



ECOREGION REPORT

Caatinga

Part 1 - Natural Profile	1
Part 2 - Regional Land Cover Dynamics	3
Part 3 - Carbon Potential	5
Part 4 - Developer Spotlight	6
Summary	7
References	8
Authors and contributors	9
Next steps	10

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July 2025

Caatinga: Brazil's largest carbon sink

The Caatinga is South America's largest dry forest¹ and the only biome found entirely within Brazil. Spanning nearly **10%** of the country's territory, it is home to over **26 million** people and a wide array of unique, arid-adapted species.²

The word "Caatinga" means "white forest" in Tupi, referring to the pale appearance of its leafless trees during the dry season.³ Vegetation ranges from low, thorny scrub to tall dry forests reaching **25-30 meters in height**.⁴

Despite its dry climate, the Caatinga is remarkably rich in biodiversity and ecosystem function. It plays a crucial role in regional climate stability, soil retention, and carbon sequestration — and is increasingly recognized as one of the most effective carbon sinks among Brazilian biomes.⁵

Biome type:

Semiarid shrubland

Dominant vegetation:

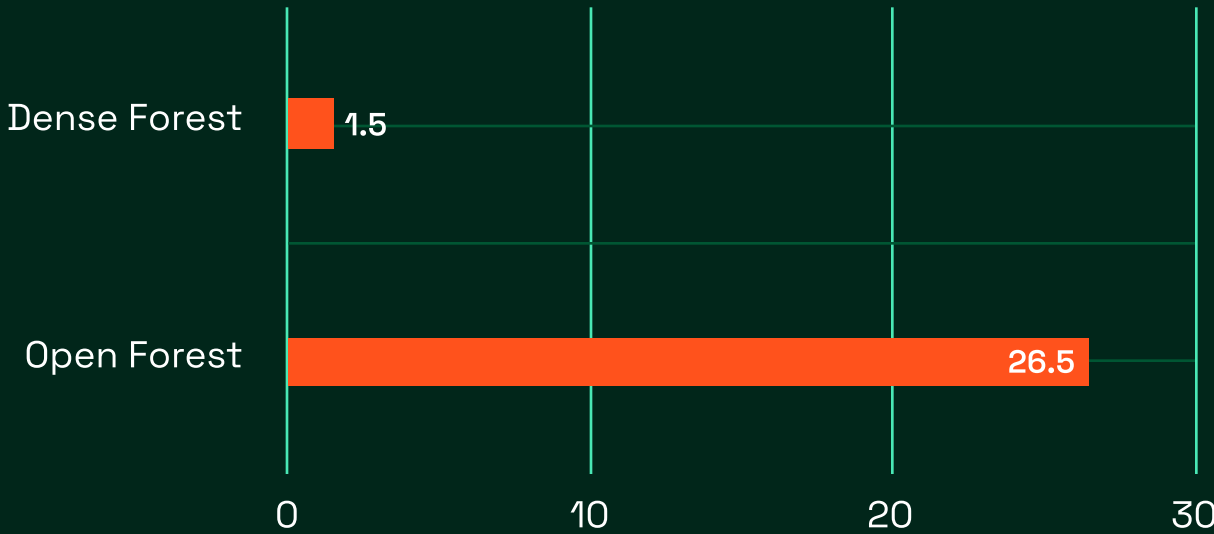
Xeric shrubs, cacti, thorny trees, and deciduous dry forest

Geographic range:

Northeastern Brazil, spanning nine states

Forest cover distribution in Caatinga, 2024 (Mha)

Source: Space Intelligence Land Cover Data



Caatinga



Source: Space Intelligence Land Cover Brazil Data, 2024

NATURAL PROFILE

Unique shrublands

The Caatinga is home to a diversity of life, much of it found nowhere else on Earth:

~2,000

species of plants, fish, reptiles, amphibians, birds, and mammals⁶

Dozens

of endemics, including the **blue macaw** (*Cyanopsitta spixii*), one of the most threatened bird species globally⁷

The rupicolous bromeliad

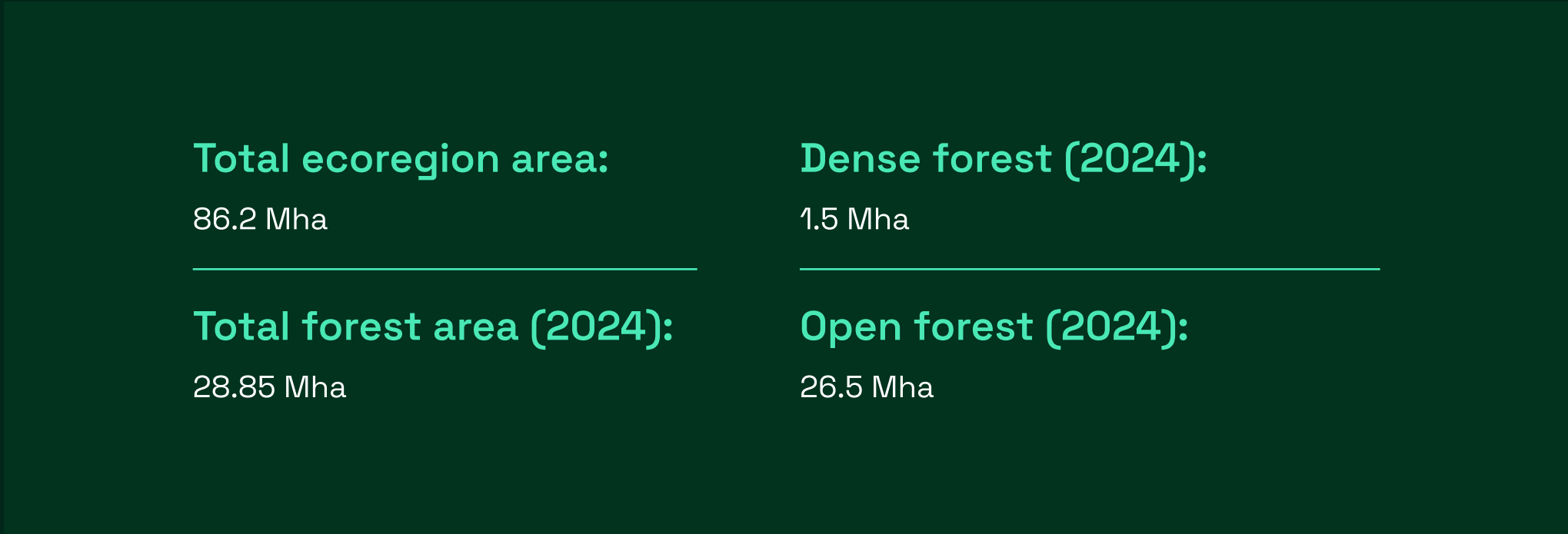
Encholirium spectabile is a key species that supports bats, birds, insects, and small mammals⁸



