ACTION PLAN FOR DEFORESTATION AND FIRE PREVENTION AND CONTROL IN THE CAATINGA BIOME (PPCAATINGA)

(2024 to 2027)

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ACTION PLAN FOR DEFORESTATION AND FIRE PREVENTION AND CONTROL IN THE CAATINGA BIOME (PPCaatinga)

Brasília — DF, 2024

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List of Acronyms	
ABC	Brazilian Cooperation Agency
Abin	Brazilian Intelligence Agency
Anater	Brazilian Rural Extension Agency
Aneel	Brazilian Electricity Regulatory Agency
ANM	National Mining Agency
APA	Environmental Protection Area
APNE	Associação Plantas do Nordeste
APP	Permanent Preservation Area
ARIE	Area of Relevant Ecological Interest
ASV	Vegetation Suppression Authorization
BCB	Central Bank of Brazil
BNDES	Brazilian Development Bank
CBHSF	São Francisco River Basin Committee
CDB	Convention on Biological Diversity
Cipoma	Independent Environmental Policing Company of Pernambuco
CNUMAD	United Nations Conference on Environment and Development
COP	Conference of the Parties or Conference of the Parties to any of the United Nations (UN) conventions
CPRH	Environment Company of Pernambuco
DOE	State Official Gazette
DOU	Federal Official Gazette
Embrapa	Brazilian Agricultural Research Corporation
Embratur	Brazilian Agency for Promoting International Tourism
ESEC	Ecological Station
FDD	Fund for the Defense of Diffuse Rights
Flona	National Forest
FNDF	National Fund for Forestry Development
FNE	Constitutional Fund for the Northeast Region

List of Acronyms	
FNMA	National Environmental Fund
FNSP	National Public Security Force
FNRB	National Benefit Sharing Fund
Funai	National Indigenous Foundation
GHG	Greenhouse Gases
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit - German Agency for International Cooperation
ha	hectare
Ibama	Brazilian Institute of Environment and Renewable Natural Resources
IBDF	Brazilian Forestry Development Institute
IBGE	Brazilian Institute of Geography and Statistics
ICMBio	Chico Mendes Institute of Biodiversity Conservation
IDHM	Municipal Human Development Index
Incra	National Institute of Colonization and Agrarian Reform
NDC	Nationally Determined Contribution
Inpe	National Institute of Space Research
Kunming-Montreal Framework	Kunming-Montreal Global Biodiversity Framework / Kunming-Montreal goals on biodiversity
LDN	Land Degradation Neutrality
Mapa	Ministry of Agriculture and Livestock
MCTI	Ministry of Science, Technology, and Innovation
MD	Ministry of Defense
MDA	Ministry of Agrarian Development
MDIC	Ministry of Development, Industry, Trade and Services
MIDR	Ministry of Integration and Regional Development
MJSP	Ministry of Justice and Public Security
mm	millimeter

List of Acronyms	
MMA	Ministry of Environment and Climate Change
MME	Ministry of Mines and Energy
Mona	Natural Monument
MPF	Federal Prosecution Service
MPI	Ministry of Indigenous Peoples
MPO	Ministry of Planning and Budget
MPPB	Prosecution Service of Paraiba
MS	Dry Matter
MT	Ministry of Transportation
MTE	Ministry of Labor and Employment
MTur	Ministry of Tourism
Parna	National Park
PEC	Proposal for Amendment to the Constitution
PF	Federal Police
PFNM	Non-Timber Forest Products
PMFS	Sustainable Forest Management Plan
PNAPO	National Policy on Agroecology and Organic Production
PNB	National Biodiversity Policy
PNCD	National Policy to Combat Desertification, Land Degradation and Mitigate the Effects of Droughts
PNMC	National Policy on Climate Change
PPCDAm	Action Plan for Deforestation Prevention and Control in the Legal Amazon
PPCerrado	Action Plan for Deforestation and Fire Prevention and Control in the Cerrado Biome
PRF	Federal Highway Police
RAMSAR--WETLAND	Ramsar-Wetland Convention - United Nations Convention on Wetlands of International Importance
RDS	Sustainable Development Project
Rebio	Biological Reserve

List of Acronyms	
Resex	Extractive Reserve
RFB	Brazilian Revenue Service
RL	Legal Reserve
RPPN	Private Natural Heritage Reserve
RVS	Wildlife Refuge
SDS	Department for Social Defense
Sema	State Department of Environment of Bahia
Semas	State Department of Environment and Sustainability of Pernambuco
Sicar	Rural Environmental Registry
Sinaflor	National System for Controlling the Source of Forest Products
Sisnama	National Environmental System
Sudema	State Superintendence for Environmental Administration of Paraiba
Ton.	tonne
TFAPE	Environmental Control and Inspection Fee of the State of Pernambuco
TI	Indigenous Land
TQ	Quilombo Territory - Land titled to remnants of quilombo communities
UAS	Alternative Land Use
CU	Conservation Unit
UF	State
UNCCD	United Nations Convention to Combat Desertification, Land Degradation and Mitigate the Effects of Droughts
UNFCCC	United Nations Framework Convention on Climate Change
Zane	Agro-ecological Zoning of the Northeast Region

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1. EXECUTIVE SUMMARY

The Caatinga biome is located in the Northeast region, covering all states in that region, except Maranhão, and the northern part of the state of Minas Gerais. It accounts for approximately 10% of the national territory and is home to nearly 32 million people. The biome is characterized by high diversity in soils, vegetation, environments, and landscapes, and it has already lost 42.6% of its native vegetation. In this context, less than 10% of the biome is protected, the fragmentation of remaining areas is high, and most regions have already undergone anthropogenic changes.

Anthropogenic action in the Caatinga biome occurs in two ways: a) deforestation with a change in land use; and b) degradation of forest cover without a change in land use. It is worth noting that pressure on vegetation areas in the biome has existed since colonization, mainly for shifting agriculture, intensive crops (such as cotton and sisal), extensive livestock farming, and biomass for energy (firewood and charcoal). More recently, new drivers, such as vegetation removal for the installation of wind and solar energy projects, have become established in the biome.

While deforestation monitoring in the Amazon began in the 1970s, it was only in the 1990s, through the Project for the Conservation and Sustainable Use of the Brazilian Biological Diversity (Probio - 1996/2005) and the Project for Satellite-Based Monitoring of Deforestation in Brazilian Biomes (PMDBBS - 2008/2013), that the impact of deforestation across the entire Caatinga was assessed for the first time. As part of the same effort, the Ministry of Environment and Climate Change (MMA) prepared a document aimed at a first action plan for deforestation and fire prevention and control in the Caatinga biome (Brazil, 2011). With the reform of the roles of the federative entities in the management of Brazilian forest resources, established by Law No. 11284, 2 March 2006, and Complementary Law No. 140, 8 December 2011, as well as the commitments to combat and mitigate climate change, conserve biodiversity, and combat desertification and mitigate the effects of drought, several states developed regulations and plans aimed at combating deforestation and preventing fires, as shown in Table 3. It is important to note that the biome contains 62% of susceptible areas and 40% of the area at risk of desertification (MMA, 2007).

According to data from Inpe, deforestation in the Caatinga has decreased over the past two decades, from 12,186.41 km² in 2001 to 1,868.16 km² in 2019. However, in the last three years, an increase in deforestation has been observed in the biome, with 3,189.61 km² recorded in 2023. The deforested areas are scattered across the biome's territory and predominantly occur in the form of polygons smaller than 10 hectares (ha) (Inpe, 2023). In this sense, the main drivers of deforestation are the demand for biomass for energy, the expansion of wind and solar energy projects, as well as the expansion of agriculture (irrigated and non-irrigated) and pastures for livestock activities.

These drivers may be interconnected, for instance, when biomass is obtained for energy in areas being converted for alternative land use. It is important to emphasize that, under articles 33 and 34 of Law No. 12651, 25 May 2012, the supply of biomass for energy generation should not result in a permanent change in land use (deforestation) but rather occur through the sustainable management of native vegetation.

When comparing deforestation data generated by the Satellite-Based Monitoring Project (Prodes/Inpe), the Authorizations for Alternative Land Use (UAS), and the Authorizations for Vegetation Suppression (ASV), declared in the National System for the Control of the Origin of Forest Products (Sinaflor/Ibama), a significant discrepancy is observed between identified and authorized deforestation. This discrepancy indicates gaps in data integration among the entities responsible for issuing administrative authorization acts and the federal managing body of Sinaflor. It also indicates that a significant portion of deforestation may be occurring without oversight and illegally, which presents an additional challenge to advancing deforestation prevention and control in the Caatinga biome.

The biome still has 18.2 million hectares of surplus legal reserve eligible for suppression authorization under the law, already discounting overlaps, which represents 23% of the biome's area. The deficit in legal reserve and in permanent preservation areas totals only 115,000 and 208,000 hectares, respectively (UFMG, 2024). It is also important to highlight that a large portion of the remaining native vegetation in the biome is highly degraded due to chronic disturbance factors such as extensive livestock farming and unregulated extractivism. These data demonstrate that deforestation in the Caatinga should not be controlled solely through policies combating environmental infractions, as they reveal the need and opportunity to advance policies aimed at improving control instruments, promoting sustainable productive activities, and enhancing the value of environmental resources, such as payments for environmental services, integration of UAS and ASV with water management in the biome, etc.

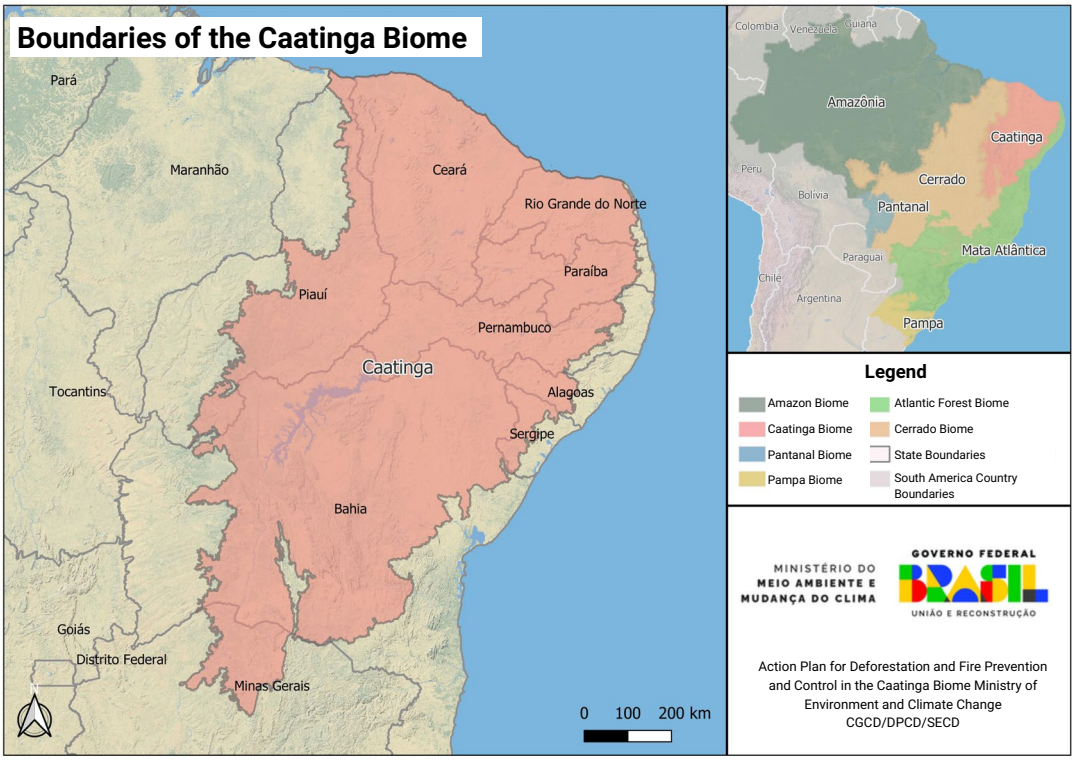
In light of this reality, and with the goal of achieving zero deforestation by 2030, in accordance with the guidelines of Decree No. 11367, 1 January 2023, this Action Plan for Deforestation and Fire Prevention and Control in the Caatinga Biome (PPCaatinga) is presented. The Plan was developed based on an assessment of the social, economic, and environmental realities of the biome and the contributions and discussions held during the 1st Technical-Scientific Seminar on the Causes and Consequences of Deforestation and Fires in the Caatinga, held on 16 April 2024, in Brasilia (DF). Its actions are organized according to the axes defined in the aforementioned decree: i) sustainable productive activities; ii) environmental monitoring and control; iii) land and territorial planning; and iv) regulatory and economic instruments.

2. POLITICAL AND INSTITUTIONAL CONTEXT

2.1. Biome characterization

The Caatinga biome extends across the Northeast and Southeast regions of Brazil, covering an area of 862,818 km², approximately 10.1% of the national territory and 53.5% of the Northeast region (Figure 1). It is present in nine states (Table 1) and spans 1,209 municipalities, home to a population of 31.6 million people, 70% of whom live in urban areas (data from July 2021) (IBGE, 2018). The Municipal Human Development Index (IDHM) of the states encompassing the biome, with the exception of the state of Minas Gerais, is below the national average (UNDP, 2024).

Figure 1. Map of boundaries between the Caatinga Biome and other Brazilian biomes.



Source: IBGE, Directorate of Geosciences, Coordination of Natural Resources and Environmental Studies, Environmental Information Database - BDiA.

Table 1. Territorial area of the Caatinga Biome by state.

Region	State	Dimension (km2)
Northeast	BA	351,402
	CE	148,895
	PI	118,896
	PE	82,546
	PB	52,373
	RN	50,773
	AL	13,182
	SE	12,139
	Subtotal	830,205
Southeast	MG	32,614
Total		**862,818**

Source: IBGE, 2019

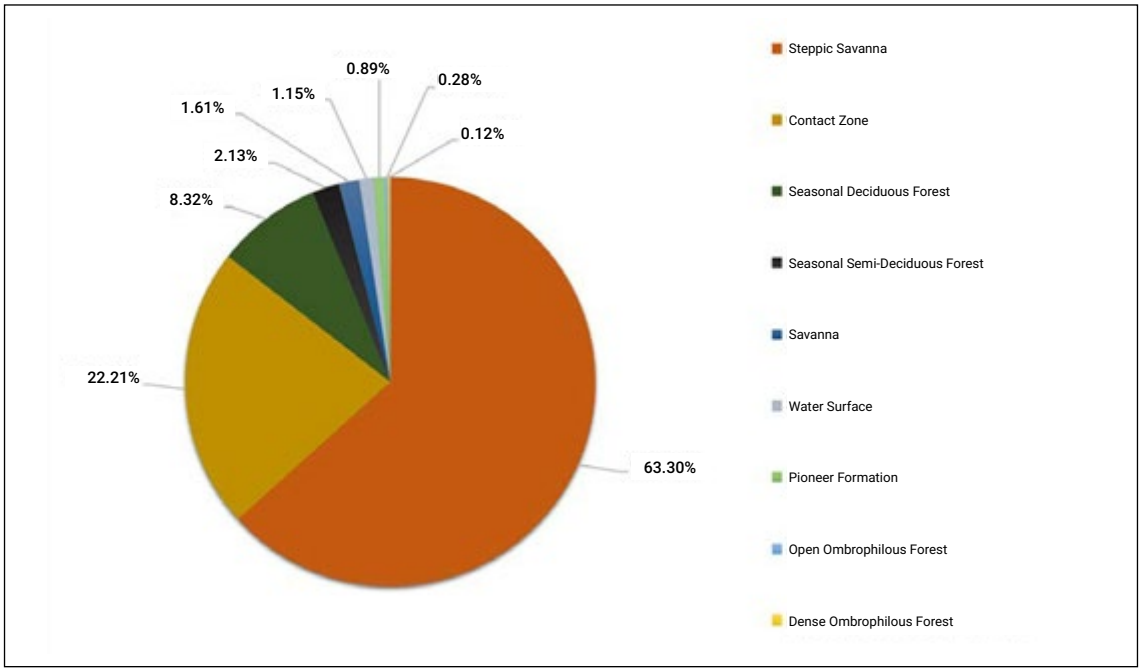
The Caatinga biome is predominantly represented by two climatic zones. The dry zone (BSh), accounting for 49.6% of the area, is characterized by a hot semi-arid climate, with an average annual precipitation of approximately 626 mm/year, concentrated between February and April, and an average annual temperature of 24°C. The tropical zone, which represents 48.5% of the biome's area, comprises areas with a dry summer (As), with precipitation concentrated between May and July, and areas with a dry winter (Aw), with precipitation occurring from December to February. The tropical zone features higher average annual precipitation (900 to 1150 mm/year), as well as higher average temperatures (24.7 to 25.7°C) (Alvares et al., 2013; Silva et al., 2022). Evapotranspiration throughout the biome is high, ranging from 1,500 to 2,500 mm per year (Reddy, 1983 apud Sampaio & Freitas, 2017).

The Caatinga is characterized by a high diversity of soils derived from two major geological formations: a) the sedimentary area present in the plateaus of western portion of the state of Pernambuco and Bahia and in the Tucano Jatobá sedimentary basin; and b) the Sertaneja Depression, where the Precambrian crystalline shield has been re-exposed (Sampaio & Freitas, 2017). In the sedimentary area, the soils are deep, ranging from sandy to clayey, and generally of low fertility: ferralsols (21%), acrisols (15%), and arenosols (9%). In the Sertaneja Depression, soil diversity is high, with shallow and stony soils (19% leptsols and 13% luvisols), soils with compacted layers (9% planosols), and soils with

poorly differentiated horizons (4% regosols) (Sampaio & Freitas, 2017; Araújo Filho, 2013; Brazil, 2011).

The name "Caatinga," in Tupi language, means "white forest," reflecting the natural appearance of the vegetation during the dry season. In this sense, the typical vegetation of the Caatinga is steppic savanna. It consists of arboreal or shrubby forests with short trees and shrubs, many of which have thorns, microphyllous leaves, and xerophytic characteristics, changing their physiognomy according to seasonality. In terms of species, the main families are *Fabaceae, Convolvulaceae, Euphorbiaceae, Malpighiaceae, Poaceae,* and *Cactaceae*. Lastly, the contact zones within the biome are quite significant and are found in specific regions such as plateaus and high-altitude wetlands (Figure 2) (Prado, 2003; Sampaio & Freitas, 2017).

Figure 2. Area occupied by type of vegetation in the Caatinga Biome.



Source: Environmental Information Database (BDIA) - IBGE, 2024.

There is still considerable lack of knowledge about the biodiversity of the Caatinga, despite research advances over the past 10 to 15 years. The rate of endemism in the flora is estimated to range between 5% and 25%; and 30% of species are classified under some category of extinction threat (Queiroz et al., 2017). Additionally, there are approximately 4,963 native plant species (Flora and Funga of Brazil, 2020) and significant faunal diversity: 183 species of mammals, 548 birds, 224 reptiles, 98 amphibians, 386 fish, among others (Garda et al., 2018). Regarding fauna, 23% of the species are endemic, and 5% are classified as endangered or critically endangered (ICMBio, 2024). Caatinga is also home to populations of the two largest feline species in the Americas, jaguars

and pumas, considered indicators of environmental integrity. However, these species are classified as "Critically Endangered" and "Endangered" in the biome, respectively, primarily due to habitat loss and fragmentation (Azevedo et al., 2013; Morato et al., 2013).

The biome presents significant environmental heterogeneity and is divided into eight ecoregions: Chapada Diamantina Complex; Campo Maior Complex; Ibiapaba-Araripe Complex; Northern Sertaneja Depression; Southern Sertaneja Depression; São Francisco Dunes; Borborema Plateau; and Raso da Catarina (Velloso et al., 2002). Furthermore, the Agroecological Zoning of the Northeast (Zane) identifies 20 major Landscape Units located within the biome, a classification based on morphostructural, geomorphological, and geographic characteristics, which are further subdivided into 172 Geoenvironmental Units, based on specific attributes of substrate, vegetation, soils, topography, among others (Silva et al., 1993). Additionally, based on floristic and environmental data, the biome is divided into nine biogeographic sub-regions, with emphasis on the central and peripheral sub-regions of the Chapada Diamantina, which present the highest endemism rates in the entire biome (Silva & Souza, 2018).

With respect to protected areas, less than 10% of the Caatinga biome is currently covered by Conservation Units (CUs), with approximately 2% classified as Strict Protection and 7% as Sustainable Use, according to the National Registry of Conservation Units (CNUC, 2024). Among the Sustainable Use CUs, most, both in number and size, are Environmental Protection Areas (APAs), which still face challenges in terms of consolidation and management, contributing little to conservation. The Kunming-Montreal Global Biodiversity Framework (GBF), established at the 15th United Nations Conference on Biodiversity (COP 15) in Montreal, Canada, set global targets to be achieved by 2030, including the conservation of at least 30% of terrestrial, inland water, coastal, and marine areas, particularly those of critical importance for biodiversity and for ecosystem functions and services (UNEP, 2024). In this context, the existing conservation units in the Caatinga, especially those under strict protection, are insufficient to contribute to the global target or to effectively conserve and promote the sustainable use of the biome's biodiversity. It is also worth noting that the area of the biome covered by Indigenous Lands accounts for less than 1% of the territory (MMA & TNC, 2008).

The total area of native vegetation converted in the Caatinga reached 370,000 km² by 2023, representing 42.8% of the biome's total area (Inpe, 2024). Most of the remaining areas with native vegetation have undergone some degree of anthropogenic disturbance, and the fragmentation of these remnants is considered high (Sampaio & Freitas, 2017; Antongiovanni et al., 2019).

In this context, it is important to highlight that there are multiple deforestation drivers in the biome. Since colonization, the Caatinga biome has been subject to intense and diverse anthropogenic pressure on its resources, with major pressure drivers including shifting agriculture, cycles of intensive crops (such as cotton and sisal), extensive

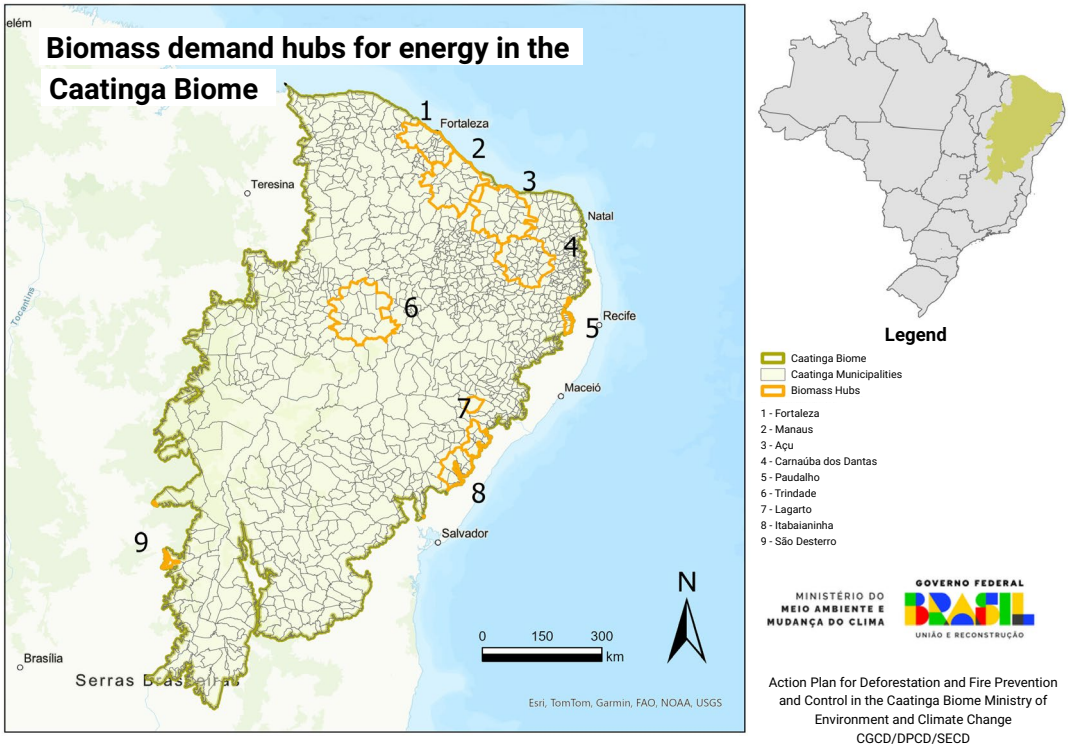
livestock farming (cattle, goats, and sheep), biomass for energy (firewood and charcoal for industrial, commercial, and domestic use), and the extraction of other timber and non-timber forest products (Riegelhaupt & Pareyn, 2022; Mamede & Araújo, 2008). Additionally, data from the 2017 Agricultural Census (IBGE) help improve the understanding of the rural reality of the biome. Approximately 67% of agricultural establishments have self-consumption as their primary purpose, 53% are primarily engaged in livestock farming, and 36% in temporary crops. Moreover, rural-to-urban population migration has been notable for over a decade, and the average age of producers was 53 years. Another specific characteristic of the rural reality in the Caatinga is that 76% of establishments reported that agricultural income is lower than income from other sources. Attention to these rural characteristics is essential to guide development strategies and deforestation control in the biome.

In addition to traditionally known deforestation drivers, new drivers have emerged in recent years. According to the Energy Generation Information System (SIGA) of the National Electric Energy Agency (Aneel), since 2011 the Caatinga biome has experienced a boom in the expansion of clean energy, with wind and photovoltaic plants. In the Caatinga states, there are already around 900 wind farms in operation and 550 more are planned for construction. Additionally, there are 317 photovoltaic power plants in operation and another 2,000 projected for construction (Aneel, 2024). Despite being clean energies, it is clear that there has been criticism of their installation and operation, both because of the environmental impacts (deforestation, death of birds, deterioration of landscapes, invasion of fishing areas) and the socio-economic impacts (psychological problems, noise pollution, low income generation, etc.), highlighting the need to improve the instruments for territorial planning and authorization of activities, such as environmental licensing, in order to make the installation and expansion of such activities compatible in a way that is sustainable in its economic, environmental and social dimensions.

Beyond a better understanding of deforestation drivers, increasing importance must be given to the assessment of degradation levels and drivers, which in Caatinga ecosystems is often characterized by the expansion of shrubby vegetation at the expense of forest physiognomies and even agricultural areas (Araújo et al., 2023). Chronic anthropogenic disturbance in these areas—largely caused by overgrazing and continuous extraction of forest products—can be assessed using indicators such as proximity to urban centers, homes, and roads, as well as population and herd density (Ribeiro et al., 2015). In this regard, and to measure the level of degradation in Caatinga areas, Antongiovanni et al. (2019) developed a Chronic Disturbance Index (CDI), based on five anthropogenic drivers: population, infrastructure, grazing, forest exploitation, and fires. This index shows that a large portion of the biome's remnants are fragmented, affected by these drivers, and accessible to human presence, with high edge effects. And while there is good connectivity, there are few large, preserved remnants.

Finally, it is worth noting the existence of several agro-industrial development hubs where greater pressure from deforestation and environmental degradation is expected (Figure 3). Therefore, the biome requires strategies that integrate conservation, sustainable use, and income generation.

Figure 3. Agro-industrial development hubs in the Caatinga Biome.



Source: National Council of the Caatinga Biosphere Reserve (2004).

Source: MMA.

2.2. Environmental commitments

Currently, the national regulatory framework concerning the use and conservation of native vegetation is Law No. 12651, 25 May 2012 - Native Vegetation Protection Law (also known as the Forest Code).

For the Caatinga biome and other biomes in the country, except those located in the Legal Amazon, the Native Vegetation Protection Law (Law No. 12651, 25 May 2012) establishes the requirement to maintain an area with native vegetation cover, designated as Legal Reserve, corresponding to at least 20% of the property's total area, along with its respective usage restrictions, except in the cases provided for in article 67. The law also establishes the obligation of a Forest Management Plan for activities involving the exploitation of native vegetation and outlines general rules for the control of origin, transport, and use of forest products. It also addresses topics such as the use of fire, support programs for environmental conservation and recovery, and specific provisions for family farming.

It is also important to note that the Caatinga biome has not yet been recognized as a national heritage site[1] in the Federal Constitution. In this regard, the Federal Senate approved in 2010 a Proposed Amendment to the Constitution (PEC 51/2003) granting such recognition; however, the matter is still pending consideration by the Chamber of

1 Currently, only the Amazon Forest, the Atlantic Forest, the Serra do Mar, the Pantanal, and the Coastal Zone are considered national heritage sites.

