with the “sensitivity” component of vulnerability to climate change, as defined by the IPCC. It is assessed by means of various governmental initiatives that take into account the population’s social, ethnic and cultural diversity. Based upon self-identification of groups, it is possible to analyse socioeconomic profiles and to identify layers of exclusion, thus enabling structuring and enhancement of public policies for addressing the realities identified.

For the purpose of identifying some of the most socially sensitive groups in Brazil, and those that, owing to their socio-economic status are considered highly sensitive to climate change, the CadUnico²⁹ was used.

Though designed primarily as a tool to support planning and implementation of federal-government social programmes, CadUnico is also quite well adapted to serving purposes associated with adaptation to climate change impacts. Much of the policy and institutional structure of the registry is equally appropriate for attaining adaptation goals, given the crosscutting nature of climate-change issues and their relevance to different line ministries and to state and municipal-level bodies.

CadUnico classifies socially vulnerable population groups in Brazil by the following characteristics: ethnic origin, environmental relationship, agricultural aptitude, and circumstantial situation. Within the Specific Traditional Population Groups (STPGs), which includes indigenous, *quilombolas*, gypsies, among other groups, the most vulnerable category are those with a per capita income of less than R\$ 77.00. This category comprises: 114,791 indigenous and *Quilombola*

²⁹ The Single Registry for Social Programmes of the Brazilian Federal Government (*Cadastro Único - CadÚnico*) was established at the end of 2001 to identify the socioeconomic profile of poor families and provide inputs for design of public policies targeted at families in situations of social vulnerability (BRAZIL/MDS, 2014). It comprises a set of targeted strategies for registration of families, classified by specific life-style, cultural, belief and critical-vulnerability features. CadÚnico has laid the foundations for differentiated registry (GM/MDS Order 376 of 16 October 2008). Since 2004 it has identified families belonging to 15 traditional population groups and living in specific situations (GPTES).

families registered in 2010; however, by June 2014, this number had risen to 1.27 million families belonging to 15 groups recognised by the MDS (Figure 12). The groups with highest percentages of extremely poor people among the STPGs can be broken down by specific ethnic

categories (indigenous 77.4%; *quilombola* 74.2%; and gypsies 75.2%); environmental categories (extractivists 81.7%; fishermen 75%; and riparian 84.5%); homeless (87.6%); and family farmers (74.1%).

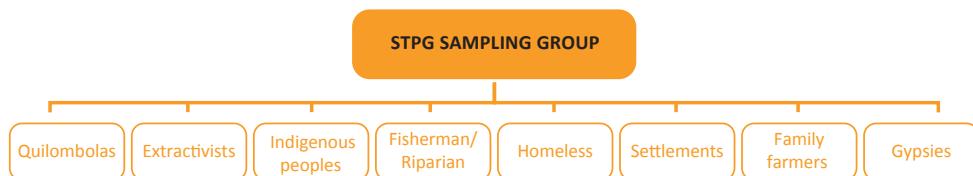


Figure 12. Some STPG categories. (MDS, 2015)

7.3.3. Population group categories most sensitive to climate change, according to CadUnico

For purposes of this Chapter, analysis of the sensitivity of certain Brazilian populations to climate change is based on STPG categories. This choice is justified, since such groups suffer high degrees of socio-economic exclusion. When compared to other poor and extremely-poor families, the data reveals that STPGs have higher sensitivities (lower income, lower schooling and less access to basic services) than other families. Apparently, families in this category suffer a process of double exclusion since, aside from discrimination generated by economic factors, social invisibility and institutional prejudices hamper their access to public policies. Additionally, unlike most other families registered in CadUnico that are predominantly urban (80%), STPG families tend to live in rural environments (69%).

