



# **NATURE-BASED SOLUTIONS IN BRAZIL**

An Overview of Policies  
and Experiences

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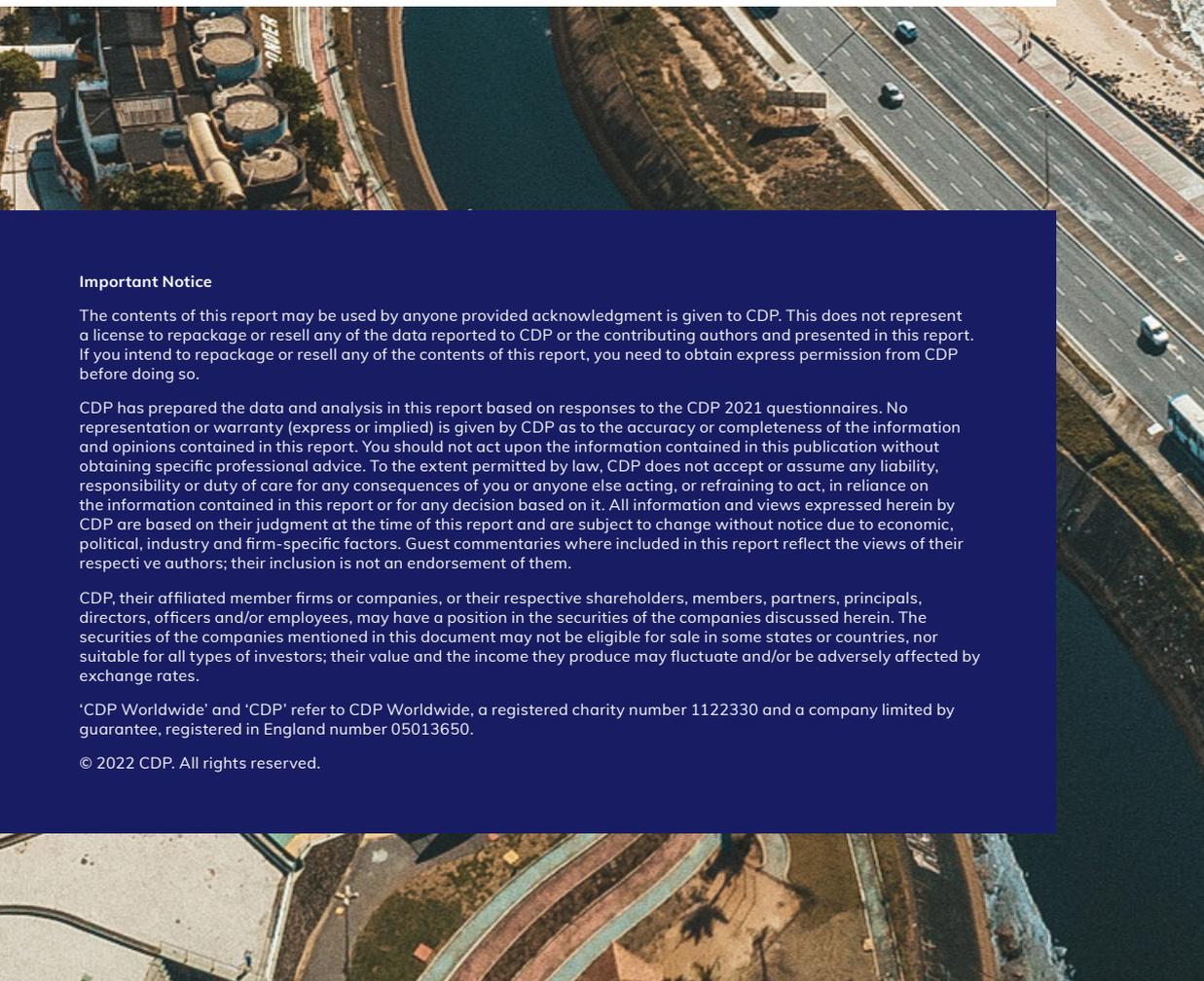


# About this document

This document aims to understand the extent to which Nature-based Solutions (NbS) can be embedded into Brazil's environmental policy framework and to understand how they can contribute to Brazil's biodiversity, climate and water security challenges.

In the first section, the document analyzes key federal policies and initiatives on biodiversity, climate, and water, considering their alignment with the concept of NbS. In the second section, the document presents NbS-related subnational policies and programs that have been implemented in Brazil, which are of crucial importance, as subnational governments have relative autonomy to promote NbS within their jurisdictions.

To better understand the context in which policies are conceived, there are two appendixes. Appendix 1 presents Brazil's progress in the implementation of biodiversity targets defined by the Convention on Biological Diversity (CBD). Appendix 2 provides an overview of the six



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# Key Messages

## Reasons for Embedding Nature-Based Solutions in Brazilian Environmental Policies

- **Brazil already has policies that are aligned with NbS**  
**Brazil is the most biodiverse country in the world<sup>1</sup>.** That is why, over the last three decades it has incorporated nature and NbS into its policy frameworks<sup>2</sup>. Initiatives at the subnational level have even adopted NbS approaches, in areas such as forest conservation and water management. These initiatives have the potential to become examples of how Brazilian policy actors can unlock the full potential of nature.
- **NbS can help prevent biodiversity loss in Brazil**  
**Change in land use is the main driver of biodiversity decline in Brazil**, which presents an opportunity to accelerate the implementation of NbS through the protection of forests and recovery of deforested areas. This is especially important considering Brazil is once more facing challenges in the fight against deforestation<sup>3</sup>. Nearly two-thirds of mitigation potential in the country is related to avoiding deforestation<sup>4</sup> – Together Indonesia and Brazil represent 50% of the worlds mitigation potential from natural climate solutions<sup>5</sup>.
- **NbS can contribute to Brazil's climate commitments**  
**The decrease of Land Use, Land Use Change, and Forestry (LULUCF) emissions between 2005 and 2012, represented a reduction of 55% of total net emissions<sup>6</sup>. This was the result of several policies aligned with NbS.** Examples of these successful anti-deforestation policies include stronger and better-enforced conservation policies in the Amazon and other biomes. If these policies are resumed with a stronger focus on NbS, mitigation potential could be enhanced. Preserving Brazilian native forests must be a top priority to prevent the world from reaching a tipping point.
- **NbS can address Brazil's water security and sanitation challenges**  
**The degradation of ecosystems is one of the main causes of water management issues, on top of this deforestation in Brazil affects the availability of water.** There has been a decline in water quality due to the removal of the natural cover from hydrographic basins that supply large urban centers. Using a combination of green and grey infrastructure, could lead to cost savings and an overall reduction in water related risks. However, “despite the rapid growth of investments in NbS, evidence suggests that they still account for less than 1% of global infrastructure investment for water management”, evidencing the need to increase awareness on NbS among policymakers<sup>7</sup>.

1 Ministry of the Environment (2021). [Biodiversity](#)

2 FRAGA, Raiza (2020). [Nature-based solutions: elements for translating the concept into Brazilian public policies](#).

3 Deforestation in the Legal Amazon has increased by 21.97% between August 2020 and July 2021, the highest rate since 2006. This is now the leading cause of the increase in emissions and maintains the country as the sixth GHG emitter worldwide.

4 The “cost-effective potential” shows the amount of a country’s available climate mitigation pathways that are considered cost-effective (\$100 USD/tonne CO<sub>2</sub>e in 2030) based on globally derived marginal abatement costs. Source: The Nature Conservancy (2021). [Natural Climate Solutions: Handbook](#).

5 Griscom et al (2020). [National mitigation potential from natural climate solutions in the tropics](#).

6 Climate Action Tracker (CAT) (2021). [Brazil's NDC Summary](#).

7 United Nations (2018). [Nature-based Solutions for Water Management: Executive Summary](#).

# Grasping the Basics of Nature-based Solutions

## What are Nature-based Solutions?

According to the United Nations Environmental Assembly (UNEA), NbS are “actions to protect, conserve, restore, sustainably use and manage natural or modified terrestrial, freshwater, coastal and marine ecosystems, which address social, economic and environmental challenges effectively and adaptively, while simultaneously providing human well-being, ecosystem services, resilience and biodiversity benefits”<sup>8</sup>.

NbS can also be defined as actions or policies that harness the power of nature to address some of the most pressing societal challenges, such as threats to water security, rising risk of natural disasters, or climate change<sup>9</sup>.

## What challenges can Nature-based Solutions address?

When NbS implementation is based on international standards and guidance, it can play a positive role in:

- **Food security and human well-being** (agroforestry systems can increase resilience of crops and farm livelihoods, especially among vulnerable populations<sup>10</sup>);
- **Water security** (reforestation can have a buffering effect on river flow and enhance groundwater storage<sup>11</sup>);
- **Disaster risk reduction** (well conserved forested slopes help prevent landslides<sup>12</sup>); and

- **Human health** (reduced pressure on ecosystems help hinder the transfer of diseases to humans that would not otherwise occur<sup>13</sup>).

NbS can also play a role in climate mitigation (slowing the rate of climate change through reducing emissions or increasing carbon sequestration<sup>14</sup>), resilience and adaptation (building capacity to withstand the worse impacts of climate change and living with the effects of warming<sup>15</sup>).

### NbS can be solutions for...



Restoration of ecosystems and habitats



Improved soil management



Wetlands management and watershed conservation



Ecosystem-based disaster risk reduction

8 UNEP/EA5/L9/REV.1: [Nature-based Solutions for supporting sustainable development](#).

9 WWF (2020). [What Are Nature-Based Solutions And How Can They Help Us Address The Climate Crisis?](#)

10 WALDRON et al (2017). [Agroforestry Can Enhance Food Security While Meeting Other Sustainable Development Goals](#).

11 VIGERSTOL et al (2021). [Addressing water security through nature-based solutions](#).

12 MOSS et al (2018). [Ecosystem-based disaster risk reduction in mountains](#).

13 WWF (2021). [Powering Nature: Creating the Conditions to Enable Nature-Based Solutions](#).

14 GRISCOM et al (2017). [Natural climate solutions](#).

15 CHAUSSON et al. [Mapping the effectiveness of nature-based solutions for climate change adaptation](#).



# NATURE-BASED SOLUTIONS IN BRAZIL'S POLICY FRAMEWORK

Brazil has created an environmental policy system that can include NbS. This is facilitated by the fact that many environmental matters can be a responsibility of the federal government, states, and municipalities, which gives jurisdictions relative autonomy to innovate and incorporate best practices.

In the following section the most relevant federal policies, laws, and regulations related to NbS biodiversity, climate, and water security are presented, in the context of Brazil's international commitments.

# 1

# Biodiversity

As deforestation is leading to an unprecedented loss of biodiversity, NbS aim to reverse ecosystem degradation and complement preventive actions. Fortunately, NbS are already being incorporated into Brazil's biodiversity policies.

## National Policy on Biodiversity

**The National Policy on Biodiversity is strongly aligned with NbS.** For example current policy suggests ecosystem management should focus on structures, processes, and functional relationships within ecosystems, “by using adaptative practices and intersectoral cooperation”. Brazil's national policy is also partly aligned with the European Union's approach to NbS (listed below), with a focus on sustainable use of biodiversity<sup>16</sup>.