Deputies. Nevertheless, several treaties and conventions to which Brazil is a signatory have implications for the Caatinga and present important synergies with the PPCaatinga:

- The Convention on Biological Diversity (CBD), a United Nations treaty drafted during the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro (ECO-92), enacted in Brazil by Federal Decree No. 2519, 16 March 1998 (MMA, 2000);

- The National Climate Change Plan (PNMC), which aims to encourage the development and enhancement of mitigation and adaptation actions in Brazil through four lines of action: mitigation opportunities; impacts, vulnerabilities, and adaptation; research and development; and education, training, and communication (MMA, 2008). At the time of drafting the PPCaatinga, a new Climate Plan was also being developed, scheduled for publication in 2025, and expected to include National Strategies and Sectoral Plans for mitigation and adaptation;

- The National Action Program to Combat Desertification and Mitigate the Effects of Drought – PAN-Brazil (MMA, 2004), developed in the context of Brazil's ratification of the United Nations Convention to Combat Desertification (UNCCD), along with various State Action Programs to Combat Desertification (PAEs). It should be noted that all states in the semi-arid region have PAEs, with varying degrees of updating. PAN-Brazil was under revision during the preparation of the PPCaatinga, with publication anticipated in 2025.

Source: MMA.

In 2004, the National Council of the Caatinga Biosphere Reserve presented a desirable scenario and a sustainable development agenda for the biome:

Economic dimension

Objective 1 - Restructuring and boosting the economic base

LA 1: Agrarian and territorial restructuring

LA 2: Consolidation of strategic production chains

LA 3: Sustainability of trade, services, and tourism activities

LA 4: Sustainability of industrial activities

LA 5: Promotion of irrigated agriculture

LA 6: Complementation of economic infrastructure

LA 7: Strengthening of the local economy

Sociocultural dimension

Objective 2 - Human, technological, and cultural development

LA 8. Investment in education and job training

LA 9. Improvement of healthcare, basic sanitation, and housing services

LA 10. Appreciation of local cultures

Environmental dimension

Objective 3 - Environmental conservation, preservation and restoration

LA 11. Restoration of areas undergoing desertification

LA 12. Implementation of Caatinga forest management

LA 13. Strengthening of environmental management

LA 14. Environmental planning of the territory and recovery, revitalization, and conservation of river basins

LA 15. Development and promotion of procedures aimed at species protection and conservation

LA 16. Promotion of studies to increase scientific knowledge of ecosystems and biodiversity

Political-institutional and science and technology dimension

LA 17. Promotion of territorial planning and management instruments

LA 18. Institutional development and organization of civil society

LA 19. Technology for competitiveness and sustainability

LA 20. Development of information technologies

All these actions are related to or have a direct impact on controlling deforestation and degradation in the biome and are aligned with the present Plan. It is worth highlighting that actions aimed at adapting to the semi-arid conditions and mitigating the effects of drought also have the potential to reduce deforestation and the degradation of native vegetation. By increasing household income, intensifying activities, and promoting the sustainable use of natural resources, pressure on deforestation and degradation is reduced.

At the national level, the National Plan for Agroecology and Organic Production (PNAPO), established by Decree No. 7794/2012 and Renewed by Decree No. 11582/2023, also addresses the use and conservation of natural resources under Axis II (MDA, 2013), encompassing forest management, agrobiodiversity, and rural technical assistance and extension.

At COP-21, held in Paris in 2015, the Brazilian government submitted its Nationally Determined Contribution (NDC) to the secretariat of the United Nations Framework Convention on Climate Change (UNFCCC) (MMA, 2019). In this commitment, Brazil pledged to increase the share of sustainable bioenergy in the country's energy matrix to 18% by 2030, to scale up the sustainable management of native forests, and to reach a 45% share of renewable energy in the national energy matrix by 2030. The NDC also includes the commitment to restore 12 million hectares of native vegetation throughout Brazil, including in the Caatinga, by 2030, for multiple uses.

Regarding Protected Areas, it is important to highlight the efforts made since the mid-1990s to create conservation units in the biome. Currently, the Caatinga biome contains 258 Conservation Units (CUs), which together account for less than 10% of its territory. Of these, 125 are federal, 117 are state-level, and 16 are municipal. In terms of conservation category, 184 are Sustainable Use units (mostly RPPNs and APAs), covering approximately 7% of the territory, while 74 are Strict Protection units, which represent only around 2% of the biome's area (https://cnuc.mma.gov.br/powerbi). Tables 2 and 3 present the distribution of Conservation Units by category and by State. However, as mentioned previously, the contribution of the Caatinga's conservation units is insufficient to meet the target established at the 15th Conference of the Parties to the Convention on Biological Diversity (CBD), held in Montreal, Canada, in 2022.

It is also important to recognize the efforts and results of the implementation of the National Policy to Combat Desertification and Mitigate the Effects of Drought and its instruments (Law No. 13153, 30 July 2015), whose objectives include: establishing mechanisms for the protection, preservation, conservation, and recovery of natural resources; integrating the production and use of water resources, and the production and use of infrastructure for water capture, storage, and distribution with actions for prevention, adaptation, and the fight against desertification and land degradation in a socially and environmentally sustainable manner; promoting environmental, food, water, and energy security in areas vulnerable to desertification; fostering environmentally sustainable production, including eco-agriculture, forestry, and agroforestry systems, with

diversification and local value addition to production; supporting and encouraging socially and environmentally sustainable development in areas vulnerable to desertification; and supporting socially and environmentally sustainable irrigation systems in areas suitable for such activity, considering salinization, alkalinization, and soil degradation processes.

This policy is based on the following principles, among others: incorporation and appreciation of traditional knowledge related to the sustainable management and use of natural resources; coordination and alignment with public policies that are thematically aligned with the goals of combating desertification, particularly those dedicated to eradicating poverty, agrarian reform, and promoting conservation and the sustainable use of natural resources.

Table 2. Distribution of Conservation Units by category and state.

Type		Number of CUs by category
PI	Esec	7
	Rebio	4
	Parna	38
	Mona	13
	RVS	12
	Subtotal	**74**
US	RPPN	122
	APA	46
	Arie	7
	Flona	5
	Resex	3
	RDS	1
	Subtotal	**184**
Total		**258**

Source: MMA, 2024.

Table 3. Number of Conservation Units by state.

State	Number of CUs by state
CE	90
BA	73
PE	28
MG	14
RN	14
PB	13
AL	10
PI	7
SE	4
AL, BA, SE	1
CE, MA, PI	1
CE, PE, PI	1
CE, PI	1
MA, PI	1

Source: MMA, 2024.

In 2023, with the start of a new federal administration, a renewed commitment was made to reduce the loss of native vegetation and achieve zero deforestation by 2030 across all biomes. Within the scope of native vegetation suppression control plans, such as the PPCaatinga, zero deforestation refers to the elimination of illegal deforestation and the compensation for the legal suppression of native vegetation and the resulting greenhouse gas emissions, through the strengthening of the implementation of forest legislation and the recovery and increase of native vegetation stock by means of economic incentives for conservation and sustainable forest management.

Source: MMA.

2.3. Governance of the PPCaatinga

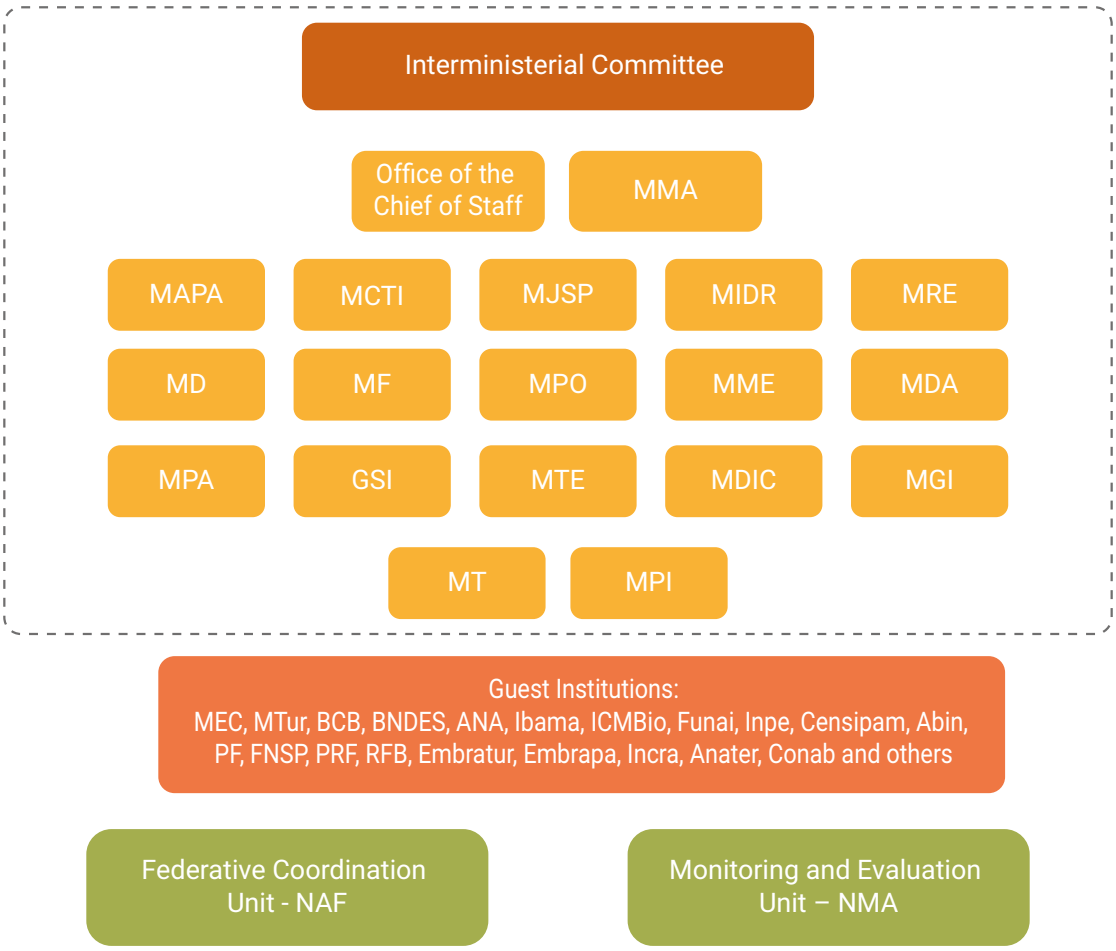
As a way of demonstrating its commitment to biodiversity conservation and the responsible use of natural resources, and in view of the significant increase in deforestation observed in recent years in the country, the federal government established, through Decree No. 11367, 1 January 2023, the Permanent Interministerial Commission for the Prevention and Control of Deforestation (CIPPCD), mandating the preparation of Action Plans for Deforestation and Fire Prevention and Control in all biomes in Brazil.

The PPCaatinga will be implemented over four years (between 2024 and 2027), in order to synchronize its actions with the execution of the current Multi-Year Plan (PPA). In alignment with other plans and public policies, the PPCaatinga is also considered an instrument for implementing Law No. 12187, 29 December 2009 - National Policy on Climate Change (PNMC), focusing on the mitigation of greenhouse gas (GHG) emissions related to land use and on the adaptation of the natural and human systems of the biome to climate change, in synergy with the National Policy to Combat Desertification and Mitigate the Effects of Drought (Law No. 13153, 30 July 2015), with the National Policy for the Recovery of Native Vegetation (Proveg), established by Decree No. 8972, 23 January 2017, and with the National Biodiversity Policy, established by Decree No. 4339, 22 August 2002. Thus, the PPCaatinga operates transversally, contributing to the fulfillment of various Brazilian, national, and international environmental commitments.

2.3.1. Institutional arrangement and governance model

The governance model for the 1st Phase of the PPCaatinga follows the procedures established in Decree No. 11367/2023 and is managed by the CIPPCD, with transparency mechanisms and social participation instruments (Figure 4).

Figure 4. Governance structure of the 1st phase of the PPCaatinga.



At the ministerial coordination level, the CIPPCD serves as the deliberative forum for decision-making and strategic proposals for new action plans. Chaired by the Office of the Chief of Staff of the Presidency of the Republic (CC/PR) and coordinated by the Ministry of Environment and Climate Change (MMA), the Interministerial Commission includes the participation of 17 other ministries.

CIPPCD has been assigned the responsibilities of defining and coordinating actions to reduce deforestation rates throughout the national territory; evaluating, approving, and monitoring the implementation of the Action Plans for Deforestation Prevention and

Control (PPCD) in all Brazilian biomes; and establishing measures to overcome any implementation challenges. It is also the responsibility of CIPPCD to ensure that the actions outlined in the PPCDs promote the development and integration of environmental protection systems and contribute to the conservation of biological diversity and the reduction of greenhouse gas emissions resulting from deforestation, forest degradation, and fires. For this reason, it is also the role of CIPPCD to monitor the formulation and implementation of public policies that affect the PPCDs, through coordinated actions with states, the Federal District, and municipalities.

Following the 1st Technical-Scientific Seminar on the Causes and Consequences of Deforestation and Fires in the Caatinga, held on 16 April 2024 in Brasilia (DF), under the coordination of the MMA, dozens of meetings were held with the members and invitees of the CIPPCD with the aim of fostering broad discussion on the means and mechanisms to address the identified issues. These discussions made it possible to thoroughly analyze the characteristics, challenges, and opportunities of each thematic axis to generate input and define objectives, expected results, actions, targets, and indicators that will comprise the plan. It is important to note that the targets and indicators will be incorporated into the Plan after consolidation with the responsible institutions.

The 1st Technical-Scientific Seminar on the Causes and Consequences of Deforestation and Fires in the Caatinga, held in Brasilia (DF) and broadcast live on MMA's social media platforms, was attended by representatives of federal and state governments, civil society, the private sector, and academia. During the seminar, several presentations were made on the causes and consequences of deforestation and fires in the biome. The seminar also enabled the analysis of intra-regional social and economic dynamics, in order to anticipate the planning of preventive actions against the emergence of new deforestation frontiers in the biome. After the seminar, a Problem Tree (Annex A) was developed compiling the various causes and consequences of deforestation and degradation in the biome, which was used as a basis for the preparation of this Plan.

To enable integrated implementation with states and municipalities, the Federative Coordination Unit (NAF) will be established, with periodic meetings between the MMA, other federal actors, and the state and municipal environmental departments. The NAF will serve not only as a forum for information sharing but also for identifying potential challenges and opportunities for joint action between the Federal Administration and the states and municipalities, with support from and within the scope of the National Tripartite Commission, created by Complementary Law No. 140, 8 December 2011.

In accordance with art. 11 of Decree No. 11367/2023, an annual monitoring report on the plan shall be published with information on the implementation of the action lines led by each member and invitee of the CIPPCD. To this end, the Monitoring and Evaluation Unit (NMA) will be established, coordinated by the MMA, with participation from ministries, oversight agencies, and representatives of civil society and academia. The NMA may

also provide suggestions for adjusting targets and indicators in order to enhance the effectiveness assessment of PPCaatinga's actions. Both units will serve as instances to support future plan revisions, as provided for in art. 2 of Decree No. 11367, 1 January 2023, to establish a routine of information generation that enables the continuous improvement of the plan.

Instruments related to transparency and social participation were also designed to ensure proper disclosure and transparency of the plan's actions, while expanding and strengthening channels for participation by states, the private sector, and organized civil society. Decree No. 11367, 1 January 2023, provides for the following social participation instruments: public consultation; technical-scientific seminars; and the preparation of follow-up and monitoring reports on the implementation of actions.

The preparation of the 1st phase of the PPCaatinga was coordinated by the Extraordinary Department for Deforestation Control and Environmental Land Management (SECD/MMA), which developed the document based on: a) the analysis of effective actions from the PPCDAm and PPCerrado; b) reports from government transition working groups in the areas of environment, agriculture, justice, and Indigenous peoples; c) inputs collected throughout the Technical-Scientific Seminar; d) inputs gathered during meetings with federal stakeholders; and e) technical meetings with states and civil society.

3. POLICIES FOR DEFORESTATION AND FIRE CONTROL IN THE CAATINGA BIOME

3.1. Federal Government Policies for Deforestation and Fire Control in the Caatinga Biome

With the publication of Decree No. 11367, 1 January 2023, the Action Plans for the Prevention and Control of Deforestation (PPCD) for the Amazon and Cerrado biomes were resumed, and plans were proposed for the other biomes, including the Caatinga. The PPCDs are considered instruments for the implementation of the National Policy on Climate Change (PNMC), established by Law No. 12187, 29 December 2009. In addition, they contribute to the implementation of the National Strategy for Reducing Greenhouse Gas Emissions from Deforestation and Forest Degradation, Conservation of Forest Carbon Stocks, Sustainable Forest Management, and Enhancement of Forest Carbon Stocks in Brazil (REDD+), established by Decree No. 11.548, 5 June 2023. The PPCDs operate in synergy with the National Biodiversity Policy (Decree No. 4339, 22 August 2002), the National Native Vegetation Plan (Planaveg) (Decree No. 8972, 23 January 2017), and the National Integrated Fire Management Policy (Law No. 14944, 31 July 2024), thereby contributing to the implementation of both national and international commitments. More specifically, the PPCaatinga also relates to the National Policy to Combat Desertification and Mitigate the Effects of Drought (Law No. 13153, 30 July 2015).

Historically, the control of deforestation in the Caatinga biome was carried out institutionally by the Brazilian Forest Development Institute (IBDF) and later by the Brazilian Institute of Environment and Renewable Natural Resources (Ibama), without the support of a specific plan. Enforcement was carried out at the state level by local units, and specific missions were also conducted in special cases (e.g., the gypsum hub of Araripe).

Over the years, some initiatives have sought to address the issue of deforestation and to explore alternatives for its control and the reduction of its impact. The National Forest Program, created by Decree No. 3420, 20 April 2000, with institutional coordination attributed to the MMA, aimed to expand the area of managed forest in conjunction with the protection of areas of high conservation value. The Project for the Conservation and Sustainable Use of the Brazilian Biological Diversity (Probio - 1996 to 2005) and, subsequently, the Project for Satellite-Based Monitoring of Deforestation in Brazilian Biomes (PMDBBS) of the Ministry of Environment (MMA) monitored deforestation in the biome during the periods 2002-2008, 2008-2009, 2009-2010, and 2010-2011 (Brazil, 2016). At that time, deforestation was already considered one of the main causes of biodiversity loss, leading to the reduction and fragmentation of habitats and the extinction of numerous species.

In 2010, the MMA conducted a diagnostic study of deforestation dynamics in the Caatinga biome, which resulted in the document Inputs for the Preparation of the Action Plan for Deforestation and Fire Prevention and Control in the Caatinga Biome (in Portuguese *Subsídios para a elaboração do plano de ação para a prevenção e controle do desmatamento na Caatinga* - Brasil, 2011). This document contained relevant information and proposals on key issues that are incorporated into this Plan, such as the impacts of livestock (overgrazing) and firewood extraction for energy purposes, as well as alternatives for sustainable forest management and energy efficiency to enable sustainable work with these activities.

In 2012, a milestone was reached when deforestation monitoring in the Caatinga biome began to be conducted by the National Institute for Space Research (Inpe) through the Satellite Deforestation Monitoring Project (Prodes).

At COP-21, held in Paris in 2015, the Brazilian government submitted its Nationally Determined Contribution (NDC) to the secretariat of the United Nations Framework Convention on Climate Change (UNFCCC) (MMA, 2019). In this commitment, Brazil pledged to increase the share of sustainable bioenergy in the country's energy matrix to 18% by 2030, to scale up the sustainable management of native forests, and to reach a 45% share of renewable energy in the national energy matrix by 2030. In addition, the NDC includes a commitment to restore 12 million hectares of native vegetation throughout Brazil by 2030 for multiple uses.

Finally, in 2023, a new commitment was proposed to reduce the loss of native vegetation and achieve zero deforestation by 2030 in all biomes. It is worth reiterating that, in the context of the PPCaatinga, zero deforestation refers to the elimination of illegal deforestation and the compensation for the legal suppression of native vegetation and the resulting greenhouse gas emissions, through the strengthening of forest law enforcement and the recovery and increase of native vegetation stocks by means of economic incentives for conservation and sustainable forest management.

Regarding fire control policies, it is important to highlight that the MMA, together with Ibama and ICMBio, has been working for several years on the prevention and combat of forest fires throughout the national territory through the Federal Brigade Program for the Prevention and Combat of Forest Fires, which is specifically contracted for this purpose. This effort is focused primarily on federal areas selected based on their history of fire occurrence and the socio-environmental relevance of each area.

In addition, as an MMA initiative through Ibama, a situation room is established annually to operate during the critical drought period in an integrated and coordinated manner, bringing together, on a daily basis, representatives from federal and state institutions that work in fire monitoring and suppression. This is the Integrated Multiagency Operational Coordination Center (Ciman), which has been operational for several years and was recently re-established by Law No. 14944, 31 July 2024, which instituted the

National Integrated Fire Management Policy. Its primary role is to monitor the status of fires in Brazil, share information, define priorities, and coordinate large-scale firefighting operations.

It is also important to mention that federal environmental institutions responsible for responding to fires work with annual planning that includes, in addition to the Federal Brigade Program and the institutionalization of Ciman, the implementation of initiatives related to Integrated Fire Management. This approach incorporates ecological, cultural, socioeconomic, and technical aspects of fire, with the objective of reducing emissions of particulate matter and greenhouse gases, conserving biodiversity, and decreasing the severity of fires. It also encompasses several activities such as training, awareness campaigns, environmental education, construction of firebreaks, development of burning calendars, implementation of controlled and prescribed burns, fires monitoring and suppression, as well as recovery and restoration of affected areas, which continue to be implemented in different regions of the country.

Another policy being developed by federal institutions in response to fires, also provided for in the National Integrated Fire Management Policy, is the recognition, appreciation, and strengthening of community and volunteer brigades and brigade members operating throughout the national territory. This is being carried out through the development of the Federal Volunteering Strategy for Integrated Fire Management actions by the MMA and its affiliated agencies, Ibama and ICMBio, in partnership with other organizations and representatives of civil society. These collectives, increasingly present in environmental protection and conservation, are a valuable resource for preserving Brazil's natural heritage, as they are located in the territory and can assist the federal government with primary and immediate actions to prevent fires, such as community awareness, execution of prescribed and controlled burns, construction of firebreaks, fire monitoring and detection, and the recovery and restoration of areas affected by fires. In some cases, these collectives are also trained for initial suppression, allowing them to provide a first response to fire outbreaks and prevent them from becoming major fires. However, to ensure that this involvement is safe and effective for both parties (government and society), these groups must be properly trained and equipped, and their activation procedures must be clear, well established, and regulated, this being the main goal of the Federal Strategy.

Furthermore, it is important to note that, under Complementary Law No. 140, 8 December 2011, the federal administration's action in areas outside its jurisdiction must occur only in a subsidiary capacity and solely upon request by the federative entity that originally holds the authority for the administrative action. It follows, therefore, that the responsibility for responding to burnings and fires in a given region should not be attributed solely to the federal government but also to state and municipal governments, which hold primary jurisdiction.

This principle is also reflected in Law No. 14944, 2024, which establishes that the National Integrated Fire Management Policy shall be guided by the principle of shared

responsibility between the Federal Administration, the States, the Federal District, and the Municipalities, in coordination with organized civil society and representatives of the productive sectors, in the creation of policies, programs, and plans that promote Integrated Fire Management.

Moreover, Decree No. 11367, 1 January 2023, reinstated the National Commission for the Recovery of Native Vegetation (Conaveg), which coordinates the implementation, monitoring, and evaluation of the National Policy for the Recovery of Native Vegetation (Proveg) and the implementation of the National Native Vegetation Recovery Plan (Planaveg), which includes, among others, actions for the restoration of degraded areas, including those affected by fires.

Finally, it may be considered that the PPCaatinga is the first plan to address the issue of deforestation, degradation, and fires in the Caatinga biome with structured proposals for confronting these challenges through interministerial and cross-sectoral actions.

3.2. Deforestation Control Plans of the States in the Caatinga Biome

With the enactment of Law No. 11284, 2 March 2006 - Law on the Management of Public Forests, and Complementary Law No. 140, 8 December 2011, which establishes rules - under art. 23.III, VI, and VII and sole paragraph of the Federal Constitution, for cooperation between the Federal Administration, the states, the Federal District, and the municipalities in administrative actions resulting from the exercise of shared environmental jurisdiction, the management of forest resources was decentralized and, to a large extent, transferred from Ibama to state agencies. From then on, the states, and in some specific cases, the municipalities, became responsible for managing issues related to the environmental licensing of rural properties, deforestation on private lands, forest management for the production of timber or non-timber forest products, as well as licensing for planting and harvesting (reforestation). In addition, responsibility was assigned to those federative entities for controlling the flow of timber and non-timber forest products, reforestation obligations, monitoring and enforcement on private lands, and promotion, technical assistance, and incentives for forest production, as well as related environmental compensation.

In the case of the Caatinga, efforts to combat deforestation and fires in the biome have occurred at different times and in various forms in each state, particularly from the late 2010s onward, in the form of state policies and programs, as well as action, prevention, and combat plans. Table 4 presents a summary of the different historical and ongoing initiatives in the biome at the state level, including the main actions that have been planned or implemented.

Table 4. State-level policies, plans, and strategies for deforestation and fire prevention and control established by the states comprising the Caatinga Biome, reference year (establishment), and main actions developed or to be carried out.

State	Plan/Strategy	Reference year	Main action
PI	Law No. 8094, 12 July 2023 - State Policy for the Prevention and Combat of Illegal Deforestation	2023	Establishment of 10 guidelines for combating illegal deforestation; Creation of the Permanent State Commission for the Prevention and Combat of Illegal Deforestation - CEPPCDI; Provision for the creation of nine instruments within the scope of the State Public Administration.
	Action Plan for the Prevention and Control of Fires in Piauí	2023	Strengthening of municipal fire brigades.
	Plan for the Prevention and Combat of Illegal Deforestation in Piauí (PPCDI) - Phase 01	2024	Strengthening of mitigation and compensation instruments for the legal suppression of native vegetation, structuring actions to be adopted by SEMARH over the next three years; Establishment of a target to reduce illegal deforestation by 80% compared to 2022 levels, in order to achieve net zero deforestation by 2030.
CE	State Program for the Prevention, Monitoring, and Control of Forest Fires (Previna)	2004	Establishment of the State Committee for the Prevention, Monitoring, and Control of Forest Fires through Decree No. 27596, 20 October 2004, amended by State Decree No. 27748, 28 March 2005, and State Decree No. 30065, 30 December 2009; Creation of a situation room responsible for monitoring hotspots and weather conditions.
	Complementary Law No. 175, 13 December 2017	2017	Definition of fire use prohibitions in the state; Establishment of conditions for the use of fire through Controlled Burning; Definition of temporary and volunteer brigades.
	State Plan for Climate Change Adaptation and Low-Carbon Agriculture for Sustainable Development (ABC+CE, 2020-2030)	2020	Establishes the state of Ceará's formal commitment to contribute to the reduction of Greenhouse Gas (GHG) emissions from agriculture.

RN	State Plan for Environmental Prevention and Combat of Burnings and Forest Fires - RN Sem Chamas	2022	Publication of the "Environmental Education: RN Sem Chamas" series, in three volumes.
PB	Prosecution Service of Paraiba (MPPB), Federal Highway Police (PRF), and State Superintendence of Environmental Administration (Sudema-PB)	2024	Definition of strategies to combat deforestation, noise pollution, and illegal mining in the state.
PE	Law No. 14090, 17 June 2010 - State Policy for Addressing Climate Change in Pernambuco	2010	Establishment of strategies to mitigate greenhouse gas emissions and promote energy efficiency and conservation, in addition to strategies for the transport, industrial, and mining sectors, public sector, agriculture, and the biodiversity and forestry sector, among others.
	State Climate Change Plan	2011	
	State Department of Environment and Sustainability (Semas - PE), State Environmental Agency (CPRH), Department of Public Safety (SDS), and Independent Environmental Police Company (Cipoma).	2023	Allocation of Control and Inspection Fee (TFAPE) funds to SDS; Creation of a Working Group to monitor and combat illegal deforestation..
AL	State Law No. 8955, 4 September 2023 - Concerns the conservation, preservation, and protection of the Caatinga biome	2023	Establishes that the Public Authorities must, among other measures: expand the system of strict protection Conservation Units to 20% of the biome within 5 years, and monitor deforestation.

SE	Operational Plan for the Prevention and Combat of Forest Fires	2010	Establishes the management of human and material resources involved in the operational plan.
BA	Action Plan for the Prevention of Forest Fires - Bahia Sem Fogo	2024	Establishment of preventive and educational actions to be implemented throughout the state, prioritizing Conservation Units and their surroundings as a way to mitigate the impacts and occurrence of fires.
MG	Decree No. 48767, 26 January 2024	2024	Establishment of the Fire Prevention Task Force (FTP).