7.4 Approaches for understanding vulnerability

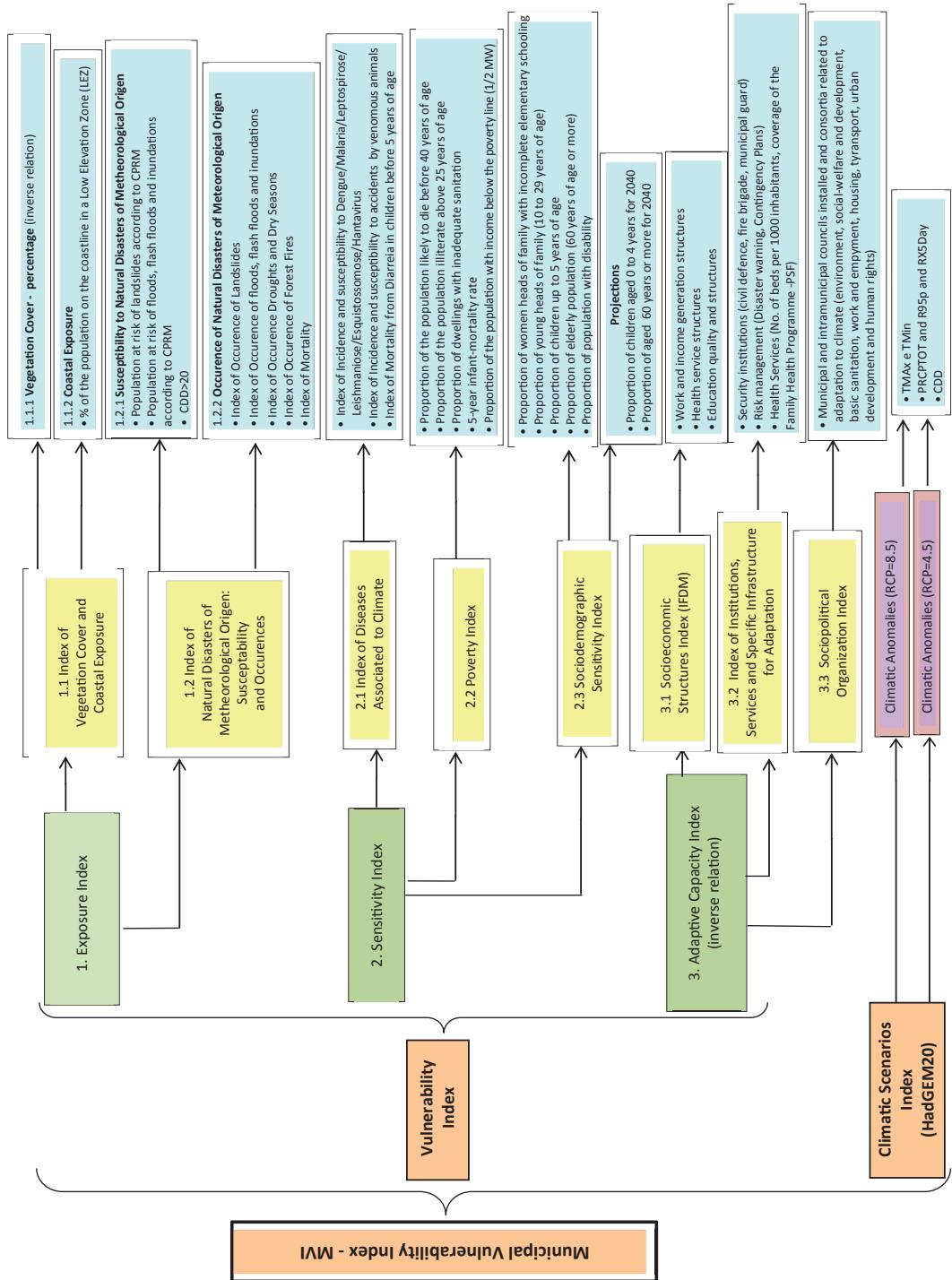
This item examines approaches for identification and analysis of the vulnerability of populations and, though different approaches are used, they can be applied simultaneously.

7.4.1. Territorial Municipal-based Approach

This methodology was developed within the scope of a project for “Construction of Population Vulnerability Indicators as an Input for Drafting of Climate-Change Adaptation Actions in Brazil”, carried out through a partnership between the Ministry of Environment (MMA) and Oswaldo Cruz Foundation (Fiocruz).

The project developed indices for Assessment of Social Vulnerability to Climate Change at the municipal level (Confalonieri *et al* 2014). Initially, this index is to be applied in six Brazilian states, and may later be adopted in other states and municipalities.

Table 12. Climate Change Vulnerability Index of Municipal Populations (FIOCRUZ, 2015).



Components of municipal indices can be broken down into sub-indices, for exposure, sensitivity, and adaptation capacity that comprise the Vulnerability index. Table 12 presents the proposed index and a description of the indicators used to comprise its sub-indices.

The MMA is providing states and municipalities with this tool as a means of supporting local strategies for addressing the vulnerabilities of different population groups. Further information on this tool is available on the MMA website.