NbS aligned components from Brazil's policy on Biodiversity:

- 3. Sustainable Use of Biodiversity Components
- 4. Monitoring, Evaluation, Prevention, and Mitigation of Impacts on Biodiversity
- 7. Legal and Institutional Strengthening for Biodiversity Management<sup>17</sup>

## Other NbS-related Biodiversity Policies and Instruments

**At the federal level, discussions on NbS are becoming more commonplace.** The Ministry of Regional Development has organized multiple workshops on how to include ecosystem services in policies, with a view to include NbS in the updated National Policy of Urban Development. The Ministry of Agriculture (MAPA), is introducing NbS concepts in an updated National Strategy for Urban Farming<sup>18</sup>.

European approaches becoming best practice in Brazil. For example, the Ministry of Science, Technology, Innovation and Communications (MCTIC) has been conducting a project since 2015 called 'Nature-Based Solutions for Resilient Cities' in line with the European Union. The Ministry of Environment (MMA) also aims to launch a program on green urban areas<sup>19</sup>.

Table 1 shows policies, laws, regulations, and initiatives that play an important role in protecting biodiversity and forests in Brazil, however they are not explicitly aligned to NbS.

16 FRAGA, Raiza (2020). [Nature-based solutions: elements for translating the concept into Brazilian public policies.](#)

17 Government of Brazil (2002). [Decree n° 4.339, establishing principles and guidelines for the implementation of the National Biodiversity Policy.](#)

18 FRAGA, Raiza (2020). [Nature-based solutions: elements for translating the concept into Brazilian public policies.](#)

19 FRAGA, Raiza (2020). [Nature-based solutions: elements for translating the concept into Brazilian public policies.](#)

**Table 1.** Biodiversity-related Policies in Brazil

Year	Policy	Description
1988	<b>National Coastal Management Plan (PNGC)</b>	<p>Focused on the sustainable use of coastal resources, the PNGC supports integrated planning for the use of coastal resources. It also focuses on capacity-building, monitoring, and the assessment of potential vulnerabilities. Even with a National Plan, there is still a lack of knowledge about coastal dynamics. For example, restoration of mangroves, consists of isolated projects, which don't always use NbS principles.</p> <p>One example of PNGC working well is the creation of the Integrated Management Centre (NGI) in the Northern region, which is part of the Integrated Management Agreements between municipalities and local communities to restore the coast and promote the sustainable use of resources<sup>20</sup>.</p>
1991	<b>Insurance Unemployment of the professional artisanal fisherman</b>	<p>Known as 'Seguro Defeso', this allows small fishermen to request unemployment insurance during the periods in which fishing areas are closed to protect species' reproduction and maintenance. There are still obstacles in preventing fraud and the efficiency of payments, renewals, and selections<sup>21</sup>.</p>
2000	<b>Protected Areas National System (SNUC)</b>	<p>A policy for the creation and management of Protected Areas, that were defined by the constitution 12 years ago. SNUC, federal, state, and municipal protected areas (Unidades de Conservação – UCs) are planned and managed in an integrated way. This policy means that 'significant and ecologically viable samples of different populations, habitats, and ecosystems are represented in the 12 different categories of UCs, which differ in required levels of protection. The UCs also must be designed considering local populations, in line with NbS<sup>22</sup>.</p>
2004 2010	<p><b>Plan to Control Illegal Deforestation and Recovery of Native Vegetation in the Amazon (PPCDAm)</b></p> <p><b>Action Plan for the prevention and control of deforestation and fires in the Cerrado (PPCerrado)</b></p>	<p>PPCDAm aimed to reduce deforestation and stimulate sustainable development models. It was the main driver of the 83% reduction in deforestation in the Amazon from 2004 to 2012, creating more than 25 million hectares of UCs and 10 million hectares of protected Indigenous Lands<sup>23</sup>. PPCerrado was created in 2010 with similar objectives for the Cerrado. However, it did not achieve the same level of success as PPCDAm, as this biome has less legal protection<sup>24</sup>. PPCDAm and PPCerrado were recently revoked, and similar plans, targets, or financial have not been made<sup>25</sup>. This disparity in policies and actions between the biomes can compromise overall benefits coming from NbS.</p>
2006	<b>Atlantic Rainforest Law</b>	<p>This law further regulates criteria for using resources in the biome, considering sustainable development principles. Furthermore, it contextualizes economic instruments, stimulates private donations for conservation projects, and forbids the removal of primary forests<sup>26</sup>.</p>

20 Ministry of the Environment (2018). [Atlas of the Mangroves of Brazil](#).

21 Brazilian Chamber of Deputies (2021). [Fishermen ask for help to overcome bureaucracy and delay in insurance-defense](#).

22 Government of Brazil (2000). [Law n° 9.985 from 2000](#).

23 Ministry of the Environment (2016). [PPCDAm](#).

24 Forest Declaration (2019). [Progress on the New York Declaration on Forests: Five-year Assessment Report](#).

25 Climate Observatory (2020). [Analysis of Brazilian Greenhouse Emissions \(1970-2019\)](#).

26 SOS Atlantic Forest (2021). [Atlantic Forest Law](#).

Year	Policy	Description
2011	<b>Bolsa Verde Program</b>	This program was launched to fight poverty and inequalities. It consists of an income transfer to people in extreme poverty or indigenous people who promote environmental conservation activities in rural and protected areas. Recently, the Congress discussed how to expand the program, including new categories of beneficiaries, like urban families involved in recycling, selective collection, or proper disposal of solid waste. This policy has been effective because it is connected to other social programs <sup>27</sup> , proving how important it is for NbS in Brazil to consider social aspects while connecting different areas of environmental protection.
2012	<b>Forest Code</b>	The 'New Forest Code' establishes norms for the protection of native vegetation in private properties. Two innovations are the Environmental Rural Registry (CAR), which evaluates environmental compliance by landowners, and regulates properties. There are benefits for family farmers or small properties, like access to special credit lines. It has a program to incentivize protection, including credit, tax, and commercial benefits <sup>28</sup> . This mix of financial incentives can be used as an effective tool to engage stakeholders in NbS.
2017	<b>National Policy for Native Vegetation Recovery (Proveg) and Planaveg</b>	Considering the challenges in implementing the Forest Code, Proveg was created with a set of objectives, guidelines, and a concrete structure of governance. Proveg better integrates policies, programs, and actions related to forests, and draws from a Plan designed in 2013 with a similar objective, the Planaveg. Therefore, Planaveg became the main instrument of this strategy and was useful to identify barriers and opportunities for scaling up forest recovery. Proveg complements cross-sectoral policies, including the Sustainable Development Goals (SDGs) <sup>29</sup> .
2020	<b>Floresta+ Program</b>	Launched by the federal government, this is a new approach to managing payments for environmental services. It includes a component that refers to the voluntary carbon market, this helps foster private sector investments for forest conservation in areas with native vegetation coverage. Recently, the axis Floresta + Bioeconomy was launched aimed at paying small workers in the extractive economy, as they help preserve forests, monitor the territory, and prevent fires, especially in the Amazon <sup>30</sup> .
2021	<b>National Policy for Ecosystem Services Payment (PNPSA)</b>	This policy allows public authorities or private agents to compensate those preserving natural resources. The law is focused on the maintenance, restoration, or improvement of natural vegetation in endangered areas, and defines actions to prevent biodiversity fragmentation while stimulating biodiversity and the protection of hydric resources. However, the creation of a national register for the payments and a technical body to oversee the application of resources, as well as the creation of additional tax incentives was vetoed <sup>31</sup> .

27 Federal Senate (2021). [Commission approves inclusion of waste pickers among Bolsa Verde beneficiaries.](#)

28 Government of Brazil (2012). [Law n° 12.651.](#)

29 Ministry of the Environment (2017). [Planaveg.](#)

30 Ministry of the Environment (2021). [Floresta+.](#)

31 Government of Brazil (2021). [Law n° 14.119 from 2021.](#)

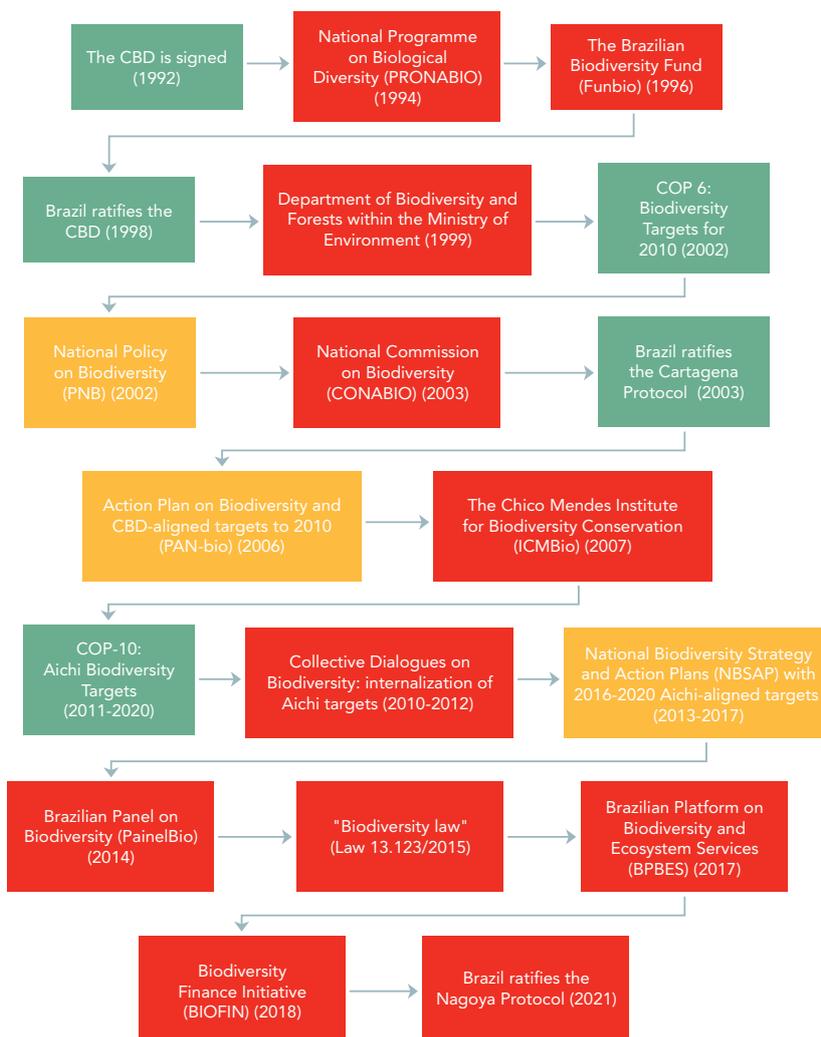
# Brazil's International Commitments on Biodiversity

Since it hosted the conference where the Convention on Biological Diversity (CBD) was signed (Rio-92), the country has played a key role in international discussions on biodiversity. Between 1995 and 2015, Brazil organized more than 20 regional CBD meetings and hosted COP-8 (Eighth Meeting of the Parties to the CBD) and Rio+20 (2012 United Nations Conference on Sustainable Development)<sup>32</sup>.