Land use changes in Caatinga, 2015-2024

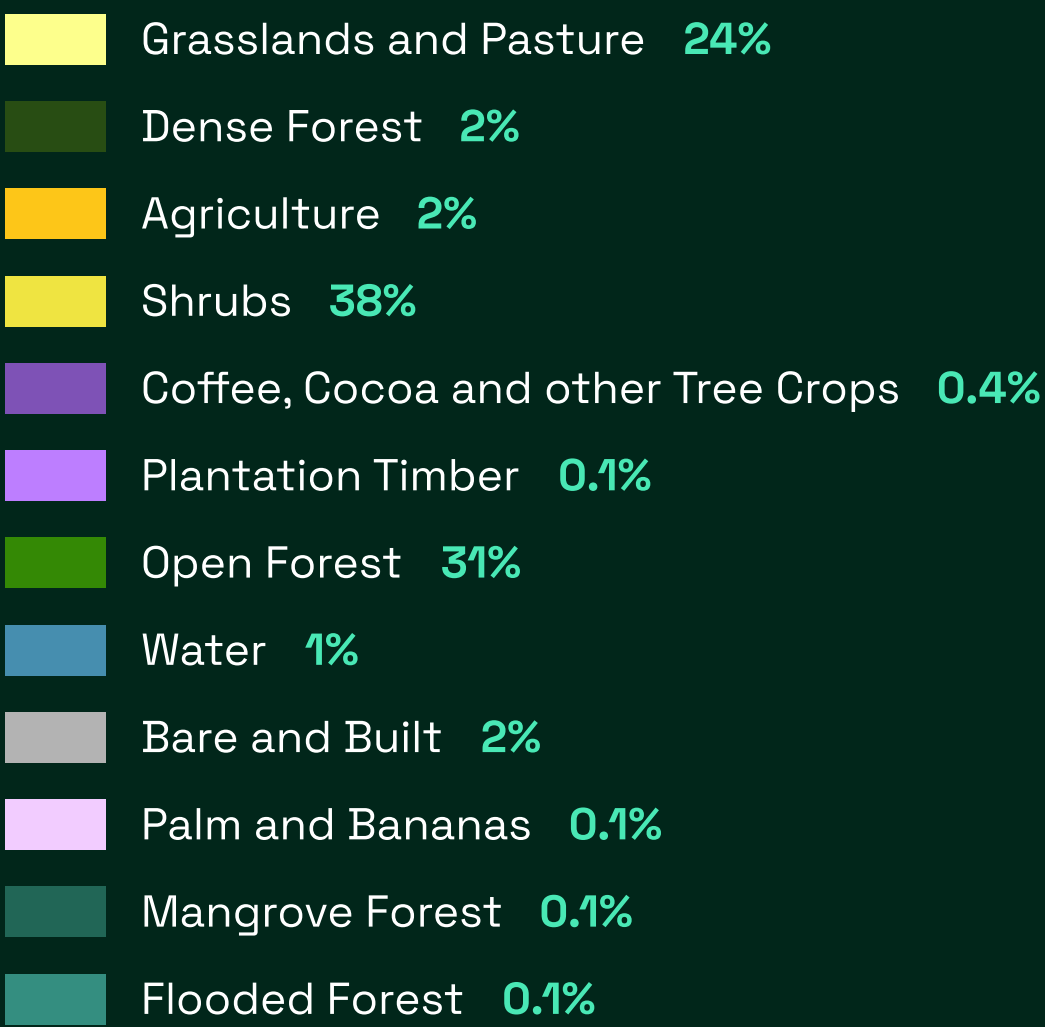
As of 2024, forest cover in the Caatinga stands at approximately **28.8 million hectares** or **33%** of the total area, majority of it open forest. The forest area decreased by **1.5 Mha** from 2015.

The most significant land cover increase was in Agriculture, which expanded by **1.1 million hectares**, followed by urban areas (**0.35 Mha**) and Water bodies (**0.31 Mha**). Open Forest saw the largest reduction - over **1.3 Mha** - followed by Shrubs, which decreased by **0.5 Mha**. Grasslands declined between 2015 and 2020, losing **1.3 Mha**, but this loss was largely reversed by 2024. Commodity Crops such as coffee and cocoa grew slightly, while Palm and Bananas declined over the same period.