7.4.2. Biome-based Approach

a. Current exposure of STPG in Brazilian Biomes

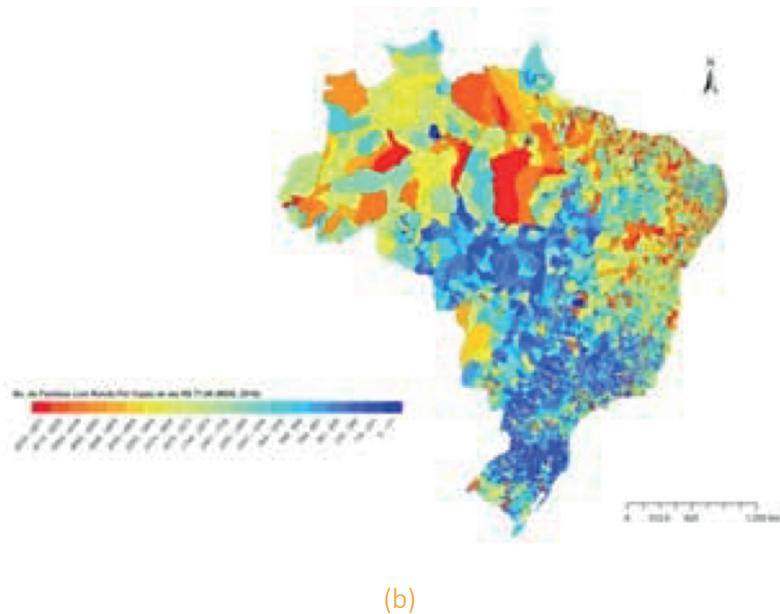
From a territorial standpoint, it can be perceived that STPGs are mainly concentrated in the Amazon (60.3%) and Caatinga Biomes (19.9%). The Amazon accounts for the largest contingents of groups dependent upon the environment for livelihoods, i.e., extractivists (68.7%), riparian populations (79.9%) and indigenous peoples (42.1%). A great wealth of information on climate change vulnerabilities in Brazil relates to indigenous peoples.

A study on disasters in Brazil between 1991 and 2010, by the Research Centre for Disasters of the Federal University of Santa Catarina (CEPED/UFSC, 2012) found that the most disaster-prone areas are located in the North, Northeast, Southeast (north and coastal areas), and South regions (Risk - Figure 13). When this map is contrasted with the number of families with per-capita incomes amounting to no more than R\$77 (STPGs supposedly more sensitive - Figure 13b) it can be observed that most are located in regions of greater climatic exposure, mainly in the North and Northeast.

Although Brazil's South region (in the Pampa and partly in the Mata-Atlântica Biomes) is exposed to climatic threats, its socioeconomic vulnerability is lower in view of better income distribution and smaller presence of STPGs, as a consequence of regional historical factors.



(a)



(b)

Figure 13. Figure (a) shows the intensity of disasters in Brazil between 1991 and 2010 by municipality (darker colour indicates a greater number of disasters). Figure (b), shows the (more sensitive/exposed) groups of families with per-capita incomes of no more than R\$77 (Blue indicates a smaller number of families and Red a higher number)

By contrast, the North (Amazon) and Northeast (Caatinga) regions suffer repercussions not only from climatic exposure (i.e., drought and flooding) but also from socio-economic aspects and the greater number of STPGs in places where, historically, such groups have settled. In the Caatinga, exposure to drought is a longstanding phenomenon and, owing to political, cultural and socioeconomic factors, solutions are hard to apply, thereby increasing the vulnerability of STPGs. Moreover, in addition to threats and exposure to current and future climate, other factors exacerbate disaster risks in these biomes.

The Cerrado and Pantanal, though less prone to disasters than other biomes, are nonetheless subject to extended dry

periods and risks arising from seasonal floods and runoff. From the standpoint of socioeconomic vulnerability of STPGs, both these biomes are in a more comfortable situation in terms of numbers of sensitive households, except in the southern part of the Pantanal and in north and north-eastern Minas Gerais, where exposure levels pose greater threats and the numbers of economically vulnerable families are higher.

There follows an analysis of biomes from a future-climate standpoint, in the light of global and regionalised predictions for Brazil, in terms of rainfall and temperature anomalies, until 2040.

Table 13 describes projected temperature and rainfall changes of the HadGEM model for 2011-2040 in the IPCC's AR5 8.5

emissions scenario for Brazilian biomes, which would cause greater exposure of STPGs. It shows some of the sensitivities and exposures of these groups, by biome, and some gaps and bottlenecks that must be understood, measured and addressed, in order to gauge the vulnerabilities of STPGs to climate change.