In Brazil, advances in biodiversity-related policies and initiatives are linked with other international milestones. Treaties are not immediately incorporated into Brazil's legal system, so as they are being reviewed by Congress and the Presidency, a dialogue takes place about domestic policies that be created to support international commitments.

Conventions like the CBD encourage national policy changes. This has catalyzed biodiversity policies in Brazil throughout the years. Figures 1 shows how international advances in biodiversity are always followed by domestic responses.

**Figure 1.** Timeline of Brazil's Biodiversity Policies in the Context of the International commitments



32 Ministry of the Environment (2020). *25 Years of Implementation of the Convention on Biological Diversity*.

Brazil was the first Party in the CBD to adopt a set of measurable biodiversity targets, and one of the first to adopt a National Biodiversity Strategy, both within the 2010 Convention's framework. In 2013, it adopted domestic biodiversity targets for 2020, in line with CBD's Aichi. Specifically the recommendation of Aichi Target 17, which urges each Party to develop and adopt an "effective, participatory and updated national biodiversity strategy and action plan" (see Box 1 to understand the difference between CBD strategic plans)<sup>34</sup>.

The ongoing negotiations for the next CBD biodiversity goals will more quantitative measures to enhance effectiveness in implementation, and will also consider NbS that increase resilience in natural disasters<sup>35</sup>. If NbS are officially included in the Post-2020 GBF as a practical tool<sup>36</sup>, this will help promote the inclusion of NbS in Brazilian policy and increase the likeliness of achieving global targets (see Appendix 1 to further understand Brazil's progress in the implementation of biodiversity targets).



## Box 1 | Strategic Plans of the CBD

**1. Strategic Plan for Biodiversity (2011-2020):** This ten-year framework was created in 2010 to drive action by all countries and stakeholders to safeguard biodiversity and the benefits it provides to people. As part of the Strategic Plan, 20 concrete targets were created, which were named Aichi Biodiversity targets.

**Aichi Biodiversity Targets (2011-2020):** National governments committed to establishing domestic targets to support CBD's targets, incorporating those in National Biodiversity Strategies and Action Plans (NBSAPs).

**2. Post-2020 Global Biodiversity Framework:** CBD has started a process to set a new ten-year framework for action, which is expected to be concluded in Kunming, China, during the 15<sup>th</sup> Conference of Parties (COP 15) of the CBD. Reaffirming and expanding on previous commitments is especially important because at the global level none of the 20 Aichi Biodiversity Targets have been fully achieved, leading to a substantial decline in biodiversity between 2011 and 2020<sup>37</sup>.

33 In 2004, CBD established a framework to facilitate the assessment of progress towards achieving the biodiversity targets to be met until 2010. This framework aimed at providing a flexible framework that could support domestic biodiversity targets. Source: Convention on Biological Diversity (CBD). [Year in Review: 2006](#).

34 Ministry of the Environment (2021). [National Biodiversity Strategy and Action Plan](#).

35 Nature (2020). [The United Nations must get its new biodiversity targets right](#).

36 WWF (2021). [Nature-based Solutions in the Convention on Biological Diversity](#).

37 International Union for Conservation of Nature (IUCN) (2021). [Post-2020 global biodiversity framework](#).

# Climate

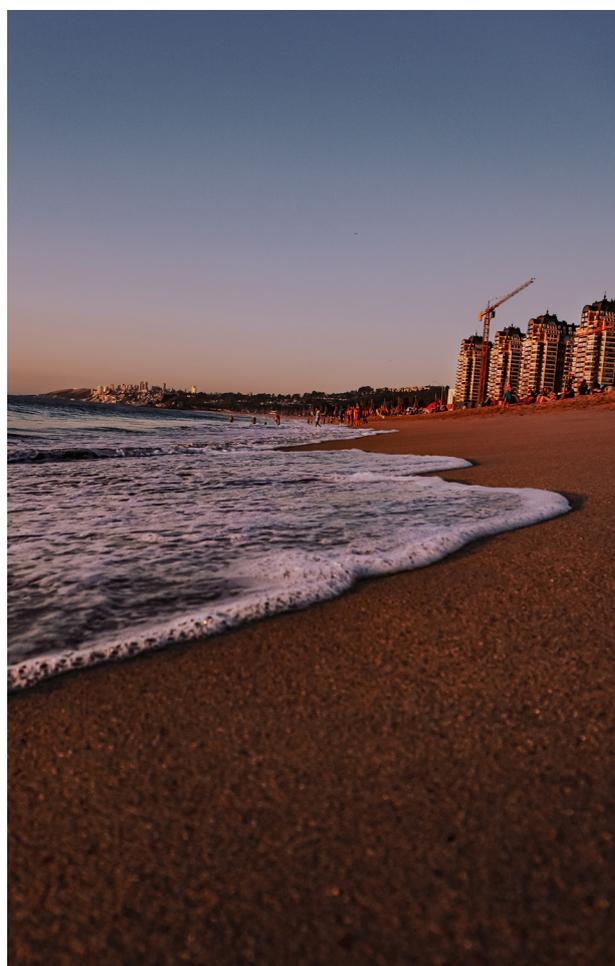
**Considering Agriculture, Forestry and Other Land Use (AFOLU) is responsible for more than 70% of Brazil's Green House Gas (GHG) emissions<sup>38</sup>, national policies and actions that tackle climate change must be linked to forest and biodiversity policies. This level of emissions highlights the importance of thinking about policies in an integrated manner, as proposed by concepts such as NbS.**

## **National Policy on Climate Change (PNMC) and National Plan on Adaptation (PNA)**

The National Policy on Climate Change (Federal Law number 12.187/2009) is relatively aligned with NbS. It does mention elements that relate to NbS for example, it highlights the relationship between NbS and innovative technologies<sup>39</sup>.

The National Adaptation Plan (Ordinance n° 150) is also considered by specialists relatively aligned to NbS. Among the 11 areas of NAP, one that relates the most to NbS is 'Biodiversity and Ecosystems'. Ecosystem-based adaptation (EbA) helps build resilience and highlights the role that ecosystems can play in reducing socio environmental vulnerability.

The Brazilian Ministry of Environment also set up the *Adapta Clima*<sup>40</sup> platform to gather knowledge related to adaptation actions supporting public and private decision-makers and civil society organizations in the implementation of actions on the ground. The platform itself raises awareness of several practical examples of NbS.



38 Climate Observatory (2019). [Analysis of Brazil's greenhouse gases emissions and their implications for Brazil's climate goals.](#)

39 FRAGA, Raiza (2020). [Nature-based solutions: elements for translating the concept into Brazilian public policies.](#)

40 Adapta Clima (2021). [Sobre a Plataforma.](#)

**Table 2.** Summary of PNMC and NAP and their Positioning on NbS

Strategy	Year	Issuer	Influence	NbS Positioning
<b>Before and during 2020</b>				
<b>National Policy on Climate Change (PNMC)</b>	2010	Legislative	It officialized Brazil's Nationally Appropriate Mitigation Action (NAMA) and it established sectoral mitigation plans, both at federal and sub-national levels <sup>41</sup> .	<p>The PNMC is translated into sectoral plans and instruments that contribute to the implementation of NbS, such as the National REDD+ Strategy, National System for Protected Areas, and National Plan for the Recovery of Native vegetation. Below there are examples of areas in which respective actions and tools have an alignment with NbS:</p> <ul style="list-style-type: none"> <li>• Strengthening of the removal of GHG emissions by sinks.</li> <li>• Consolidation and expansion of legal protected areas and incentives to reforestation.</li> <li>• Preservation, conservation, and recovery of environmental resources.</li> </ul>
<b>National Adaptation Plan (NAP) – under the PNMC</b>	2016	Ministry of Environment (MMA)	<p>It was established from a collaborative process with civil society, the private sector, and subnational governments. It was included in Brazil's climate change commitments to the UNFCCC and outlines the major policy initiatives involved in management and reduction of long-term climate risks.</p> <p>It is divided into 11 sectors, including biodiversity and water resources<sup>42</sup>.</p>	<p>The NAP uses the term EbA, which is also used by the CBD, instead of NbS. Below are some of the main examples of NbS-related measures mentioned in the plan:</p> <ul style="list-style-type: none"> <li>• Ecosystem-based adaptation measures in areas at risk of extreme events and other impacts of climate change.</li> <li>• Incorporation of climate risk into existing policies for conservation, restoration, and sustainable use of biodiversity.</li> <li>• Monitoring of 50 federal protected areas to assess and monitor the impacts of current and future climate change on biodiversity.</li> <li>• Including climate change adaptation measures in the actions developed by the National Water Agency.</li> <li>• Adaptation actions in coastal areas.</li> </ul>

41 Ministry of the Environment (MMA). [National Policy on Climate Change \(2009\)](#).

42 Ministry of the Environment (2016). [National Adaptation Plan to Climate Change \(NAP\)](#).

## Other NbS-related Climate Policies and Instruments

As previously mentioned, the climate change agenda is intertwined with forests and biodiversity. However, there are other central

policies and initiatives related to low carbon transition and climate resilience, which are presented in Table 3.

**Table 3.** NbS in Other Core Climate Policies in Brazil

Year	Policy	Description
2011	<b>Low Carbon Emission Agriculture Plan (ABC Plan)</b>	This plan consists of a set of public policies to adopt sustainable agriculture technologies. Brazil's NDC links the Plan to its target of 'restoring an additional 15 million hectares of degraded pasturelands by 2030 and enhancing 5 million hectares of integrated cropland-livestock-forestry systems (ICLFS) by 2030'. Working groups lead by states are responsible for implementing the programs according to each biome's specificities. The ABC Program, in its turn, is a credit line aimed at financing activities aligned to the ABC plan's portfolio <sup>44</sup> .
2012	<b>Civil Defense National Policy</b>	Creates the Integrated Disaster Information System (S2ID), which aims to help with the management of risk and disasters by making information available and by supporting local governments' responses, including on adaptation <sup>45</sup> .
2015	<b>National Policy to Combat Desertification and Mitigate the Effects of Drought</b>	This policy adds to national programs to combat decertification (PAN-Brasil) that exists since 2005. If national programs defined the main zones susceptible to decertification and established priorities for public and private actions, the policy structures implementation, incorporating criteria from the United Nations Convention to Combat Desertification (UNCCD). This materializes the importance of agrobiodiversity, and traditional knowledge, and recognizes human action as a cause aggravating the phenomena. This policy has underpinned Brazil's Cisterns Program, which was awarded by the United Nations as one of the best public policies in the world in combating decertification and land degradation <sup>46</sup> .
2020	<b>RenovaBio (Brazilian National Biofuel Policy)</b>	This policy recognizes the strategic role of biofuels (ethanol, biodiesel, biomethane, biokerosene for aviation and others), that can reduce the carbon emissions from transport in Brazil <sup>47</sup> .
2022	<b>Methane Zero National Program</b>	This package aims to stimulate programs, actions, and technologies to reduce methane emissions. The government created a "methane credit", which has yet to be detailed, but "will generate additional income for biogas and biomethane projects" <sup>48</sup> . This is expected to be part of the Renovabio market and is another example of economic instruments being used to promote a nature-positive future. An example of how credits using NbS play a key role in CO <sub>2</sub> capture.