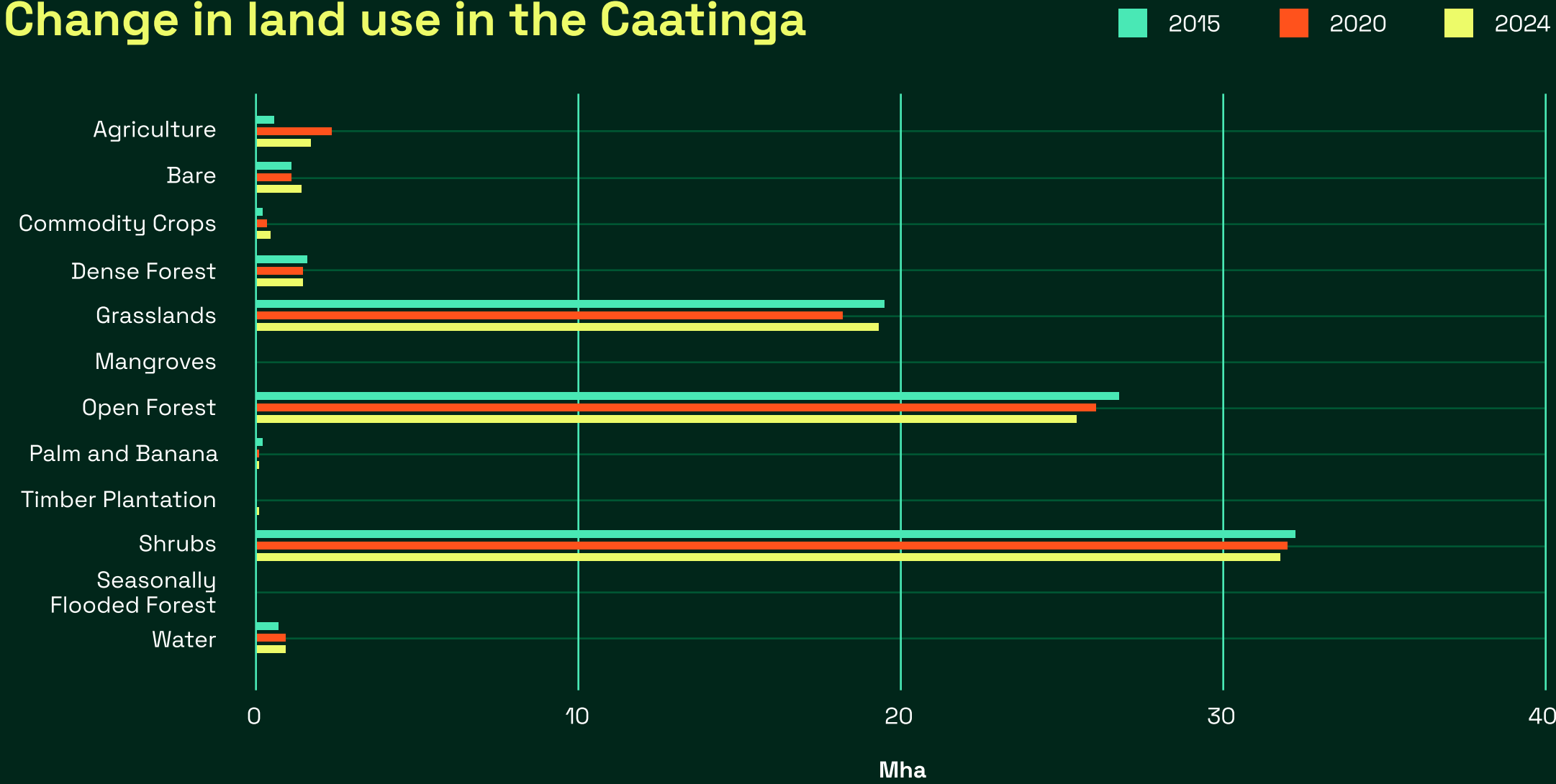


Drivers of degradation include overgrazing, firewood extraction, urban sprawl, and agricultural conversion.