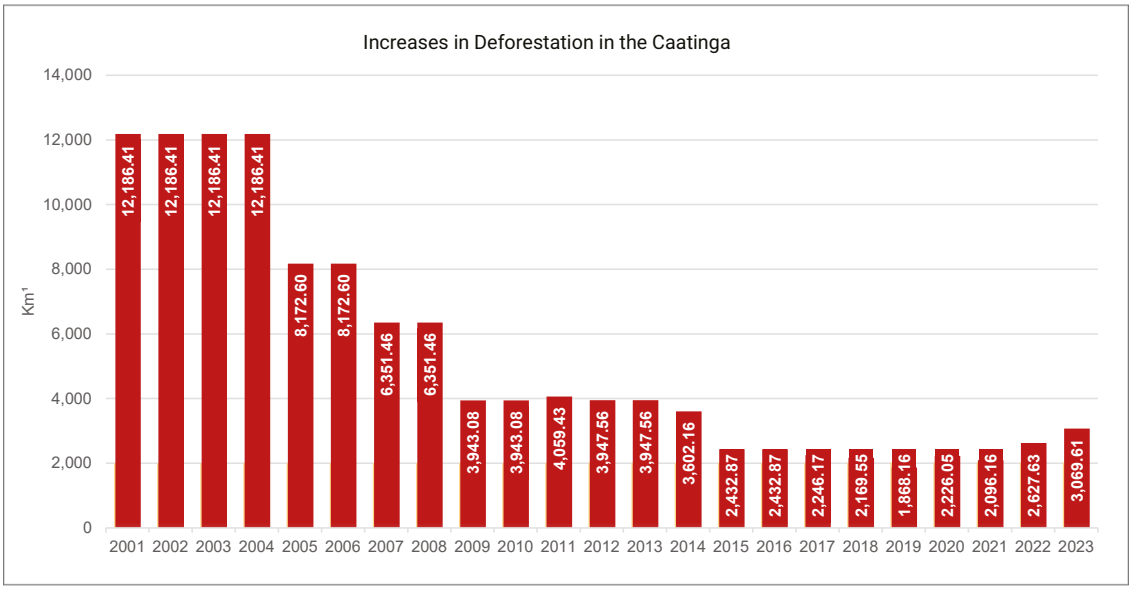
4. DYNAMICS OF DEFORESTATION AND FIRES IN THE CAATINGA BIOME

4.1. Deforestation dynamics

The official deforestation data for the country are produced through the Satellite Monitoring Program of the Brazilian Biomes (BiomasBR Program), coordinated by the National Institute for Space Research (Inpe). The BiomasBR Program encompasses three Inpe projects: the Project for Satellite Monitoring of Deforestation (Prodes); the Real-Time Deforestation Detection System (Deter); and the Land Use and Cover Mapping Project (TerraClass), carried out in partnership with the Brazilian Agricultural Research Corporation (Embrapa). In addition to the quantification of annual deforestation increases, Inpe also provides, through the Fires Program, the hotspots detected by satellites and the burned area in each Brazilian biome, among other information.

According to the data presented by Inpe, between 2001 and 2023 (Prodes/Inpe), a significant reduction in deforestation was observed in the Caatinga biome starting in 2001, when 12,186.41 km² were deforested, reaching the lowest point in the historical series in 2019, with 1,868.16 km² of deforestation increase. The data indicate a rise in the rates in the following years (2020-2023), reaching 3,069.61 km² in 2023 (Figure 5).

Figure 5. Annual deforestation increases in the Caatinga biome between 2001 and 2023.



Source: MMA, adapted from INPE (2024).

Regarding each state's contribution within the biome, the state of Bahia leads the historical series, followed by the state of Ceará. Together, they account for more than 71,000 km² of deforestation, representing approximately 58% of the total area cleared in the Caatinga between 2001 and 2023 (Table 5). However, it is important to note that these are also the states with the largest territorial coverage of the biome, jointly representing around 58% of its total area. On the other hand, the state of Pernambuco ranks third in terms of deforested area, despite being the fourth-largest state by Caatinga area. Also noteworthy are the states of Sergipe and Minas Gerais, which, despite having a small percentage of Caatinga within their territories, show the highest deforestation rates relative to their total Caatinga area, 23% and 20%, respectively.

Table 5. Relative participation of each state in total area and deforested area in the Caatinga Biome from 2001 to 2023 (Prodes/Inpe).

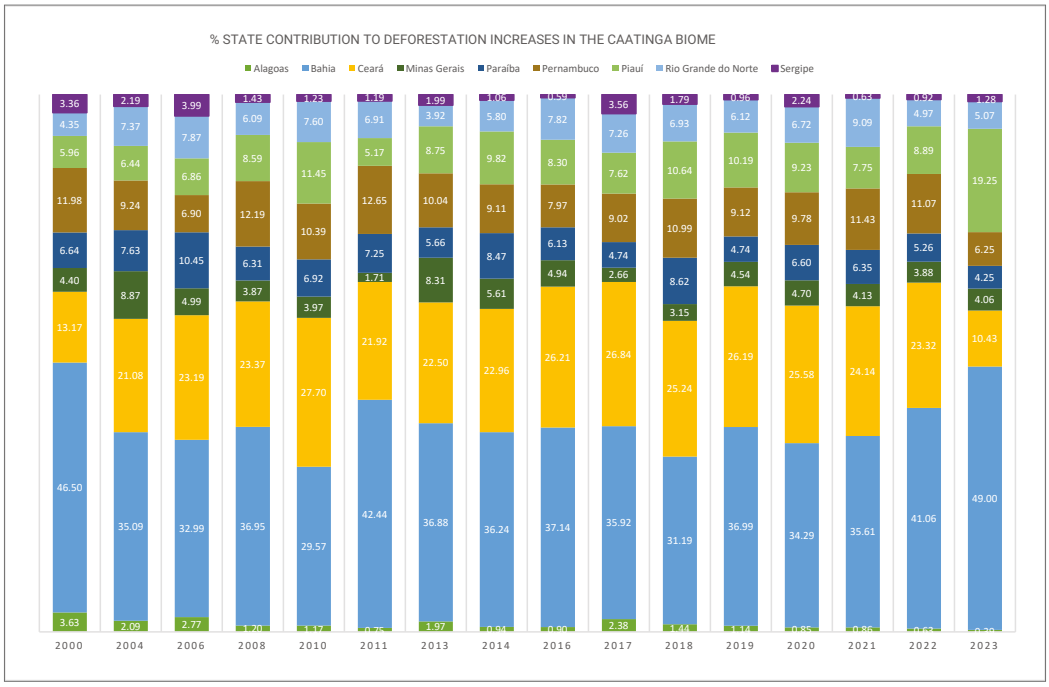
State	Total Caatinga area in the state		Deforested Caatinga area		% desmatamento na Caatinga em relação a área do estado
	Km²	%	Km²	%	
BA	351,402	41%	42,375	35%	12%
CE	148,895	17%	28,856	24%	19%
PI	118,896	14%	9,417	8%	8%
PE	82,546	10%	11649	10%	14%
PB	52,373	6%	9,259	8%	18%
RN	50,773	6%	8,818	7%	17%
MG	32,614	4%	7,524	6%	23%
AL	13,182	2%	2,119	2%	16%
SE	12,139	1%	2,488	2%	20%
Total	**862,818**	100%	**122,506**	100%	

Source: Table generated by the MMA, based on data from Prodes/Inpe.

The same trend of decreasing deforestation intensity observed for the biome as a whole is also seen across the states. No significant changes are observed in the relative contribution among states, except for Bahia, which increased deforestation from 2021 to 2023, and Piauí, which saw an increase from 2022 to 2023. On the other hand, the state of Ceará reduced its contribution between 2022 and 2023 (Figures 6 and 7). It is also worth noting that smaller, coastal states such as Sergipe had already lost a large

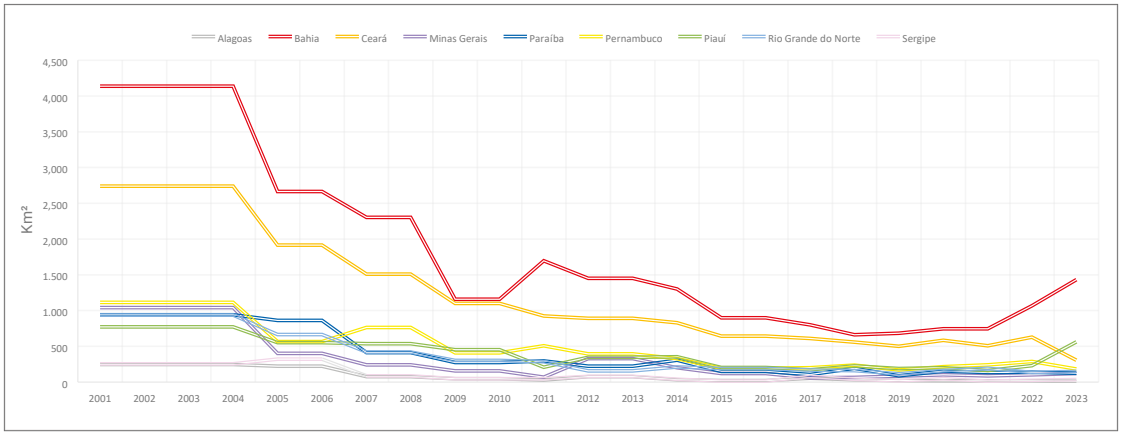
part of their Caatinga area before 2001. Today, only small fragments remain in much of their territory (Brazilian Forest Service, 2017). This situation calls for a tailored strategy to preserve these fragments and promote their connectivity through landscape-level restoration.

Figure 6. States' share of cumulative deforestation increases in the Caatinga Biome.



Source: Chart prepared by the MMA based on deforestation increase data for the Caatinga biome (Prodes/Inpe).

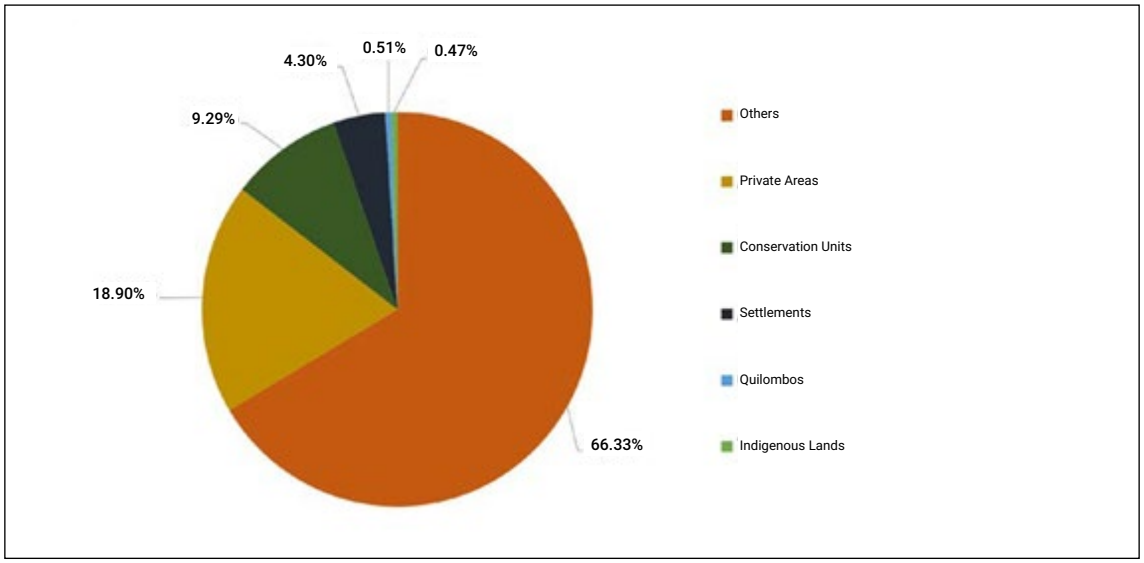
Figure 7. Dynamics of deforestation increases from 2001 to 2023 by state.



Source: Chart prepared by the MMA based on deforestation increase data for the Caatinga biome (Prodes/Inpe).

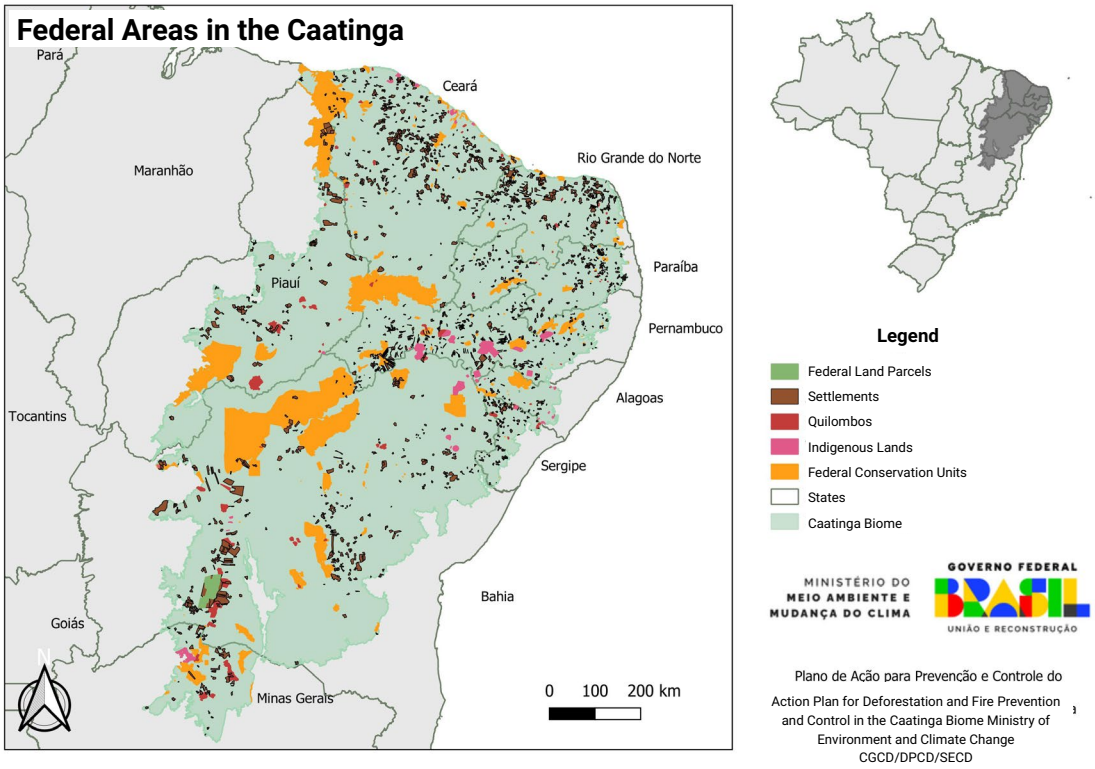
To support the understanding of deforestation and fire dynamics in the biome, it is important to understand its land title profile. According to data produced by the MMA from public sources, with overlapping land categories removed, most of the biome is comprised of areas classified as “Other”, which includes areas managed by state or municipal governments, the military, or those lacking information and not registered in the databases of the National Institute for Colonization and Agrarian Reform (Incra), representing 66.33% of the biome’s total area. This category is followed by private lands registered in the Land Management System (Sigef) and the National Land Certification System (SNCI) (18.90%), federal, state, and municipal conservation units (9.29%), federal settlements (4.3%), quilombola territories (0.51%), Indigenous lands (0.47%), and undesignated federal land parcels (0.20%) (Figures 8 and 9).

Figure 8. Distribution of land tenure categories in the Caatinga Biome in 2023.



Source: Adapted from data provided by Incra, MMA, and Funai.

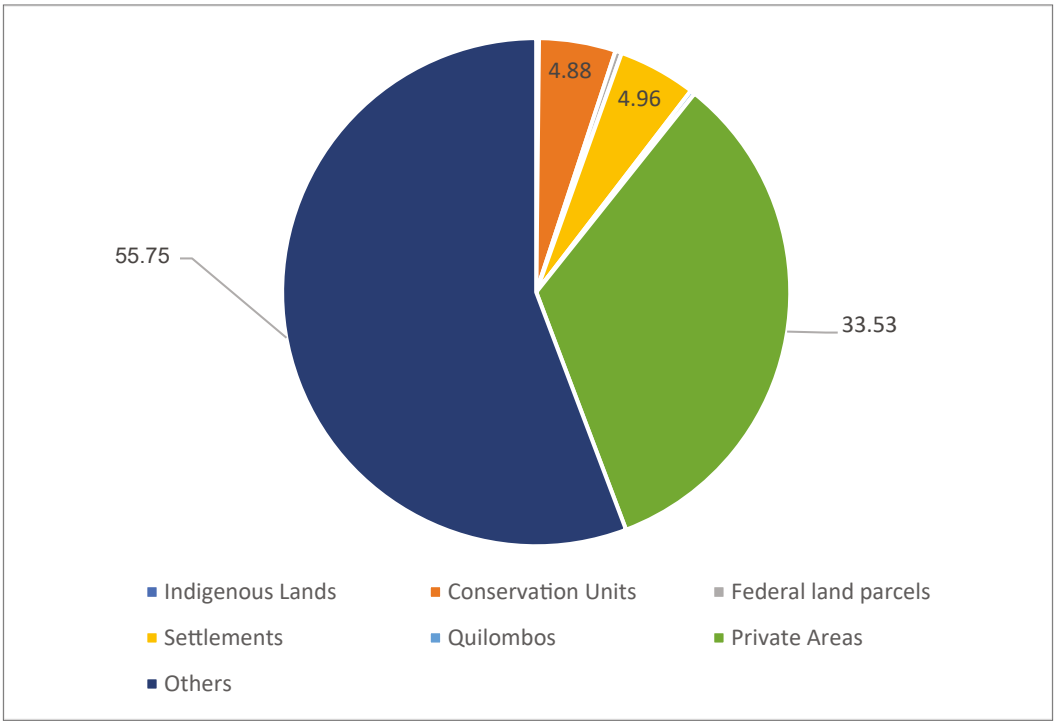
Figure 9. Federal Areas in the Caatinga.



Source: Map based on data provided by Incra, MMA and Funai.

When assessing deforestation within these land title categories for the year 2023, it becomes clear that there is a strong correlation between deforestation occurrences and the land tenure profile of the biome, with most deforestation taking place in the categories with the highest representativeness. Therefore, the majority of deforestation occurs in the “Other” category (approximately 55.75% of the total), a characteristic common to all states within the biome (Figure 10 and Table 6).

Figure 10. Distribution of deforestation in the Caatinga Biome by land title category in 2023.



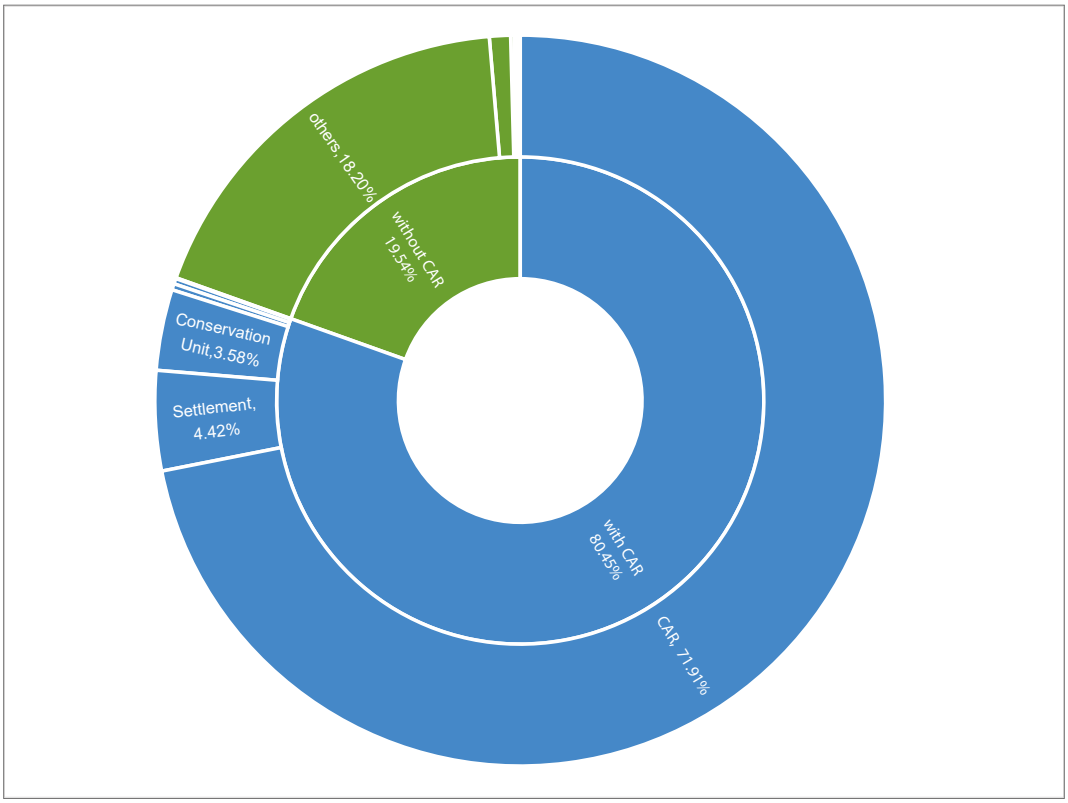
Source: Adapted from data provided by Incra, MMA, Inpe, and Funai.

Table 6. Distribution of deforestation by land title category.

State	Indigenous Lands	Conservation Units	Federal land parcels	Settlements	Quilombos	Private Areas	Others
AL	2.89	8.59	0.00	7.48	0.00	48.17	32.86
BA	0.08	2.33	0.83	3.97	0.27	33.17	59.35
CE	0.10	14.20	0.00	6.42	0.34	40.05	38.88
MG	1.56	1.06	0.00	10.76	1.14	34.23	51.24
PB	0.00	1.35	0.00	5.20	0.05	49.21	44.19
PE	0.72	16.88	0.00	5.45	0.10	32.74	44.12
PI	0.01	5.38	0.00	2.46	0.19	25.64	66.33
RN	0.00	0.71	0.00	11.12	0.57	39.76	47.84
SE	0.03	0.00	0.00	21.70	0.59	33.27	44.40
Total (%)	**0.17**	**4.88**	**0.41**	**4.96**	**0.29**	**33.53**	**55.75**

Given the limited reach of private land registration in Sigef/SNCI, it is also important to evaluate deforestation within rural properties registered in the Rural Environmental Registry (CAR), even without confirmation as to whether these areas are truly private or public, with legitimate occupation or not. It was observed that 80.45% of the deforestation occurred within properties registered in CAR. However, some of these properties overlap with other land title categories. In this regard, it was found that 4.42% of the properties overlap with settlements and 3.58% with conservation units; the remaining overlaps account for less than 1% (Figure 11).

Figure 11. Distribution of deforestation in the Caatinga Biome by Rural Environmental Registry enrollment and overlap in 2023.



Source: Chart prepared by the MMA based on deforestation increase data for the Caatinga (Prodes/Inpe), Sicar, and other public databases.

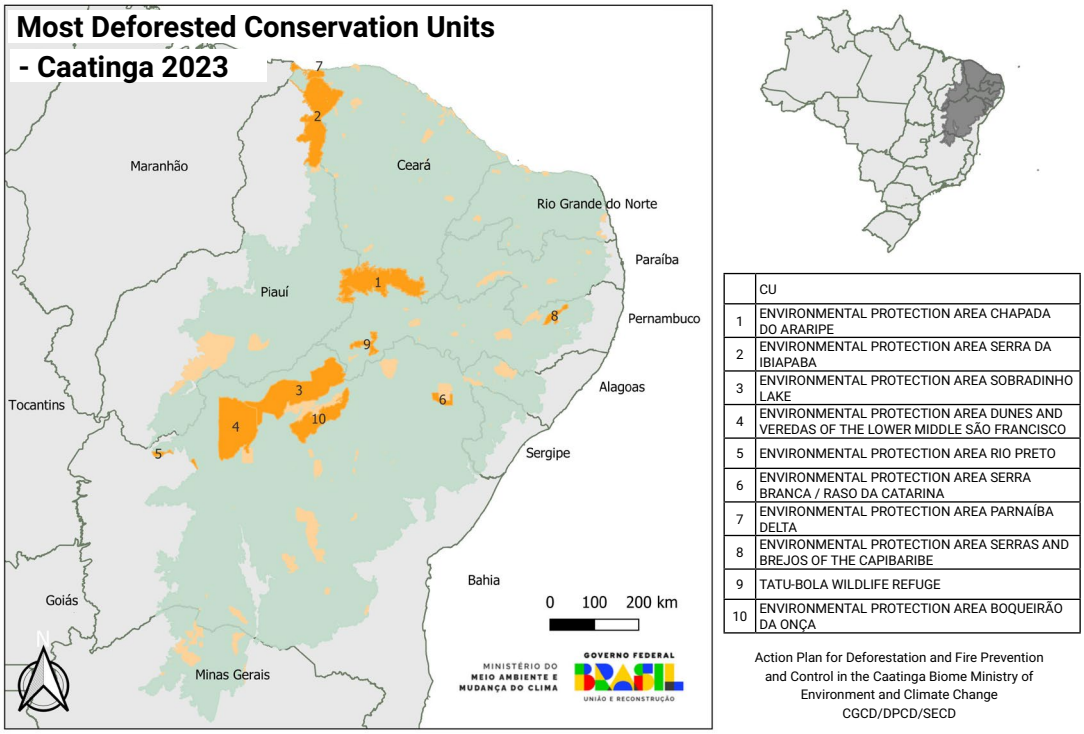
Regarding deforestation in conservation units, the highest figures occur in Environmental Protection Areas (APAs), which are generally large areas that allow human occupation and the development of economic activities and consist of either public or private lands. Table 7 and Figure 12 present the 10 conservation units with the highest deforestation values in the biome, which together account for 93% of the deforestation in that land title category between 2019 and 2023. Notably, the data for the APA Chapada do Araripe, located in the states of Ceará, Pernambuco, and Piauí, show that it accounted for an average of 60.25% of deforestation in conservation units in the biome in 2023.

Table 7. List of the 10 most deforested Conservation Units between 2019 and 2023.

		Annual Deforestation (km²)					
Name of Conservation Unit	**State**	**2019**	**2020**	**2021**	**2022**	**Contribution**	**Trend**
ENVIRONMENTAL PROTECTION AREA CHAPADA DO ARARIPE	CE/PE/PI	39.46	26.98	43.75	60.63	40%	
ENVIRONMENTAL PROTECTION AREA SERRA DA IBIAPABA	CE/PI	20.68	20.11	22.88	24.23	16%	
ENVIRONMENTAL PROTECTION AREA DUNES AND VEREDAS OF THE LOWER MIDDLE SÃO FRANCISCO	BA	4.96	6.83	5.15	19.94	13%	
ENVIRONMENTAL PROTECTION AREA SOBRADINHO LAKE	BA	16.16	13.03	14.44	10.86	7%	
ENVIRONMENTAL PROTECTION AREA BOQUEIRÃO DA ONÇA	BA	1.26	1.06	12.03	9.04	6%	
ENVIRONMENTAL PROTECTION AREA RIO PRETO	BA	10.12	9.69	2.34	6.19	4%	
ENVIRONMENTAL PROTECTION AREA SERRA BRANCA / RASO DA CATARINA	BA	0.88	1.57	3.57	5.47	4%	
ENVIRONMENTAL PROTECTION AREA SERRA DA CAIÇARA	AL	1.67	3.43	5.49	2.11	1%	
ENVIRONMENTAL PROTECTION AREA PARNAÍBA DELTA	CE/MA/PI	2.12	2.7	3.65	1.89	1%	
TATU-BOLA WILDLIFE REFUGE	PE	1.31	3.06	3.36	1.88	1%	
Total of the 10 most deforested		98.62	88.46	116.66	142.24	94%	
Overall Total		**108.44**	**106.93**	**131.97**	**151.57**		

Source: Data obtained by cross-referencing information on Conservation Units (CNUC) and Prodes/Inpe 2023.

Figure 12. Most deforested conservation units in the Caatinga Biome in 2023.



	CU
1	ENVIRONMENTAL PROTECTION AREA CHAPADA DO ARARIPE
2	ENVIRONMENTAL PROTECTION AREA SERRA DA IBIAPABA
3	ENVIRONMENTAL PROTECTION AREA SOBRADINHO LAKE
4	ENVIRONMENTAL PROTECTION AREA DUNES AND VEREDAS OF THE LOWER MIDDLE SÃO FRANCISCO
5	ENVIRONMENTAL PROTECTION AREA RIO PRETO
6	ENVIRONMENTAL PROTECTION AREA SERRA BRANCA / RASO DA CATARINA
7	ENVIRONMENTAL PROTECTION AREA PARNAÍBA DELTA
8	ENVIRONMENTAL PROTECTION AREA SERRAS AND BREJOS OF THE CAPIBARIBE
9	TATU-BOLA WILDLIFE REFUGE
10	ENVIRONMENTAL PROTECTION AREA BOQUEIRÃO DA ONÇA

Action Plan for Deforestation and Fire Prevention and Control in the Caatinga Biome Ministry of Environment and Climate Change
CGCD/DPCD/SECD

Source: Data obtained by cross-referencing information on Conservation Units (CNUC) and Prodes/Inpe 2023.