44 Brazilian Agricultural Research Corporation (2021). [Low Carbon Agriculture: ABC Plan](#).

45 Minister of Regional Development (2021). [The S2ID](#).

46 Joaquim Nabuco Foundation (2019). [With the "desertification" of public policies, the fight against the degradation of soils and biomes is to "exercise resistance"](#).

47 Ministry of Energy (2021). [RenovaBio \(English\)](#).

48 Eye on ESG (2022). [Brazil launches Methane Zero National Program with a package of incentive measures to biogas and biomethane](#).

# Brazil's International Commitments on Climate Change

According to research lead by the United Nations Development Programme (UNDP), many countries still do not include NbS in their NDCs. This is because there are technical barriers, that countries do not want to impact international commitments, like “a level of uncertainty associated with estimating GHG reductions by sources and removals by sinks”<sup>49</sup>.

Out of the last three NDCs presented by Brazil, none of these explicitly mention NbS. However, they do mention policies and initiatives that can be adapted to embed NbS principles, as highlighted in Table 4.



**Table 4.** NbS in Brazil's NDCs

International Commitment	Commitments that can be Aligned to NbS
2016 NDC	<ul style="list-style-type: none"> <li>• Strengthening and enforcing the implementation of the <b>Forest Code</b>, including <b>zero illegal deforestation</b> by 2030, and <b>restoration and reforestation</b> of 12 million hectares of forests by 2030.</li> <li>• Strategy for <b>sustainable agriculture development</b> (Low Carbon Emission Agriculture Program - ABC), including <b>restoring</b> an additional 15 million hectares of <b>degraded pasturelands</b> by 2030 and enhancing 5 million hectares of <b>integrated cropland-livestock-forestry systems (ICLFS)</b> by 2030.</li> <li>• In the <b>industry sector</b>, promote a new standard of <b>clean technology</b> and further <b>enhance energy efficiency</b> measures and <b>low carbon infrastructure</b>.</li> <li>• In the <b>transportation sector</b>, further promote efficiency measures and improve infrastructure for transport and public transportation in urban areas.</li> </ul>
2020 NDC	All previous commitments are maintained, but this NDC expressly mentions it is compatible with climate neutrality by 2060.
2021 NDC	All previous commitments are maintained, but climate neutrality was anticipated by 2050.
2022 NDC	All previous commitments are maintained, with an expectation to zero illegal deforestation by 2028.

49 UNDP (2019). [Pathway to Increase Nature-based Solutions in National Determined Contributions \(NDCs\)](#).

However, for NbS to effectively contribute to global climate goals, Brazil should set more ambitious mitigation goals.

Brazil presented its **first NDC** to the UNFCCC in September 2016, committing to reduce GHG emissions by 37% below 2005 levels by 2025 and 43% below 2005 levels by 2030<sup>50</sup>.

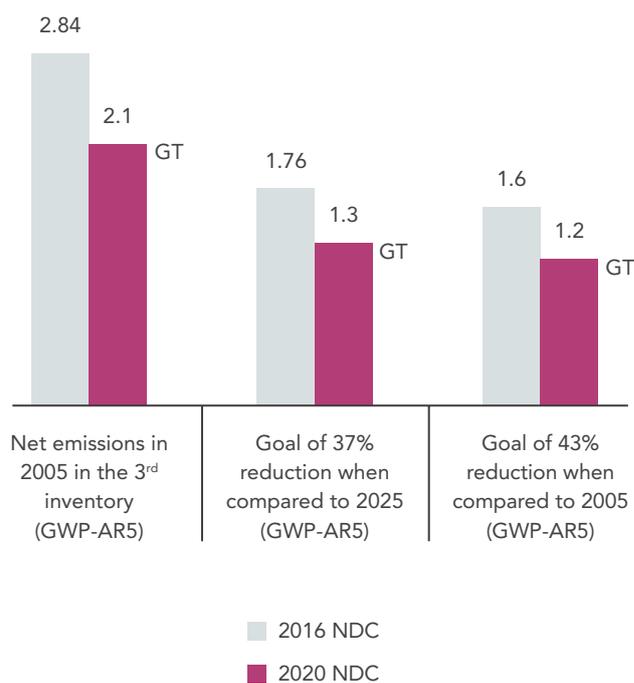
The **NDC submitted in December 2020**, had the same targets for NDC's and LULUCF. The difference is that the 2005 emissions baseline was updated, taking into account the latest emissions inventory available (3<sup>rd</sup> inventory). The new methodology increased the total emissions for this year, this resulted in an increase of the baseline.

In other words, Brazil was allowed to emit approximately 0,4 gigatons of GHG (see figure 2<sup>51</sup>). Therefore, the Climate Action Tracker (CAT) classified the Brazilian NDC as not increasing ambition<sup>52</sup>.

After the 26<sup>th</sup> United Nations Climate Change Conference of the Parties (COP26), which took place in 2021, **Brazil updated its NDC**<sup>53</sup>. Now, the country promises to reduce emissions by 50% by 2030, using the same baseline year.

In reality, Brazil announced a commitment stronger than the 2020 NDC, but with the same ambition levels as the 2016 NDC. As mentioned, this is insufficient to meet the target of limiting global warming to 1,5°C - according to the IPCC, it is necessary to reduce global emissions by 40% or 50% by 2050.

**Figure 2.** Brazil's NDC change in the 2005 baseline (in GT/CO<sub>2</sub>-eq)



50 Government of Brazil. [Intended Nationally Determined Contribution of the Federative Republic of Brazil](#).

51 Climate Observatory (2020). [NDC and the carbon trick maneuver: how Brazil reduced the ambition of its goals under the Paris Agreement](#).

52 Climate Action Tracker (2021). [Brazil's NDC Summary](#).

53 Government of Brazil (2021). [Nationally Determined Contribution of the Federative Republic of Brazil: Updated Submission Letter](#).

# Water

**Even with its relatively strong legal foundations on water policies, serious water crises hit the country in 2013 and 2021, causing severe drought and illustrating the need for greater policy action. NbS can offer multiple solutions for improving water quality, including tackling water and forest management at the same time.**

## National Policy on Water Resources (PNRH)

The National Policy on Water Resources (Federal Law number 9.433/97) – PNRH, provides relative support to NbS, as it makes references to elements of NbS, albeit without explicitly mentioning them. Some examples are the support of the capture, preservation, and use of rainwater, the consideration of public health and safety in drainage and stormwater management services, and prevention and defense against events arising from inappropriate use of natural resources<sup>54</sup>.

The PNRH was a legal milestone in the management of water resources in Brazil,

demonstrating the importance of water management as a resource with economic value. It established that its management must be structured in an integrated manner, with decentralized governance elements, and effective social participation.

However, associated laws, like the National Policy on Sanitation updated in 2020 (Federal Law number 14.026/20) and the National Plan on Water Security, still rely on traditional infrastructure, which make up Sustainable Development Goal (SDG) 6.6 (see Table 5 below). A broad revision of water-related laws is needed if NbS are to be included – for example, the law on sanitation does not recognize access to water and sanitation as a fundamental right and there are no mechanisms to integrate water management and the environment<sup>55</sup>.

In the face of domestic problems like sanitation, water scarcity, floods, and degradation of ecosystems, NbS water initiatives can play a key role in generating co-benefits for different areas. NbS can contribute to drainage, recovery, and conservation of water resources, water supply and quality, rain gardens and filter gardens, and sustainable urban drainage systems.

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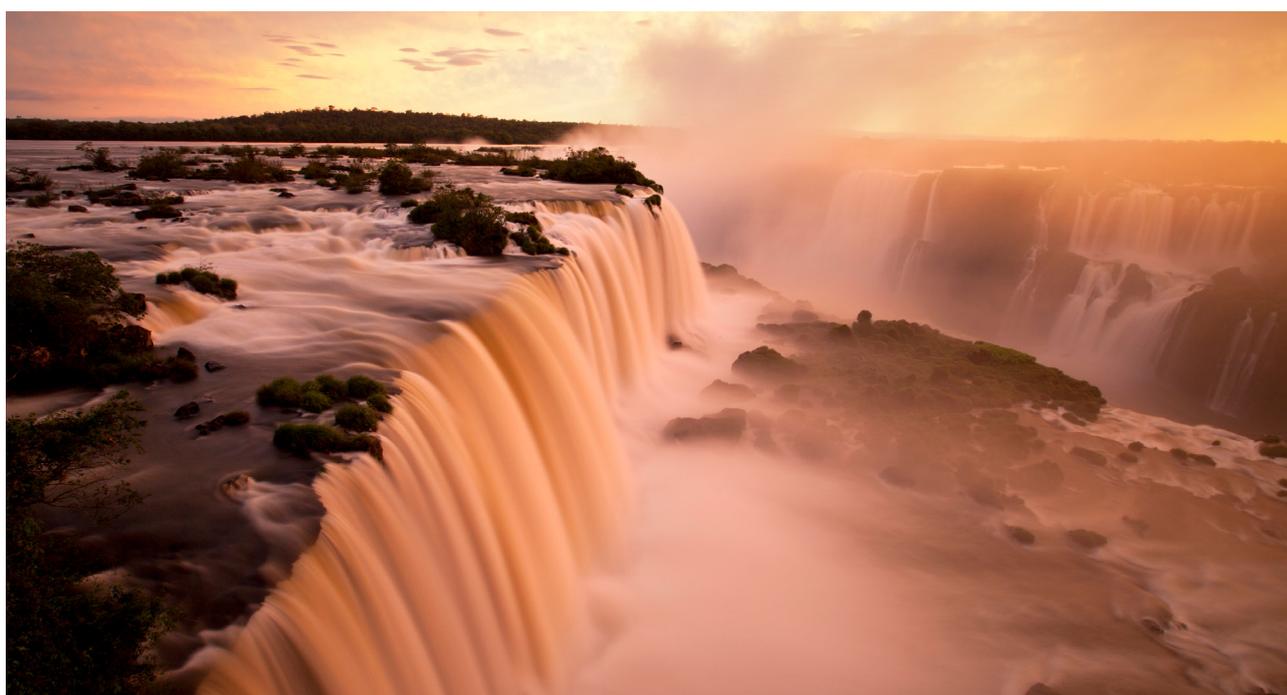
<sup>54</sup> FRAGA, Raiza (2020). [Nature-based solutions: elements for translating the concept into Brazilian public policies.](#)

<sup>55</sup> Civil Society Working Group for the 2030 Agenda (2021). [Spotlight Report: Brazil \(Synthesis\).](#)

**Table 5.** Brazil's progress towards Achieving SDG 6: Clean Water and Sanitation

Target	Status
<b>Target 6.1:</b> By 2030, achieve universal and equitable access to safe and affordable drinking water for all	Stagnant
<b>Target 6.2:</b> By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations	At risk
<b>Target 6.3:</b> By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally	At risk
<b>Target 6.4:</b> By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity	Setback ↓
<b>Target 6.5:</b> By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate	Stagnant
<b>Target 6.6:</b> By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers, and lakes	Setback ↓
<b>Target 6.a:</b> By 2030, expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programs, including water harvesting, desalination, water efficiency, wastewater treatment, recycling, and reuse technologies	Stagnant
<b>Target 6.b:</b> Support and strengthen the participation of local communities in improving water and sanitation management	Setback ↓

Source: Civil Society Working Group for the 2030 Agenda, Spotlight Report.