The table does not show vulnerabilities for each STPG separately, nor their spatial distribution within each biome. This represents a knowledge gap which will require further studies in coming years.

There is a lack of updated and systematised information on the demographics and location of STPGs. This represents a bottleneck for formulation and implementation of public policies targeted at improving living conditions, addressing their invisibility, and reducing neglect of their vulnerability status. Such information gaps aggravate other structural limitations of policies targeted at STPGs and, to some extent, explain flaws in their basic rights (i.e., access to territories and to basic services).

Table 13. Contributing factors to future vulnerability of Specific Traditional Population Groups (STPGs) in Brazilian biomes, under the IPCC's AR58.5 Wm² scenario

Vulnerability components of Specific Traditional Population Groups in Brazilian biomes

Groups: Indigenous peoples, quilombolas, extractivists, artisanal fishermen, squatters, riparian populations and family farmers.

Exposure: Risk of fire/prolonged drought/heavy rainfall; strong dependence on biodiversity and related ecosystem services; risk of flooding and of landslides; changes in phenology of domesticated and native species, dependence on soil quality.

Sensitivities: High degree of dependence on natural resources; high incidence of diseases associated with hot and humid weather; low migration capacity; land-tenure insecurity; strong identification with the land; houses in remote areas of difficult access; poor access to public services and private markets; incomes; sudden changes in local weather cycles threaten traditional production practices; and interference in the traditional knowledge on planting and harvesting cycles.

Some potential impacts: Reduced fish stocks; impaired livelihoods; impairment of material goods; increase in vectors of diseases caused by higher temperatures; increased incidence of lung diseases caused by smoke from fires and burning.

Gaps: Lack of knowledge of the specific vulnerabilities of each STPG category, by biome.

Cerrado

Groups: Extractivists, quilombolas, indigenous peoples, gypsies, family farmers, land-reform settlers and homeless.

Exposure: Extreme rainfall events; more intense urban landslides and flooding that may affect populations living in risk areas; more extended periods of drought; increase in the risk of fires and burnings; threats to remaining forests and endemic and/or endangered species.

Sensitivities: High incidence of respiratory diseases associated with dry weather, livelihoods highly dependent upon natural resources; food insecurity; reliance on farming for income; dependence on biodiversity and ecosystem services.

Possible impacts: Impairment of large-scale and family farming, hampering not only subsistence activities but also production of soybeans, sugar cane, cotton, and other commodities and foods. Dry air and burning may cause higher incidences of respiratory disease.

Gaps: Lack of time-series information on vegetation cover in the biome; lack of smaller-scale climate modelling and research on the impacts on specific populations or groups; poor knowledge and mapping of biodiversity within the biome and its potential to support the population; and poor coverage of weather stations in these areas.

Groups: Quilombolas, family farmers, indigenous peoples, extractivists, artisanal fishermen, gatherers, homeless, gypsies.

Exposure: In semi-arid portions of the Northeast, warmer and drier climate foreseen in models points and more intense droughts in this region. Low vegetation cover. Areas susceptible to extreme climatic effects of drought.

Sensitivities: Low-income population groups; poorly managed energy mix based on biomass.

Caatinga

Possible impacts: Climate change scenarios for the Caatinga point to replacement of current vegetation cover with more drought-resistant desert vegetation; water levels in local reservoirs are likely to decline, posing threats to water-supply and health of local populations. Subsistence agriculture, especially rain-dependant farming, will suffer; undermining livelihoods and posing a threat to food security. Warmer and drier weather may cause migration to big cities of the region and to other regions, in waves of environmental refugees.

Poor availability of high-quality and timely data for monitoring signals and observing impacts of climate change; lack of adequate indicators and systems for monitoring the water balance, salinization and deforestation.

Groups: Indigenous peoples, extractivists, artisanal fishermen, gypsies, family farmers, homeless, quilombolas.

Exposure: Risks of flooding, landslides and higher sea levels. High population density in the coastal region. This biome is characterised by rugged terrain that is susceptible to landslide and flooding events. Risk of increased periods of droughts and of longer dry seasons.

Sensitivities: This biome has Brazil's highest population densities and encompasses one of the most economically dynamic parts of South America. Prevalence of insect-transmitted diseases, such as dengue and yellow fever, is high. Sanitation and wastewater treatment indices are low. A major portion of the population lives in high-risk areas.