Land cover distribution in Caatinga, 2024



Change in land use in the Caatinga

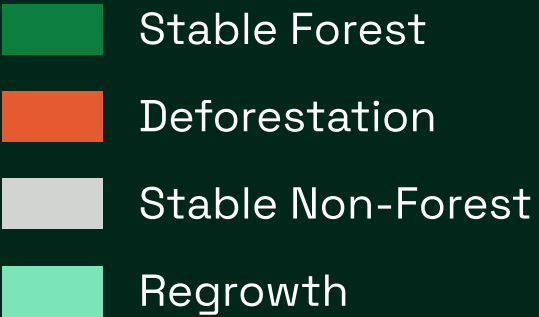
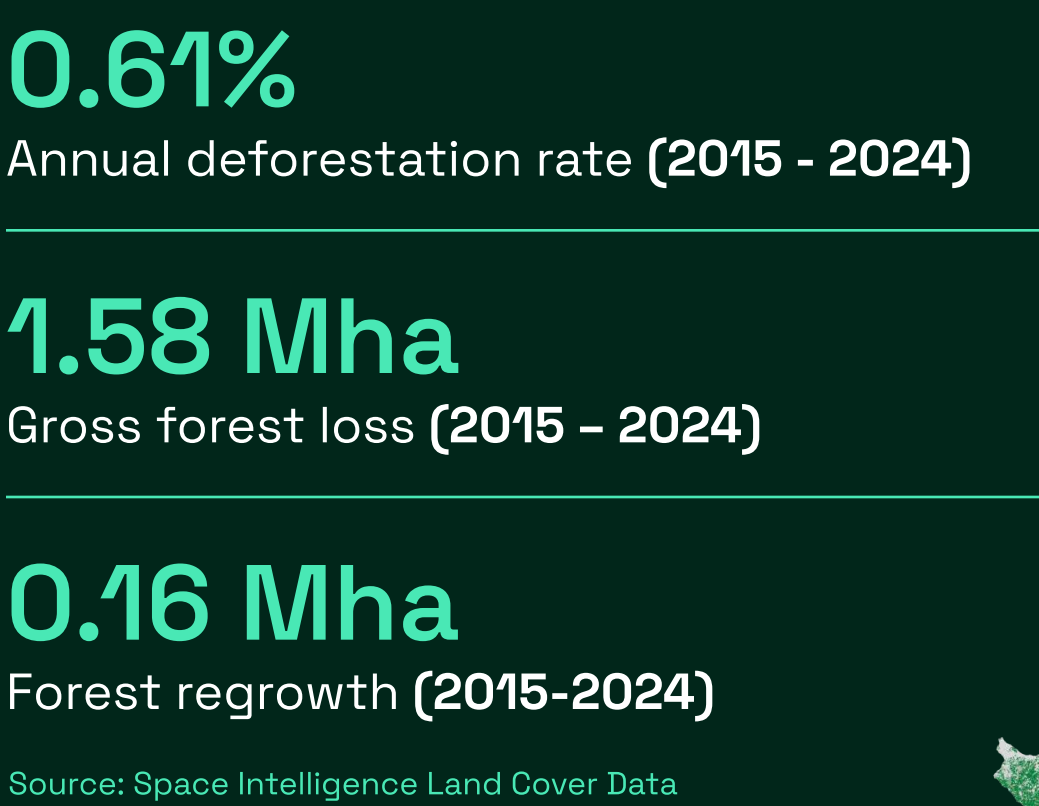
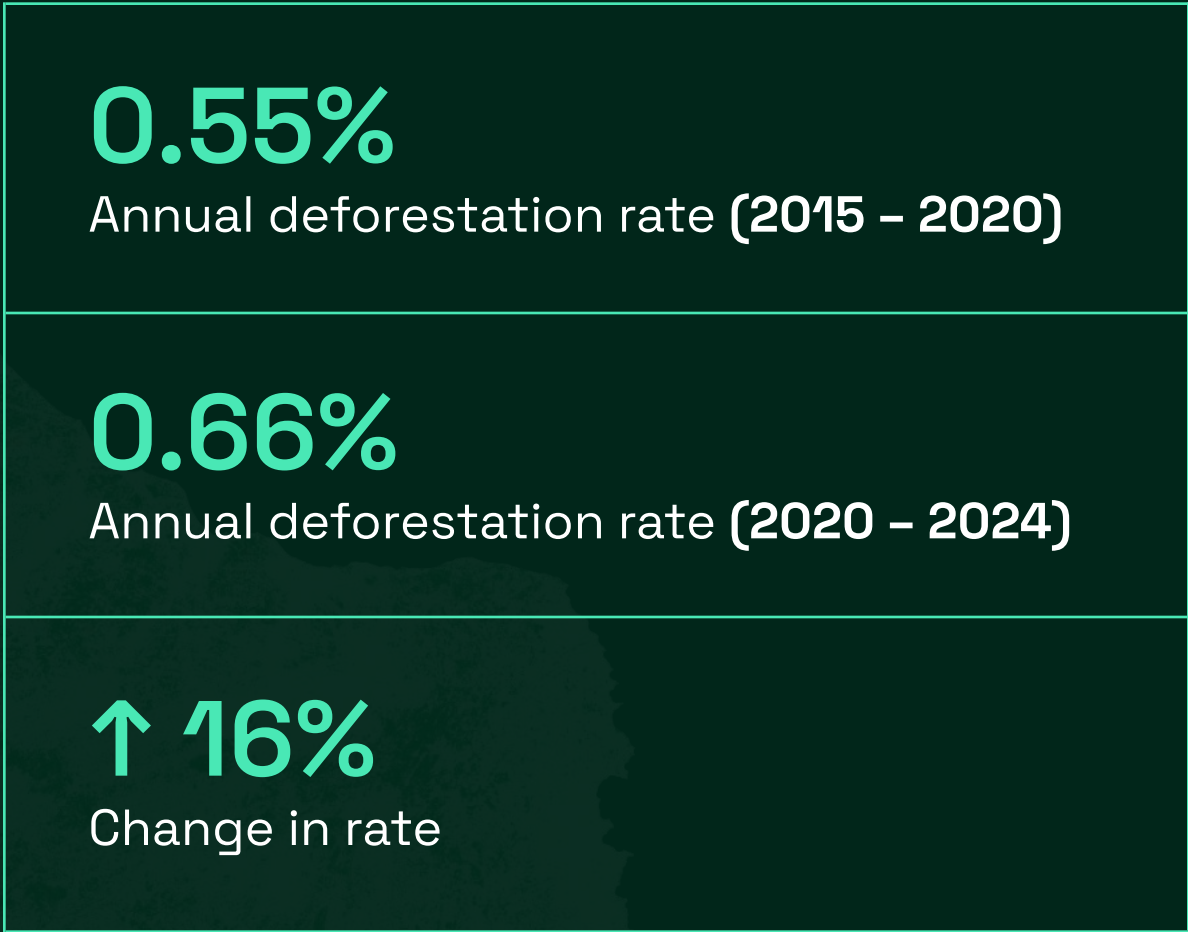


Deforestation and regrowth

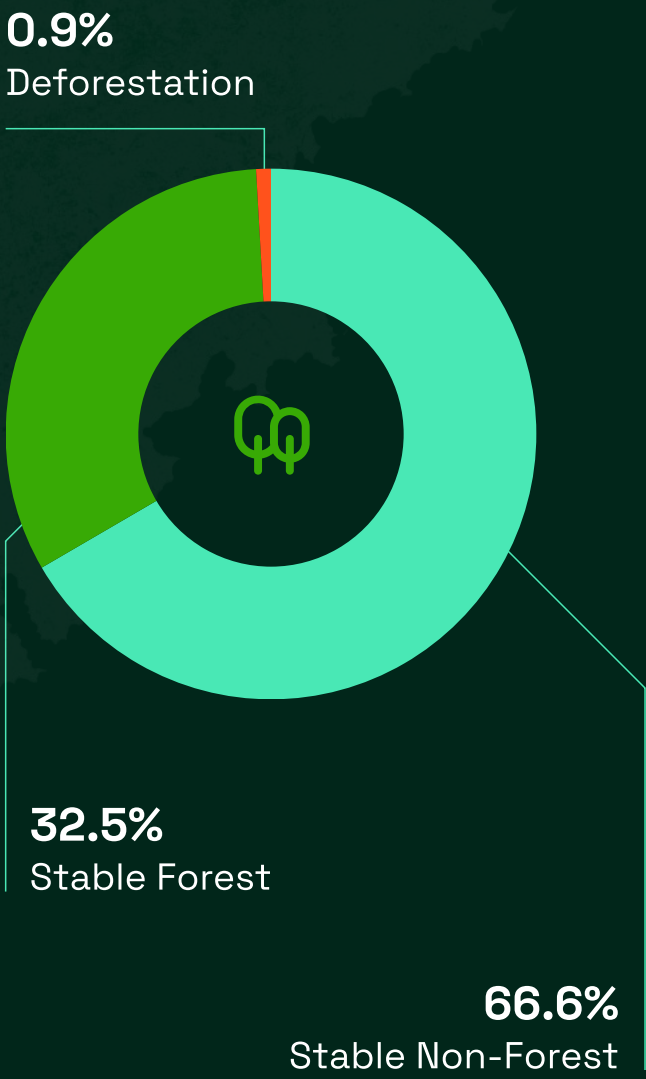
The Caatinga is Brazil’s second most historically degraded biome, after the Atlantic Forest, with **25-50%** of native vegetation altered or destroyed since 1985.⁹

Between 2015 and 2024, the Caatinga experienced a gross loss of **1.58 million hectares** of native vegetation, while regrowth accounted for just **160,000 hectares**. The annual deforestation rate increased from **0.55% (2015–2020)** to **0.66% (2020–2024)**, averaging **0.61%** across the decade. Today, the biome loses roughly **480 hectares per day**, equivalent to **100 trees per minute**, based on a density of 300 trees per hectare.

