

F A C T S H E E T



ANNUAL REPORT ON DEFORESTATION IN BRAZIL

MAY | 2024

Fifth year of the most comprehensive deforestation X-ray for **all Brazilian biomes** since 2019, with analyses for different territories and land tenure categories.

Deforestation alerts and native vegetation conversion that were validated and refined based on **high-resolution satellite images**.

Evaluation of illegality indications in deforested sites and an overview of the **enforcement actions** to control and reduce deforestation in the country.

ACCESS THE FULL RAD2023 REPORT AND MAPBIOMAS ALERTA'S PLATFORM AT:

<http://alerta.mapbiomas.org>

DEFORESTATION IN BRAZIL AND PER BIOME

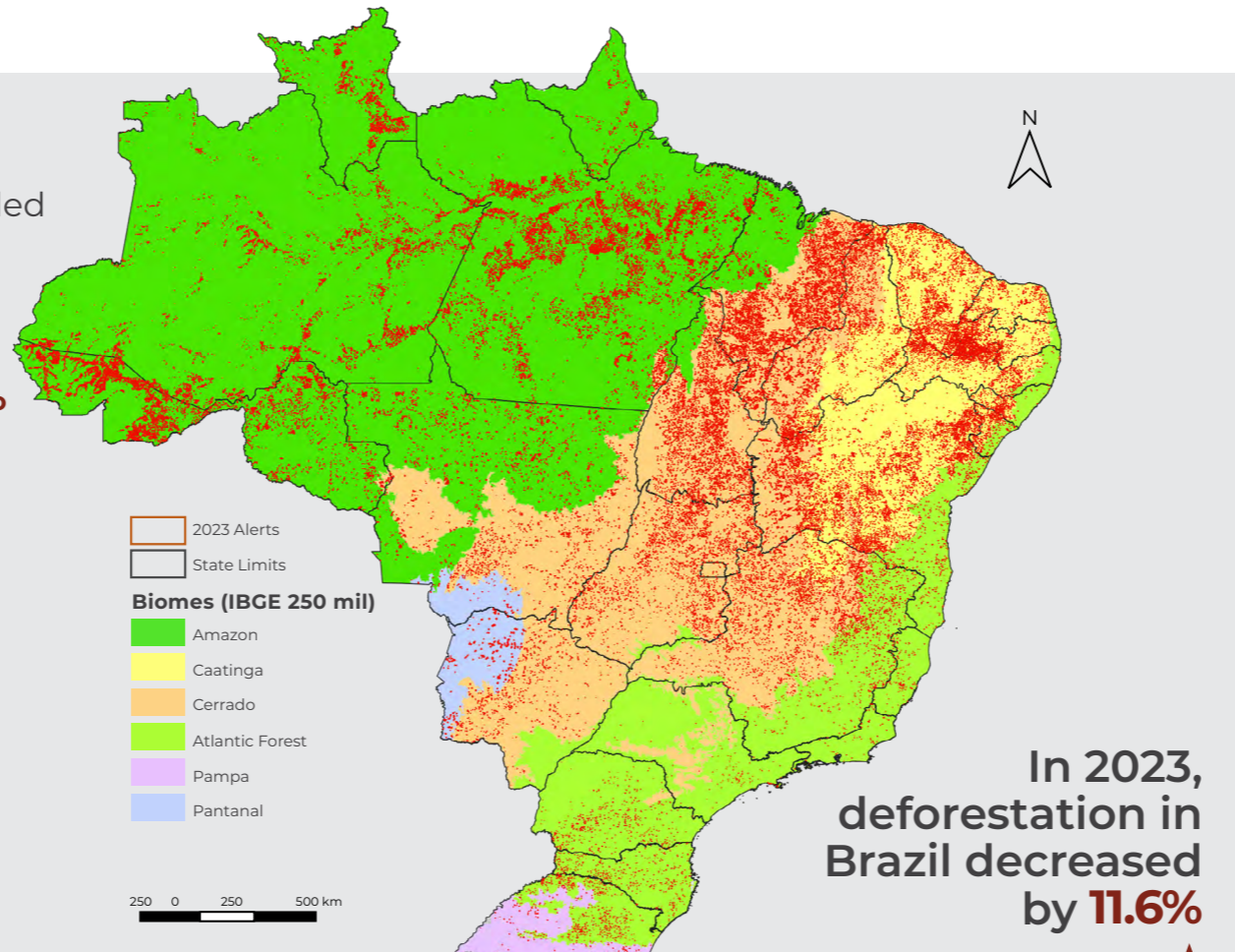
IN 2023

Amazon and Cerrado corresponded to **more than 85%** of the total deforested area in the country.