## Other NbS-related Water Policies and Instruments

The PNRH manages water resources, taking into account multiple factors such as how many people need to use the water. Furthermore, it promotes cooperation between the federal entities, in a decentralized governance. However,

it is still necessary to establish effective programs and projects on the sustainability of water resources, focusing on other aspects like recycling and reuse. Table 6 shows the main policies related to water governance in Brazil.

**Table 6.** NbS in Other Core Water Policies in Brazil

Year	Policy	Description
1997	<b>National Water Resources Management System (SINGREH)</b>	Consists of a set of bodies and collegiate bodies that design and implement the national water policy - municipalities, as well as federal and state environmental agencies, participate. Therefore, its main role is to manage water use in a democratic and participatory manner. The Singreh coordinates integrated water management, arbitrates conflicts on water, and plans, regulates and controls the use, as well as the recovery of water bodies <sup>56</sup> .
1997	<b>National Water Resources Information System (SIRH)</b>	Manages the collection, treatment, storage, recovery, and dissemination of information on water resources and factors involved in their management. As it is an instrument that supports decision-making by the Water Council, Basin Committees, Agencies, and water resource management bodies <sup>57</sup> , giving visibility to NbS could play a key role in scaling up subnational, private and independent initiatives linking NbS and water.
1997	<b>Hydrographic Basin Committees (CBHs)</b>	The CBHs are local collegiate bodies, formed by representatives across society who have an interest in water resources in their local area. These committees, raise the profile on issues related to water, arbitrate related conflicts, and approve and monitor the Basin's Water Resources Plan. They show how decentralized management of water resources can work and demonstrates how NbS can be used to enhance social benefits in local communities <sup>58</sup> .
2000	<b>The National Water Agency (ANA)</b>	Are legally liable for implementing the Singreh and SIRH, it supervises, controls and evaluates compliance with legislation on water, inspecting the use of water resources. It also works with watershed committees to implement respective plans and charge for the use of water <sup>59</sup> . This agency could evaluate the adherence of water plans and water incentives to NbS principles, spreading awareness on NbS integrated approaches.
2001	<b>Water Producer Program</b>	The PES aims to remunerate rural producers who conserve water and soil on rural properties by reducing erosion and silting in springs <sup>60</sup> .

56 National Water and Sanitation Agency (ANA) (2021). [Strengthening of SINGREH entities](#)<sup>7</sup>.

57 National Water Resources Information System (SIRH) (2021). [About SIRH](#).

58 National Water and Sanitation Agency (ANA) (2021). [Hydrographic Basin Committees](#).

59 National Confederation of Municipalities (CNM) (2021). [About ANA](#).

60 National Water and Sanitation Agency (ANA) (2021). [Water Producer Program](#).

Year	Policy	Description
2007	<b>National Policy on Sanitation</b>	The sanitation policy outlines a set of services, infrastructures and operational facilities that control the supply of drinking water, sanitary sewage, urban cleaning, solid waste management, and the drainage and management of urban rainwater. It sets principles like the universalization of access, economic efficiency, sustainability, and use of technologies, inspiring the National Basic Sanitation Plan established in 2013 and creating previous programs like 'Sanitation for All' launched in 2005. There is a national database on sanitation (SNIS) <sup>61</sup> .
2010	<b>National Dam Safety Policy (SNISB)</b>	After two major accidents involving the disruption of mining tailings dams, in 2015 and 2019, this policy was updated in 2020 to place greater responsibility on mining companies. The SNISB requires companies, to notify the government of any changes in the safety conditions of the dam. ANA became responsible for implementing SNISB, and created guidance that companies must follow <sup>62</sup> .
2013	<b>Consolidation Program of the National Pact for Water Management (Progestão)</b>	Led by ANA, this program co-ordinates payments for states that achieve agreed goals on water management. Participation in the program is voluntary and compensations are made based on the complexity of water management in the region. In the first five years, more than US\$ 18 million were available. An example of an improvement made is the enhanced monitoring of networks of rivers and basins. Considering its effectiveness, a similar program to improve the coordination of Basin Committees was created in 2016 <sup>63</sup> . This program could be used to discuss targets and metrics for NbS for water with the view of adopting a payback scheme for the implementation of projects that meet a set criteria.
2019	<b>National Plan on Water Security (PNSH)</b>	This plan's purpose is to define interventions to ensure water security in the country and reduce the risks associated with critical events, droughts, and floods. It ensures integrated planning of water infrastructure throughout Brazil, with a regional focus <sup>64</sup> . As grey and green infrastructure are starting to be seen as tools that help increase water availability, they should be included in the PNSH (see Table 7, item 3.1 on natural infrastructure).

61 Government of Brazil (2007). [Law n° 11445 from 2007](#).

62 Government of Brazil (2020). [New National Dam Safety Policy that imposes greater responsibility on mining companies is sanctioned](#).

63 National Water and Sanitation Agency (ANA) (2021). [Progestão](#).

64 National Water and Sanitation Agency (2021). [Plano Nacional de Segurança Hídrica](#).



# SUBNATIONAL NATURE-BASED SOLUTIONS POLICIES AND PROGRAMS IN BRAZIL

Subnational governments in Brazil are starting to align on NbS, however, they continue to be focused on specific objectives, rather than considering environmental services as a strategy integrated with other social and economic initiatives<sup>65</sup>. States and municipalities could benefit from NbS if they are included in other policy actions, including fiscal incentives, restoration actions, etc.

The following section describes some of the most relevant national laws, regulations, and policies related to NbS in states and municipalities. It does not intend to capture all NbS-related policies, as the policy framework is always evolving. Instead, the most relevant cases are selected, to provide an overview of the Brazilian environmental policy.

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<sup>65</sup> PICARELLI apud FRAGA, Raiza (2020). *Nature-based solutions: elements for translating the concept into Brazilian public policies*.

# Examples of NbS-related Subnational Policies and Programs

In Brazil, it is the federal government's responsibility to develop certain policies, such as national plans, while other policies fall under the remit of states and municipalities, for example, **states can legislate on topics outlined by federal complementary law, adapting environmental issues to their local contexts and detailing requirements. There is also some autonomy in the definition of criteria related to oversight and administration of environmental policies. As such, there are many policies and**

**initiatives that can be explicitly or implicitly aligned to NbS concepts.**

For IUCN, NbS is an umbrella concept covering different ecosystem-related approaches. To better understand its applications, the approaches are divided into five main categories, which share similarities. As these categories help provide an operational framework for policymakers<sup>66</sup>, Brazilian subnational policies and initiatives are classified below under IUCN's criteria.

**Table 7.** Examples of NbS-related Subnational Policy Frameworks and Actions in Brazil

Category of NbS Approaches	NbS Examples	Examples of NbS actions in Brazil
1. Ecosystem restoration approaches	<b>1.1. Ecological restoration</b> 	<b>Water Conservators (2005):</b> This was ratified through a municipal law – Extrema municipality in Minas Gerais state – in partnership with civil society organizations, federal and state entities. Its objective is to ensure water quality and promote environmental compliance by rural properties. Therefore, it privileges preventive intervention, instead of repressive intervention. The successful implementation of this project has led to a project to restore forests in the Mantiqueira Mountains ('Mantiqueira Conservators'), which are home to springs supplying the largest metropolitan regions in Brazil, in São Paulo and Rio de Janeiro states <sup>67</sup> .
	<b>1.2. Forest landscape restoration</b> 	<b>Atlantic Forest Restoration Pact (2009):</b> This initiative brings together forest restoration actions across the 17 states in the Atlantic Forest, with the support of not-for-profit organizations. "Regional units" help identify the landscapes and stakeholders. Coordination among different agents working on restoration increases the speed and scale of recovery and helps with monitoring success. The Pact promotes awareness, capacity building, and their activities such as generating donations and the adoption of payment mechanisms for environmental services <sup>68</sup> .

<sup>66</sup> International Union for Conservation of Nature (IUCN) (2021). [Nature-based Solutions](#).

<sup>67</sup> Government of Extrema in Minas Gerais (2021). [Projeto Conservador das Águas](#).

<sup>68</sup> Pacto pela Restauração da Mata Atlântica. [Estratégia de Atuação](#).

Category of NbS Approaches	NbS Examples	Examples of NbS actions in Brazil
2. Issue-specific ecosystem-related approaches	<p><b>2.1. Ecosystem-based adaptation</b></p> <p><b>EbA</b></p>	<p><b>Municipal Plans for Conservation and Recovery of the Atlantic Forest (PMMA, 2006):</b> Subnational entities can play a proactive role in defining specific actions for the Atlantic Forest through specific laws for the biome<sup>69</sup>. The PMMA of Porto Seguro municipality (2014) was the first to officially use the approach in a PMMA. Based on an assessment of vulnerabilities and on a proposal for strengthening ecosystems, adaptation measures like resilience of coral reefs, sustainable and adaptive fisheries management, and water availability stand out <sup>70</sup>. States like Mato Grosso, Bahia, and the Federal District have examples of projects implicitly fitting the EbA criteria<sup>71</sup>.</p>
	<p><b>2.2. Ecosystem-based mitigation</b></p> <p><b>EbM</b></p>	<p><b>Forest Conservation Allowance in the Amazonas State (2007):</b> The ‘Bolsa Floresta’, a pioneer program, it compensates local communities for helping to keep forests standing and managing UCs. The objective is to reduce deforestation and conserve biodiversity while increasing income from forestry products, in line with the Millennium Development Goals (MDGs) and the Sustainable Development Goals (SDGs). The project has reached scale and produced concrete results, serving as an example to other states in the Amazon region. Communities have complied with the commitment of zero deforestation in primary forests and are even going beyond this. The Amazon Fund has been funding the project since 2016<sup>72</sup>.</p>
	<p><b>2.3. Ecosystem-based disaster risk reduction</b></p> <p><b>Eco-DRR</b></p>	<p><b>Reforestation collective action in Rio de Janeiro (1987):</b> The region had multiple incidents of mudslides, landslides, and floods, worsened by human habitation. Due to the limitation of technical solutions, ecosystem-based measures have been developed. One of these was the relaunch of the “Mutirão Reflorestamento” (Reforestation collective action), carried out by Rio de Janeiro’s municipality. The measure consists of a series of reforestation actions in ‘favelas’ - local communities are hired to help with planting and monitor activities, which has the additional benefit of providing jobs. The reforestation aims to “mitigate landslide risks, reduce river and channel sedimentation, minimize the intensity of floods, and finally reduce the occupation in high risk and protected areas<sup>73</sup>”.</p>
3. Infrastructure-related approaches	<p><b>3.1. Natural infrastructure</b></p> <p><b>NI</b></p>	<p><b>Natural Infrastructure in São Paulo’s Water System:</b> Between 2013 and 2015 São Paulo faced severe droughts, leading to a radical rationing regime that caused economic issues. Cantareira, the largest of five water supply systems in the region, lost 75% of its vegetation. A report showed that restoring some 4,000 hectares of highly degraded pasturelands in the watershed (13% of highest degraded land) would reduce sedimentation by 36%, saving US\$ 3,5 million a year for the next 30 years in water treatment. Therefore, the São Paulo State Sanitation Company (Sabesp) launched a fundraising campaign to implement this program to improve water availability and quality<sup>74</sup>.</p>