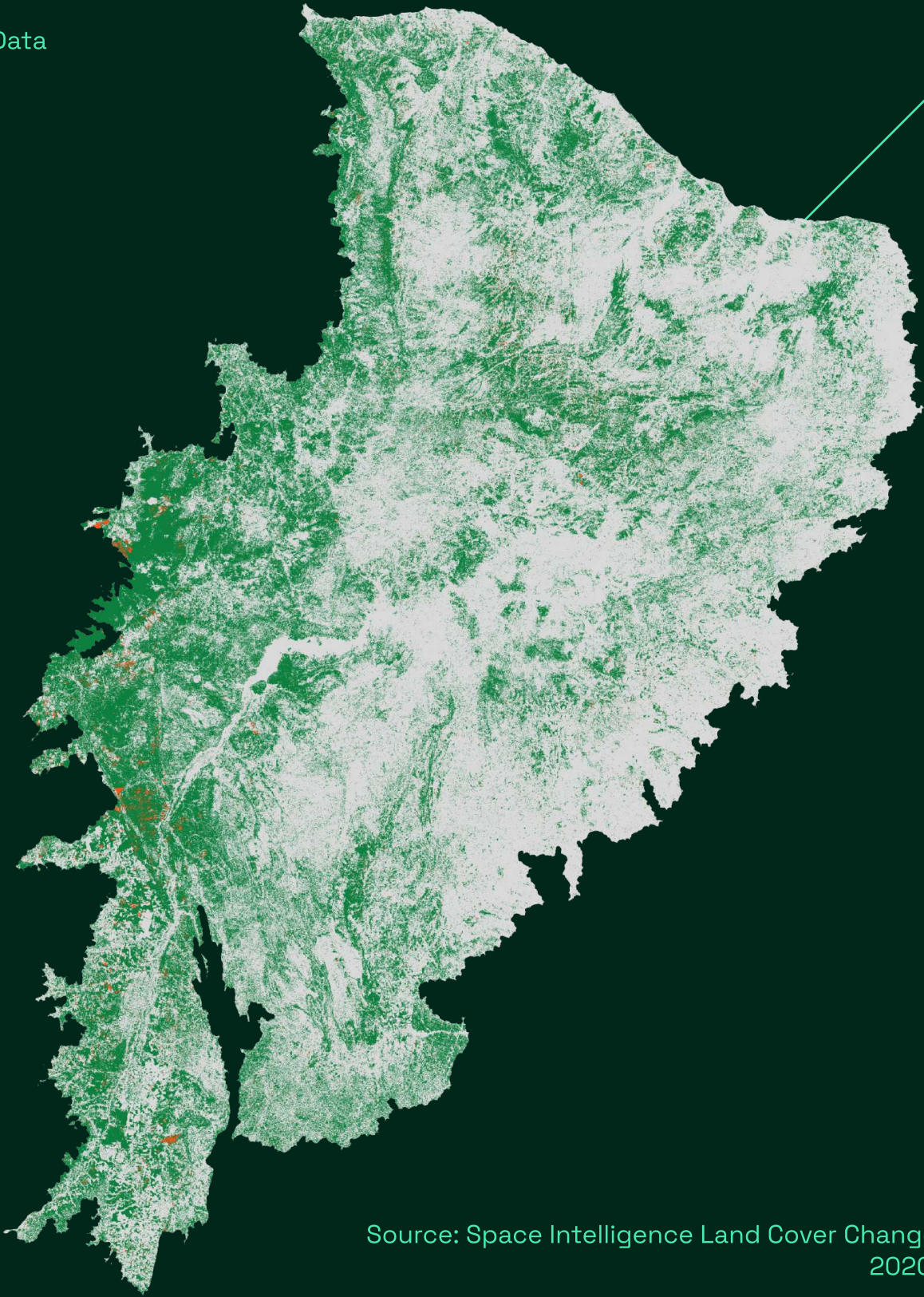
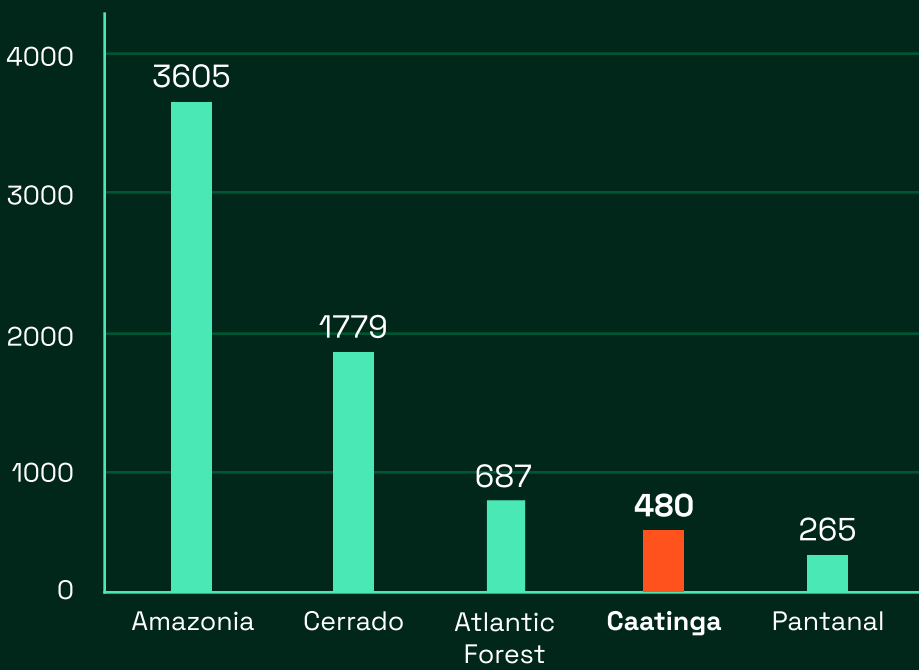
One of the dominant land transitions is from open forest to shrubland or pasture, further degrading habitat quality.