Possible impacts: Hurricanes may begin to reach Brazil's southern coast (as occurred in Santa Catarina). Longer dry seasons may affect the regional water balance, with consequences for human activities, such as abstraction of water for agriculture, energy generation and food production. There may be more frequent flooding, landslides and floods brought on by extreme rainfall events, causing economic damage and loss of lives. Waterfronts may be washed away; ports destroyed and populations displaced. Even though rainfall will tend to increase, the high air temperatures predicted by models may, at the same time, reduce availability of water for agriculture, human water supply, and electricity generation, owing to foreseen increases in evaporation or evapotranspiration.

Gaps: Inadequate mapping of risk areas, taking into account climate-related disaster risks and real-time early-warning systems; participatory development of master plans; adequate urban planning.

Groups: Artisanal fishermen, riparian populations, indigenous peoples, land-reform settlers and family farmers.

Exposure: Higher temperatures, lack of rain, flat and low terrain, susceptible to floods.

Sensitivities: Economic activities highly dependent upon the seasonal ebb and flow of the water cycle. Any significant disruption of this cycle, resulting from climate change or deforestation, may affect the water-retention and control capacity of these wetlands; populations thinly distributed in remote areas.

Gaps: Few studies on the impacts of climate change on this biome and their repercussions on specific population groups and; poor coverage of weather stations in these areas.

Groups: Family farmers, land-reform settlers, homeless, indigenous peoples.

Exposure: Some areas already undergoing desertification; land-use changes may increase vulnerability to drought. Higher frequency of extreme weather events, with intense and frequent waves of heat and cold. Dry hot summers. Intense and concentrated rainfall. Longer dry seasons. Increase in wind speeds and possibility of hurricanes.

Sensitivities: Characteristics of buildings/homes; deforested areas and threats of further land clearing; few conservation units in the region.

Possible impacts: Grain production and reforestation with exotic species may be undermined in the Pampa region. Higher temperatures and rapid temperature variations may lead to higher incidences of associated diseases. Intense rains may increase flooding and landslide risks, mostly affecting populations living on deforested hillsides and residents of poorer neighbourhoods that lack infrastructure; excessive heat and drier air may cause salinization of soils in areas affected by reforestation with pine and eucalyptus.

Gaps: Few studies and little knowledge of biodiversity of this biome; further studies are needed on the impacts of climate change in the Pampas and their effects on specific population groups.

7.5 Indigenous peoples and climate change: vulnerability, adaptation and traditional knowledge

Any evaluation of the effects of climate change on Brazil's human populations must take into account the vast ethnic and cultural diversity of its more than 300 indigenous peoples³⁰. The cosmologies, languages, traditional knowledge and identities of such population groups

comprise totally distinct social, cultural, political, legal and economic systems, within a variety of territorial and social contexts. These peoples have long and multigenerational histories of interactions with surrounding Brazilian society, with the environment and, more especially, with the territories they traditionally occupy, which have little relationship with concepts of private land ownership or tightly bounded borders. From an indigenous standpoint, territory is ecological, social and symbolic space, which harks back to historical and mythological references, of fundamental importance to the physical and cultural reproduction of the group, its ways of life, and its autonomy projects.

The specialised scientific literature predicts that, in view of lifestyles based on sustainable management and use

³⁰ The Population Census (IBGE, 2010) estimates the Brazilian indigenous population at 817,963, of which 502,783 live in rural areas and 315,180 in towns in all the Brazilian states and the Federal District. There are 305 different peoples, speaking 274 indigenous languages, and an estimated 69 as yet un-contacted indigenous groups, according to FUNAI. Brazil, as a multi-ethnic and democratic State, has a number of legal and constitutional provisions that acknowledge, protect and establish rights to such diversity. Provisions of the 1988 Federal Constitution govern relations between the State and indigenous peoples, ensuring protection and guaranteeing their collective rights, and sweeping away assimilationist, tutelary and integrationist premises of earlier laws.

of natural resources and the biological diversity of territories in which they live, the impacts of climate change on the cultures and territories of indigenous peoples will be come early and with severe effect. Such exposure and sensitivity are, in part, linked to the fragility of the ecosystems in which many communities are located, their vulnerability to climatic extremes, and rapid spatial transformations caused by anthropogenic activities and unsustainable development models. Indigenous peoples possess detailed traditional knowledge on seasonal, annual and inter-annual cycles and of their interrelationships with other components of the ecosystems in which they live and which they use in the exercise of landscape-scale land-use and natural-resources management, and around which their social and ceremonial lives revolve. Moreover, they are keen observers of environmental dynamics and changes and of related impacts and trends that affect their lives. Since before the dawn of recorded history, they have developed varied creative and sustainable responses and strategies to address climate change, and assumed active roles in design of distinctive change and adaptation scenarios, based on their own culture-specific and astute climate perceptions.