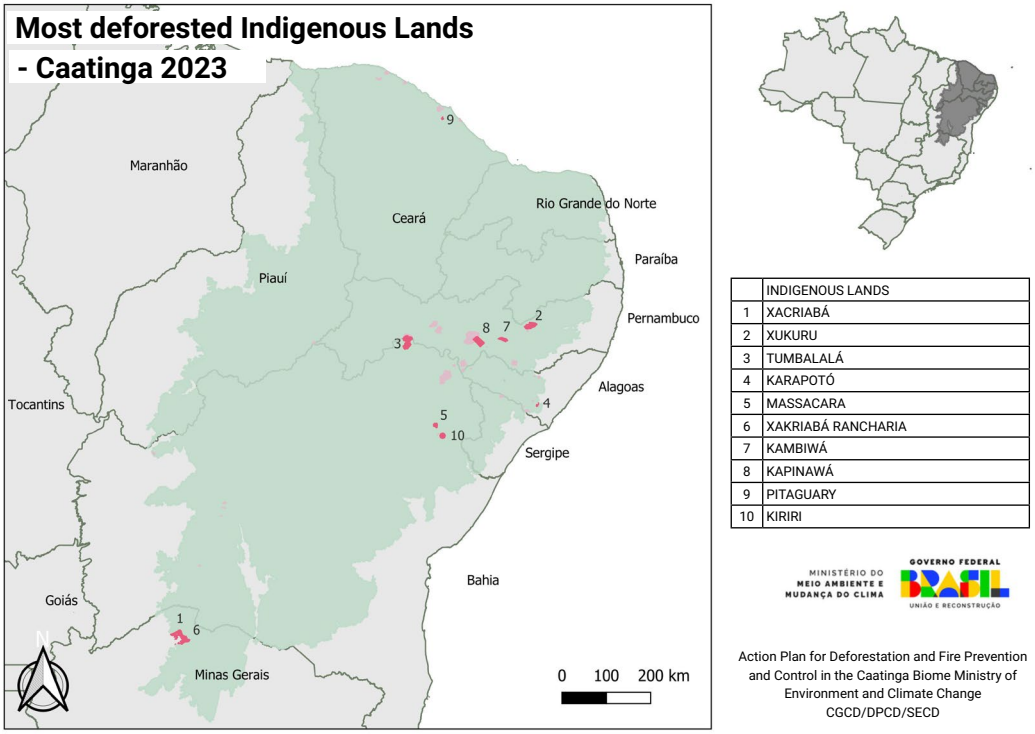
In the case of Indigenous Lands (TIs), deforestation values, measured in km², are low and concentrated in three TIs: TI Xacriabá (MG), TI Xukuru (PE), and TI Tumbalalá (BA). In other Indigenous Lands, the absolute values of annual deforestation remain below 0.5 km²/year (Table 8 and Figure 13). It is important to note that the representativeness of Indigenous Lands in the biome is low, comprising only 0.25% of the biome's total area.

Table 8. List of the 10 most deforested Indigenous Lands between 2019 and 2023.

		Annual Deforestation (km²)					
Name of Indigenous Land	**State**	**2019**	**2020**	**2021**	**2022**	**Contribution**	**Trend**
Xacriabá	MG	0.69	1.37	1.68	2.17	34%	
Tumbalalá	BA	1.51	0.95	0.52	1.57	25%	
Massacara	BA	0.26	0.08	0.05	0.39	6%	
Pankararé	BA	0.04	0.01	0.16	0.37	3%	
Kiriri	BA	0.26	0.00	0.20	0.20	3%	
Tremembé da Barra do Mundaú	CE	0.02	0.09	0.03	0.20	2%	
Tapeba	CE	0.05	0.52	0.04	0.15	2%	
Atikum	PE	0.31	0.04	0.16	0.13	2%	
Truká - Ilha da Assunção	PE	0.18	0.33	0.18	0.12	2%	
Fulni-ô	PE	0.00	0.00	0.00	0.12	2%	
Total of the 10 most deforested		3.32	3.39	3.02	5.42	85%	
Overall Total		**4.82**	**6.44**	**5.43**	**6.37**		

Source: Land Tenure Data on Indigenous Lands (Funai) and Prodes/Inpe 2023.

Figure 13. Most deforested Indigenous Lands in the Caatinga Biome in 2023.



Source: Data obtained through the cross-referencing of information from Indigenous Lands (Funai) and Prodes/Inpe 2023.

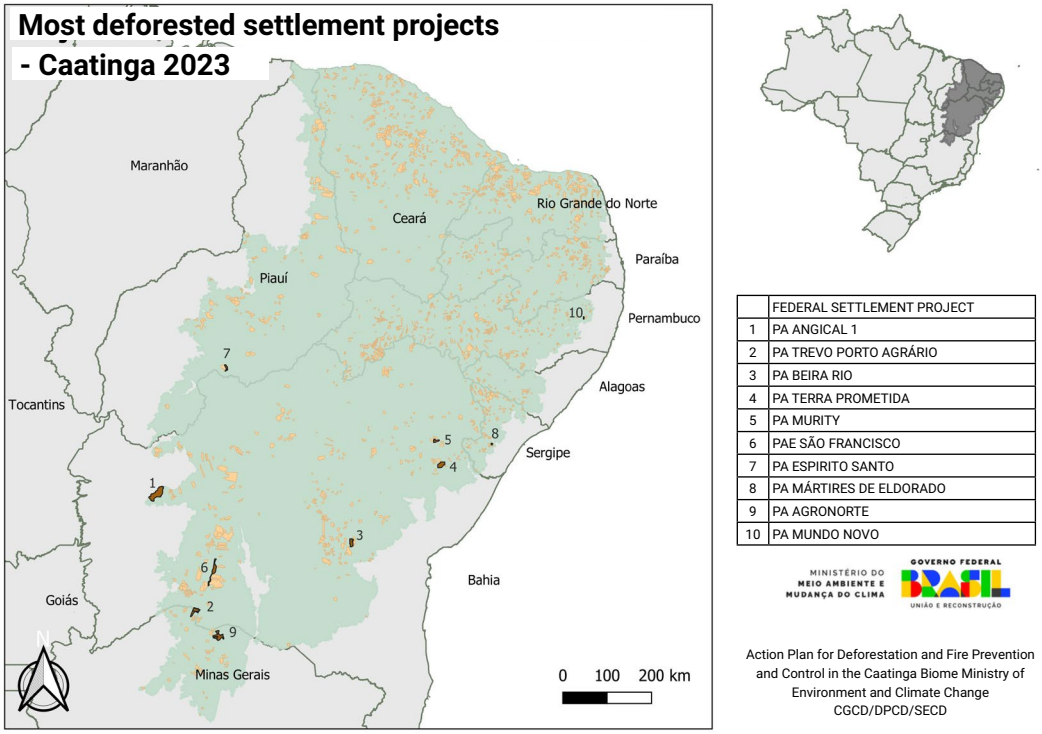
Finally, the list of the ten settlement projects (PA) with the largest deforested areas between 2019 and 2023 shows that such occurrences are not highly concentrated among the PAs in the Caatinga biome, accounting for only 30% of the total deforested area across all settlements in the biome (Table 9 and Figure 14). Notably, PA Angical I deforested a total of 12.52 km² in 2023, which is more than twice the area cleared by the second and third positions on the list in the same year.

Table 9. List of the 10 most deforested settlements between 2019 and 2023.

		Annual Deforestation (km²)					
Name of Settlement Project	**State**	**2019**	**2020**	**2021**	**2022**	**Contribution**	**Trend**
PA ANGICAL I	BA	4.84	7.64	4.67	5.57	5%	
PA TREVO PORTO AGRÁRIO	MG	2.96	3.42	1.08	2.73	3%	
PA TERRA PROMETIDA	BA	0.81	0.24	1.27	2.71	3%	
PA AGRONORTE	MG	3.18	0.90	1.58	1.96	2%	
PA GUARIBAS I	PI	0.60	1.42	0.55	1.92	2%	
PA PAI JOÃO FOAGRO	BA	0.52	1.76	0.28	1.85	2%	
PAE SÃO FRANCISCO	BA	3.15	2.00	1.42	1.75	2%	
PA CURRAL DAS VARGENS	BA	0.64	0.17	2.21	1.51	1%	
PA FAZ REUNIDAS PAI JOÃO	BA	0.57	0.59	0.15	1.32	1%	
PA TOMÉ AFONSO	CE	0.04	0.05	0.00	1.32	1%	
Total of the 10 most deforested areas		17.31	18.19	13.21	22.64	21%	
Overall Total		**116.91**	**140.33**	**110.58**	**107.20**		

Source: Table prepared by the MMA based on data from settlements and Prodes/Inpe.

Figure 14. Most deforested settlement projects in the Caatinga biome in 2023.



Source: Data obtained through the cross-referencing of settlement information (Incra) and Prodes/Inpe.

The analysis of polygon sizes shows that deforestation in the biome is largely characterized by small-scale clearings, under 10 hectares. From 2008 onward, deforestation of up to 10 hectares accounts for more than 50% of the total recorded in the biome. One possible explanation for this pattern is that it may result from the activities of small producers or

from practices that do not require the immediate clearing of large areas. Additionally, when analyzing polygons smaller than 10 ha and those between 10 and 50 ha, they jointly represent 80% of the deforestation polygons recorded in the biome (Table 10).

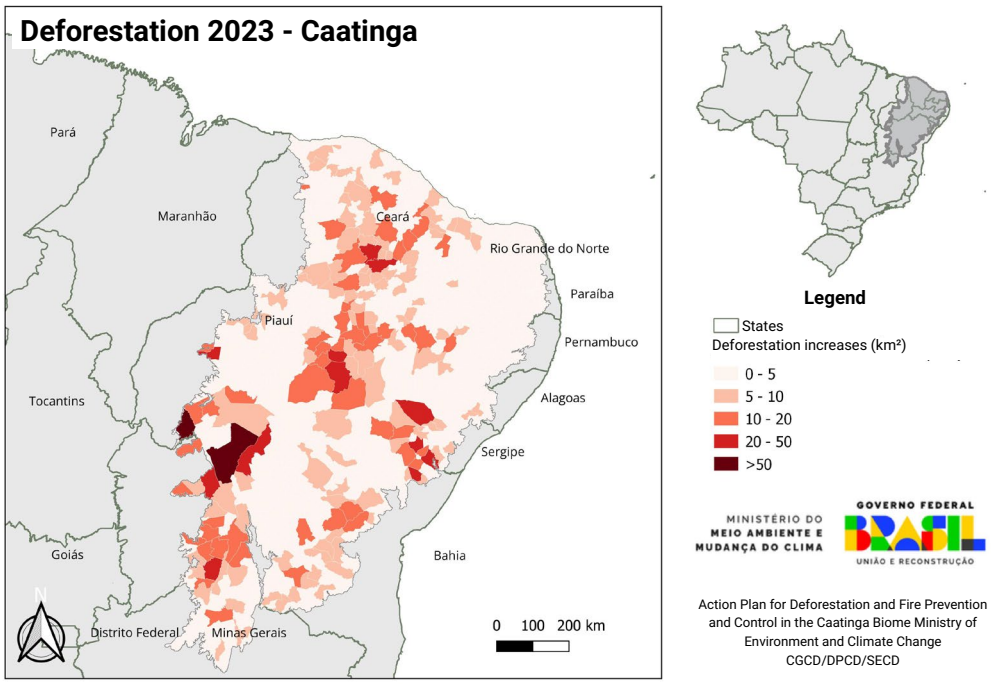
Table 10. Size of deforestation polygons in 2023.

Year	less than 10 ha	between 10 and 50 ha	between 50 and 100 ha	greater than 100 ha
2004	29%	30%	10%	31%
2006	47%	30%	8%	15%
2008	58%	29%	6%	7%
2010	59%	28%	6%	7%
2011	62%	26%	5%	7%
2013	57%	28%	6%	9%
2014	64%	24%	5%	6%
2016	63%	24%	6%	7%
2017	71%	22%	3%	4%
2018	69%	20%	4%	6%
2019	66%	22%	4%	7%
2020	64%	23%	5%	8%
2021	63%	24%	5%	8%
2022	57%	25%	6%	11%
2023	55%	25%	6%	14%

Source: Table prepared by the MMA based on the analysis of deforestation data from Prodes/Inpe.

The concentration of deforestation by municipalities within the biome shows that most municipalities experienced less than 5 km² of deforestation. On the other hand, some municipalities concentrated more than 50 km² of deforestation in 2023 (Figure 15).

Figure 15. Deforestation increases by municipality in the Caatinga Biome in 2023.



Source: Map prepared by the MMA based on data on increased deforestation in the Caatinga Prodes/Inpe)

To better understand the dynamics of deforestation in the Caatinga and to develop effective strategies, it is important to explore several key aspects: the legality of deforestation; biomass demand for burning; deforestation for wind and solar energy projects; expansion of irrigated and subsistence agriculture; deforestation for pasture expansion; and deforestation for mining and urban sprawl. The role of fires in biome degradation will also be analyzed.

4.1.1. Legality of deforestation in the caatinga

In most of the biome, conservation of 20% of native vegetation on rural properties is required as a legal reserve, except in the cases provided by the Native Vegetation Protection Law, such as the exemption for properties smaller than 4 fiscal modules. As a result, it is estimated that the biome has around 18 million hectares of surplus Legal Reserve eligible for authorized clearing in properties registered in the CAR, after overlap deductions. This area corresponds to about 23% of the national surplus of legal reserves. At the same time, due to the predominance of small farmers and the amnesty of deforestation on properties up to 4 fiscal modules before 2008 (Article 67 of Law 12651/2012), the deficits in legal reserves and permanent preservation areas amount to only 115 thousand and 208 thousand hectares, respectively (UFMG, 2024).

Given the large area of surplus legal reserve and the 20% Legal Reserve requirement, it is expected that much of the deforestation in the biome occurs within the legal limits. Based on the analysis of native vegetation on properties within the CAR, Conservation Units, Indigenous Lands, and settlements, it is estimated that about 21% of total deforestation in the biome is illegal (MCTI, 2017). However, an analysis of public data and clearing authorizations available in Sinaflor/Ibama and state sources shows different results. The cross-referencing of Vegetation Suppression Authorizations (ASVs) with observed deforestation data from Prodes/Inpe between 2018 and 2022 indicates that 94% of vegetation loss occurred without a valid authorization (ICV, 2024) (Table 11).

These contrasting results reveal the difficulty of obtaining comprehensive data on ASVs and other authorizing acts, and they likely indicate a high level of irregularity in deforestation within the biome, even on properties with surplus legal reserve. It is also evident that controlling deforestation in the Caatinga cannot rely solely on environmental law enforcement policies. There is a need to advance policies that enhance the value of environmental assets (e.g., payment for environmental services) and support sustainable productive activities, along with improving control mechanisms to suit local realities, for example, integrating ASV issuance with water management concerns.

Table 11. Authorized deforestation resulting from the cross-checking of Prodes/Inpe Caatinga database 2018-2022 with the unified database (per year).

YEAR	Authorized area (ha)	Total Deforested (PRODES)	% Without Authorization
2018	6,415	216,955	97%
2019	6,787	186,816	96%
2020	12,820	222,605	94%
2021	15,445	209,616	92%
2022	19.498	262,793	93%
TOTAL	60,966	1.098.775	94%

Source: Table prepared by the MMA based on the document Analysis of Vegetation Suppression - Caatinga (in Portuguese Análises da supressão da vegetação - Caatinga - Instituto Centro de Vida, 2024) and data from Prodes/Inpe.

In addition to deforestation and the permanent change in land use in the Caatinga biome, the chronic degradation of native vegetation raises major concerns. This degradation is caused by burning/fires, extensive grazing/overgrazing, illegal logging without management or change in land use, and the practice of shifting agriculture. These are driving factors of desertification, which result from the degradation of vegetation, water resources, and soils in arid, semi-arid, and dry sub-humid climates.

4.1.2. Demand for biomass for burning

Since the oil crisis of the 1970s, biomass (firewood and charcoal) from the Caatinga has been one of the main sources of thermal energy for households, commerce, and industry within the biome. In fact, Caatinga biomass also supplies thermal energy to coastal regions in the Atlantic Forest biome in the Northeast, where availability is now practically nonexistent and/or legally restricted (MMA, 2018).

The estimated biomass demand for energy in the Northeast in 2015 was 14.92×10^6 tonnes of dry matter (tDM), roughly half of which was for domestic use and the other half for industrial and commercial use (Brazil, 2018). The same study indicates that the existing sources in the biome are sufficient not only to meet internal demand but also to generate surpluses for other regions. However, the legality of this production still needs to be better understood.

The projected trend through 2030 shows a reduction in total biomass demand. However, the industrial sector is expected to see a demand increase of 20% to 40%. Additionally, new players are emerging among the biomass consumers in the region. Large industries located in coastal areas are initiating a transition from natural gas to renewable biomass, driven either by corporate decisions or by the search for more affordable thermal energy sources.

On the other hand, the expectations for demand reduction through greater energy efficiency (in the domestic, commercial, or industrial sectors) remain low, as the most accessible technologies yield only modest reductions in consumption, while the most efficient options require substantial investments, such as high-efficiency kilns in the red ceramic industry. Although new biomass sources, unavailable some 20 years ago, have emerged, such as biomass from mesquite (in Portuguese algaroba), cashew, and bamboo, biomass from native Caatinga vegetation will continue to play a significant role in this market.

The legal procurement of biomass in the Caatinga can occur in two ways:

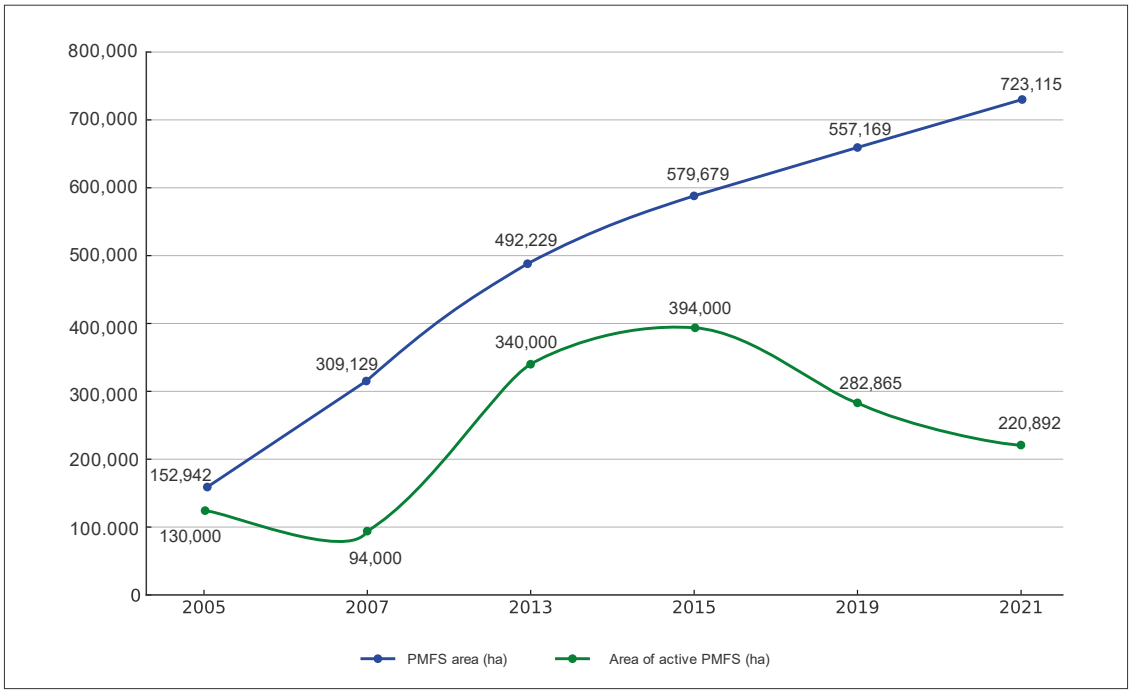
a) utilization of timber resources in areas with a Vegetation Suppression Authorization (ASV) or Land Use Change Authorization (UAS);

b) sustainable forest management through the implementation of Sustainable Forest Management Plans.

It is important to highlight that Sustainable Forest Management (PMFS), in addition to enabling a legal and renewable biomass supply, contributes to biodiversity and ecosystem services conservation, forest cover and landscape maintenance, integration with other productive activities (extensive livestock farming and non-timber forest products - PFNM), and the generation of local employment and income. Furthermore, it is conducted during the dry season, avoiding conflicts with other activities in the agricultural calendar.

Nevertheless, a decrease in the contribution of sustainable forest management has been observed over the past 5 to 10 years. Monitoring of the dynamics of Sustainable Forest Management Plans in the Caatinga, conducted by the Associação Plantas do Nordeste (APNE) (MMA, 2024), shows a systematic reduction in the number, area, and volume authorized for PMFS since 2015 (Figure 16).

Figure 16. Dynamics of sustainable forest management area in the Caatinga Biome from 2005 to 2022.

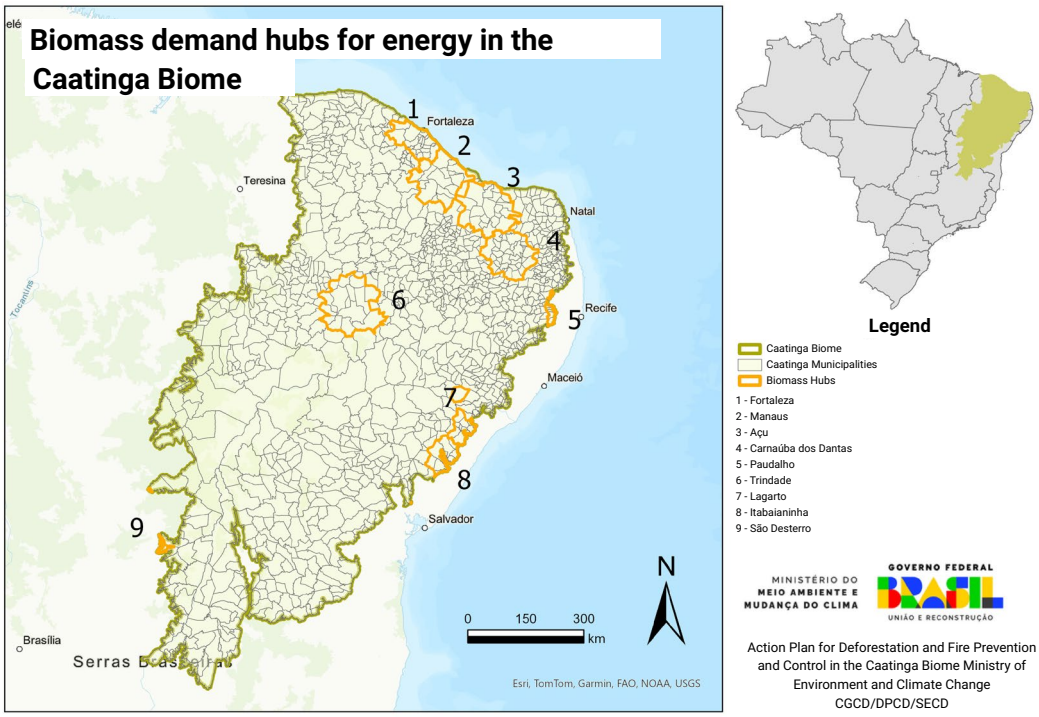


Source: MMA (2024).

In order to support, promote, and harmonize the implementation of sustainable forest management in the biome, Resolution No. 507 of the National Environmental Council (Conama), dated 18 July 2024, was recently approved. This resolution establishes technical parameters to be adopted and brings some advancements compared to the Ministry of the Environment's Normative Instruction No. 01/2009, which regulated management plans in the Caatinga. Among these advancements is the possibility of reducing the cutting cycle, previously set at 15 years under the Normative Instruction, based on local rainfall levels.

Thus, there are alternatives to reduce deforestation driven by biomass demand, such as: strengthening sustainable forest management in the Caatinga; implementing reforestation with fast-growing species in the most suitable regions; and promoting the development of waste utilization value chains (Brazil, 2018). These actions can be concentrated in the main biomass demand hubs (Figure 17).

Figure 17. Biomass demand hubs for energy in the Caatinga Biome.



Source: Brasil (2018)

Source: MMA.

4.1.3. Deforestation for wind and solar energy projects

A new driver of land-use change in the Caatinga biome that has gained relevance in recent years is the demand for land to install renewable energy plants, particularly wind and solar. The impact of deforestation caused by these activities varies: it is typically a complete change of land use for photovoltaic parks and a partial and temporary change for wind farms.

There has been a noticeable incompatibility between these activities and preexisting land uses in the biome, for example, forest management and agricultural production, since landowners tend to prefer the significant and predictable income derived from energy generation royalties over the unpredictable, insecure, and variable returns from other productive activities (whether agricultural or forestry). Table 12 presents the current and planned participation of each energy source in the Caatinga biome, according to the **Brazilian Electric Energy Agency (ANEEL)**[2].

Table 12. Installed energy capacity (GW) by source in the Caatinga Biome.

Status	Biomassa	Eólica	Solar	Hídrica	Fóssil	Total
In operation	0.3	28.1	9.3	10	2.6	50.2
Under construction	0	3.8	4.2	0	0	8
Construction not started	0	18.6	86.4	0	0	105.1
Total	**0.4**	**50.5**	**99.9**	**10**	**2.6**	**163.3**
% Brazil (operation)	2%	91%	69%	9%	8%	25%

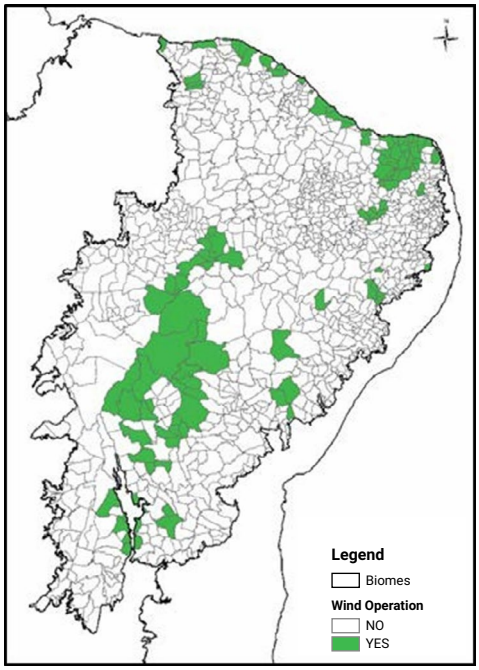
Source: Aneel (2024).

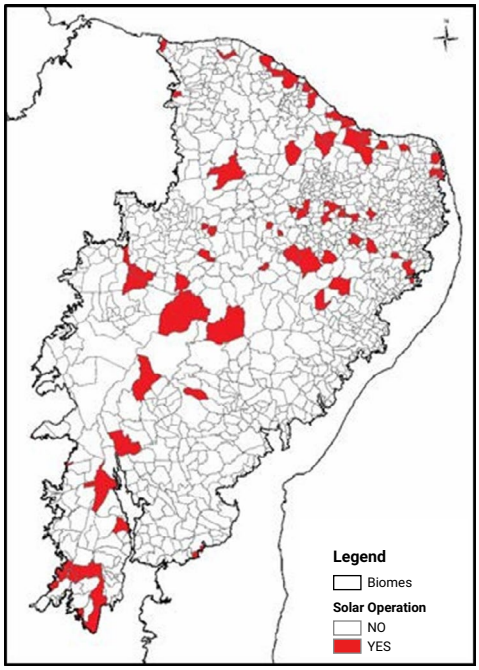
Currently, wind and solar energy generation in the Caatinga biome represents 91% and 69% of their respective total national generation, and together they account for 75% of the energy generated in the biome. At present, there are 913 wind farms in operation, 93 under construction, and another 450 planned for construction. Similarly, there are 317 photovoltaic power plants in operation, 100 under construction, and 1,982 more planned (Figure 18).

2 Available at: https://dadosabertos.aneel.gov.br/dataset/siga-sistema-de-informacoes-de-geracao-da-aneel. Access on: 7 May 2024.

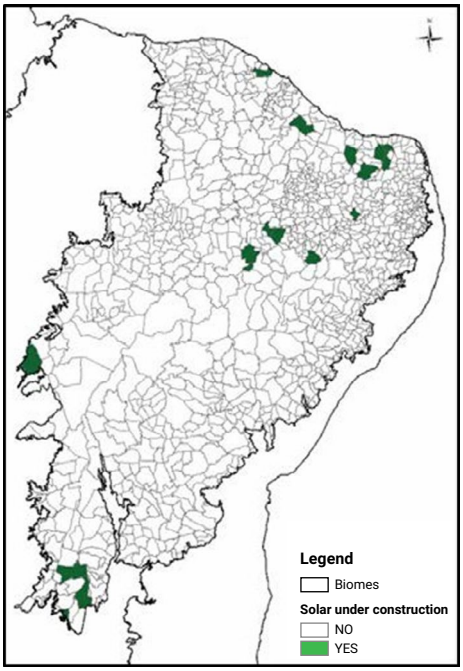
Figure 18. Wind and solar energy hubs in operation and under construction in the Caatinga Biome.