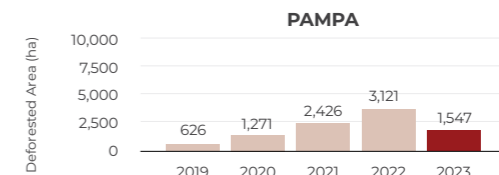
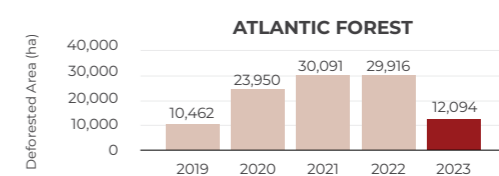
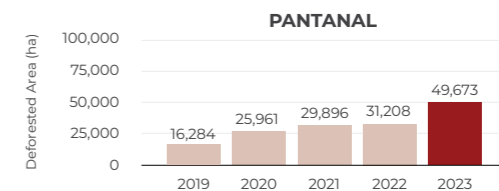
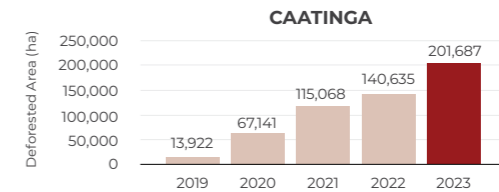
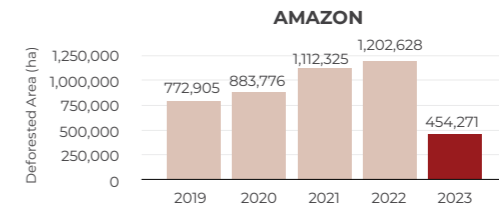
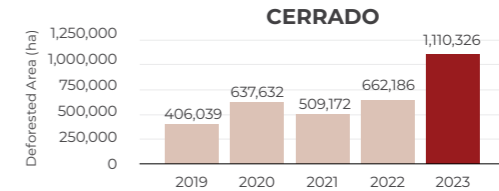
For the first time, deforestation in the **Cerrado** surpassed the Amazon, featuring the largest deforestation rates in the country with a total of 1,110,326 hectares, an **increase of 67.7%***.

In the **Amazon**, there was a deforestation **decrease of 62.2%**.

Deforestation in the **Pantanal** increased by **59.2%**, as did the **average size of alerts** (mean of **158.2 hectares**, an increase of 35.9%), the largest among the biomes.



In 2023, deforestation in Brazil decreased by **11.6%**



Over the last 5 years, Brazil lost around **8,558,237 ha** of native vegetation.