69 Portal PMMA (2021). [O que são os Planos Municipais da Mata Atlântica?](#)

70 Municipality of Porto Seguro (2014). [Plano Municipal de Conservação e Recuperação da Mata Atlântica de Porto Seguro.](#)

71 Fundação Grupo Boticário (2015). [Adaptação Baseada em Ecossistemas.](#)

72 Fundo Amaônia. Projeto Bolsa Floresta: [Relatório Final de Avaliação de Efetividade.](#)

73 United Nations Environment Programme (2014). [The Ecosystem-based Disaster Risk Reduction.](#)

74 World Resources Institute (2018). [Natural Infrastructure in São Paulo’s Water System.](#)

Category of NbS Approaches	NbS Examples	Examples of NbS actions in Brazil
3. Infrastructure-related approaches	3.2. Green infrastructure GI	<b>Filtering Gardens' Project in Recife (2020):</b> The city faces a double challenge of river protection and sewage control. The filtering gardens technology should be applied at the municipal level for several reasons: easy management and low costs. The possibilities for water treatments from water gardens include: the use and protection of riparian areas as public environmental recovery areas, avoidance of future human occupations and environmental risks and a reduction in the level of GHG emissions (when compared to other conventional sewage treatment systems). The filtering gardens will be applied in selected areas of polluted rivers that have the potential to be revived <sup>75</sup> .
4. Ecosystem-based management approaches	4.1. Integrated coastal zone management ICZM  4.2. Integrated water resources management IWRM	<b>Subnational vulnerability studies (2010s):</b> Brazil still does not have an integrated study looking at the vulnerability of coastal cities to the impacts of climate change, including the impact of rising sea levels on a national scale. However, cities such as Santos, Rio de Janeiro, and Recife have started vulnerability studies and plans to adapt to climate change, including integrated coastal management actions <sup>76</sup> .  <b>Integrated Water Resources Management System from the State of São Paulo (SIGRH, 1991):</b> This system is based on participation, decentralization, and integration in the sustainable management of water resources, in accordance with the São Paulo Water Law. The SIGRH is represented by members of the state, municipalities, and civil society, and is based on the State Water Resources Plan (PERH). This plan is a document prepared every four years, based on the specific Basin Plans of each of the 21 Committees of State Hydrographic Basins. This administration's approach aims to strengthen sustainability by recognizing water resources as a public good <sup>77</sup> .
5. Ecosystem protection approaches	5.1. Area-based conservation approaches, including protected area management (CCAS, PAS, LMMA) AbC	<b>'Mangroves of Brazil' Project (2007):</b> This is executed by the Ministry of Environment to improve Brazil's capacity to promote conservation and sustainable use of resources in mangrove ecosystems. The project intends to strengthen the SNUC and the designation of areas of permanent preservation for all mangroves in Brazil. After ten years of implementation, it has established an in-situ strategy counting on civil society participation <sup>78</sup> .

Source: elaborated by the authors based on [IUCN criteria for Nature-Based Solutions](#).  
Notice: some policies can be associated with more than one NbS category.

75 Citinova (2021). [Recife desenvolve tecnologia inovadora para tratamento da água poluída](#).

76 Adapta Clima (2021). [Zonas Costeiras no Contexto da Mudança do Clima](#).

77 Integrated Water Resources Management System for the State of São Paulo (2021). [SIGRH](#).

78 Ministry of the Environment (2018). [Atlas of the Mangroves of Brazil](#).

# Other NbS-related Subnational Policies and Initiatives

In addition to the policies described above, several other policies, directly and indirectly, influence the ability of subnational governments

to support and implement NbS. Table 8 below provides an overview of the most relevant among those policies.

**Table 8.** Overarching Subnational Policies and Initiatives

Year	Policy	Description
1991	Ecological-ICMS	The tax on the circulation of products and services (ICMS) is defined by states. This tax must be paid when the ownership of a good or service moves to another company or customer in their jurisdiction. The 'Ecological ICMS' is a payment for environmental services that stimulates the preservation of the environment. Once municipalities have followed the requirements, they can access financial resources collected by their respective states. This happens because states are legally allowed to define how to distribute one quarter of their income <sup>79</sup> . Paraná was the first Brazilian state to regulate an Ecological ICMS, in 1991. Currently, 17 states adopt the Ecological ICMS. In the Atlantic Forest, for example, 40% of the municipalities in the biome have almost 20% of their territory covered by UCs, and the ecological ICMS could be used to maintain these <sup>80</sup> . However, it is not mandatory that compensation goes to the environment, let alone environmental projects with multiples benefits like those that fall under NbS.
2001	City Statutes	This federal law with general guidelines applies to subnational governments and aims to create a new legal-urban order to provide land access and equity in large urban cities. It follows the principles of the Federal Constitution of 1988, the first one to mention the 'right to the city', and advocates for 'democratic city management' and for the right to a 'sustainable city'. Municipalities have relative autonomy to specify strategies and actions in master plans and could include NbS approaches in the most important tool for Brazilian urbanization policy. The metropolitan region of Belo Horizonte is an example. Within its master plan for integrated development (PDDI), there is a strong implementation of agroecological practices and agroforestry systems, connected with UCs, through the Trama Verde-Azul strategy (connection of green areas to hydrographic basins) <sup>81</sup> .
2006	Municipal Plan for Conservation and Recovery of the Atlantic Forest (PMMA)	Following the example given in Table 7, example 2.1, article 38 of the Atlantic Rainforest Law institutes the PMMA, giving subnational entities a proactive role in defining specific actions for the Atlantic Forest <sup>82</sup> .

79 ICLEI South America (2019). [Portal publishes state legislation on Ecological ICMS.](#)

80 Folha de São Paulo (2017). [Ecological ICMS, regulated in 17 states, is an example of success in the country.](#)

81 Government of Minas Gerais (2021). [RMBH Metropolitan Plan.](#)

82 SOS Atlantic Forest (2021). [Atlantic Forest Law.](#)

Year	Policy	Description
2007	<b>Amazonas' State Policy on Climate Change, Environmental Conservation and Sustainable Development</b>	<p>Amazonas was the first Brazilian state to institute a law aimed at protecting its forest and biodiversity and considered climate change through a broader lens in line with NbS rationale.</p> <p>After this law was implemented, 18 other states followed to create their state policies on climate change. There are eight remaining states that still do not have one<sup>83</sup>.</p>
2015	<b>Mato Grosso's 'Protect, Conserve and Include' (PCI)</b>	<p>The 'Protect, Conserve and Include' (PCI) was launched during COP-21, in December 2015, and is one of the most advanced examples of jurisdictional approaches in the world. Mato Grosso became a pioneer for using fundraising from the state's REDD+ system for PCI goals (funds from Germany's REDD+ Early Movers Program). Its objectives include reducing GHG emissions, preserving and recovering native vegetation, and promoting the socioeconomic inclusion of people working with natural resources. The 'Institute PCI' was created to support multi-stakeholder engagement, which was at the core of the strategy from the beginning (<a href="#">read more about the PCI project</a>)<sup>84</sup>.</p>
2018	<b>State System of Climate Governance and Environmental Services (SGSA)</b>	<p>The PGSA, created by the state of Rondônia, is one of the most advanced policies at subnational level regarding climate change. The law states that it will observe the main decisions of the UNFCCC and other international forums that Brazil may be a part of, as well as any relevant national legislation. The law specifies that it "aims to ensure the reduction of GHG emissions and increase mitigation and adaptation"<sup>85</sup>, considering mechanisms such as payment for environmental services (PES), sustainable forest management, REDD+, as well as highlighting the importance of indigenous people, traditional communities, and family farming.</p>
2018	<b>Amapá's Public incentives for conservation</b>	<p>The "Green Treasure Program" (Programa Tesouro Verde) instituted by the state of Amapá is one example of how diverse public incentives can be applied at the subnational level. This issued environmental assets, as to repay the sustainable use of natural resources. Certificates can be traded on the financial market by rural producers, associations, and individual or collective business plans. Only credits certified by internationally credible institutions are considered. There is also a regional green seal attesting a certain company has fulfilled the Social and Environmental Retribution Quota for the year, acquiring Forest Credits<sup>86</sup>. Initiatives like this can give preference to NbS credits, reflecting their value to different aspects of natural capital (forests, climate and water).</p>
2019	<b>Pará's Eastern Amazon Fund (FAO)</b>	<p>This was launched by the state of Pará during COP-25. Similar to the Amazon Fund, the initiative aims to raise public and private finance to expand investments in sustainable development. Throughout the pre-launch process civil society was involved which resulted in a public notice to select a nongovernmental organization to administrate the Fund. FAO is part of the Plan Amazon Now (PEAA), which is driven by the target of making Pará net-zero by 2036<sup>87</sup>.</p>

83 CDP (2021). [How Brazilian State Governments Address Climate Change?](#)

84 CDP (2021). [Jurisdictional Approaches: An Analysis of Brazil's States and Companies Contribution.](#)

85 Government of Rondônia. [Law N° 4437 from 2021.](#)

86 Government of Amapá (2021). [Programa Tesouro Verde.](#)

87 Secretary of Environment of Pará (2021). [Governo do Pará avança na estruturação do Fundo Amazônia Oriental.](#)

# Takeaways

**NbS play an important role in the Brazilian policy landscape and policymakers should incentivize a broader and more ambitious implementation of the concept. At the same time, it is important to consider the suitability of each NbS and understand that it is not a silver bullet, but rather one tool amongst many environmental practices.**

As the concept receives growing recognition worldwide, there is a window of opportunity to integrate NbS in Brazil. By analyzing the current policies in the country, it is possible to draw some conclusions from barriers and opportunities:

## **1. The lack of coordination between policies and strategic plans is a barrier to NbS implementation in Brazil:**

Some initiatives and policies end up moving away from NbS principles because they still do not fully integrate actions (e.g., PNGC, PPCerrado) or connect agendas (e.g., PNRH and circular economy).

Structures of governance (e.g., Proveg for the implementation of Forest Code and related policies) are proving to

be an alternative to better integrate policies, programs and actions to the objectives and principles previously established. NbS could be considered as a practical tool within these structures, which would enable the concept to spread to different policies, helping to create cohesiveness.