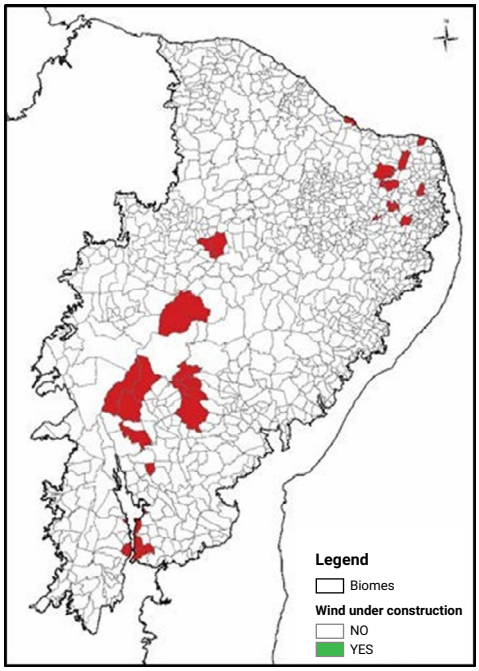
Wind farms (left) and photovoltaic power plants (right) in operation





Wind farms (left) and photovoltaic power plants (right) under construction





Source: Maps developed by the Ministry of the Environment based on wind and solar project data in the Caatinga biome (ANEEL).

The potential impact of these projects on deforestation in the biome is foreseeable. Moreover, several states have specific studies mapping the areas with the greatest generation potential (wind and solar atlases). In addition to the impacts related to the clearing of native vegetation, other impacts must also be considered, such as impacts on fauna, landscape changes, and effects on the well-being of surrounding populations (Maurício, 2020). Impacts on fauna may be direct, mainly from bird and bat collisions, or indirect, affecting terrestrial animals. Some studies have shown the negative effects of wind farm installations on the habitats of terrestrial mammals in the Caatinga, such as removing water springs and habitats and increasing hunting pressure (Dias et al., 2019; Esteves & Campos, 2022). According to Mapbiomas Alerta (RAD2023, 2024), 4,302 out of the 4,535 hectares deforested in Brazil due to renewable energy projects (solar and wind) occurred in the Caatinga biome.

The need to reduce impacts and create mechanisms that ensure adequate social and environmental conditions for the implementation of renewable energy projects (wind and solar) led a group of institutions to develop a set of safeguards (Plano Nordeste Potência, 2024), with special attention to traditional communities and local populations in the areas of influence.

On the other hand, when implemented sustainably, these projects may contribute to environmental preservation. Furthermore, the use of technologies such as agrivoltaic systems, which allow for simultaneous agricultural and energy production, adopted by the Água Doce Program of the Ministry of Integration and Regional Development in rural communities, demonstrates the potential to combine agricultural production with clean energy generation, promoting sustainable socioeconomic development.

Source: Frans Pareyn

4.1.4. Expansion of irrigated and subsistence agriculture

Another major driver of deforestation in the Caatinga biome is land-use change for agriculture. Due to climatic characteristics, there are two predominant agricultural production systems in the biome (Sampaio et al., 2009):

a) rainfed agriculture, with crop planting timed to the annual rainy season, largely for subsistence purposes;

b) irrigated agriculture, using various irrigation systems and varying levels of cultivation technology.

Obviously, both systems depend on the availability of a water source (reservoir, well, or irrigation perimeter).

In this context, deforestation for agricultural land use takes two forms in the biome:

a) concentrated expansion of the agricultural frontier in high-potential areas, generally involving permanent land-use change;

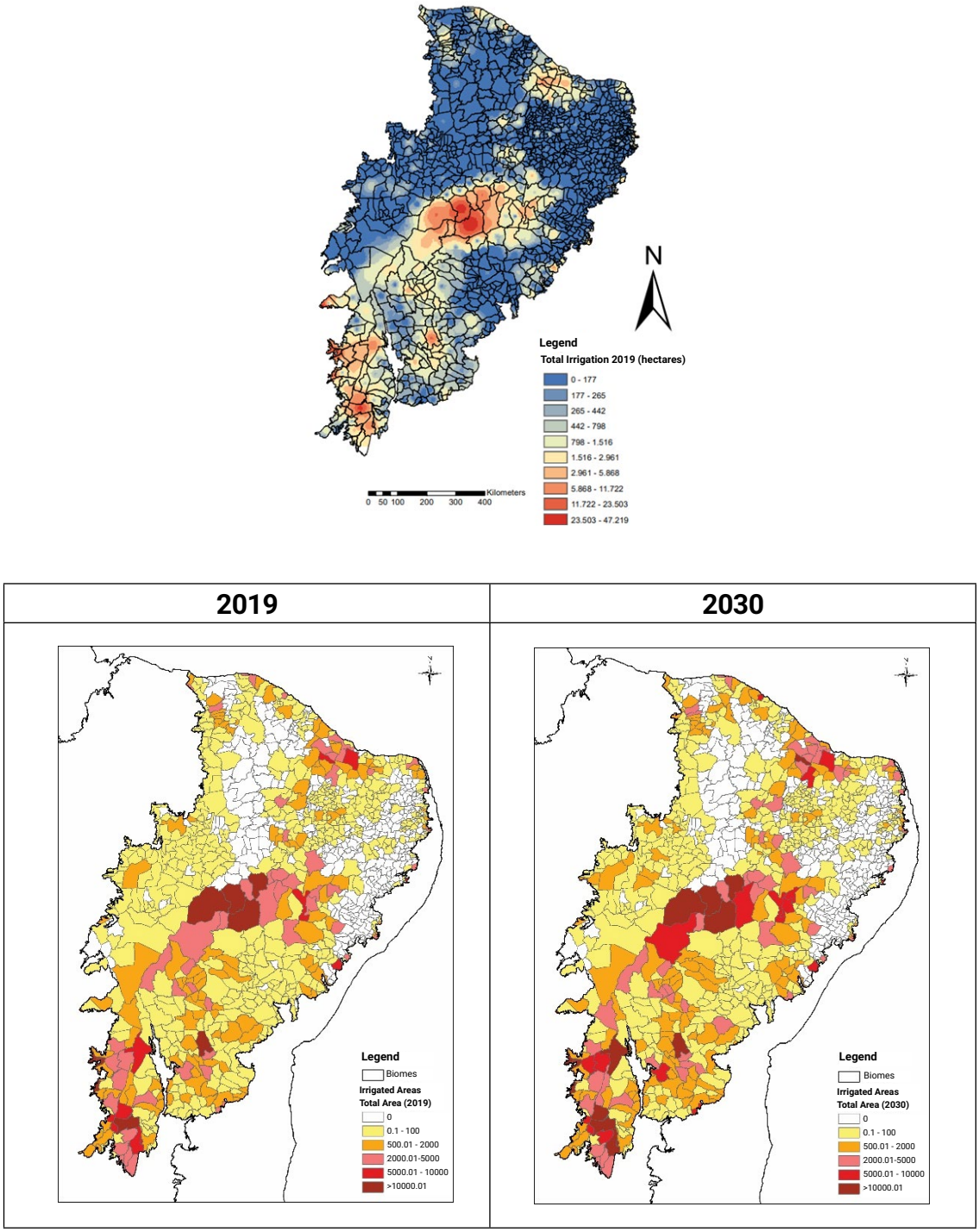
b) dispersed expansion of rainfed agriculture, which may be permanent (valleys, foothills, wetlands) or semi-permanent (shifting cultivation), where burning is part of the production system.

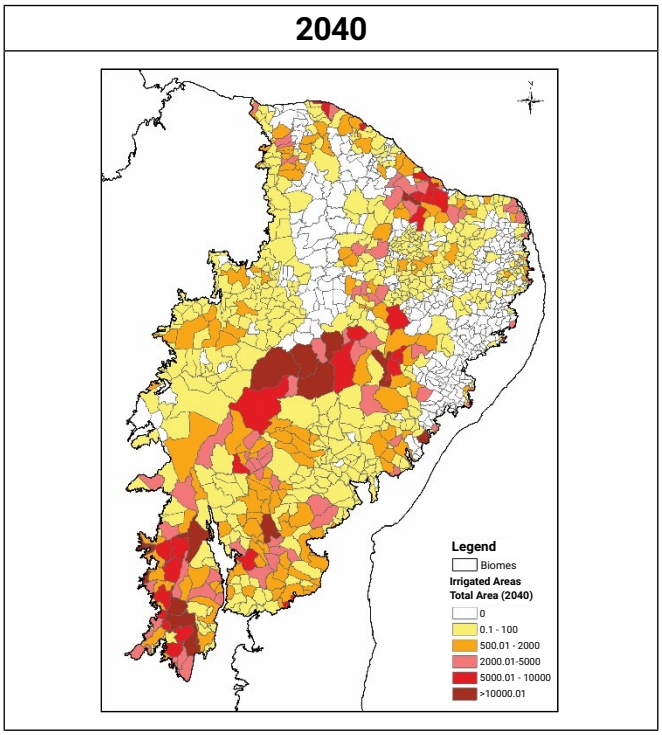
Agricultural frontier expansion is mainly occurring in specific regions:

- irrigation hubs with new areas being opened for cultivation;
- plateaus (e.g., Chapada do Araripe) with more favorable climate and groundwater availability for irrigation;
- the transitional region bordering the Cerrado (Matopiba), where crops like soybeans are rapidly expanding due to favorable edaphoclimatic conditions.

According to the National Water Agency (ANA), the irrigated agricultural area in the Caatinga biome reached 712,000 hectares in 2019. Projections for 2030 and 2040 estimate expansion to 981,000 and 1,254,000 hectares, respectively. As a result, the demand for water for irrigated agriculture, which already accounted for 87% of total water consumption in the biome in 2019, is expected to increase by around 48% to meet this expansion. Figure 19 presents the main irrigated agriculture hubs, which are expected to expand and therefore represent future deforestation pressures: Jaguaribe/Chapada do Apodi, Jaíba, Mucugê-Ibicoara, and Petrolina/Juazeiro. It is important to note that if not properly managed in the Caatinga (e.g., without adequate drainage and other essential practices), irrigated agriculture can lead to soil salinization, resulting in desertification.

Figure 19. Main irrigated agriculture hubs and their dynamics through 2040 in the Caatinga Biome.





Source: Maps developed by the MMA in partnership with GIZ, based on irrigated agriculture projections from ANA.

Finally, the deforestation pressure from shifting agriculture is very scattered throughout the rest of the biome. In addition to being less sustainable, its significance has been decreasing due to low productivity and income, as well as its limited impact. This decline likely explains why part of the deforested areas are undergoing regeneration.

4.1.5. Deforestation for expansion of pasture areas

Livestock farming was introduced in the biome as early as the colonial period and is expected to grow increasingly important and relevant, as the activity adapts well to the region, which is marked by irregular rainfall. When water is available for animal consumption, there are several sources of feed to meet the animals' forage needs: exotic forage species, a variety of native vegetation plants, and crop residues. Additionally, animals can be relocated and may lose weight, which can later be recovered (Sampaio et al., 2009).

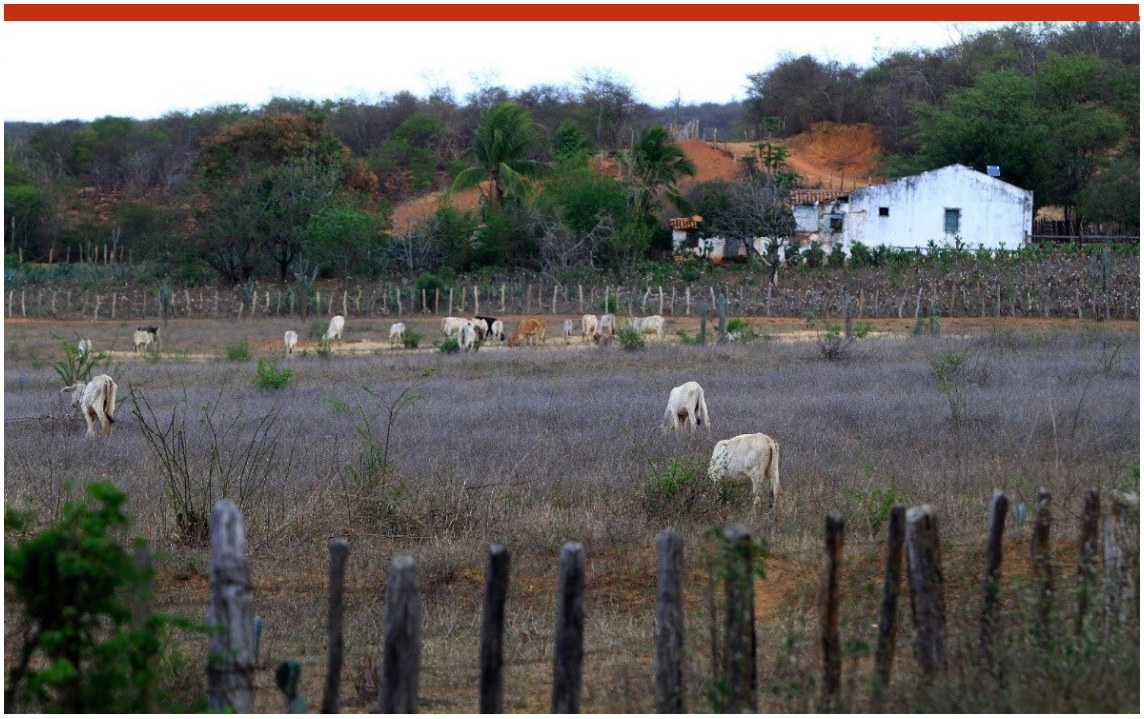
However, the use of Caatinga vegetation as extensive pasture is already recognized for accelerating strong and/or irreversible degradation in the ecosystem, primarily due to overgrazing of native vegetation areas (Alves et al., 2008). Thus, its impact on the biome occurs in two ways:

- deforestation: opening of new areas for planted pasture;
- degradation: overgrazing leading to the deterioration of Caatinga remnants.

According to the 2017 Agricultural Census (IBGE), 53% of agricultural establishments list livestock as their main activity, while 36% are focused on temporary crops. While rainfed crops have stagnated or declined in importance in the biome, livestock remains a productive activity and is the main source of income for most farms. Another data source confirming this trend is MapBiomas (v.8): of the total area classified as "Agriculture and Livestock" (which grew from 33% to 40% of the biome's surface between 1985 and 2022), "Pasture" occupied 54% in 1985, increasing to 68% in 2022, covering approximately 23.5 million hectares. This expansion occurred mainly over areas previously classified as “savanna formations” and cropland.

Unlike irrigation hubs and renewable energy parks, deforestation for pasture expansion occurs in a much more scattered and even shifting manner: abandoned pastures become secondary vegetation areas and sometimes return to the natural characteristics of the biome; occasionally, they are restored and revert to pasture use. This dynamic remains quite intense in the biome.

Finally, the importance of livestock in the Caatinga, especially goat and sheep farming, is reflected in the fact that, in Brazil, approximately 90% of the goat herd and 60% of the sheep herd are located in the Northeast region, primarily in the Caatinga biome, with a 20% increase between 2006 and 2017 (IBGE, 2017). A promising alternative for sustainably harnessing this potential, particularly for goat and sheep farming, is the use of sustainable pastoral management technologies for Caatinga vegetation, developed mainly by Embrapa Goats and Sheep (in Sobral, CE) and Embrapa Semi-Arid (in Petrolina, PE). It is worth noting that around 70% of tree and shrub species in the Caatinga are forage plants (Araújo Filho, 2013).



Source: MMA.

4.1.6. Deforestation for mining and urban expansion

According to the National Mining Agency (ANM, 2024), approximately 138 mineral substances are exploited in the biome. Although not all mining activities necessarily require the clearing of new areas (e.g., mineral water and sand), mineral extraction and production still exert pressure on native vegetation. The areas currently involved in mining activities include the categories of Mining Concession, Artisanal Mining, and Licensing. Areas under future deforestation pressure include applications for Mining Concession, Artisanal Mining Application, and Licensing Application.

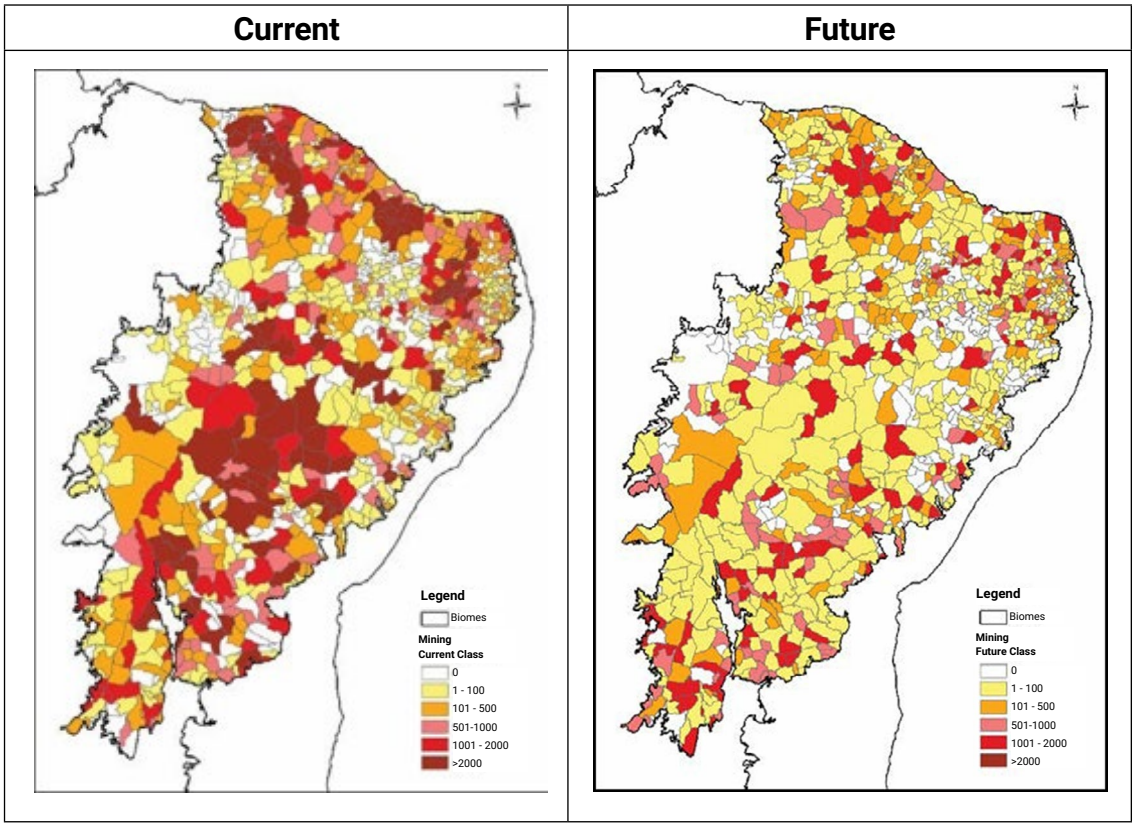
Table 13 presents the areas authorized by ANM for mineral exploration/production by state, while Figure 20 shows the geographical distribution of mining activities in the biome. The states with the highest levels of authorized activity, as well as the greatest potential to begin operations, are Bahia, Ceará, and Rio Grande do Norte. Future expansion may double or triple the extent of anthropized areas. The impacts typically go beyond native vegetation removal, also involving soil stripping, excavation, waste accumulation, environmental pollution, among others.

Table 13. Areas currently authorized for mineral exploration and production and areas with potential to be authorized.

State	Current area (ha)	Future area (ha)
AL	7,902	9,173
BA	215,309	520,286
CE	178,761	231,306
MG	8,741	28,944
PB	77,812	84,791
PE	60,635	36,449
PI	35,564	67,684
RN	123,783	321,357
SE	4,417	20,190
Total	712,925	1.320.180

Source: Open Data from the National Mining Agency (2024). Available at: https://www.gov.br/anm/pt-br/acesso-a-informacao/acoes-e-programas/dados-abertos. Access on: 10 Jun. 2024.

Figure 20. Location of current and future mining activity in the Caatinga Biome.



Source: Maps prepared by the MMA in partnership with GIZ based on mining exploration data from ANM.

Urban sprawl has occurred with great intensity over the last 15 years; however, on a biome scale, its impact in terms of deforestation is limited. According to MapBiomas, the "urbanized area" expanded from 99,000 hectares in 1985 to 405,000 hectares in 2022. This represents an increase of approximately 300,000 hectares over 38 years. Even assuming that the entire urban expansion was based on deforestation, this would imply an annual rate of 8,000 hectares, which accounts for only 4% of the annual deforestation rate observed in the biome.

Therefore, urban expansion does not appear to be a significant factor in the fight against deforestation in the Caatinga. However, it is worth noting that the biome delimitation adopted by the National Institute for Space Research (Inpe) includes parts of the coastal regions of the states of Ceará, Maranhão, Piauí, and Rio Grande do Norte, which contain sensitive areas, such as dunes and mangroves, impacted by urban growth (Semace, 2006).

4.2. Dynamics of burnings and fires

Fires, understood as any uncontrolled and unplanned fire that affects forests and other types of vegetation, whether native or planted, have been a constant concern for the Brazilian government due to the problems they cause. Beyond the environmental impacts, including the emission of greenhouse gases, fires can also affect transportation and power distribution systems, causing damage to power grids and unwanted blackouts, and interfering with land and air transportation systems, potentially leading to the closure of roads and airports. Furthermore, fires severely compromise air quality and the health of populations exposed to atmospheric pollutants and gases released by biomass burning or fires. The main pollutants generated by burnings and fires are carbon dioxide (CO_2), carbon monoxide (CO), ozone (O_3), particulate matter (PM), hydrocarbons, and other toxic gases.

The information presented in this section was collected from the Fire Data Platform of Inpe (BD Queimadas/Inpe), specifically: hotspots and burned area[3]. As noted on the Inpe website, the product related to burned area is still under validation, with provisional maturity status, which means incremental improvements are ongoing; therefore, the quality of the product may not yet be ideal. Within this context, between 1 January and 31 December 2023, a total of 189,901 hotspots were detected throughout Brazil, of which 21,550 were in the Caatinga, representing 11.35% of the total recorded hotspots. Additionally, 100,331 km² of burned area were recorded in the biome, accounting for 26.94% of the total area burned in the country in 2023, placing it behind only the Cerrado biome (Table 14).

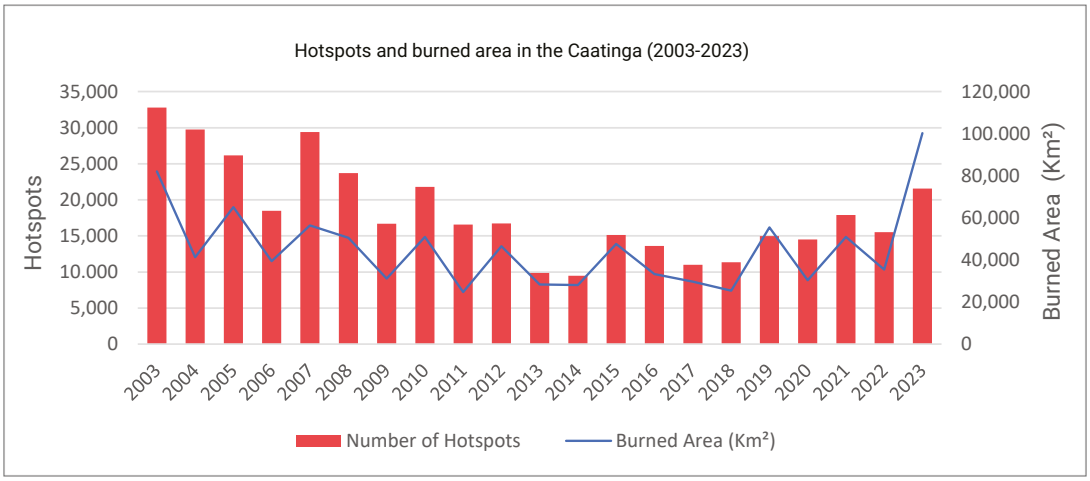
Table 14. Number of hotspots and burned area in Brazil in 2023.

Biome	Number of Hotspots in 2023	%	Burned Area (Km2) in 2023	%
Amazon	98,639	51.94%	91,860.00	24.67%
Cerrado	50,713	26.70%	149,864.00	40.25%
Caatinga	21,550	11.35%	100.311.00	26.94%
Atlantic Forest	11702	6.16%	16,135.00	4.33%
Pantanal	6,580	3.46%	12,996.00	3.49%
Pampa	717	0.38%	1.180.00	0.32%
Total	189,901	100%	372,346.00	100%

3 The product related to burned area provided by Inpe is currently under validation, with provisional maturity status, and incremental improvements are continuously under development (https://terrabrasilis.dpi.inpe.br/queimadas/aq1km/).

When analyzing the behavior of burned area and hotspots from 2003 to 2023, a certain fluctuation pattern is observed, with the number of hotspots and burned area in the biome varying over the years, showing increases and decreases every two years (Figure 21).

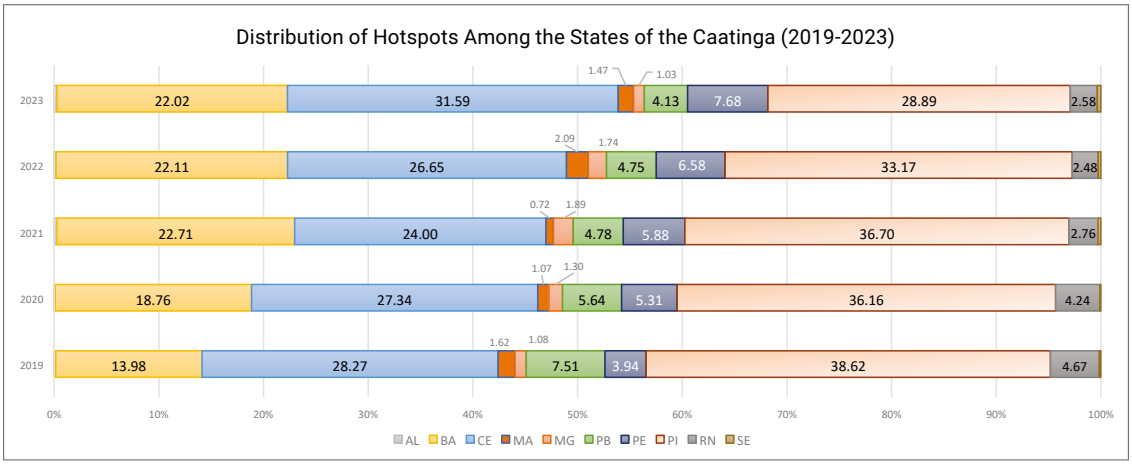
Figure 21. Hotspots and burned area in the Caatinga from 2003 to 2023.



Source: Chart prepared by the MMA based on data from BDQueimadas/Inpe.

In spatial terms, however, there is a recurring distribution of hotspots among the states within the biome. The state of Piauí has the highest concentration of hotspots, followed by Ceará and Bahia. Together, these three states account for about 80% of the hotspots observed between 2019 and 2023 (Figure 22).

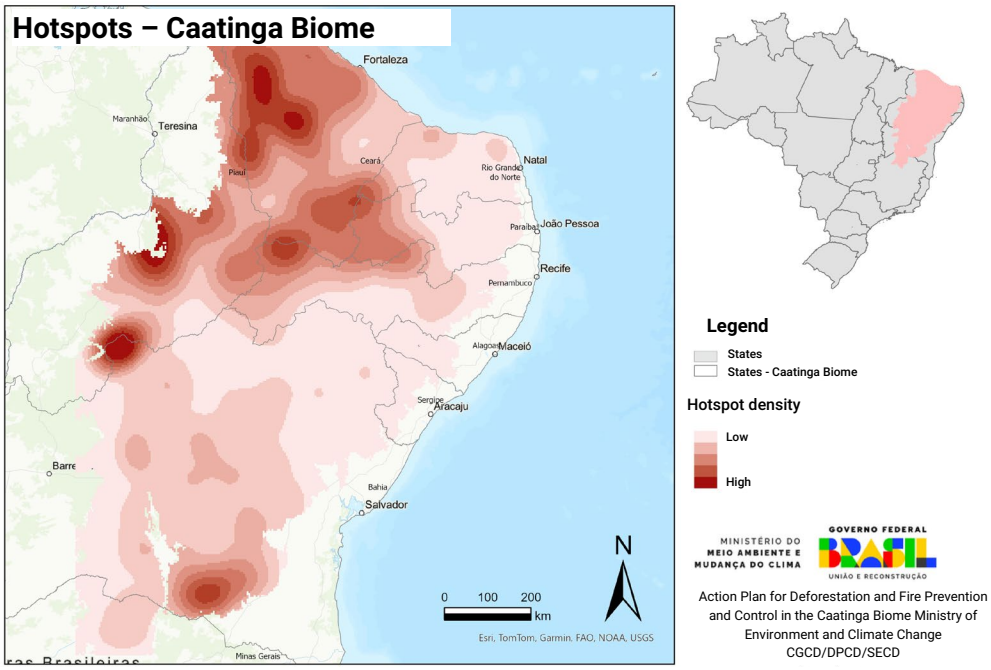
Figure 22. Distribution (%) of hotspots among Caatinga states, 2019-2023.