This corresponds to **2x** the area of the state of Rio de Janeiro

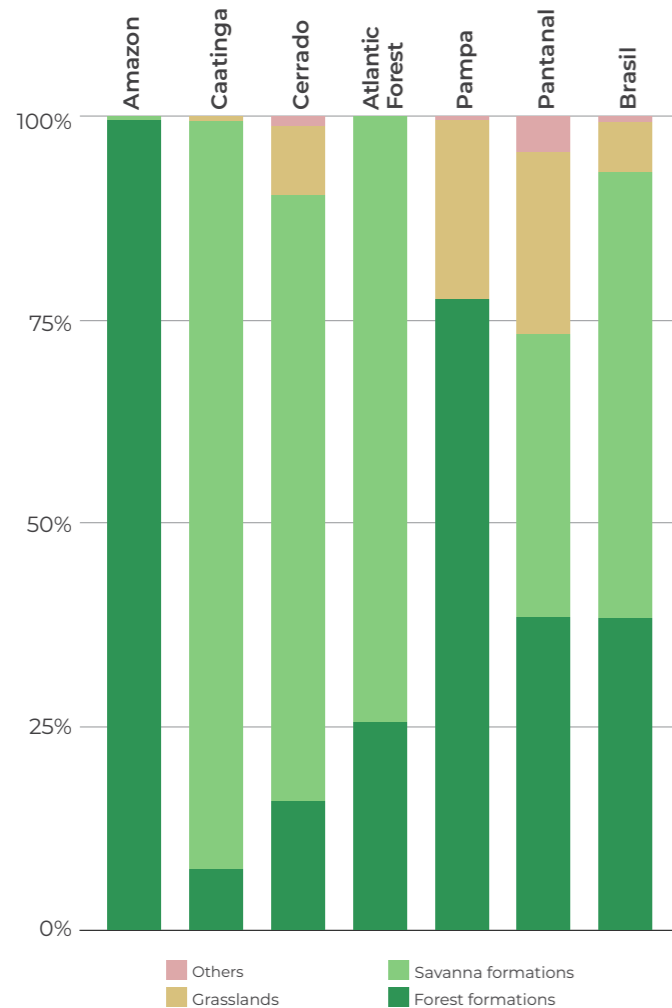


Alert Validation	2019	2020	2021	2022	2023	2022-2023 Variation
Count of alerts published by MapBiomas Alerta	56,511	98,987	81,641	76,670	83,353	8.7%
Total deforested area (ha)	1,220,236	1,639,730	1,798,978	2,069,695	1,829,597	-11.6%

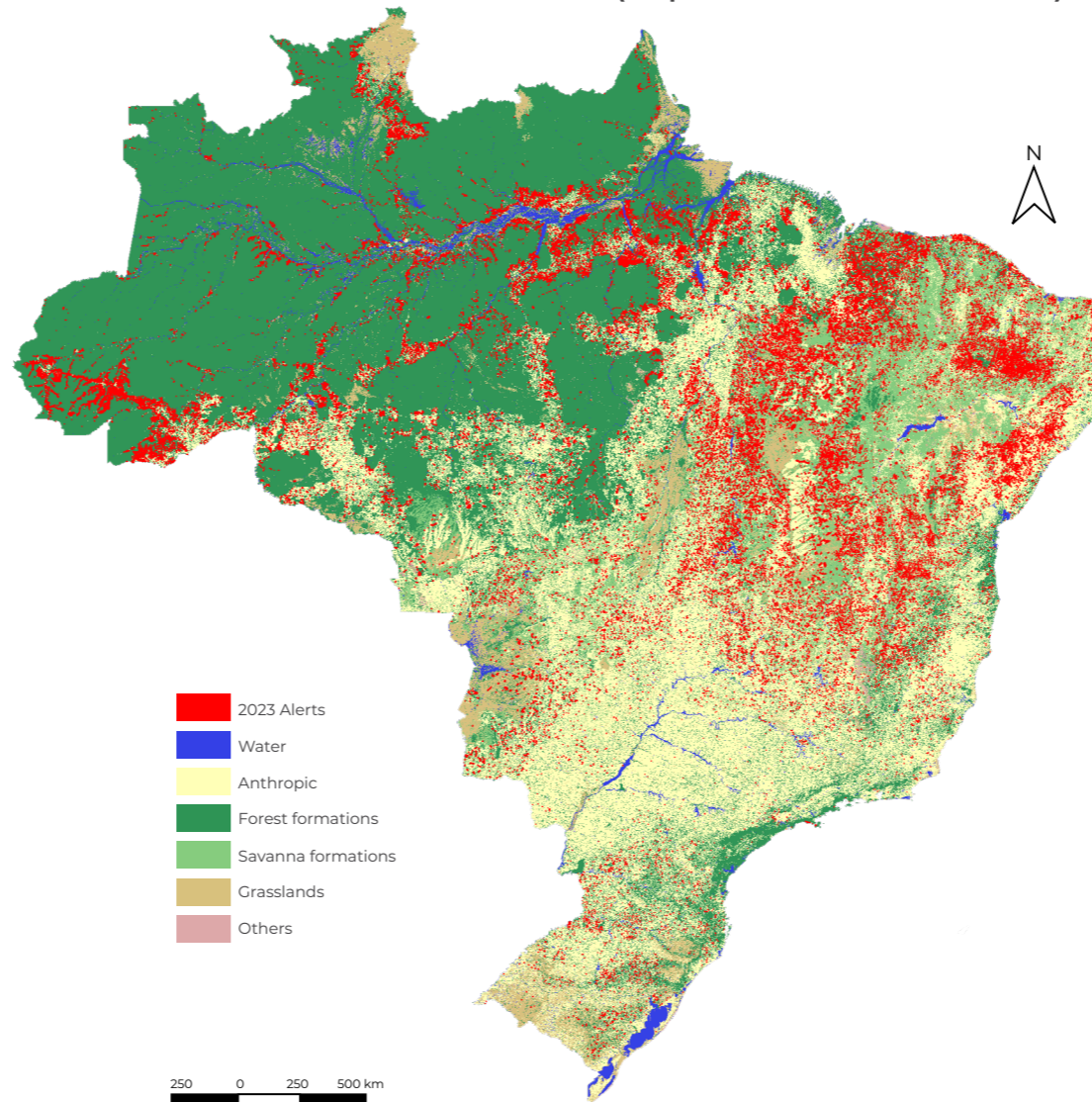
*The increase in the Cerrado is due to an increase in deforestation, improvements in detection systems, and the integration of a new detection source (SAD Cerrado/IPAM).