When considering synergies between aspects of adaptation and mitigation, it should be acknowledged that traditional knowledge and cultural, patterns of territorial land use and the inherent systems for management and conservation of environmental

assets pursued by indigenous peoples in their territories have, historically, promoted conservation of biodiversity and of hydrological cycles, retarded deforestation, maintained forest carbon stocks and provided numerous significant environmental services for maintenance of a stable climate.

The Traditional Knowledge Initiative (TKI) of the Institute for Advanced Studies of United Nations University (UNU) is endeavouring to promote greater appreciation of the traditional knowledge and practices of indigenous peoples. It has sought to promote acknowledgement that such knowledge can: 1) provide valuable local and regional-level information, serving as means for verification of regional and global scientific-data models and provide a basis for preparation of adaptation and mitigation strategies; 2) provide a solid basis for development of adaptation measures for communities and micro regions; 3) serve as a basis for development of strategies for adaptation and natural-resources management in response to environmental and other types of change; 4) assist in understanding of the potential of cost-effective, participatory and sustainable adaptation strategies³¹. It was recommended that representatives of indigenous peoples be invited to participate in debates,

³¹ Contributions of Working Group II ("Impacts, Adaptation and Vulnerability") to the 4th and 5th IPCC evaluation reports, provide numerous case studies; documents of the 31st and 32nd Sessions of the IPCC; the compilation of summaries presented in the joint IPCC - UNU Workshop "Pueblos Indígenas, poblaciones marginadas y cambio climático: vulnerabilidad, adaptación y conocimientos indígenas" (IPCC, UNU, 2011) and the report "Weathering Uncertainty – Traditional knowledge for climate change assessment and adaptation" (UNESCO, UNU, 2012).

evaluations and planning of policies to counter the adverse impacts of climate change, in recognition that a blend of scientific, traditional and local knowledge could foster adaptation capacity and reduce vulnerabilities.

Notwithstanding their accumulated traditional knowledge on functioning and interrelationships of natural cycles and ecosystems, the intensity and rapidity with which climate-change is

affecting the different biomes may lead to situations in which the magnitude of future risks exceeds the adaptation capacity and resilience of these peoples, jeopardising maintenance of their cultural practices and livelihoods. Few studies and initiatives have sought to understand the perceptions of Brazil's indigenous peoples with respect to the indicators and signals of climate change, or their adaptive practices and strategies for dealing with such changes.

IMPACTS OBSERVED

Some recent experiences³² indicate that, rather than normal weather variations or effects predicted in future scenarios, various communities of different socio-cultural and territorial backgrounds report changes in temperature and rainfall patterns and in humidity and seasonal river-flow levels. Alongside other exposure factors and variables, they report that climate change has variously affected important environmental, cultural and territorial dimensions, and that its impacts include, among others: increases in burnings and deforestation, extreme weather events, desertification; changes in plant and animals life cycles, agricultural cycles, water dynamics and fisheries, ritual and traditional-medicine practices, organisation of community life; sustainability of livelihood activities, food production and food security, and health. An important auxiliary planning tool for adaptation actions for indigenous territories and for the peoples of the Brazilian Amazon is the online digital System for Observation and Monitoring of the Indigenous Amazon (SOMAI platform)³³. Developed by the Amazon Environmental Research Institute (IPAM) the platform provides scientific information on climate scenarios and vulnerabilities of Amazonian indigenous territories (including maps and rainfall and temperature change scenarios); and on their role in maintenance of regional and global climatic stability.

Climate change is thus but one among the multiple threats to Indigenous Lands. It cannot be analysed separately from other social, political, economic and environmental threats that such peoples currently face. Thus, strengthening the resilience and adaptive capacity of indigenous peoples must necessarily entail efforts targeted at overcoming

³² Information was gathered from seminars and training sessions "Climate change from the standpoint of the indigenous peoples of Brazil", promoted by the Association of Indigenous Peoples of Brazil, FUNAI, IPAM and partners in the second half of 2014; provided by the Indigenous Council of Roraima's publication entitled "Amazad Pana'adinhán: perceptions of indigenous communities on climate change – Serra da Lua Region/RR", resulting from a long and careful process of collaborative research conducted by teachers and indigenous territorial and environmental agents (ATAIS) and partner researchers, as contributions for a plan for combating the effects of climate change in the region and reducing the consequences of climate change.