Source: Chart prepared by the MMA based on data from BDQueimadas/Inpe.

The distribution of hotspots in the year 2023 is consistent with the historical series, as a concentration of hotspots can be observed in southern portion of the state of Bahia, throughout the state of Ceará, and in the interior regions of the states of Pernambuco, Paraíba, and Piauí (Figure 23).

Figure 23. Hotspots in the Caatinga Biome.



Source: Map prepared by the MMA based on data from Inpe.

The distribution of hotspots by land title categories shows that the vast majority of hotspots occur in areas classified as “Other” (74.17%), a pattern similar to that of deforestation discussed in the deforestation dynamics section. Next are the categories of “private properties,” “conservation units,” and “settlements,” accounting for approximately 14.84%, 6.71%, and 3.86% of total detected hotspots, respectively (Table 15). The number of hotspots detected in the remaining land title categories (indigenous lands, quilombola territories, and undesignated federal land parcels) was below 0.1%, a pattern repeated across all states of the biome.

The distribution of burned area by land title categories follows the same pattern as that of the hotspots, with the “Other” category accounting for the largest share of burned area (72.35%), followed by “private properties” (17.30%), “conservation units” (4.90%), and “settlements” (4.30%) - Table 16.

Table 15. Distribution (%) of hotspots by land title category in 2023.

Distribution of Hotspots by Land Title Category in the Caatinga in 2023								
State	Indigenous Land	Conservation Unit	Quilombola Territory	Settlement	Undesignated Federal Land Parcels	Private Property	Others	The state's contribution to hotspots in the biome
AL	1.7%	5%	0%	0%	0.0%	7%	87%	0.3%
BA	0.0%	6%	0%	3%	0.01%	25%	66%	22.0%
CE	0.1%	7%	0%	4%	0%	13%	75%	31.6%
MG	0.0%	0%	4%	8%	0%	35%	53%	1.5%
PB	0.0%	1%	0%	4%	0%	12%	83%	4.1%
PE	0.7%	22%	0%	2%	0%	8%	67%	7.7%
PI	0.0%	4%	0%	4%	0%	10%	81%	28.9%
RN	0.0%	2%	0%	15%	0%	18%	64%	2.6%
SE	0.0%	0%	0%	11%	0%	34%	55%	0.3%
Category contribution to the biome (%)	0.10%	6.71%	0.32%	3.86%	0.00%	14.84%	74.17%	

Table 16. Distribution (%) of burned area by land title category in 2023.

Distribution of Burned Area (km²) by Land Title Category in the Caatinga in 2023								
State	Indigenous Land	Conservation Unit	Quilombola Territory	Settlement	Undesignated Federal Land Parcels	Private Property	Others	The state's contribution to hotspots in the biome
AL	0.1%	0.8%	0.0%	0.6%	0.0%	7.5%	91.2%	0.3%
BA	0.1%	5.1%	0.8%	3.4%	1.3%	20.8%	68.7%	32.6%
CE	0.1%	3.5%	0.2%	4.6%	0.0%	13.6%	78.0%	26.4%
MG	1.4%	1.5%	3.0%	6.0%	0.0%	42.3%	45.8%	3.1%
PB	0.0%	1.8%	0.1%	3.3%	0.0%	13.9%	81.0%	5.4%
PE	0.6%	7.3%	0.1%	3.8%	0.0%	8.4%	79.8%	11.1%
PI	0.0%	7.4%	0.9%	4.2%	0.0%	19.0%	68.5%	17.7%
RN	0.0%	1.8%	0.1%	13.5%	0.0%	16.5%	68.2%	3.2%
SE	1.0%	0.0%	0.0%	14.4%	0.0%	14.4%	70.2%	0.2%
Category contribution to the biome (%)	0.15%	4.90%	0.58%	4.30%	0.41%	17.30%	72.35%	

Therefore, most of the hotspots and burned area occur in areas that are not under the exclusive jurisdiction of the Federal Government; only 10.98% of the hotspots and 10.35% of the burned area occur in land title categories that may be considered federal areas (Table 17). In this regard, it is important to highlight that the burnings and fires in the Caatinga take place predominantly in private areas, for which primary jurisdiction lies with states or municipalities, or in areas whose ownership and jurisdiction have not yet been identified. It is also worth noting that the "conservation units" category includes units from all three levels of government, and the "other" category may encompass military areas, which fall under federal jurisdiction.

Table 17. Distribution (%) of hotspots and burned area across federal, private, and other areas in 2023.

Number of Hotspots per Area	Distribution % of Hotspots %	Distribution % of Burned Area
Federal Areas	10.98	10.35
Private Areas	14.84	17.30
Others	74.17	72.35

Considering an approximate breakdown of federal areas, including indigenous lands, conservation units (noting that this category also includes state and municipal units), quilombola territories, and undesignated federal land parcels, it is observed that prevention and control actions for burnings and fires in the Caatinga should focus on

conservation units and settlements, which together account for approximately 89% of the burned area among the evaluated categories (Table 18). Analyzing the contribution of each state, it is noted that 45% of the total burned area in Federal areas of the Caatinga is located in the state of Bahia.

Table 18. Percentage distribution of burned area by land tenure category in 2023.

Burned Area Distribution in Federal Areas in the Caatinga in 2023 (km²)						
State	Indigenous Land	Conservation Unit	Quilombola Territory	Settlement	Undesignated Federal Land Parcels	State's contribution to area burned in Federal Areas
AL	4.8%	54.7%	0.0%	40.5%	0.0%	0.0%
BA	0.5%	48.2%	7.5%	31.9%	11.9%	33.2%
CE	0.7%	41.9%	2.7%	54.7%	0.0%	21.4%
MG	11.5%	12.6%	25.4%	50.5%	0.0%	3.5%
MA	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
PB	0.0%	34.3%	1.8%	63.9%	0.0%	2.7%
PE	5.2%	61.6%	1.3%	31.9%	0.0%	12.6%
PI	0.0%	59.2%	6.9%	33.9%	0.0%	21.4%
RN	0.0%	11.8%	0.4%	87.8%	0.0%	4.7%
SE	6.5%	0.0%	0.0%	93.5%	0.0%	0.4%
Contribution of the category to the total area burned in federal areas (%)	**1.42%**	**47.39%**	**5.65%**	**41.60%**	**3.93%**	

The assessment of the dynamics of burnings and fires presented here allows us to conclude that most of the hotspots and burned area occur in areas that are not under the primary jurisdiction of the federal government, similar to what is observed with deforestation. Therefore, integrated action among the Federal Government, states, and municipalities is key to advancing the planning and implementation of efficient, effective, and impactful public policies to address this issue. Furthermore, it is important to emphasize the need to adopt preventive measures, given that the Caatinga is an environment sensitive to fire. In this regard, it is essential to move forward with the implementation of Law No. 14994, 31 July 2024, which established the National Policy on Integrated Fire Management and aims to regulate and promote interinstitutional coordination regarding:

a) Integrated Fire Management;

b) the reduction of incidence and damage from fires across the national territory;

c) the recognition of the ecological role of fire in ecosystems; and

d) the respect for traditional knowledge and practices related to fire use.

The Law is clear in establishing that the policy defined therein must be implemented by the Federal Government, states, Federal District, municipalities, civil society, and private entities under a cooperative regime and through coordinated action.

5. STRATEGIC AXES AND OBJECTIVES OF THE PPCAATINGA

The analysis of the historical and current context of deforestation in the Caatinga biome, as well as the projected future dynamics of its drivers, has made it possible to define the strategic objectives of the PPCaatinga (Table 19). Additionally, the detailed objectives, expected outcomes, lines of action, targets, and indicators are presented in Annex B. Progress in the implementation of the Plan can be monitored using the indicators presented, which may be updated through the monitoring and annual evaluation process as established in articles 4 and 11 of Decree No. 11.367/2023.

Table 19. Axes and strategic objectives of the PPCaatinga.

Axes	Strategic Goals
Axis I. Sustainable productive activities	**Objective 1.** Promote the sociobioeconomy, sustainable forest management, and the recovery of deforested or degraded areas.
	Objective 2. Encourage sustainable agricultural and livestock activities.
	Objective 3. Expand research, knowledge production, training, and technical assistance for sustainable production activities.
Axis II. Environmental monitoring and control	**Objective 4.** Strengthen the role of federal institutions and ensure accountability for environmental crimes and administrative violations related to deforestation, fires, and forest degradation.
	Objective 5. Improve the capacity for control, prevention, analysis, and monitoring of deforestation, degradation, and production chains.
	Objective 6. Implement Integrated Fire Management to prevent and combat fires.
	Objective 7. Improve systems and integrate data on deforestation authorizations, embargoes, and infraction notices issued by state and municipal authorities into federal systems.
	Objective 8. Strengthen federative coordination to promote actions to control deforestation and fires and implement the Native Vegetation Protection Law.

Axis III. Land and territorial planning	**Objective 9.** Ensure the designation of public land parcels for protection, conservation, and sustainable use of natural resources, especially for Indigenous Peoples, quilombola communities, other traditional peoples and communities, and family farmers.
	Objective 10. Expand and strengthen the management of protected areas.
	Objective 11. Coordinate and/or align the planning of major projects and infrastructure developments in the region with the goal of achieving zero deforestation by 2030.
	Objective 12. Conduct territorial planning and implement existing legal instruments to ensure the role of native vegetation in maintaining and restoring water regimes and water quality.
Axis IV. Regulatory and economic instruments	**Objective 13.** Create, improve, and implement regulatory and economic instruments for deforestation and fire control and biodiversity conservation.

The following sections present the rationale and purpose of each axis and strategic objective, based on the information provided in Annex B - Summary Table of Strategic Objectives, Expected Results, Lines of Action, Targets, and Indicators.

5.1. Axis I - Sustainable productive activities

Given the socioeconomic characteristics (populous region, high population density, historical and widespread human occupation, high dependence on natural resources, lack of alternatives for employment and income generation) and environmental conditions (semiarid climate, high diversity of soil, terrain, and water resource availability) of the biome, it is essential to focus development on sustainable actions and productive chains to provide economic alternatives that prioritize the sustainable use of resources. The native vegetation resources of the biome have been used since colonization, through more or less intense cycles (e.g., cotton and sisal), which has resulted in most areas having undergone significant anthropogenic transformation. Nevertheless, the biome still maintains important native vegetation cover and should therefore be utilized to meet human demands in harmony with the conservation of biodiversity and ecosystem services. It is important to emphasize the need for coordination with responsible federal and state governmental sectors, as well as civil society, to ensure the necessary water security to support the proposed productive activities, as well as for domestic use, bearing in mind that the biome is characterized by water scarcity.

In this context, under the axis of sustainable productive activities, the PPCaatinga establishes three strategic objectives:

Objective 1. Promote sociobioeconomy, sustainable forest management, and the recovery of deforested or degraded areas: aimed at promoting and encouraging the harvesting and processing of non-timber forest products (PFNM), including the sustainable use of genetic resources for industry (medicines, pharmaceuticals, resins, etc.) and the use of industrial residues for energy purposes, replacing biomass from native vegetation; and promoting the production of forest biomass and timber products (for energy use, stakes, fence posts, others), integrated with the increase of forage production through sustainable management, adding value to productive chains. This objective also seeks to implement actions to reduce pressure on native forest resources and restore ecosystem services;

Objective 2. Stimulate efficient and sustainable agricultural and livestock activities: with an emphasis on subsistence and irrigated agriculture, livestock farming, and the need to accelerate productive intensification, efficient water use, environmental regularization, and reduction in the opening of new areas, based on coexistence with the semiarid environment, avoiding the application of production models unsuited to the biome's reality;

Objective 3. Expand research, knowledge production, training, and technical assistance for sustainable productive activities: as a support strategy for Objectives 1 and 2.

Source: MMA.

Strategic Objective 1 aims to promote sociobioeconomy, sustainable forest management, and the recovery and restoration of deforested and degraded areas. The loss of biodiversity due to the unrestrained use of natural resources and the replacement of native vegetation with exotic species has resulted in significant losses, including economic ones, given the inability to add value and capitalize on the sociobioeconomy products richly found in the biome. Therefore, it is necessary to recognize and promote native products, as well as to create and strengthen mechanisms to enable the integration of these products into national and international markets. In this regard, it is essential to develop and implement programs and actions to support bioeconomy (1.1.1), strengthen and expand public procurement programs (1.1.2), and promote sustainable businesses and green jobs, including efforts toward agroecological transition and ethnodevelopment (1.1.3).

The sustainable extraction of non-timber forest products, combined with the strengthening of productive chains and systems for fair trade and sustainable businesses, is an effective way to maintain forest cover and avoid deforestation for alternative land use, particularly targeting family farmers and traditional communities. For these groups, actions will be included to strengthen community organizations, including cooperatives. These activities may be carried out concurrently with nature-based tourism, ethnotourism, and community-based regenerative tourism (1.2.1), as well as with multi-use sustainable forest management (1.3.1).

The sustainable extraction of non-timber forest products, combined with the strengthening of productive chains and systems for fair trade and sustainable businesses, is an effective way to maintain forest cover and avoid deforestation for alternative land use, particularly targeting family farmers and traditional communities. For these groups, actions will be included to strengthen community organizations, including cooperatives. These activities may be carried out concurrently with nature-based tourism, ethnotourism, and community-based regenerative tourism (1.2.1), as well as with sustainable forest management (1.3.1).

Source: MMA.

In addition to non-timber production, sustainable management should, on the one hand, contribute to the sustainable production of timber, primarily biomass for energy (timber forest management), and on the other hand, to strengthening the forage base for extensive livestock through silvopastoral management. Sustainable forest management simultaneously ensures the maintenance of forest cover, the sustainable supply of renewable energy, and income generation, contributing to biodiversity conservation and also enabling meliponiculture. Thus, forest and silvopastoral management aim to mitigate two of the main drivers of degradation and deforestation in the biome: the demand for biomass for energy and livestock farming, whether extensive or for pasture establishment.

Several initiatives for the recovery and restoration of native vegetation and degraded areas have been implemented in the Caatinga biome and already show accumulated experience (e.g., the "Strategies for Conservation, Restoration, and Management for Biodiversity in the Caatinga, Pampa, and Pantanal" project - GEF Terrestrial - Funbio; restoration of degraded areas in conservation units in the semiarid region of the state of Pernambuco, among others), and are expected to scale up in the near future. Strengthening and expanding the implementation of the National Plan for the Recovery of Native Vegetation (Planaveg) will allow these restoration actions to be scaled up, with the added potential for employment and income generation. Alongside sustainable management, the restoration of native vegetation will contribute to reducing degradation, combating desertification, conserving biodiversity, and maintaining and increasing carbon stocks while generating jobs and income (1.4.1). Likewise, it is crucial to integrate native vegetation recovery and restoration actions with the River Basin Revitalization Program (1.4.2).

The Caatinga Restoration Network (Recaa) stands out as a hub of accumulated experience through its members and strong coordination with the GEF Terrestrial. Recaa can also act as a collective that shares effective and tested restoration practices, considering the multiple landscapes and ecoregions of the Caatinga. One of the key issues for restoration in the biome is the development of production technologies, especially nurseries, to support restoration strategies for degraded natural systems, focusing on functional roles and ecosystem services.

Strategic Objective 2 seeks to prevent deforestation caused by the opening of new agricultural and pasture areas by encouraging sustainable agricultural and livestock activities. The opening of new pasture areas can be avoided through the recovery and proper management of existing areas, including the sustainable use of native vegetation for forage and the intensive production of forage, coupled with its conservation for the dry season (hay, silage). Agricultural productivity is highly variable and dependent on annual rainfall, which is often scarce and irregular, leading to significant losses. The occurrence of "green drought" is recurrent, and although it allows pasture formation for extensive livestock farming, it compromises agricultural production and the replenishment of water reservoirs (ponds, dams). As previously mentioned, extensive agriculture has been losing relevance, and irrigated agriculture is becoming increasingly important for food production and the generation of employment and income, enhancing the quality and professionalism of agricultural activities. Although there are technical requirements (such as water availability and soil suitability) for the implementation of irrigated agriculture, it will be important to promote its expansion in already converted areas, taking due care to avoid soil salinization. The implementation of sustainable irrigation practices must be prioritized, using technologies that maximize water-use efficiency and minimize environmental impact, promoting the conservation of water resources.

The PPCaatinga will seek to promote sustainable livestock and agricultural production based on the social-environmental-economic triad (2.1.1). In this sense, higher agricultural and livestock productivity per unit area must be achieved, ensuring sufficient employment and income generation to keep rural populations, especially youth, in the countryside, while promoting the conservation of areas vital for biodiversity and ecosystem services. This includes many permanent preservation areas (mountains, riparian forests), which have often been exploited for decades due to their favorable conditions for agriculture and livestock. In this context, sustainable agriculture and livestock actions, including Agroforestry Systems (AFSs) (2.1.1), will complement restoration actions (1.4.1).

Sustainable use techniques, conservation, and sustainable agricultural and livestock production, mainly aimed at family farming, must be properly disseminated through rural technical assistance, which will support their dissemination and implementation, as well as access to markets and public policies for family farming (2.1.2).

Source: MMA.

The success of the previous strategic objectives will depend on the generation of appropriate knowledge and technology and their wide dissemination and availability to target audiences (3.1.1). While there is already extensive technical and scientific knowledge regarding sustainable forest management (MMA, 2024), coexistence with the semiarid, irrigated agriculture, and intensive forage production, there remain considerable knowledge gaps regarding restoration and its most promising techniques in the Caatinga biome. It will also be necessary to promote innovation and technological development, along with technology transfer, for ongoing initiatives in the territory and for future ones. The specific environmental conditions and sociocultural context pose challenges to the success of restoration initiatives. The contribution of sustainable use systems and traditional techniques to ecosystem services, carbon capture and storage, and GHG emissions reduction needs to be quantified to support Payment for Environmental Services (PES) initiatives and carbon credit markets (such as the Brazilian Greenhouse Gas Emissions Trading System - SBCE). Lastly, the sustainable productive actions and alternatives proposed in this plan must strongly consider coexistence with drought and the conservation of the biome's water resources, which are scarce across much of its territory, or else they risk becoming unfeasible.

5.2. Axis II - Environmental monitoring and control

As previously described, nearly all land in the biome has already been designated, with most areas classified as “Other” and “Private Property,” which, in the vast majority of cases, under Complementary Law No. 140/2011, fall under the jurisdiction of state environmental agencies. It is worth noting that due to the difficulty in integrating information on Authorizations for Vegetation Suppression (ASVs), Authorizations for Alternative Land Use (UASs), and fire use authorizations in the form of controlled burns, issued by states and, occasionally, municipalities, into the federal system, environmental and law enforcement agencies struggle to classify deforestation and fires as “authorized” or “illegal.”

Environmental control, carried out through the planning and implementation of repressive measures, such as environmental and police inspections, is the main instrument the State has for swift intervention against native vegetation suppression and fires. To this end, it is essential to improve information production and enhance the integration of databases and monitoring systems to support the planning and execution of such actions, as well as decision-making based on spatial intelligence, in order to optimize the use of limited available resources.

It is important to emphasize, similarly to biomes where land occupation is older and, therefore, the land regularization process is more advanced, that most environmental control actions fall under the responsibility of state environmental agencies, pursuant to Complementary Law No. 140/2011. The role of federal environmental agencies and the Federal Police, as a primary jurisdiction, applies in federal areas such as federal conservation units, Indigenous lands, and other federally managed territories. Thus, the role of states and municipalities in this matter is crucial, given the distribution of responsibilities under the legal framework.

To address these challenges, the "Environmental Monitoring and Control" axis of the PPCaatinga comprises five strategic objectives:

Objective 4. Strengthen the role of federal institutions and ensure accountability for environmental crimes and administrative violations related to deforestation, fires, and forest degradation.

Objective 5. Improve the capacity for control, prevention, analysis, and monitoring of deforestation, degradation, and production chains.

Objective 6. Implement Integrated Fire Management to prevent and combat fires.

Objective 7. Improve systems and integrate data on deforestation authorizations, embargoes, and infraction notices issued by state and municipal authorities into federal systems.

Objective 8. Strengthen federative coordination to promote actions to control deforestation and fires and implement the Native Vegetation Protection Law.

Strategic Objective 4 aims to strengthen the role of federal agencies by expanding and modernizing their operational capacity, thereby increasing the efficiency, efficacy, and effectiveness of administrative, civil, and criminal actions against deforestation, fires and degradation in native vegetation. To this end, it seeks to ensure accountability for environmental crimes and administrative violations related to deforestation, fires, and forest degradation (4.1.1), and to strengthen the capacity of institutions through human, technological, and logistical resources to effectively address fires and other environmental crimes and violations (4.2.1).

Strategic Objective 5 seeks to improve the capacity for control, prevention, analysis, and monitoring of deforestation, degradation, and production chains. This includes enhancing monitoring systems for suppression and degradation of native vegetation (5.1.1); strengthening community-based monitoring initiatives for deforestation and fires and providing safety mechanisms for involved stakeholders (5.1.2); strengthening governance and institutional cooperation for monitoring (5.1.3); and implementing/ developing air pollution monitoring, inventories, and State Air Emissions Control Plans in the Caatinga states, as well as running public awareness campaigns against burnings and fires (5.1.4). This strategic objective also includes integrating deforestation prevention and control actions outlined in the National Action Plans for the Conservation of Endangered Species (5.1.5), and implementing systems for monitoring and controlling the environmental origin and traceability of timber, minerals, and agricultural products (5.2.1).

Strategic Objective 6 focuses on implementing a framework of actions for Integrated Fire Management in the biome, a set of practices that incorporates ecological, cultural, socioeconomic, and technical aspects into the execution, integration, monitoring, evaluation, and adaptation of fire-related activities, as well as fire prevention and response. The goal is to reduce fires and enhance technical-scientific knowledge on the subject. A cornerstone of this objective is to strengthen the institutional capacity of key federal agencies responsible for fire prevention and suppression (ICMBio and Ibama) by reinforcing the Federal Brigades Program (6.1.1). It also aims to promote a range of actions and initiatives under the scope of the National Policy on Integrated Fire Management (6.1.2), including public education campaigns to raise awareness about the impacts of fires (6.1.3).

Strategic Objective 7 focuses on improving systems and integrating state and municipal data on deforestation authorizations, embargoes, and infraction notices into federal systems. Given the legal framework regarding environmental assessments on rural properties and the permitting processes for vegetation suppression, federative entities play a key role in this objective.

Law No. 14.600/2023, which reorganized agencies of the Presidency and Ministries, transferred the technological infrastructure and database of the National Rural Environmental Registry System (SICAR) from the MMA to the Ministry of Management and Innovation in Public Services (MGI). The MGI plans to manage the CAR as public

digital infrastructure, integrating it with various public policies and consolidating geospatial information across the federal government. The Rural Environmental Registry (CAR) is a national electronic public registry, mandatory for all rural properties, designed to integrate environmental data from land ownership and possession. The CAR is the main instrument for implementing the Native Vegetation Protection Law (Forest Code) and contributes to the environmental regularization of rural properties. It is used for control, monitoring, environmental planning, and combating deforestation. All federal units must be integrated with SICAR, either by using the system or transmitting data from their own systems. However, integration is not always performed adequately, as there are challenges related to technological, financial, and human resources. Additionally, improvements in SICAR are needed to enhance the automation of record analysis and support the monitoring of Forest Code implementation.

Within Strategic Objective 7, the goal is to develop a technological solution that qualifies authorized and unauthorized deforestation and enables tracking the proper execution of ASVs and UASs, thus providing data to support targeted actions using spatial intelligence (7.1.1). Finally, it is important to also integrate embargoed area data from the states in order to build a unified national database that can be used by oversight bodies, financial agents, and others (7.1.3).

Strategic Objective 8 is structured to strengthen collaboration among the federal government, states, and municipalities within the Caatinga, with the goal of increasing the effectiveness of efforts directed at structural actions to control deforestation and fires. In this scope, key actions include supporting the development and updating of State and Municipal Plans for the Prevention and Control of Deforestation and Forest Fires (PPCDQs) (8.1.1); promoting coordination with state and municipal agencies involved in fire prevention and response for the implementation of Integrated Fire Management (8.1.2); and improving the environmental regularization process through CAR analysis by the states and supporting the implementation of PRAs and other mechanisms provided for in the Native Vegetation Protection Law (8.2.1).

Source: MMA.

5.3. Axis III - Land and territorial planning

Axis III - Land and territorial planning of the PPCaatinga - seeks to align and guide land allocation and use in order to optimize conservation efforts, minimize the impacts of large-scale developments, and enhance existing legal instruments to promote sustainable use and reduce deforestation, as reflected in its four strategic objectives:

Objective 9. Ensure the designation of public land parcels for protection, conservation, and sustainable use of natural resources, especially for Indigenous Peoples, quilombola communities, other traditional peoples and communities, and family farmers.

Objective 10. Expand and strengthen the management of protected areas.

Objective 11. Coordinate and/or align the planning of major infrastructure and development projects in the region with the goal of zero deforestation by 2030.

Objective 12. Conduct territorial planning and implement existing legal instruments to ensure the role of native vegetation in maintaining and restoring water regimes and water quality.

The conservation and sustainable use of natural resources depend initially on land tenure security to ensure responsibility and rights. In the Caatinga biome, there is a major challenge regarding land regularization, particularly for Indigenous Lands, Quilombola territories, and areas occupied by traditional communities and family farmers. Land and territorial planning in the Caatinga biome (Strategic Objective 9) will aim to better understand the land tenure reality, fill knowledge gaps, prevent and resolve conflicts, ensure rights, and assign responsibilities to the appropriate actors. To this end, the federal government must carry out the designation of federal land parcels (9.1.1). The plan also seeks to encourage the creation of interinstitutional bodies and programs for managing land tenure conflicts (9.1.2).

Working with communities - such as traditional communal pasture areas (in Portuguese fechos and fundos de pasto) in the backlands of Bahia - is an opportunity to promote the sustainable use of the Caatinga, fostering socio-bioeconomy and extensive livestock in community-managed territories. Their management must be improved, and their formal recognition must be registered and structured in official systems or databases. Territories of other traditional peoples and communities in the biome should also be recognized as opportunities to promote the socio-bioeconomy through the proper and sustainable management of biodiversity products.

Strategic Objective 10 of the PPCaatinga aims to expand and strengthen the management of protected areas. Considering that less than 10% of the biome's territory is protected by Conservation Units, there is a need to expand full protection in the biome, focusing on critical deforestation areas (10.1.1), observing the priority areas and actions for conservation (Decree No. 5092/2004; Ordinance No. 463 of December 18, 2018), as well as specific plans (e.g., PAN Aves Caatinga). It is important to consider the possibility of connectivity between existing and new protected areas and between habitats defined in the National Action Plans for the Conservation of Endangered Species (10.1.2; 10.1.3).

Although deforestation and fires in Conservation Units, Indigenous Lands, and Quilombola Territories are relatively limited in the Caatinga biome, future threats may emerge, such as the expansion of soy, corn, and cassava farming in the Chapada do Araripe, where the APA Chapada do Araripe is located, which may significantly impact forest cover in the region. Given the positive contribution of Indigenous Lands and Quilombola Territories to conservation and sustainable use, the plan aims to identify, demarcate, legalize, and officially recognize these territories to ensure their legal acknowledgment (10.2.1).

One of PPCaatinga's strategies to prevent deforestation is the proper planning of large-scale projects and infrastructure in the region. In this context, Strategic Objective 11 will focus on scaling up initiatives related to clean renewable energy (wind farms and photovoltaic plants). These two sectors show high growth potential and could double their footprint in the biome over the next 5-10 years. To avoid or reduce the impact of such projects on Caatinga deforestation, it is important to regulate, develop, and

implement tools such as Technical, Economic, and Environmental Feasibility Studies (EVTEA) and Strategic Environmental Assessments (AEE) in order to proactively support environmental and territorial governance, control deforestation, implement restoration measures in deforested areas, and mitigate GHG emissions from land-use changes in the project's area of influence (11.1.1). Special efforts should be made to avoid clearing new forested areas for these developments by prioritizing already degraded or anthropized lands. Other criteria should also be considered, such as the presence or impact on residents and rural communities, negative effects on ecological corridors, or on endangered species and their habitats/dispersal zones.