## **2. The Brazilian federal government has an important role to play in NbS dissemination:**

Even though Brazil's legal framework can be aligned with NbS, stakeholders' appetite to adopt NbS, as well as their knowledge on the concept, are challenges to be addressed. Therefore, capacity-building is needed, as is the exchange of experiences with countries and organizations leading the agenda. There is also an important role to play in mobilizing finance for NbS, monitoring and assessing non-state progress in this agenda and developing public-private partnerships for NbS projects.

In Brazil, subnational governments are driven by priorities defined by the federal government, so its leadership on the agenda is likely to cause widespread action. Furthermore, they should lead in the work of adapting international best practices domestically. Whilst independent subnational NbS initiatives are encouraging, national plans and other policies and instruments are essential to mainstream NbS in a consistent and interconnected way.

### 3. Local communities are essential for NbS:

The effectiveness of many initiatives are related to the fact that environmental policies are connected to financial support or social programs (e.g., “Bolsa Verde”, modalities of PES). In Brazil, indigenous populations, family farmers and groups like extractive communities are in a close relationship with nature. However, these groups are usually more vulnerable.

Therefore, NbS that intertwine protecting nature and the reduction of social inequalities have great potential in the country. Even when there is no previous environmental awareness among underprivileged communities (e.g., urban reforestation actions in Rio de Janeiro), through a mix of financial incentives they are empowered to replicate projects and advocate for the continuation of policies. These also have high impact with limited budget, which can enable NbS in the short-term even in the face of financial gaps.

### 4. Carbon credits using NbS have potential in the country:

With the emergence of science-based targets (SBTs), many companies are prioritizing carbon credits that can use NbS for their removals. This sector's understanding of the value of nature-based carbon credits is growing.

Brazil has ongoing negotiations for a regulated carbon market and this criterion can be promoted through public policy. It is necessary to raise the bar on the current proposed requirements and strengthen the importance of carbon credits delivering social and environmental benefits, going beyond just emissions reductions.



# Appendix 1

## Analysis of the Implementation of Aichi Targets in Brazil

The implementation of international best practices has a long way to go. Brazil must improve in 10 of the 20 Aichi targets (see Table 9 below). Specific policies and actions on local development and poverty reduction are still needed, as well as the phase-out, reduction, or elimination of incentives that are harmful to biodiversity. Furthermore, stronger efforts in areas such as sustainable consumption, pollution control, and a sustainable offer of essential services are urgent<sup>88</sup>.

Brazil must also scale up financial resources to effectively implement its Strategic Plan. Federal initiatives like the Biodiversity Finance Initiative (BIOFIN) are essential to quantify the biodiversity financing gap and articulate these needs to existing or new biodiversity funds<sup>89</sup>.

Ecosystem-based approaches to protect species, core to NbS, need to be strengthened as well. Three targets considered 'insufficient' (Articles 6, 9, and 12) advocate for improvements in sustainable management of fish, invertebrate stocks, aquatic plants, invasive alien species, and protection of threatened species. In 2020, Brazil became the country with the second highest number of endangered tree species (20%)<sup>90</sup>, reinforcing Brazil's developing work in avoiding deforestation and meeting the target of ecosystem resilience, conservation, and restoration actions.

**The post-2020 Global Biodiversity Framework will set new global biodiversity targets to replace the Aichi Targets in 2022. The same efforts highlighted above will be necessary if Brazil is to perform better on the new targets.**

Brazil has been participating as an observer in the meetings of the signatory countries of the Nagoya Protocol since 2014, due to the delay in this ratification, which only occurred in 2021<sup>91</sup>. Brazil's leadership in international discussions has been compromised by challenges in the domestic environmental agenda, as exemplified by the increased deforestation rates observed in recent years<sup>92</sup>.

As the most biodiverse country with a NbS-aligned policy framework, Brazil has the potential to resume its active participation and go further in supporting the NbS agenda within the Convention. Renewed political will is necessary for Brazil to continue to catalyze international advances to enhance national policy processes.

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88 Convention on Biological Diversity (CBD) (2021). [Aichi Target Pages: Article 11](#).

89 Ministry of the Environment (2021). [Biodiversity Finance Initiative](#).

90 Global Tree Assessment (2021). [State of the World's Trees Report](#).

91 Senate (2021). [Decree published confirming Brazil's entry into the Nagoya Protocol](#).

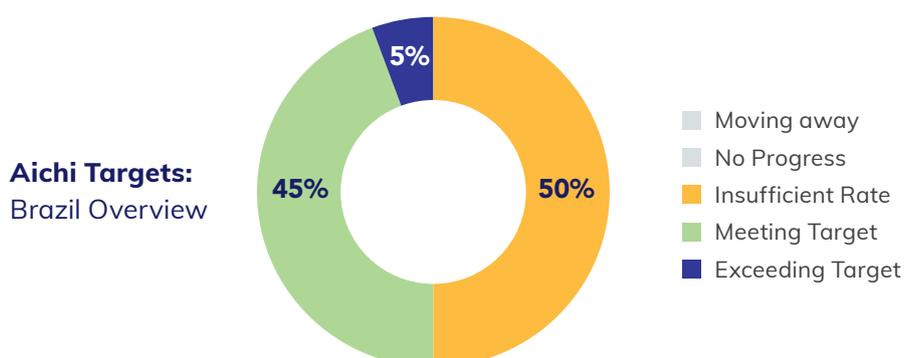
92 Folha de São Paulo (2021). [Brazil resists nature protection goals at the UN Biodiversity Conference](#).

**Table 9. Brazil's Progress on the Aichi Targets**

Aichi Target	Brazil Status
1. Awareness increased	★ ★ ★ ★ ☆ Meeting target
2. Biodiversity values integrated	★ ★ ★ ☆ ☆ Insufficient rate
3. Incentives reformed	★ ★ ★ ☆ ☆ Insufficient rate
4. Sustainable production and consumption	★ ★ ★ ☆ ☆ Insufficient rate
5. Habitat loss halved or reduced	★ ★ ★ ★ ☆ Meeting target
6. Sustainable management of marine living resources	★ ★ ★ ☆ ☆ Insufficient rate
7. Sustainable agriculture, aquaculture, and forestry	★ ★ ★ ★ ☆ Meeting target
8. Pollution Reduced	★ ★ ★ ☆ ☆ Insufficient rate
9. Invasive alien species prevented and controlled	★ ★ ★ ☆ ☆ Insufficient rate
10. Pressures on vulnerable ecosystems reduced	★ ★ ★ ★ ☆ Meeting target
11. Protected areas increased and improved	★ ★ ★ ★ ☆ Meeting target
12. Extinction prevented	★ ★ ★ ☆ ☆ Insufficient rate
13. Genetic diversity maintained	★ ★ ★ ★ ☆ Meeting target
14. Ecosystems and essential services safeguarded	★ ★ ★ ☆ ☆ Insufficient rate
15. Ecosystems restored and resilience enhanced	★ ★ ★ ☆ ☆ Insufficient rate
16. Nagoya Protocol in force and operational	★ ★ ★ ★ ☆ Meeting target
17. National Biodiversity Strategies and Action Plans (NBSAPs) adopted as a policy instrument	★ ★ ★ ★ ☆ Meeting target
18. Traditional knowledge respected and integrated	★ ★ ★ ★ ☆ Meeting target
19. Knowledge improved, shared, and applied	★ ★ ★ ★ ★ Exceeding target
20. Financial resources from all sources increased	★ ★ ★ ☆ ☆ Insufficient rate

★ Moving Away / ★ ★ No progress / ★ ★ ★ Insufficient Rate  
 ★ ★ ★ ★ Meeting Target / ★ ★ ★ ★ ★ Exceeding Target

Source: Convention on Biological Diversity (CBD) (2021). [Aichi Target Pages](#).



# Appendix 2

## Deep Dive Into Brazilian biomes

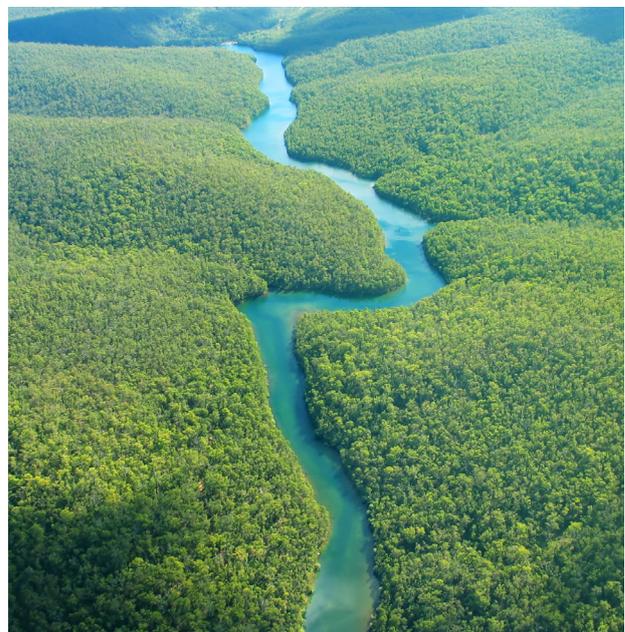
**Forests in Latin America and the Caribbean represent about 22% of forest area in the world. Over 50% of them are primary forests, which are valuable in terms of biodiversity<sup>93</sup>**

### Amazon:

The Amazon is the largest biome in the world. Covering more than 40% of the national territory and crossing eight other countries in South America<sup>94</sup>, its basin is the world's largest watershed, with a volume that consists of 18% of the freshwater reaching the oceans. Research indicates that the Amazon hosts thirty million animal species, holding at least 10% of the world's known biodiversity<sup>95</sup>.

Around 16% of its tropical and dense forests have been cleared. Forest destruction is trending upwards, with an increase of 51% between August 2020 and July 2021 (when compared to the previous season)<sup>96</sup>. Deforestation, fires, mining, agro-grazing, and biopiracy are some of the challenges the biome faces.

Nevertheless, this is the most preserved biome in Brazil, with 20% of its territory protected in UCs. This rate is especially important because the Amazon's canopy cover helps regulate temperature and humidity in South America and protects indigenous native people. In the period mentioned above, only 2% of deforestation happened on indigenous lands, while UCs accounted for 13% of the recorded deforestation. This reinforces how traditional ways of life and knowledge can protect forests<sup>97</sup>.