Change classes distribution, 2020-2024
Source: Space Intelligence Land Cover Data



Forest lost per day, per biome, 2024 (ha)
Source: Space Intelligence Land Cover Data



Source: Space Intelligence Land Cover Change Data, 2020-2024

Opportunity for protection

Although arid, intact Caatinga is a remarkably effective carbon sink, storing up to 5 tCO₂e/ha/yr¹⁰. It's thought this is because the higher CO₂ levels of the modern atmosphere have enabled the plants of the Caatinga to grow faster. There are clear opportunities for both REDD+ and ARR interventions, particularly in forested areas. While this report does not cover the full potential of grassland and shrubland restoration, these ecosystems also present valuable opportunities.

In this dry region, tree cover plays a critical role in stabilising soil, storing rainfall, and reducing the risk of flash floods. Because the Caatinga is globally unique and home to many endemic species, careful selection of native vegetation will be essential to ensure restoration efforts protect its distinct ecological character.

Estimated annual sequestration potential:

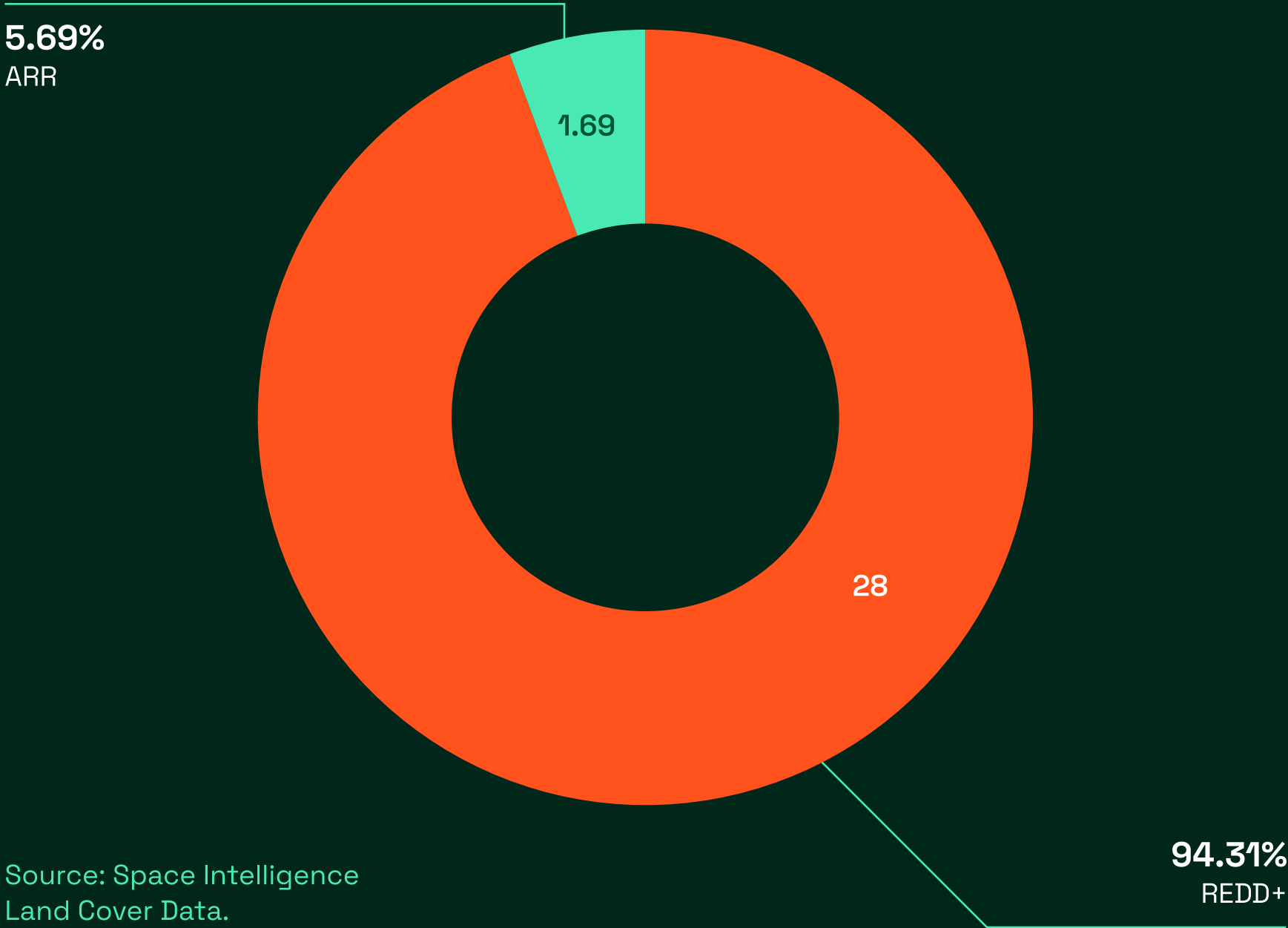
8,433,000 tCO₂
REDD+

472,000 tCO₂
ARR

Average sequestration rate
(over 20 years for ARR):

ARR: 2-5 tCO₂e/
ha/yr

Areas available for ARR and REDD+ in Caatinga (Mha)



Manduri Caatinga

Verra VCS: 5608

The Manduri Caatinga Grouped IFM project focuses on sustainable forest management across **50,000 hectares** of the Caatinga, starting in Mauriti, Ceará. In a biome long affected by illegal and unsustainable exploitation, the project extends harvesting cycles to improve carbon sequestration and reduce pressure to convert native forest. Its goal is to keep forest management economically viable while generating environmental benefits and strengthening Caatinga-based value chains.