Strategic Objective 12 proposes carrying out territorial planning and implementing legal instruments to ensure the role of native vegetation in maintaining and restoring water regimes and water quality. Maintaining forest cover through the protection of springs and APPs, mountain ranges and riparian forests, is essential for the availability of water resources and for protection against erosion and degradation. Many of these areas face conflicting interests, as they are favorable to agricultural and livestock activities and have historically been used for such purposes. Therefore, the protection and restoration of native vegetation in these areas are essential and should be promoted by integrating and considering effective and sustainable agro-livestock systems (Strategic Objective 2).

In this regard, the PPCaatinga will seek to develop a proposal for priority areas for Legal Reserve compensation, focusing on restoring spring areas, aquifer recharge zones, and wetlands, as well as establishing ecological corridors and conserving or restoring vegetation, soil, ecosystems, and endangered species (12.1.1).

5.4. Axis IV - Regulatory and economic instruments

The adoption and promotion of public policies must be accompanied by both regulatory instruments (obligations to be fulfilled and methods of implementation) and economic instruments (incentives and support to enable the necessary adjustments by social actors and recognition of specific contributions) to meet the targets within the agreed timelines. In the case of the PPCaatinga, the regulatory and economic instruments seek to guide and promote the conservation, sustainable use, and restoration of natural resources, reducing deforestation and fires while also supporting the development of economic activities, value chains, and the strengthening of the socioeconomic rights of local populations. The strategic objective of Axis IV is as follows:

Objective 13. Create, improve, and implement regulatory and economic instruments to control deforestation and fires and conserve biodiversity.

In addition to an appropriate incentives and credit strategy, the PPCaatinga must be supported by a strong and adequate regulatory framework to meet its goals. A significant mismatch still exists between the authorizations for alternative land use (UAS) and vegetation suppression (ASV) and the areas actually deforested, as observed in monitoring systems. Except for Conservation Units, Indigenous Lands, Quilombola Territories, and Settlement Projects, nearly the entire Caatinga biome is located on private land. According to Article 12 of Law No. 12651/2012, 20% of rural properties must be maintained as Legal Reserve, which allows for potential land-use changes on 80% of the area. In this context, the conservation and sustainable use of natural resources require economic incentives, while deforestation and fire control must rely on measures that discourage economic activities that promote deforestation, as well as effective regulation, monitoring, and enforcement systems.

In addition to specific and special funds, it will be important to propose, in coordination with the implementation efforts of the Climate Plan and Planaveg, the creation of funds or similar mechanisms to ensure water availability, mitigate and adapt to climate change, and promote soil conservation and the conservation and restoration of native vegetation and biodiversity in the biome, with funding from multiple sources and contributions from the public and private sectors, international cooperation, and multilateral financing institutions (13.1.1). Another important measure provided for in the plan is to promote initiatives to classify economic activities according to their environmental, social, and governance impacts, known as green taxonomy (13.2.1).

A key economic instrument in the Caatinga biome will be the promotion of tax incentives for the bioeconomy, as well as for the implementation and consolidation of sustainable production systems, agroforestry systems, and sustainable extractivism. The target audience for this action includes Indigenous Lands, Quilombola Territories, traditional communities, and family farmers (13.3.1). Business opportunities in the bioeconomy and bioindustry may be enhanced through public/private financing mechanisms (13.3.1).

Regarding rural credit, it will be essential to revise the access rules for Pronaf and other credit lines to finance sustainable use and extractivism, agroforestry, and sociobiodiversity value chains. This includes developing manuals and training programs for bank managers who implement rural credit (13.4.1). In this regard, it is also necessary to progressively align rural credit policies with the goal of achieving zero deforestation by 2030, building upon the measures already implemented in the 2022/23 harvest in compliance with CMN Resolution 5081/2023. Given the growing importance of livestock and pasturelands, combined with widespread overgrazing and land degradation, it will be important to expand financing for pasture recovery and degraded area restoration in critical deforestation zones, considering both public and private sources (13.4.1).

Brazil's National REDD+ Strategy (ENREDD+) is the document that formalizes, to Brazilian society and the UNFCCC signatory countries, how the federal government has structured its efforts and how it intends to enhance them by 2030. The focus is on coordinated actions for deforestation and forest degradation prevention and control, conservation of forest carbon stocks, forest restoration promotion, and sustainable development support. Fundraising through payment for REDD+ results should contribute to the implementation of Brazil's National REDD+ Strategy and Nationally Determined Contribution (NDC) (https://www.gov.br/fazenda/pt-br/assuntos/fundos-internacionais-de-desenht-tps://www.gov.br/fazenda/pt-br/assuntos/fundos-internacionais-de-desenvolvimento/fundo-verde-do-clima/passo-a-passo-para-submissao-das-propostas/simvolvimento/fundo-verde-do-clima/passo-a-passo-para-submissao-das-propostas/sim). Thus, revising and implementing the National REDD+ Strategy (ENREDD+) is a key initiative to finance deforestation control (13.5.1).

Regulatory instruments related to environmental compensation, Integrated Fire Management, and the sustainable use of resources in conservation units must be improved, revised, or regulated (13.6.1; 13.7.1; 13.8.1).

Payment for Environmental Services, as provided for in Law No. 14119/2021 and the Federal Program for Payment for Environmental Services (PFPES), should be regulated, implemented, and strengthened. Instruments such as the Green Grant Program (Bolsa Verde) must be adapted to the reality of the biome, seeking to incentivize and enhance sociobioeconomy, conservation, and the sustainable use and management of environmental resources (13.9.1), thus contributing to deforestation reduction. Payment for Environmental Services initiatives developed and implemented by state and municipal governments should be strengthened.

Globally and in Brazil, the recognition of forest conservation has been gaining traction, whether through Payment for Environmental Services (PES) or carbon credits. Bill 182/2024, which regulates the Brazilian Greenhouse Gas Emissions Trading System (SBCE), was approved by the Chamber of Deputies in December 2023 and is now under review by the Federal Senate. It aims to encourage emission reductions in accordance with the National Climate Change Policy (Law 12187 of 2009) and international agreements ratified by Brazil. The establishment of a regulated carbon market in Brazil (13.10.1) may be a key element to promote and add value to conservation, sustainable management, and restoration in the biome. The remuneration from carbon credits may enable and foster a favorable environment for the implementation of productive activities aligned with environmental conservation and carbon stock maintenance. However, such initiatives must be paired with good practices for promoting socio-environmental justice (e.g., clear and informed consent, preservation of traditional and sustainable land use practices), cultural respect, and people's well-being. They should also avoid potential future credit restrictions, among other concerns.

In addition to an appropriate incentives and credit strategy, the PPCaatinga must be supported by a strong and adequate regulatory framework to meet its goals. A significant mismatch still exists between the authorizations for alternative land use (UAS) and vegetation suppression (ASV) and the areas actually deforested, as observed in monitoring systems. The PPCaatinga therefore proposes to standardize the criteria for issuing ASVs and UASs by the states and municipalities, and to integrate and publish the data in Sinaflor in a common format (13.12.1).

Source: MMA

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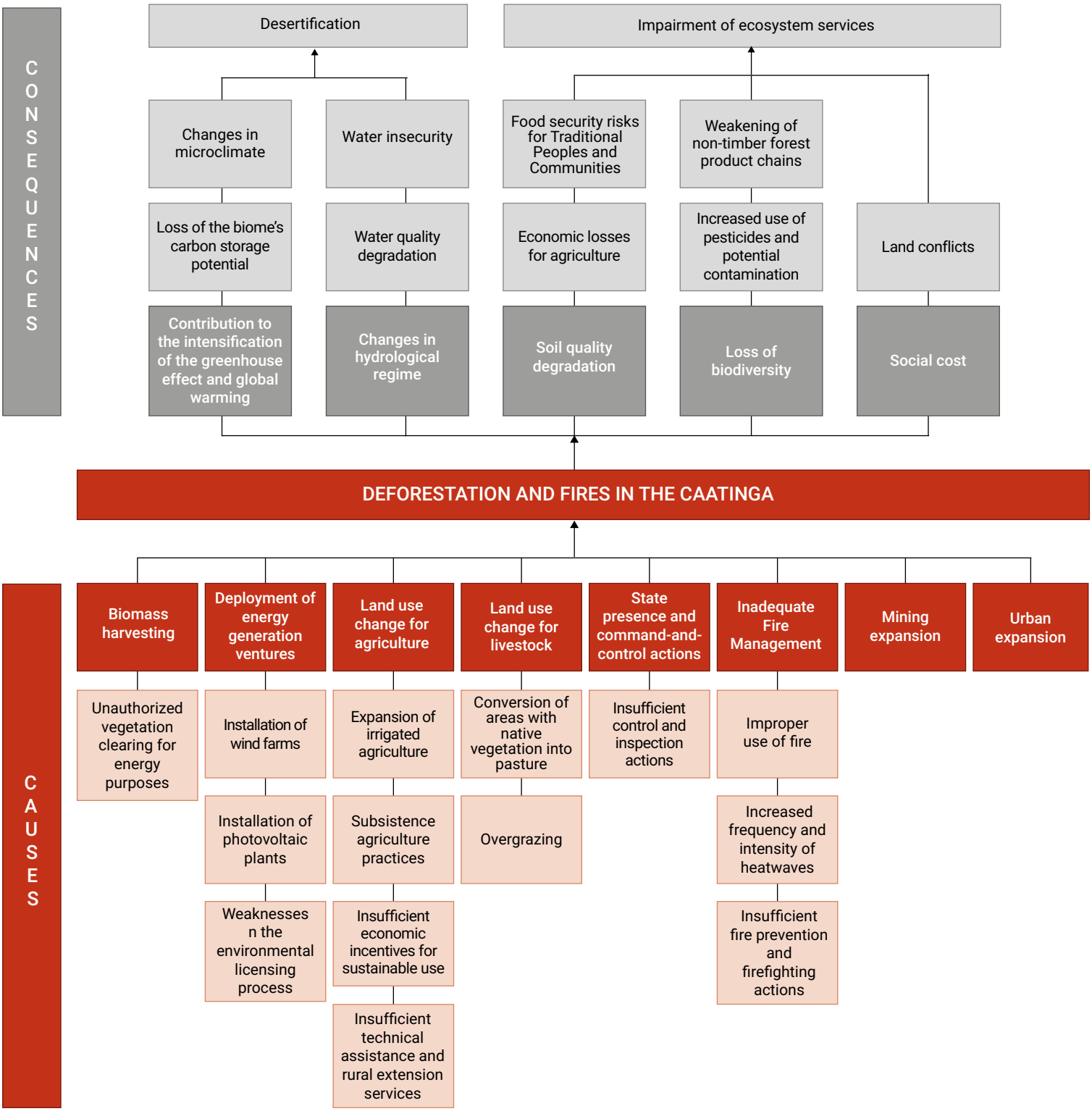
ANNEX A - Problem Tree



ANNEX B - Summary table of strategic objectives, expected results, lines of action, targets, and indicators

Axis 1 - Sustainable Productive Activities				
Strategic Objective 1. Promote sociobioeconomy, sustainable forest management, and the recovery and restoration of deforested or degraded areas.				
Expected Result 1.1. Bioeconomy, sociobiodiversity, and agroecological transition expanded and strengthened.				
Line of Action 1.1.1. Develop and implement programs and actions to support the bioeconomy.				
Goal	Indicator	Deadline	Key Actor	Partners
1.1.1.1. Develop the National Bioeconomy Plan.	Plan developed	2025	SBC-MMA	MDA / MIDR MCTI / MDIC / MAPA / Conab / MF / MDS
1.1.1.2. Support 30 bioeconomy initiatives in the Caatinga.	Number of supported initiatives	2027	SFB-MMA	SBio
1.1.1.3. Establish a priority biorregional territory in the Caatinga biome.	Number of selected territories	2025	MIDR	MMA
1.1.1.4. Promote the sustainable use of natural resources, aligned with the cultural and economic needs of traditional communities.	Sustainable management projects developed and implemented with community participation	2026	ICMBio	Peoples of the Caatinga, CNPCT
1.1.1.5. Map species of socioeconomic importance for Caatinga communities.	Structuring a biocultural community protocol and monitoring sociobiodiversity in the Caatinga.	2025	ICMBio	GEF Terrestrial; Pantanal Traditional Communities Network
1.1.1.6. Create a database of traditional knowledge associated with Caatinga biodiversity.	Scientific article published	2025	ICMBio	GEF Terrestrial; Pantanal Traditional Communities Network
1.1.1.7. Increase by 50% the support for sustainable productive inclusion projects for Indigenous peoples, traditional communities, family and peasant farming, and community enterprises, valuing sociobiodiversity product chains.	a) Number of projects supported per year b) Number of territories and families benefited per year	2027	MDA	SNPCT – MMA/ MDIC/ MAPA/ MCTI/ Funai/ MPI/ Conab
	a) Number of applied technologies and social technologies for socio-biodiversity chains b) Number of sociobiodiversity chains benefited per year	2027	MDA	SNPCT – MMA/ MDIC/ MAPA/ MCTI/ Funai/ MPI/ Conab

1.1.1.8. Implementar 15 projetos para estimular as cadeias da sociobiodiversidade e dos produtos agroecológicos, através de fomento produtivo e/ou da ampliação da infraestrutura local de transporte, saneamento, conectividade e energia renovável.	a) Number of implemented projects b) Number of enterprises benefited c) Total investment amount (BRL)	2027	Mapa	ANA, ICMBio e SNPCT- MMA/ MD/MDS/SBC-MMA/SNPCT, SBC - MMA/ GSIPR/MCOM/ MA
1.1.1.9. Implement 10 projects to stimulate sociobiodiversity and agroecological product chains through productive support and/or expansion of local infrastructure for transportation, sanitation, connectivity, and renewable energy.	a) Number of implemented projects b) Number of enterprises benefited c) Total investment amount (BRL)	2027	MIDR	ANA, ICMBio e SNPCT- MMA/ MD/MDS/SBC-MMA/SNPCT, SBC - MMA/ GSIPR/MCOM/ MA
1.1.1.10. Implement 30 projects to stimulate sociobiodiversity and agroecological product chains through productive support and/or expansion of local infrastructure for transportation, sanitation, connectivity, and renewable energy.	a) Number of implemented projects b) Number of enterprises benefited c) Total investment amount (BRL)	2027	MDA	ANA, ICMBio e SNPCT- MMA/ MD/MDS/SBC-MMA/SNPCT, SBC - MMA/ GSIPR/MCOM/ MA
Line of Action 1.1.2. Strengthen and expand government procurement policies and programs (PAA, PNAE, PGPM, PGPM-Bio, and the Family Farming Seal).				
Goal	Indicator	Deadline	Key Actor	Partners
1.1.2.1. Increase commercialization actions through government procurement programs (PAA, PNAE) compared to 2022 values.	% increase in government purchases	2027	Conab	MDA / MDS / MPI / MMA / MDIC
1.1.2.2. Monitor the generation of information and data on sociobiodiversity products supported by PGPM-Bio.	Annual publication of monitoring data	2027	Conab	MDA / MMA / IBGE
1.1.2.3. Include more Caatinga products in the PGPM-Bio list (e.g., licuri and murici).	Number of products included	2027	Conab	MDA / MMA / IBGE - MPO
Line of Action 1.1.3. Promote sustainable businesses and create green jobs, strengthening the bioeconomy, agroecological transition, and ethnodevelopment.				
Goal	Indicator	Deadline	Key Actor	Partners
1.1.3.1. Increase support for sustainable productive inclusion projects for Indigenous peoples, traditional communities, family and peasant farming, and community enterprises, valuing sociobiodiversity product chains compared to the average of the past 4 years.	% increase in supported projects	2027	Conab	SNPCT-MMA / MDIC MAPA / MCTI / MDIC / Funai-MPI

1.1.3.2. Adjust and strengthen the Pronatec Extrativista program.	Number of people assisted	2027	SNPCT -MMA	ICMBio / Conab / MPI / MEC / MDS
1.1.3.3. Manage 16,200 hectares under sustainable use (13,200 in Uauá – BA and 3,000 in the Seridó region - RN and PB).	Number of hectares under management	2025	SNPCT -MMA	Araripe Foundation / FAO
1.1.3.4. Promote initiatives for socioproductive inclusion, territorial and environmental management, and institutional strengthening for traditional peoples, communities, and family farmers.	Number of initiatives carried out	2024	SNPCT -MMA	IDH / Funatura / IEB
Expected Result 1.2. Nature tourism, ethnotourism, and regenerative tourism promoted and expanded.				
Line of Action 1.2.1. Expand nature, rural, community-based, and conservation unit tourism.				
Goal	Indicator	Deadline	Key Actor	Partners
1.2.1.1. Establish pilot projects to promote ecotourism and regenerative tourism per year.	Number of projects established annually	2027	MTur	Embratur / SBC-MMA / MDIC
1.2.1.2. Establish a community-based and ethnotourism program in the Caatinga.	Community-based and ethnotourism program established	2027	MTur	Embratur / SBC - MMA / MDIC / MPI-Funai
1.2.1.3. Monitor visitation numbers in 100% of conservation units where visitation is a primary objective (National Parks and Natural Monuments).	% of conservation units with monitoring of the number of visits, in accordance with Normative Instruction No. 05/2018	2027	ICMBio	Private sector
1.2.1.4. Provide annual places on courses promoted by the general coordination of public use and environmental services or on the subject of managing visitation in conservation units, for 20% of the staff in Conservation Units in the Caatinga.	Number of training places offered to develop skills related to the management of visitation in conservation units	2025	ICMBio	
1.2.1.5. Mark 100 km of long-distance trails.	Kilometers of long-distance trails cumulatively marked in federal Conservation Units under Joint Ordinance MMA / MTUR / ICMBio No. 407/2018	2025	ICMBio	
1.2.1.6. Strengthen visitation in federal CUs, including RPPNs, and promote sustainable and responsible tourism, contributing to valuing sociobiodiversity and boosting the local economy through the implementation of the Program for Visitation and Sustainable Tourism in federal CUs.	a) Program phases implemented b) Number of Conservation Units benefited	2027	ICMBio	MMA, MTur, Embratur

1.2.1.7. Implement the National Development Plan for Recreational and Sport Fishing (PNPA), considering the particularities of the biome.	Number of fishers benefited per year	2027	MPA	MMA
Expected Result 1.3. Expanded sustainable forest management				
Action Line 1.3.1. Promote sustainable multiple-use forest management (including timber, non-timber, and livestock use) and good production practices for the economic exploitation of native timber and non-timber species and fauna, such as the production of honey and pollen from native bees.				
Goal	Indicator	Deadline	Key Actor	Partners
1.3.1.1. Support 20 community enterprises in carrying out sustainable multiple-use forest management.	Number of enterprises supported	2027	SFB - MMA	SBio and SNPCT - MMA
1.3.1.2. Implement sustainable forest management actions in line with planning instruments within the scope of the Federal Community and Family Forest Management Program (PFMFC - to be published as an Interministerial Decree signed by MMA, MDA, and MPI), integrating and optimizing federal government actions in the territory.	Number of community forest management initiatives supported by the PFMFC and PPCaatinga in an integrated manner	2027	SBio - MMA	SFB - MMA/ MDA/ MPI
1.3.1.3. Implement actions under the National Program for Productive Forests and support for productive organization, rural extension, and technical assistance for forest and community enterprises.	Number of family farmers and rural entrepreneurs supported	2027	MDA	SFB and SBC – MMA/ MEC/ MF/ MAPA/ MDIC
Expected Result 1.4. Expansion of native vegetation restoration, with social participation and the establishment of community-based and collaborative foundations, income generation for the local population, and technological innovation in the ecological restoration of semi-arid areas.				
Action Line 1.4.1. Promote the recovery and restoration of native vegetation, supporting and strengthening the national policy for native vegetation recovery (PROVEG), through the implementation of PLANAVEG, contributing to reducing degradation, combating desertification, conserving biodiversity, increasing carbon stocks, and generating employment and income.				
Goal	Indicator	Deadline	Key Actor	Partners
1.4.1.1. Implement the macro actions provided in Planaveg, with emphasis on implementation arrangements for the recovery of native vegetation in APP and RL, in public areas (Conservation Units and Indigenous Lands) and in low-productivity rural areas in the Caatinga.	a) Number of completed steps for plan implementation. b) Area (ha) of native vegetation recovered per year	2027	SBio - MMA	CONAVEG Members
1.4.1.2. Incorporate actions to promote native vegetation recovery into state public policies in the Caatinga and strengthen other forms of collective organization at the landscape scale (e.g., Caatinga Restoration Network - Recaa) through the actions of the PLANAVEG Territorial Articulation Unit.	Number of state public policies and other forms of collective organization aligned with Planaveg.	2027	SBio - MMA	Members of the PLANAVEG Territorial Articulation Unit
1.4.1.3. Improve the monitoring of native vegetation recovery in public and private areas.	Area (ha) of monitored recovery.	2027	PF - MJSP	MMA/ OEMAs
1.4.1.4. Develop a portfolio of projects for the restoration and recovery of natural vegetation.	Project portfolio developed.	2025	MIDR	SBio - MMA/ OEMAS

1.4.1.5. Promote integrated management of micro-basins, including actions for soil and water conservation, vegetation cover recovery, and social mobilization.	Number of micro-basins covered.	2027	MIDR and SBio - MMA	OEMAS
1.4.1.6. Execute projects from the Management Committee of the Accounts of the Endangered Species (PAN) Basins Revitalization Program and from the Thematic Climate Adaptation Plan for Water Resources aimed at soil recovery in the São Francisco and Parnaíba river basins.	Area (ha) of native vegetation recovered in the São Francisco and Parnaíba River Basins.	2027	SQA - MMA	OEMAs
1.4.1.7. Implement measures to reintroduce and preserve native fauna species in degraded forest areas, aiming to contribute to ecosystem recovery and restoration, resilience, pollination, seed dispersal, and ecological balance.	Number of areas covered by the project.	2027	SBio - MMA	
1.4.1.8. Support the implementation of the project "Planting Trees and Producing Healthy Food" in the semi-arid region in agrarian reform settlements.	Number of settlement projects with the project implemented per year.	2027	SNPCT - MMA	INCRA, MST, IFES
1.4.1.9. Approve and implement projects for native vegetation restoration and soil conservation in basins in the Caatinga and Atlantic Forest within the scope of the Management of the Eletrobrás Drainage Basins Revitalization Program.	Area (ha) with project implemented per year.	2027	SQA - MMA	Eletrobrás
1.4.1.10. 16,500 ha for recovery/restoration, of which 16,200 ha in Uauá - BA come from 16 adopted plans for the potential and sustainable use of collective forest pastureland, and 300 ha associated with Legal Reserve recovery in the Xingó Region - AL. These initiatives will not take place in concession areas, but in collective areas.	Area (ha) recovered/restored/year	2025	SNPCT - MMA	Araripe Foundation/ FAO
1.4.1.11. Carry out compensatory planting due to road and railway construction, duplication, capacity increase, modernization, maintenance, etc., and indicate priority areas for planting.	Area (ha) with compensatory planting carried out per year.	2027	MT	MMA
1.4.1.12. Promote actions of diagnosis, implementation, or monitoring of ecological restoration of ecosystems in at least 10,000 hectares of degraded areas within federal CUs, corridors, and critical areas for species conservation in the Caatinga.	Degraded area (ha) with diagnosis, implementation, or monitoring of restoration.	2027	ICMBio	MMA, IBAMA, SFB, NGOs and local organizations
1.4.1.13. Make available the polygons of degraded areas in federal CUs in the Caatinga that are eligible to receive restoration projects.	Website implemented providing polygons of degraded areas available for restoration projects in federal Conservation Units as open data.	2025	ICMBio	MMA
1.4.1.14. Train more than 90% of managers of federal conservation units in the Caatinga in ecological restoration project management.	% of Caatinga CUs with staff trained in ecological restoration project management.	2027	ICMBio	MMA, IBAMA, SFB, NGOs and local organizations

1.4.1.15. Implement actions of the National Program for Productive Forests to disseminate sustainable and biodiverse productive systems, through rural credit and other instruments, with incentives for the recovery of degraded pastures, extractivism, and the implementation of sustainable productive activities.	Number of completed steps for project / program implementation / Area of recovered pasture and other low-carbon technologies (ha) / Area of SAF.	2027	MDA	MAPA/SAF – MDA/SBC– MMA/MF
Action Line 1.4.2. Promote the integration of native vegetation recovery and restoration actions with those provided in the Drainage Basin Revitalization Program.				
Goal	Indicator	Deadline	Key Actor	Partners
1.4.2.1. Five projects per year of integrated micro-basin management supported through agreement;	Number of projects supported per year.	2027	MIDR	
1.4.2.2. Promote the coincidence of priority areas in federal Conservation Units, ecological corridors, or critical habitats for the conservation of endangered species and areas for basin revitalization in more than 90% of recovery/restoration investments.	% of investments (Number of public calls or other related initiatives) in basin recovery/restoration considering federal CUs, ecological corridors, and critical habitats for species.	2027	ICMBio	MMA/ ANA
Strategic Objective 2. Encourage sustainable agricultural and livestock activities.				
Expected Result 2.1. Expansion of sustainable agriculture and livestock.				
Action Line 2.1.1. Promote sustainable livestock and crop production by reducing pressure on critical deforestation areas, ensuring the social, environmental, and economic promotion of agriculture and livestock, including the promotion of Agroforestry Systems (SAFs) and ICLF.				
Goal	Indicator	Deadline	Key Actor	Partners
2.1.1.1. Develop and implement the National Program for Rural Environmental Management.	a) Number of phases completed for program development. b) Program under implementation in priority territories.	2027	SNPCT - MMA	MDA / MAPA / MIDR
Action Line 2.1.2. Strengthening and expanding access to markets and public policies for family farming.				
Goal	Indicator	Deadline	Key Actor	Partners
2.1.2.1. Design and implement the Socio-environmental Development Program for Rural Family Production (Proambiente).	a) Number of phases completed for program development. b) Program under implementation in priority territories.	2027	SNPCT - MMA	MDA
2.1.2.2. Structure 50 sustainable-use family production units + 100 agroforestry system units + two Honey Houses in the Seridó Territory (PB and RN).	Number of structured family production units, agroforestry units, and Honey Houses.	2025	SNPCT - MMA	FAO

Strategic Objective 3. Expand research, knowledge production, training, and technical assistance for sustainable production activities.				
Expected Result 3.1. Research, training, capacity building, and knowledge for use and conservation expanded and disseminated.				
Action Line 3.1.1. Produce knowledge, disseminate information, including through the strengthening of researcher networks, raise awareness, train and build the capacity of different social actors on the importance of conservation, the adoption of sustainable production and consumption practices, including sustainable multiple-use forest management, for reducing deforestation and fires.				
Goal	Indicator	Deadline	Key Actor	Partners
3.1.1.1. Survey and publication of informational panels on bioeconomy initiatives in the Caatinga.	Number of panels published	2025	SFB - MMA	
3.1.1.2. Train 4,290 people in recovery and sustainable use of the Caatinga in the municipality of Uauá - BA, plus 120 farmers trained in the collection, selection, and storage of native seeds and 50 technicians and farmers trained in seed and seedling registration in the SNSM in the regions of Seridó (PB and RN), Araripe (CE), Sertão do São Francisco (BA), and Seridó (PB and RN).	Number of people trained/year	2025	SNPCT - MMA	FAO
3.1.1.3. Support the Caatinga Biome Sub-networks of the Biodiversity Research Program.	Number of supported sub-networks	2027	MCTI	UFPE / UEFS / Other Science and Technology Institutes in both states
3.1.1.4. Expand applied research, the production of technical-scientific and traditional knowledge, and strengthen training and technical assistance in sustainable practices for the productive activities of traditional communities in the Caatinga, focusing on bioeconomy, sustainable management, and strengthening of sociobiodiversity.	a) Number of research projects carried out focusing on sustainable productive practices and natural resource management in Caatinga communities. b) Number of publications and educational materials produced based on scientific and traditional knowledge about sustainable productive activities. c) Number of training sessions and capacity-building events held with local communities promoting sustainable management and production techniques. d) Number of families or communities assisted with technical support from CNPT to implement sustainable productive activities. e) Annual % increase in the adoption of sustainable productive practices in traditional communities, based on participatory monitoring.	2027	ICMBIO	UNIVERSIDADES, POVOS DA CAATINGA
3.1.1.5. Implement a fisheries research and monitoring system to support sustainable fishing activity in the biome.	Fisheries research and monitoring system implemented.	2027	MPA	MMA,MCTI

Expected Result 3.2. Technical assistance strengthened and expanded with inclusive outreach and diversified practices.				
Action Line 3.2.1. Strengthen and expand the provision of technical assistance through rural technical assistance implementing agencies (Ater), ensuring inclusive service and incorporating assistance models focused on sustainable practices, conservation, deforestation reduction, agroecological production, and coexistence with the semi-arid region, with mastery of appropriate social technologies.				
Goal	Indicator	Deadline	Key Actor	Partners
3.1.2.1. Develop and implement a training and capacity-building program in technical assistance and rural extension with a focus on agroecological transition to address climate change.	a) Nº de fases para elaboração do progra) Number of phases completed for program development. b) Program under implementation in priority territories.	2027	SNPCT--MMA	IFSP / GPP-E-salq
.1.2.2. Professional training of technicians in the field of basin revitalization under the National Program for Access to Technical Education and Employment - Pronatec, in partnership with the Federal Institute of Northern Minas Gerais - IFNMG. Number of technicians trained per year.	Number of technicians trained per year	2027	MDIR	MMA/MEC
Axis II - Environmental Monitoring and Control				
Strategic Objective 4. Strengthen the role of federal institutions and ensure accountability for environmental crimes and administrative violations related to deforestation, fires, and forest degradation.				
Expected Result 4.1. High level of resolution and administrative, civil, and criminal accountability for illegal deforestation and forest degradation achieved.				
Action Line 4.1.1. Ensure accountability for crimes and administrative violations related to deforestation, forest fire occurrence, and forest degradation.				
Goal	Indicator	Deadline	Key Actor	Partners
4.1.1.1. Monitor, through intensive patrolling, federal highways and areas of interest to the Federal Administration.	Number of actions carried out per year	2027	PRF	IBAMA, ICMBio and other environmental law enforcement agencies.
4.1.1.2. Provide support through personnel deployment upon request by other agencies.	Number of actions supported/year	2027	PRF	IBAMA, ICMBio and other environmental law enforcement agencies.
4.1.1.3. Establish 400 administrative proceedings per year to investigate administrative violations against flora in the Caatinga	Number of proceedings opened/ year	2025	Ibama	
4.1.1.4. File 10 public civil actions (ACP) per year to seek compensation for damage to Caatinga flora.	Number of proceedings opened/ year	2027	AGU	IBAMA
4.1.1.5. Conduct at least one national-level enforcement activity (as a priority Conservation Unit) in federal Conservation Units of the Caatinga.	Number of inspection activities carried out in federal Conservation Units/year	2027	ICMBio	PM, PRF, PF, IBAMA and others.