³³ <www.somai.org>

structural disparities, promoting climate justice³⁴ and safeguarding human rights.

A variety of adaptive measures and responses are used by indigenous peoples in Brazil, stemming from traditional knowledge and practices, including:

Cutting and maintenance of firebreaks and training of fire fighters;

Surveillance and monitoring of boundaries of indigenous lands;

Community debates on fire management, use of irrigation and soil conservation techniques;

Projects for recovery of springs and agroforestry systems;

Renewal and strengthening of traditional farming practices, with guidance and knowledge of elders;

Relocation and redistribution of villages and plantations within territories;

More flexible production activities, choice of more resilient strains that are less dependent upon seasonal factors, changes in hunting/gathering/planting/harvest intervals and diversification of crops;

Changes in time and location of ritual and ceremonial practices;

Use of new production technologies; establishment of seed banks and promotion of inter-community exchanges; medicinal herb gardens and projects for strengthening knowledge of traditional medicine; local and regional-level management and planning instruments e.g., ethno-mapping, ethno-zoning and territorial and environmental management plans for indigenous lands in compliance with the National Policy for Territorial and Environmental Management on Indigenous Lands (PNGATI);

Regional plans for facing up to climate change; educational activities and training on the theme of environmental and territorial management, targeted at strengthening capacities;

Diagnoses, case studies, collaborative research and intercultural dialogues on climate-change themes;

Participation in climate-change forums.

³⁴ Proponents of Climatic Justice argue that those who are least responsible for greenhouse gas emissions are the ones who will suffer most from impacts of climate change. To redress these problems, they propose deployment of initiatives and policies that address ethical and human-rights dimensions of climate change, with a view to reducing vulnerabilities of social groups disproportionately affected by climate change (EBI, 2009; ROBERTS & PARKS, 2009; SHEPARD & CORBIN-MARK, 2009; TYREE & GREENLEAF, 2009).

The basis for discussion of strategies for adaptation to climate change as it affects indigenous peoples must be based upon acknowledgement of provisions on integral protection and promotion of their rights enshrined in law. These encompass: an understanding of the multiple forms of sociocultural and environmental vulnerabilities to which they are subject; visibility of contributions of their traditional knowledge and practices; fostering of intercultural and

cross-scientific dialogues; guarantee of adequate training, information, participation and consultation processes for indigenous peoples; and coordination, liaison and synergy among public policies for addressing climate change and support for territorial and environmental management of indigenous lands.

In support of the development of future programmes, the following guidelines for adaptation strategies of indigenous peoples are suggested:

Acknowledge, highlight and enhance the contribution of indigenous territories and peoples and of their knowledge, traditional technologies and livelihood practices, management and use of natural resources, toward conservation of biodiversity, the containment of deforestation, maintenance of the stability of weather conditions, and formulation and implementation of public policies for adaptation and mitigation of the effects of climate change;

Ensure budget resources and from international cooperation for implementation of the PNGATI, which has proven a useful tool for coordination of public policies for indigenous lands, enabling actions for adaptation and addressing the effects of climate change. With a view to supporting development of future programmes, the following guidelines and adaptation strategies for indigenous peoples are suggested;

Expand and strengthen protection, supervision and land-tenure status of lands traditionally occupied by indigenous peoples, in a coordinated, synergistic and integrated manner, with the promotion of territorial and environmental management of their territories;

Strengthen participatory and on-going processes for implementation of the National Policy for Territorial and Environmental Management of Indigenous Lands, promoting synergies with the guidelines, objectives and instruments of the National Climate Change Policy and prioritizing actions for protection, recovery, conservation and sustainable use of the natural resources of the indigenous lands and territories, with appropriate budgetary funding;

Promote appropriate training, information, participation and consultation on climate change themes, at grass-roots levels (including different generational and gender-based themes) and support creation of networks for exchanges of experiences and dialogues;

Ensure the participation of indigenous peoples in decision-making and discussions, drafting and implementation of related policies, such as the National Plan for Adaptation, the National REDD+ Strategy, the REDD+ Information System on Socio-environmental Safeguards, the National Policy for Territorial and Environmental Management in Indigenous Lands (PNGATI) and in other forums and instruments relating to climate change and payment for environmental services;

Promote research, mapping and diagnostic studies targeted at a deeper analysis of (current and potential) vulnerabilities to climate change of indigenous peoples, and of their knowledge, adaptive practices and strategies, with priority for participatory methodologies, intercultural dialogues, participation of indigenous researchers and networking for broader educational and training purposes.