Local Impact

Rural communities in the semi-arid Caatinga often lack access to clean water, sanitation, and public health services, relying on seasonal reservoirs that frequently dry up. To address this, the project will invest in social technologies that secure reliable water access, improve sanitation, and support health initiatives in collaboration with local agencies. It will also expand training and income opportunities by involving families, especially women and youth, in biodiversity monitoring, value chain development, and community governance. These efforts build climate resilience, empower vulnerable groups, protect endemic species, and support a forest-based economy that helps keep the Caatinga intact.

Over 50,000 ha

expansion after 1st instance 200 ha

~1 million tCO₂e

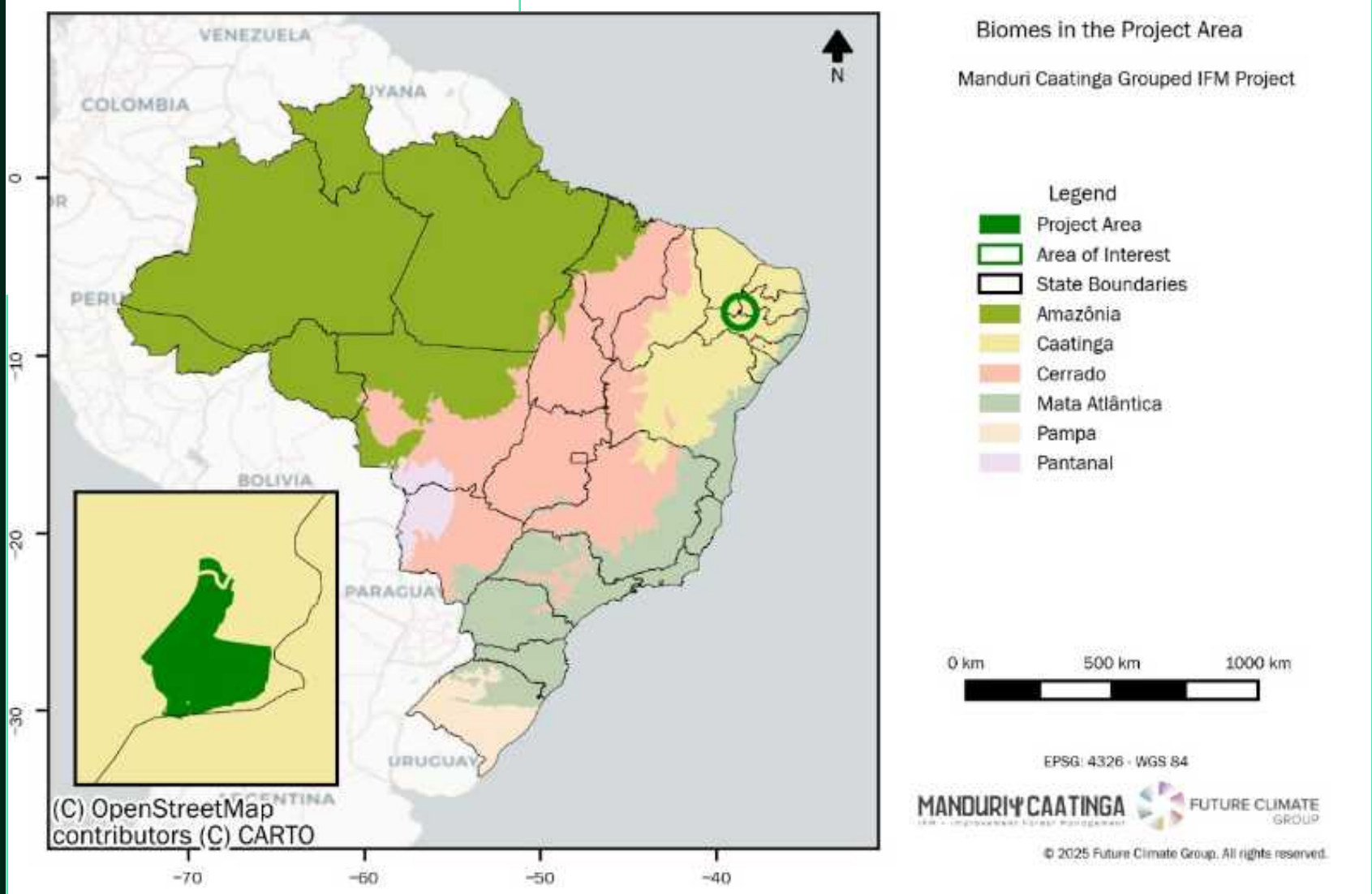
benefit projected over the 40-year project duration



Project type: IFM
Verra VCS Standard: v4.7, VM0003, 1.3
Years operational: 2026-2066
Local partner: APNE – Associação Plantas do Nordeste



Source:
Future Climate Group



Summary Snapshot

0.16 Mha

Forest Gain (2015-2024)

1.58 Mha

Forest Loss (2015-2024)

480 ha/day

Daily Deforestation
(2023 - 2024)

Caatinga’s Carbon Potential

1.69 Mha

Eligible Area for ARR

472,000 tCO₂e

Annual Carbon Potential for ARR

28.7 Mha

Eligible area for REDD+

8.4 million tCO₂e

Annual Carbon Potential for REDD+

0.61%

Annual Deforestation Rate
(2015-2024)

References

- ¹ <https://www.oneearth.org/ecoregions/caatinga/>
- ² Salcedo, I.H., Menezes, R.S.C. 2009. Agroecosystem functioning and management in semi-arid Northeastern Brazil, in: Tiessen, H., Stewart, J.W.B. (eds.): Applying Ecological Knowledge to Landuse Decisions. Inter-American Institute for Global Change Research - IICA-IAI-Scope, Paris, pp. 73–81
- ³ Lambert Moreira, Leticia & Damasceno, et al. 2025. Reflections and Perspectives on the Caatinga Drylands for the Development of Bioactive Plant Products as Medicine. Revista Brasileira de Farmacognosia. 35. 10.1007/s43450-024-00612-w.
- ⁴ <https://www.oneearth.org/ecoregions/caatinga/>
- ⁵ <https://news.mongabay.com/2024/05/research-shows-the-caatinga-is-brazils-most-efficient-carbon-capture-biome/>
- ⁶ https://www.oneearth.org/ecoregions/caatinga
- ⁷ <https://news.mongabay.com/2024/07/for-extinct-spixs-macaw-successful-comeback-is-overshadowed-by-uncertainty/>
- ⁸ Jorge, J.S., Freire, E.M.X. and Caliman, A., 2021. The rupicolous bromeliad (Encholirium spectabile) as a keystone species for Brazilian semiarid biodiversity. Ecology, 102(9), pp.1-5.
- ⁹ https://www.oneearth.org/ecoregions/caatinga
- ¹⁰ <https://news.mongabay.com/2024/05/research-shows-the-caatinga-is-brazils-most-efficient-carbon-capture-biome/>