4.1.1.6. Conduct at least two regional-level enforcement activities (as a priority Conservation Unit) in federal Conservation Units of the Caatinga.	Number of inspection activities carried out in federal Conservation Units/year	2027	ICMBio	PM, PRF, PF, IBAMA and others.
4.1.1.7. Carry out at least 30 local-level enforcement activities in federal Conservation Units of the Caatinga.	Number of inspection activities carried out in federal Conservation Units/year	2027	ICMBio	PM, PRF, PF, IBAMA and others.
4.1.1.8. Investigate liability for fires started on private properties through monitoring of hotspots (FIRMS) and cross-checking with the Rural Environmental Registry (CAR).	Number of infraction notices in federal CUs/year	2027	ICMBio	OEMA, PM
4.1.1.9. Increase by 40% the number of operations related to deforestation, fires, and forest degradation in the Caatinga biome, by strengthening investigations and implementing effective accountability measures, using 2024 as the baseline year.	Number of operations related to crimes of deforestation, fires and forest degradation/year	2027	PF	
Expected Result 4.2. Human, technological, and logistical resources available to effectively combat environmental crimes and violations.				
Action Line 4.2.1. Human, technological, and logistical resources available to effectively combat fires and other environmental crimes and violations.				
Goal	Indicator	Deadline	Key Actor	Partners
4.2.1.1. Support the implementation of vehicle license plate recognition equipment to assist in monitoring timber transportation from the biome on federal highways.	Number of federal highways with equipment installed.	2027	DNIT/ MT	
4.2.1.2. Adjust maintenance, environmental management, and concession contracts to include specific technological and logistical resources to support environmental monitoring and control in the biome.	Number of federal highways covered.	2027	DNIT/ MT	
4.2.1.3. Hire 200 environmental analysts through public examination to work on combating deforestation and fires by 2027.	Number of environmental analysts hired per year.	2027	Ibama	MMA
Strategic Objective 5. Improve the capacity for control, prevention, analysis, and monitoring of deforestation, degradation, and productive chains.				
Expected Result 5.1. Monitoring capacity of deforestation and degradation in the biome expanded.				
Action Line 5.1.1. Improvement of monitoring systems for vegetation suppression and degradation, including the detection of vegetation physiognomies and conservation status.				

Goal	Indicator	Deadline	Key Actor	Partners
5.1.1.1. Expand the monitored area in the biome.	% increase in the monitored area in the biome.	2027	Censipam	Ibama, ICMBio, SECD- MMA / Inpe- MCTI
5.1.1.2. Develop a technological solution using SAR imagery for deforestation detection.	a) Number of phases completed related to solution development (during the development phase). b) Number of operations carried out in critical areas identified through the deforestation prediction technological solution per year	2025	Censipam	ICMBio, Ibama and SECD - MMA / Inpe - MCTI, and PF / MJSP
Action Line 5.1.2. Strengthen community monitoring initiatives of deforestation and fires, and provide safety mechanisms for the actors involved.				
Goal	Indicator	Deadline	Key Actor	Partners
5.1.2.1. Training in fire prevention and combat.	Number of training events held per year.	2027	ICMBio	Prevfogo/ IBAMA
5.1.2.2. Train and equip communities to fight fires.	Number of communities trained per year.	2027	ICMBio	IBAMA Prevfogo and the Pantanal Traditional Communities Network
5.1.2.3. Reforest the surroundings of communities with native species.	a) Number of seedlings produced and planted. b) Number of communities served.	2027	ICMBio	IBAMA Prevfogo and the Pantanal Traditional Communities Network
Action Line 5.1.3. Strengthen governance and institutional cooperation for monitoring, including through a joint communication protocol on deforestation and fires, enabling risk identification (prevention) and a more coordinated and efficient response.				
Goal	Indicator	Deadline	Key Actor	Partners
5.1.3.1. Establish communication protocols between its own agents and contracted companies for carrying out construction and/or maintenance upon detection of deforestation and fires.	Communication protocol established.	2026	DNIT/ MT	MMA
Action Line 5.1.4. Implement / develop air pollution monitoring, inventories, and State Plans for Air Emissions Control in the Caatinga biome states, as well as promote awareness campaigns against burnings and fires in native vegetation.				
Goal	Indicator	Deadline	Key Actor	Partners
5.1.4.1. Enforcement through intensive patrolling focused on vehicular emissions on federal highways and areas of interest to the Federal Administration.	Number of inspections carried out per year.	2027	PRF	Ibama

Action Line 5.1.5. Strengthen and integrate deforestation prevention and control actions provided for in the National Action Plans for the Conservation of Endangered Species (PAN) as a strategy for conserving endangered species.				
Goal	Indicator	Deadline	Key Actor	Partners
5.1.5.1. Integrate and implement at least 80% of the actions.	% of PAN actions implemented and integrated.	2027	ICMBio	MMA, IBAMA, Education and research institutions, NGOs, OEMAS, Civil Society
Expected Result 5.2. Improved monitoring of production chains				
Action Line 5.2.1. Implement and improve systems for monitoring and controlling the environmental origin and traceability of wood, minerals, and agricultural products.				
Goal	Indicator	Deadline	Key Actor	Partners
5.2.1.1. Improve and implement the wood traceability system.	Wood traceability system improved and implemented.	2026	Ibama	SECD - MMA
Strategic Objective 6. Implement Integrated Fire Management to prevent and combat fires.				
Expected Result 6.1. Capacity for prevention, preparedness, and response to fires improved.				
Action Line 6.1.1. Implement and equip the Federal Brigades Program, aiming to reduce the number of fires in priority federal areas.				
Goal	Indicator	Deadline	Key Actor	Partners
6.1.1.1. Increase the number of brigade members hired in federal protected areas.	% increase in the number of brigade members hired per year.	2027	ICMBio	Ibama/ MMA
6.1.1.2. Install and equip brigades for prevention and control of fires in the states comprising the biome.	Number of brigades installed per year.	2027	Ibama	MMA
Action Line 6.1.2. Implement the National Policy for Integrated Fire Management.				
Goal	Indicator	Deadline	Key Actor	Partners
6.1.2.1. Develop and implement Integrated Fire Management Plans for Federal Conservation Units.	100% of Federal Conservation Units with contracted brigades and a PMIF drawn up and approved.	2027	ICMBio	Vários
6.1.2.2. Establish a specialization course in Integrated Fire Management at ACADEBio, with the aim of training specialists to act in the prevention and control of fires and in the implementation of the National Policy for Integrated Fire Management.	Number of classes opened and completed for the Integrated Fire Management specialization.	2027	ICMBio	MMA/ Ibama
Action Line 6.1.3. Support awareness campaigns and training related to deforestation and fire prevention and control.				
Goal	Indicator	Deadline	Key Actor	Partners

6.1.3.1. Environmental education through lectures on deforestation and fire in the biome for users of federal highways and areas of interest of the Federal Administration.	Number of people trained/year	2027	PRF	IBAMA, ICMBio and other environmental law enforcement agencies.
Strategic Objective 7. Improve systems and integrate data on deforestation authorizations, embargoes, and infraction notices issued by state and municipal authorities into federal systems.				
Expected Result 7.1. Authorizations for vegetation suppression, embargoes, and infraction notices integrated into federal systems.				
Action Line 7.1.1. Integrate data on Authorizations for Vegetation Suppression (ASV) and Authorizations for Alternative Land Use (UAS) under the responsibility of federative entities into federal systems.				
Goal	Indicator	Deadline	Key Actor	Partners
7.1.1.1. Integrate the state bases into Sinaflor.	Number of states with databases integrated into Sinaflor.	2026	Ibama	MMA
Action Line 7.1.2. Improve and make available a platform to integrate data on environmental infractions and embargoes under the responsibility of federative entities into a federal system.				
Goal	Indicator	Deadline	Key Actor	Partners
7.1.2.1. Integrate state databases of infraction notices and forest embargoes into the federal database.	Number of states with integrated databases.	2027	SECD - MMA/ Ibama	ICMBio
Strategic Objective 8. Strengthen federative coordination to promote actions to control deforestation and fires and implement the Native Vegetation Protection Law.				
Expected Result 8.1. State and municipal initiatives for deforestation and fires prevention and control aligned with federal plans for deforestation and fire prevention and control in the biomes.				
Action Line 8.1.1. Support the development and updating of State and Municipal Plans for Deforestation and Fire Prevention and Control (PPCDQs) and other strategic actions.				
Goal	Indicator	Deadline	Key Actor	Partners
8.1.1.1. Engage and support Caatinga states in the development of PPCDQs.	Number of states with PPCDQs developed.	2027	SECD - MMA	
Action Line 8.1.2. Promote coordination with state and municipal agencies involved in the prevention and response to fires for the implementation of Integrated Fire Management.				
Goal	Indicator	Deadline	Key Actor	Partners
8.1.2.1. Engage states and municipalities in participation in the Federal Ciman.	Number of states and municipalities participating in Ciman per year.	2027	Ibama	SECD - MMA
Expected Result 8.2. Sicar improved to support states in the implementation of the Native Vegetation Protection Law.				

Action Line 8.2.1. Improve the environmental regularization process through the analysis of properties in the CAR conducted by states, support for implementation of PRAs and other mechanisms under the Native Vegetation Protection Law.				
Goal	Indicator	Deadline	Key Actor	Partners
8.2.2.1. Solutions for promoting and monitoring the environmental regularization of rural properties made available.	Number of solutions made available.	2027	SFB and MGI	SECD - MMA
Axis III - Land and territorial planning				
Strategic Objective 9. Ensure the designation of public land parcels for protection, conservation, and sustainable use of natural resources, especially for Indigenous Peoples, quilombola communities, other traditional peoples and communities, and family farmers.				
Expected Result 9.1. Federal and state land parcels designated, land tenure databases with improved controls, and land tenure insecurity reduced.				
Action Line 9.1.1. Designate federal land parcels for protection, conservation, sustainable use of natural resources, recognition of territorial rights, and deforestation prevention and control.				
Goal	Indicator	Deadline	Key Actor	Partners
9.1.1.1. Recognize and protect the territories of artisanal fishers under the Artisanal Fishing Peoples Program established by Decree No. 11626, 2 August 2023.	Number of territories recognized and protected.	2027	MPA	MMA/MDA/ INCRA
9.1.1.2. Implement the Term of Authorization for Sustainable Use (TAUS), established by Ordinance No. 89 of April 15, 2010, and, where applicable, the Concession of Real Right of Use (CDRU), which are crucial for protecting the territorial rights of traditional communities, including artisanal fishers.	Number of TAUS and CDRUs implemented.	2027	MPA	MMA/MDA/ INCRA
Action Line 9.1.3. Encourage and strengthen the creation of interinstitutional bodies and programs for land conflict management.				
Goal	Indicator	Deadline	Key Actor	Partners
9.1.3.1. Establish free, prior, and informed consultation protocols, according to the principles established by ILO 169, for resolving land issues related to traditional communities, including fishing communities.	Number of protocols established per year.	2027	MPA	MMA/MDA/ INCRA
Strategic Objective 10. Expand and strengthen the management of protected areas.				
Expected Result 10.1. Protected areas created, consolidated, and with strengthened management.				
Action Line 10.1.1. Create and consolidate Protected Areas focusing on critical deforestation areas.				
Goal	Indicator	Deadline	Key Actor	Partners

10.1.1.1. Create 200,000 hectares in conservation units.	a) Number of finalized processes submitted to the MMA. b) Area of Conservation Units created.	2027	ICMBio	MMA, OEMAS, GEF
10.1.1.2. 80% of conservation units with established and active advisory/deliberative councils.	Number of conservation units with established and active advisory/ deliberative councils.	2027	ICMBio	Civil society, community representatives.
10.1.1.3. Four instruments for rights compatibility developed or made permanent in overlapping or dual-affectation areas between federal conservation units and territories of traditional peoples and communities.	Number of rights compatibility instruments developed or made permanent, or with negotiations or development initiated.	2027	ICMBio	Civil society, community representatives, research institutions.
Action Line 10.1.2. Strengthen, recognize, and implement territorial governance and management instruments for protected area connectivity, such as mosaics, ecological corridors, biosphere reserves, Ramsar sites, RPPNs, restoration plans, and others.				
Goal	Indicator	Deadline	Key Actor	Partners
10.1.2.1. Initiate two processes for the recognition of protected area mosaics.	Number of processes initiated.	2026	ICMBio	MMA, REMAP, OEMAs, MIR, FUNAI, MPI
Action Line 10.1.3. Strengthen and integrate habitat connectivity actions provided in the National Action Plans for the Conservation of Endangered Species (PAN) as a strategy for species conservation.				
Goal	Indicator	Deadline	Key Actor	Partners
10.1.3.1. Integrate and implement 80% of actions.	% of PAN actions implemented and integrated.	2027	ICMBio	MMA, IBAMA, Education and research institutions, NGOs, OEMAS, Civil Society
Expected Result 10.2. Indigenous Lands, Quilombola Territories, and Territories of Traditional Peoples and Communities identified, delimited, demarcated, approved, regularized, and with improved management.				
Action Line 10.2.1. Identify, delimit, demarcate, approve, and regularize Indigenous Lands and Quilombola Territories to ensure recognition of their territories.				
Goal	Indicator	Deadline	Key Actor	Partners
10.2.1.1. Develop a normative instrument to regulate the identification, recognition, and regularization of the territories of traditional peoples and communities.	Normative instrument developed.	2027	MDA	SNPCT - MMA / GSIPR/ MME

Action Line 10.2.2. Develop and implement territorial and environmental management plans for Indigenous Lands, Quilombola Territories, and territories of traditional peoples and communities, with technological and economic support and technical assistance for carrying out sustainable activities.				
Goal	Indicator	Deadline	Key Actor	Partners
10.2.2.1. Develop the National Sustainable Development Plan for Traditional Peoples and Communities.	a) Number of phases completed for Plan development. b) Plan published. c) Plan under implementation.	2027	SNPCT - MMA	CNPCT
10.2.2.2. Promote the development of territorial and environmental management plans for Indigenous Lands, Quilombola Territories, and territories of traditional peoples and communities in accordance with the Indigenous and Quilombola Territorial and Environmental Management Policy.	Number of territorial management plans developed per year.	2027	MDA	MGI/ RFB
Strategic Objective 11. Coordinate and/or align the planning of major projects and infrastructure developments in the region with the goal of achieving zero deforestation by 2030.				
Expected Result 11.1. Planning and decision-making processes for the implementation of large-scale developments and infrastructure and development projects improved and aligned with Brazil's environmental and development goals.				
Action Line 11.1.1. Regulate, develop, and implement instruments (Technical, Economic, and Environmental Feasibility Studies - EVTEA, Strategic Environmental Assessment - AEE, etc.) to, preventively, contribute to environmental and territorial governance for deforestation control; promote restoration of deforested areas; prevent or mitigate impacts and ensure the rights of affected populations; and promote mitigation of greenhouse gas emissions resulting from land use change in the area of influence of large-scale developments and infrastructure and regional development projects.				
Goal	Indicator	Deadline	Key Actor	Partners
11.1.1.1. Identify infrastructure projects and developments with significant impact related to deforestation and GHG emissions in the Caatinga.	Number of identified projects.	2027	SECD - MMA	MMA/ MPO/MF/ MGI,RFBSP/ CCPR /MME/ MT/MPor/ Mapa
11.1.1.2. Establish an interinstitutional working group to propose regulation, development, and implementation of environmental and territorial governance instruments related to large infrastructure and development projects in the Caatinga.	Working group established.	2026	SECD - MMA	MMA/ MPO/MF/ MGI,RFBSP/ CCPR /MME/ MT
11.1.1.3. Reduce deforestation and GHG emissions resulting from land use change in the area of influence of large infrastructure and development projects.	Number of actions carried out in areas of influence of large projects.	2027	SECD, Ibama, ICMBio – MMA	MME, MT and MF, OEMAs
11.1.1.4. Align National Sectoral Plans with national deforestation reduction targets.	% of National Sectoral Plans aligned.	2027	MT	Office of the Chief of Staff-PR, MF, MMA / SECD, Ibama and ICMBio

11.1.1.5. Increase the recovery of degraded areas in the area of influence of large infrastructure and development projects.	Number of hectares of degraded areas recovered per year.	2027	SECD and Ibama – MMA	MME, MT, MF, MT, MME, ANTT, ANM, MDIC, MIDR, DNIT, INFRA S.A, and OEMAs
11.1.1.6. Propose and implement integrated planning instruments for large infrastructure and development projects.	Number of projects with integrated planning instruments.	2027	SECD and Ibama – MMA	MME, MT, MF, MT, MME, ANTT.ANM, MDIC, MIDR, DNIT and INFRA S.A and OEMAs
11.1.1.7. Propose and implement actions to reduce the socio-environmental impact of developments in traditional community territories.	Number of projects with proposed and implemented actions per year.	2027	SECD and Ibama – MMA	MME, MT, MF, MT, MME, ANTT.ANM, MDIC, MIDR, DNIT and INFRA S.A and OEMAs
Strategic Objective 12. Conduct territorial planning and implement existing legal instruments to ensure the role of native vegetation in maintaining and restoring water regimes and water quality.				
Expected Result 12.1. Instruments provided in the Native Vegetation Protection Law (Law No. 12651/2012) implemented.				
Action Line 12.1.1. Develop a proposal for priority areas for Legal Reserve compensation, focusing on spring restoration, aquifer recharge zones, wetlands, creation of ecological corridors, and conservation or restoration of vegetation, soil, ecosystems, and endangered species.				
Goal	Indicator	Deadline	Key Actor	Partners
12.1.1.1. Establish criteria for defining priority areas for restoration (under PROVEG), to be compiled and agreed upon in a prioritization protocol that can be replicated or adapted at the state and municipal level, considering the specificities of each land use typology.	Prioritization protocol for restoration areas developed.	2025	SBio - MMA	MPI / FUNAI, INCRA, ICMBio, Biomatic Networks and Collectives, ISS and PLANAFLOR
1.2.1.1.2. Define priority areas for Legal Reserve compensation, including criteria and restrictions for CRA allocation, and pre-approval criteria for compensation and/or restoration projects in priority areas (regulation of Art. 66.7, Law No. 12651/2012).	Number of maps of priority areas for restoration developed.	2027	SBio - MMA	States
Axis IV - Regulatory and economic instruments				
Strategic Objective 13. Create, improve, and implement regulatory and economic instruments for controlling deforestation and fires, and conserving biodiversity.				
Expected Result 13.1. Funds or mechanisms established and expanded in support of deforestation and fire control policies.				
Action Line 13.1.1. Propose, in coordination with efforts to implement the Climate Plan and Planaveg, the creation of funds or similar mechanisms to maintain water availability, mitigate and adapt to climate change, conserve soil, and conserve and restore native vegetation and biodiversity in the biome, with resources from multiple sources and contributions from the public and private sectors, international cooperation, and multilateral finance organizations.				

Goal	Indicator	Deadline	Key Actor	Partners
13.1.1.1. Create the Caatinga Fund.	Fund created.	2025	SECD - MMA	MF
Expected Result 13.2. Incentive instruments for mitigation and adaptation activities implemented.				
Action Line 13.2.1. Implement initiatives for building a green and sustainable taxonomy.				
Goal	Indicator	Deadline	Key Actor	Partners
13.2.1.1. Develop a proposal for a Sustainable Green Taxonomy in partnership with government stakeholders, covering activities that integrate the climate change mitigation and adaptation strategy, to guide public and private activities.	Taxonomy proposal developed and approved.	2027	MF/ BCB	MDIC/ MGI,RFB/ MPOR/ MMA
Expected Result 13.3. Tax incentives, subsidies, and financing for productive activities and sustainable biodiversity businesses created and implemented				
Action Line 13.3.1. Propose standards and promote tax incentives for the bioeconomy and subsidies for sociobioeconomy products from sustainable and biodiverse production systems, sustainable extractivism, and agroforestry systems, especially from indigenous lands, territories of traditional peoples and communities, and family farming.				
Goal	Indicator	Deadline	Key Actor	Partners
13.3.1.1. Execute the transfer of credit benefits to beneficiaries from Quilombola, Indigenous, and traditional peoples and communities.	Number of beneficiaries served per year.	2027	MDA	MPI/ SNPCT - MMA
13.3.1.2. Present a draft regulatory instrument to promote tax incentives for the bioeconomy and subsidies for sociobioeconomy products.	Draft regulatory instrument presented.	2026	SBC and SBio - MMA	MPI, MDA/ MAPA
Expected Result 13.4. Rural credit improved.				
Action Line 13.4.1. Expand financing for pasture and degraded area restoration in critical deforestation areas, considering public and private sources.				
Goal	Indicator	Deadline	Key Actor	Partners
13.4.1.1. Provide financial support to pasture and degraded area recovery projects.	Number of beneficiaries supported per year.	2027	SBio - MMA/ Mapa	MF/ MDA
Expected Result 13.5. ENREDD+ aligned with current climate change mitigation challenges through forest policies.				
Action Line 13.5.1. Revise and implement the National REDD+ Strategy (ENREDD+).				
Goal	Indicator	Deadline	Key Actor	Partners
13.5.1.1. Revise and implement the National REDD+ Strategy (ENREDD+).	Number of states eligible for REDD+ resource mobilization.	2027	SECD - MMA	
Expected Result 13.6. Environmental compensation instruments implemented				
Action Line 13.6.1. Review the decree regulating the Environmental Reserve Quota to guarantee the environmental integrity of the instrument.				

Goal	Indicator	Deadline	Key Actor	Partners
13.6.1.1. Review regulation of operational Environmental Reserve Quota.	Decree revised.	2026	SFB - MMA	State Departments of the Environment / Private Sector
Expected Result 13.7. Technical assistance, sustainable use in federal conservation units, and community and family forest management strengthened.				
Action Line 13.7.1. Regulate existing normative instruments to encourage the sustainable use of resources in conservation units, considering aspects related to technical assistance, community forest management, the National Climate Change Policy, and ENREDD+.				
Goal	Indicator	Deadline	Key Actor	Partners
13.7.1.1. Develop and implement regulatory standards that encourage the sustainable use of natural resources in conservation units, especially in areas where traditional communities operate, integrating the principles of the National Climate Change Policy and ENREDD+.	Number of developed and innovative regulatory standards focused on the sustainable use of natural resources in conservation units. Percentage of traditional communities trained in community forest management practices and climate change mitigation policies.	2027	ICMBio	FUNAI, INCRA, MMA, CNPCT, NGOs
Expected Result 13.8. Bills, or other legal acts relevant to the prevention and control of deforestation and fires presented.				
Action Line 13.8.1. Improve infra-legal regulation related to Integrated Fire Management.				
Goal	Indicator	Deadline	Key Actor	Partners
13.8.1.1. Establish and improve norms, resolutions, and other infra-legal acts on Integrated Fire Management.	Number of legal acts established or improved.	2027	SECD - MMA	CCPR
13.8.1.2. Present a proposal for regulatory change with adjustments to the environmental parameters of the Rural Environmental Registry, to expand control, monitoring, and combat of deforestation and fires.	Regulatory proposal submitted.	2026	SECD - MMA	MGI
Action Line 13.8.2. Revise provisions of the Environmental Crimes Law, the Native Vegetation Protection Law, and Decree No. 6514/2008 to increase penalties related to environmental crimes against flora, including fires.				
Goal	Indicator	Deadline	Key Actor	Partners
13.8.2.1. Propose legal and infra-legal changes to increase penalties and sanctions related to environmental crimes and infractions against flora, including fires.	Number of proposals submitted.	2027	SECD - MMA	CCPR/ Ibama/ ICMBio
Expected Result 13.9. Law No. 14119/2021 regulated and new economic instruments and mechanisms for Payment for Environmental Services (PES) created or revised.				
Action Line 13.9.1. Implement the Bolsa Verde Program (Environmental Conservation Support Program) as a mechanism to encourage sustainable use and support local socio-economic development projects, with an emphasis on the collective management of territories and their traditional systems in protected areas.				

Goal	Indicator	Deadline	Key Actor	Partners
13.9.1.1. Promote sustainable fishing and the inclusion of artisanal fishers in social and economic support programs, such as Bolsa Verde and Pronaf.	Number of people assisted per year.	2027	MPA	MMA, MDA
Action Line 13.9.2. Implement incentives for sustainable activities and penalties for predatory practices aimed at conserving native vegetation and water resources, including for sustainable irrigation, such as those already developed in other contexts, like the Water Producer Program, supported by MIDR and implemented by the National Water and Basic Sanitation Agency.				
Goal	Indicator	Deadline	Key Actor	Partners
13.9.2.1. Regulate the Federal PES Program to prioritize support for family farming, Indigenous peoples, and traditional peoples and communities.	Regulation approved.	2026	SBC – MMA	MPI/FUNAI/ MDA
Expected Result 13.10. Brazilian Emissions Reduction Market (MBRE) regulated.				
Action Line 13.10.1. Regulate the carbon market in Brazil, defining rules and operational standards, considering the specificities of the biome.				
Goal	Indicator	Deadline	Key Actor	Partners
13.10.1.1. Propose a normative instrument with a view to regulating the Brazilian emissions reduction market.	Regulatory instrument proposed.	2027	SMC - MMA/ MF	MDIC/ MCTI/ CCPR/MME
Expected Result 13.11. Land regularization of Quilombola Territories and territories of traditional peoples and communities strengthened.				
Action Line 13.11.1. Improve the regulatory process for regularizing Quilombola territories and those of traditional peoples and communities.				
Goal	Indicator	Deadline	Key Actor	Partners
13.11.1.1. Draw up a normative instrument to regulate the identification, recognition, and regularization of territories collectively occupied and used by traditional peoples and communities.	Regulatory instrument developed and approved.	2027	"MDA/ SNPCT – MMA"	
Expected Result 13.12. Regulatory standardization for issuing and integrating permits for suppression and alternative land use.				
Action Line 13.12.1. Establish a normative instrument to standardize the criteria for issuing and integrating data from Vegetation Suppression Authorizations (ASVs) and Alternative Land Use Authorizations (UASs) issued by federal, state and municipal agencies into Sinaflor (MMA), and define criteria for publicizing the information.				
Goal	Indicator	Deadline	Key Actor	Partners
13.12.1.1. Establish a CONAMA Resolution on minimum criteria for issuing ASVs and UASs.	CONAMA Resolution published.	2026	SECD - MMA	States / Ibama

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