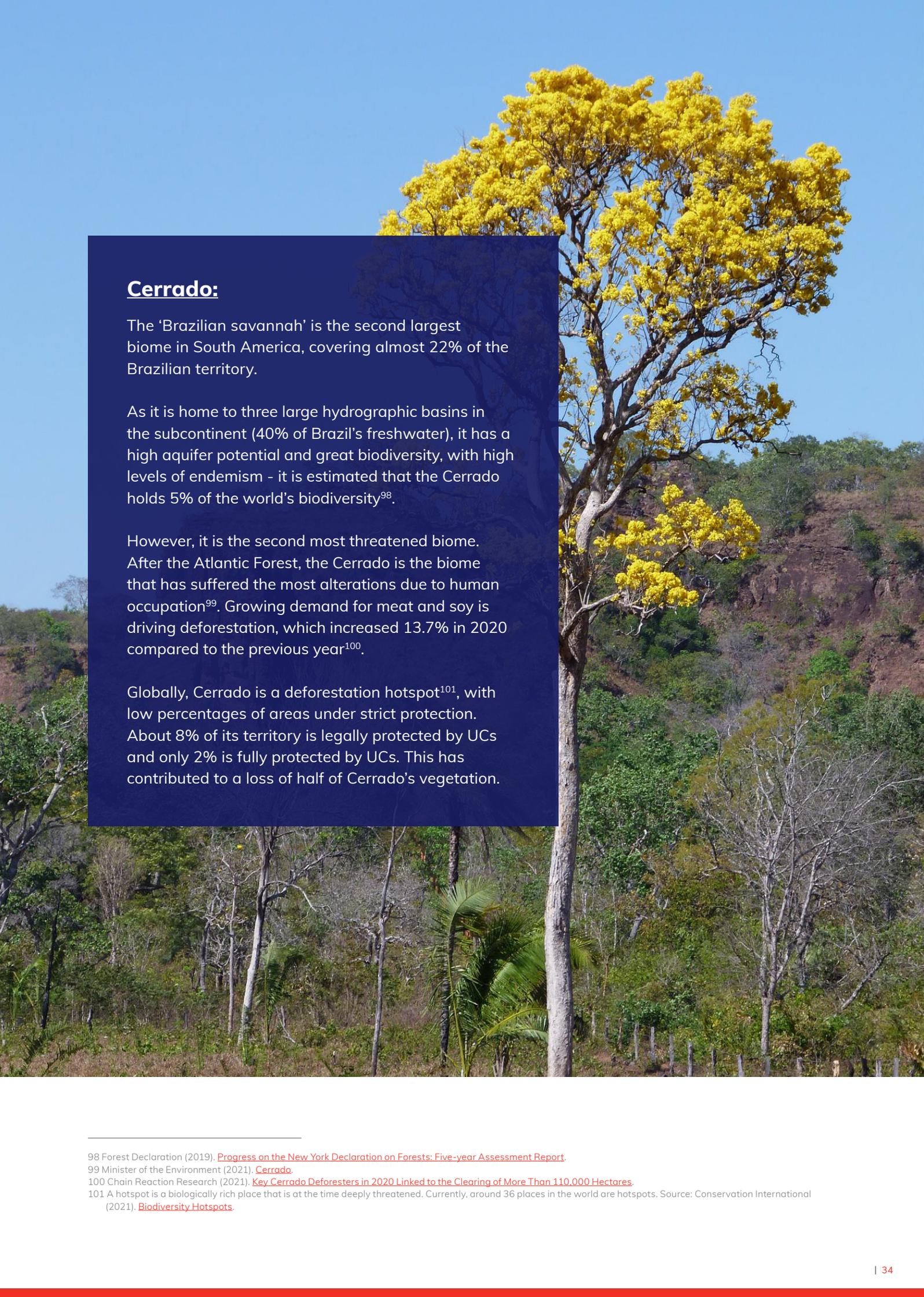
<sup>93</sup> Food and Agriculture Organization of the United Nations (FAO) (2021). [Sustainable forest management in Latin America and the Caribbean](#).

<sup>94</sup> Bolivia, Colombia, Ecuador, Guyana, French Guyana, Peru, Suriname and Venezuela.

<sup>95</sup> Brazilian Agricultural Research Corporation (2021). [Amazon](#).

<sup>96</sup> G1 (2021). [Deforestation in the Amazon grows 51% in the last 11 months compared to the previous period, says Imazon](#).

<sup>97</sup> G1 (2021). [Deforestation in the Amazon grows 51% in the last 11 months compared to the previous period, says Imazon](#).



## **Cerrado:**

The 'Brazilian savannah' is the second largest biome in South America, covering almost 22% of the Brazilian territory.

As it is home to three large hydrographic basins in the subcontinent (40% of Brazil's freshwater), it has a high aquifer potential and great biodiversity, with high levels of endemism - it is estimated that the Cerrado holds 5% of the world's biodiversity<sup>98</sup>.

However, it is the second most threatened biome. After the Atlantic Forest, the Cerrado is the biome that has suffered the most alterations due to human occupation<sup>99</sup>. Growing demand for meat and soy is driving deforestation, which increased 13.7% in 2020 compared to the previous year<sup>100</sup>.

Globally, Cerrado is a deforestation hotspot<sup>101</sup>, with low percentages of areas under strict protection. About 8% of its territory is legally protected by UCs and only 2% is fully protected by UCs. This has contributed to a loss of half of Cerrado's vegetation.

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98 Forest Declaration (2019). [Progress on the New York Declaration on Forests: Five-year Assessment Report](#).

99 Minister of the Environment (2021). [Cerrado](#).

100 Chain Reaction Research (2021). [Key Cerrado Deforesters in 2020 Linked to the Clearing of More Than 110,000 Hectares](#).

101 A hotspot is a biologically rich place that is at the time deeply threatened. Currently, around 36 places in the world are hotspots. Source: Conservation International (2021). [Biodiversity Hotspots](#).

## **Atlantic Forest:**

Originally, this biome was the second largest, occupying more than 15% of the Brazilian territory across 17 states. However, due to human activities since colonization, only 7% to 12% of its original coverage remains. Now, more than 70% of Brazil's population lives within the biome, which reinforces the role forests play in providing ecosystem services<sup>102</sup>.

The Forest holds about 20,000 plant species (35% of existing species in the country), more than Europe (12,500) or North America (17,000), which corresponds to 1% of the world's biodiversity. However, it is still one of the most threatened hotspots in the world – 25% of endangered species in Brazil are in this biome<sup>103</sup>.

Between 2019 and 2020 deforestation has had a slight decrease, 9% less than the previous period. However, deforestation remained relatively stable in the last years, driven by real estate<sup>104</sup>.



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102 Ministry of the Environment (2021). [Atlantic Forest](#).

103 Brasil de Fato. [Why does deforestation in the Atlantic Forest persist?](#)

104 Ministry of the Environment (2021). [Atlantic Forest](#).

## **Caatinga:**

The Caatinga is an exclusively Brazilian biome and comprises approximately 11% of Brazil, covering 70% of the Northeast Region. It is a semiarid climate biome with lots of biodiversity, so droughts and dry periods are common. However, climate change and human intervention are unbalancing natural dynamics<sup>105</sup>.

Caatinga has lost more than half of its original coverage, due to the demand of firewood for domestic and industrial purposes, pasture, and agriculture. Fires in the biome increased by 164% between 2020 and 2021 - most of them are concentrated in Matopiba, a new agricultural frontier region<sup>106</sup>.

Despite this, the biome is one of the least protected in the country. Approximately 7,5% of the area is protected and just over 1% of this is fully protected. Furthermore, UCs have low levels of implementation in this biome<sup>107</sup>.

This region is the most impacted by climate change in Brazil, and it has one of the lowest human development indices. About 13% of the entire region is in an advanced stage of decertification and 94% is at risk of decertification<sup>108</sup>.



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105 Ministry of the Environment (2021). [Caatinga](#).

106 BBC Brasil (2021). [Climate change accelerates creation of England-sized desert in Northeast](#).

107 Ministry of the Environment (2021). [Caatinga](#).

108 BBC Brasil (2021). [Climate change accelerates creation of England-sized desert in Northeast](#).

## **Pampa:**

The Pampa is one of the most important temperate grassland areas on the planet. Although it only occupies 2,07% of the territory, in the state of Rio Grande do Sul, it has the greatest plant biodiversity per square meter among Brazilian ecosystems. This biome concentrates most of the Guarani Aquifer, the world's largest underground freshwater reservoir<sup>109</sup>.

The expansion of monocultures and pastures, silviculture, and others have led to a rapid decline of natural landscapes<sup>110</sup>. Now, it is estimated that less than half of the native vegetation is preserved. If decline is maintained at the current levels, in 2050 less than 12.9% of the biome will remain covered by native fields. Despite this, this is the Brazilian biome with the smallest area with UCs: about 3.5%<sup>111</sup>.

Sandbanks, for example, are a natural phenomenon but intense human activity has been accelerating erosion. One common practice to fight sandification is planting pine or eucalyptus, exotic species, in degraded areas. This partially controls the process and generates income, but exotic species impacts water resources and affects the fauna and flora<sup>112</sup>.

109 Ministry of the Environment of Brazil (2021). [Pampa](#).

110 National Geographic Brazil (2019). [More degraded than Cerrado and Amazonia, Pampa is the least protected biome in Brazil](#).

111 ((O)) Eco (2020). [The Pampa is threatened](#).

112 National Geographic Brazil (2019). [More degraded than Cerrado and Amazonia, Pampa is the least protected biome in Brazil](#).



## **Pantanal:**

The largest wetland area on the planet is known for being a mosaic of ecosystems. The smallest biome of Brazil, it covers 1,76% of the territory, covers a little of the Amazon, a part of the Cerrado, another part of the Atlantic Forest, and a portion of the Bolivian Chaco<sup>113</sup>.

This floodplain is recognized as a Biosphere Reserve by the United Nations, but it is estimated that only 5,37% is protected by UCs. The biome is affected by human action, mainly by agricultural activities, especially in the highland areas of the biome. Although Pantanal was, between 2002 to 2018, the biome that lost the least natural area, if degradation is maintained at the same levels, its hydrographic basin will lose 64% of its natural coverage in 2050, from 60% in 2008<sup>114</sup>.

In 2020, serious episodes of illegal fires generated an environmental crisis in Pantanal. Fires have consumed, to date, 23% of the biome. The drought prolonged by climate change could increase the figures to unprecedented levels in 2021<sup>115</sup>.

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113 Ministry of the Environment (2021). [Pantanal](#).

114 Federal University of Santa Maria (2020). [Pantanal on fire: risks to biodiversity](#).

115 R7 (2021). [Drought may intensify new record of fires in the Pantanal in 2021](#).

## Author

### Rebeca Rocha

Policy Analyst  
[Rebeca.rocha@cdp.net](mailto:Rebeca.rocha@cdp.net)

## Acknowledgments

Thomas Maddox  
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Miriam Garcia  
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## For more information please contact:

### CDP Latin America

#### Rebeca Lima

Executive Director  
[Rebeca.lima@cdp.net](mailto:Rebeca.lima@cdp.net)

#### Miriam Garcia

Senior Policy Manager  
[Miriam.garcia@cdp.net](mailto:Miriam.garcia@cdp.net)

#### Rebeca Rocha

Policy Analyst  
[Rebeca.rocha@cdp.net](mailto:Rebeca.rocha@cdp.net)

## CDP Latin America

Capitão Cavalcanti Street,  
38 Vila Mariana,  
04017-000 São Paulo, Brasil

Tel.: +55 (11) 2305 6996

[www.cdp.net](http://www.cdp.net)



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