7.6 Guidelines

7.6.1. General guidelines for implementation of the Biome-based Adaptation Strategy

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. The following measures are proposed: (1) develop institutional frameworks for cooperation strategies to join states and municipalities (2) develop 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 to promote more synergistic government policies, especially for primary health infrastructure and prevention against events and associated impacts, and climate change; (4) increase social inclusion of more vulnerable peoples, with emphasis on training to foster autonomy among populations highly

dependent on government subsidies; and (5) identify poverty hotspots in territories and where they intersect with areas of greatest physical, environmental and climatic vulnerabilities; (6) promote territorial planning initiatives, ensuring access to territory and fostering actions for economic inclusion in association with the sustainable management of territorial resources and recovery of degraded areas, when appropriate.

7.6.2. Ecosystem-based Adaptation (EbA) Tools

Ecosystem-based Adaptation (EbA) is an important tool for identification of adaptation measures. The premises of EbA include enabling populations to raise their adaptive capacities, through use of ecosystem services and biodiversity as components of a more comprehensive adaptation strategy. This strategy aims to assist people and communities in adapting to negative effects of climate change on local, regional, national, and global levels. EbA is based upon use of biodiversity and ecosystem services (including actions for conservation, recovery and ecosystems

management); it promotes adaptation measures for people and communities; it applies a climate perspective, preferably conducted within the scope of evaluation and vulnerability studies; and it involves participatory multi-stakeholder processes

(ICLEI, 2015). Further information on this methodology is available on the Ministry of Environment website.

The following table reproduces the priority goals for vulnerable populations presented in Volume 1 of this NAP:

Sectoral Strategy and Themes: Vulnerable Populations			
Objective 3. Identify and propose measures to promote adaptation to and reduction of climate risk	Goal 3.6	Initiatives	Responsible
	Diagnosis of Vulnerability to Climate Change of target populations of the National Territorial and Environmental Management Policy for Indigenous Lands- (PNGATI).	Spatial analysis of climate risk of target populations of the National Territorial and Environmental Management Policy for Indigenous Lands (PNGATI).	FUNAI
		Analysis of the degree of vulnerability of each group using pre-set and agreed-upon indicators.	
		Establish a vulnerability scale for identification of priority groups.	
	Indicator/Monitoring:	Progress of on-going activities.	
	Impact:	Identification of priority groups for support under governmental programmes.	
	Goal 3.7	Initiatives	Responsible
	Diagnosis of Vulnerability to Climate Change of target populations of the National Food and Nutritional Security Plan (PLANSAN).	Spatial analysis of climate risk of target populations in Federal Government's Unified Register of Social Programmes (<i>CadUnico</i>), especially Traditional and Specific Population Groups (TSPGs) identified in the register.	MDS/ SESAN/ CAISAN
		Analysis of the degree of vulnerability of each group using pre-set and agreed-upon indicators.	
		Create a vulnerability scale for identification of priority groups.	
	Indicator/Monitoring:	Percentage of CadUnico population groups classified by vulnerability indicators and the climate-risk scale.	
	Impact:	Identification of priority groups for support under governmental programmes.	

Sectoral Strategy and Themes: Vulnerable Populations		
Goal 3.8	Initiatives	Responsible
Diagnosis of vulnerability to climate change for vulnerable populations and beneficiaries of public policies for agro-extractivism.	<p>Analysis of the degree of vulnerability of peoples and traditional communities residing in the 10 priority territories.</p> <p>Analysis of the degree of vulnerability, by means of establishment of a vulnerability scale for identification of priority groups.</p> <p>Foster application of measures to foster resilience in populations classed as vulnerable.</p>	MMA
Indicator/Monitoring:	<p>Progress of on-going activities.</p> <p>Progress of actions for reducing vulnerability applied to vulnerable populations in the territories listed.</p>	
Impact:	Identification of vulnerable populations for support under public policies for agro-extractivism.	

7.7 Final considerations

Identification and analysis of the vulnerabilities of populations to climate change need to advance in coming years.

Public policies targeted at promoting development among these groups must include assessments of climate risk, with a view to promoting resilience among these populations.

For this purpose, territorial vulnerability assessment tools are available, such as the indicator developed by the Ministry of the Environment and Fiocruz, as well as tools such as Ecosystem-Based Adaptation. These, among other tools and methodologies, are available for use by organizations and society.