Authors and contributors



Prof. Ed Mitchard
Co-founder & Chief Scientist

Professor Ed Mitchard has spent ~20 years using satellite data to map the changing carbon stocks of the world’s forests and peatlands. As a professor at Edinburgh University, he published over 100 scientific papers and measured >15,000 trees across 13 countries. He has been deeply involved in the evolution of carbon standards, including Verra’s VCS and the Plan Vivo Standard.



Jocelyne Wardley
Ecologist

Jocelyne Wardley is a tropical ecologist with over four years of experience in ecology and conservation. For the past two years, Jocelyne has worked for Space Intelligence, helping to create various maps across the tropics, including being the lead ecologist on the Brazil mapping. Before this, he has worked for the likes of World Agroforestry, Lions Guardians, and Ol Pejeta Conservancy.

About Space Intelligence

Space Intelligence is a NatureTech company enabling zero deforestation and mass restoration of biodiverse forests globally by providing the highest quality nature mapping data.

We combine our extensive expertise in remote sensing, data analytics, and forest ecology to provide highly accurate and comprehensive baseline reporting and dMRV solutions for forest carbon project developers and investors.

Our approach is rooted in science, with our co-founders leveraging over 30 combined years of academic and on-the-ground research to develop our products, which are used and trusted by some of the largest nature-based market participants, including Everland, Forest Carbon, Wildlife Conservation Society, and Verra.

Contributors

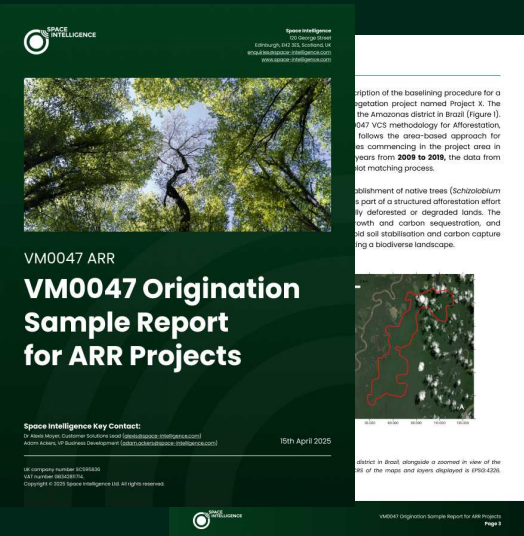
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- Klara Winther, Mapping Quality Expert
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Invest and Offset with Confidence - Backed by Audit-Grade Data

Our geospatial, ecology, and carbon standards expertise underpin our suite of tools and services for carbon project developers and portfolio builders.

With pre-processed data available across Brazil, we have the data, expertise, and agility to help you originate, due diligence, or monitor NbS projects to support Brazil’s carbon capture and storage potential.

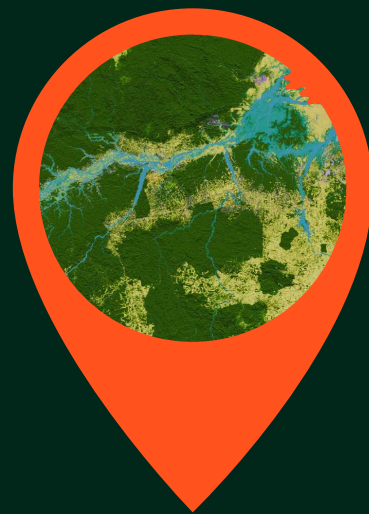
Project Verification



Maximise credit integrity with our support in baseline creation + MRV across avoidance and removals projects, including VM0047 dynamic baseline creation.

[Download our sample report \(VM0047 baseline\) →](#)

Rapid Area Screening (in beta)



Quickly find eligible areas for your ARR or REDD+ projects

[Enquire about the Beta program →](#)

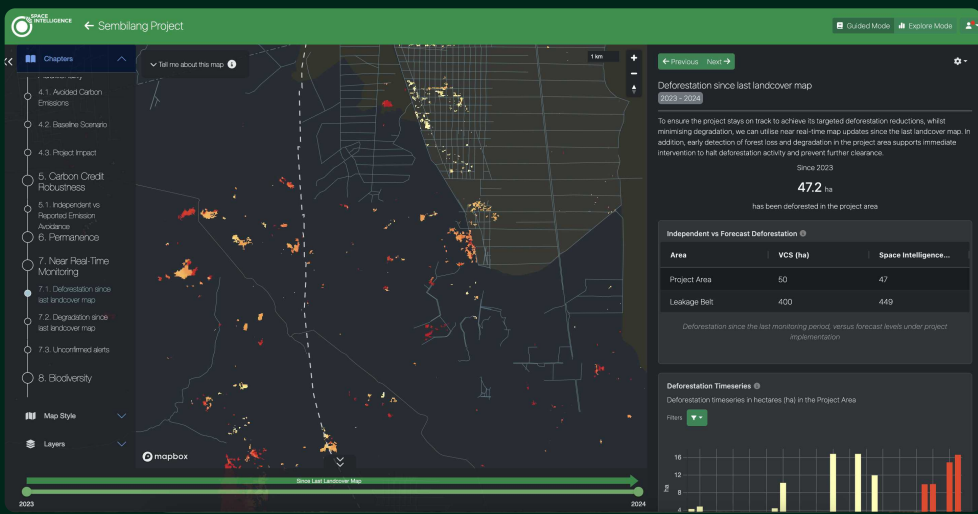
Pre-Feasibility Report



Assess your project’s carbon potential from the outset under VM0048 methodology

[Download the sample report →](#)

Project Monitoring



See project impact and monitor small scale canopy loss in near-real time

[Take the tour →](#)