NATIVE VEGETATION TYPES MOST IMPACTED BY DEFORESTATION

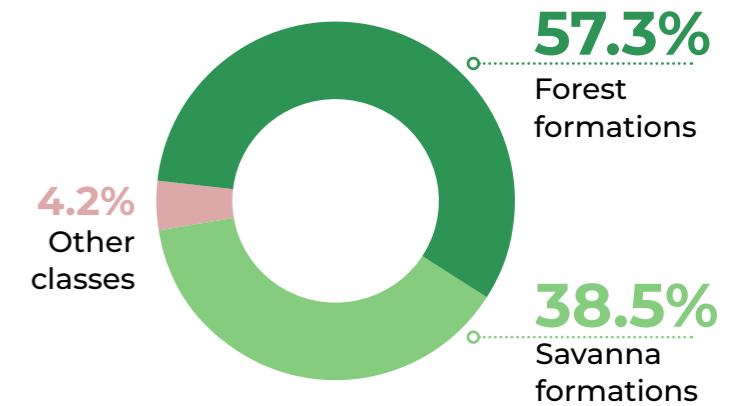
For the first time, in **2023**, **savanna** was the most affected native vegetation type in Brazil, with **54.8%** of the total deforested area. Forest formations follow with 38.5%*.



Deforested land in 2023 overlaid with land cover map of 2022 (MapBiomias Brazil Collection 8)



Proportion of **vegetation types deforested** after December 31, 2020

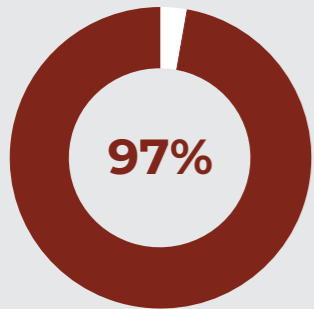


Considering the **new European Union Deforestation-Free Regulation**, a total of 208,522 deforestation events were identified in Brazil after **December 31st, 2020, covering an area of 4,885,688 ha.**

This restriction might affect **~230,000 rural** properties (3.1% of the 7,5M registered private properties on CAR - National Environmental Rural Registry).

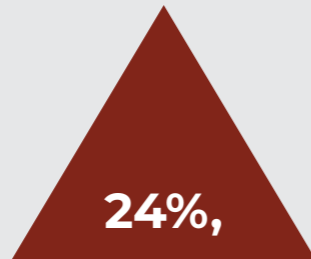
DEFORESTATION DRIVERS

Deforestation driven by **agriculture** accounts for more than

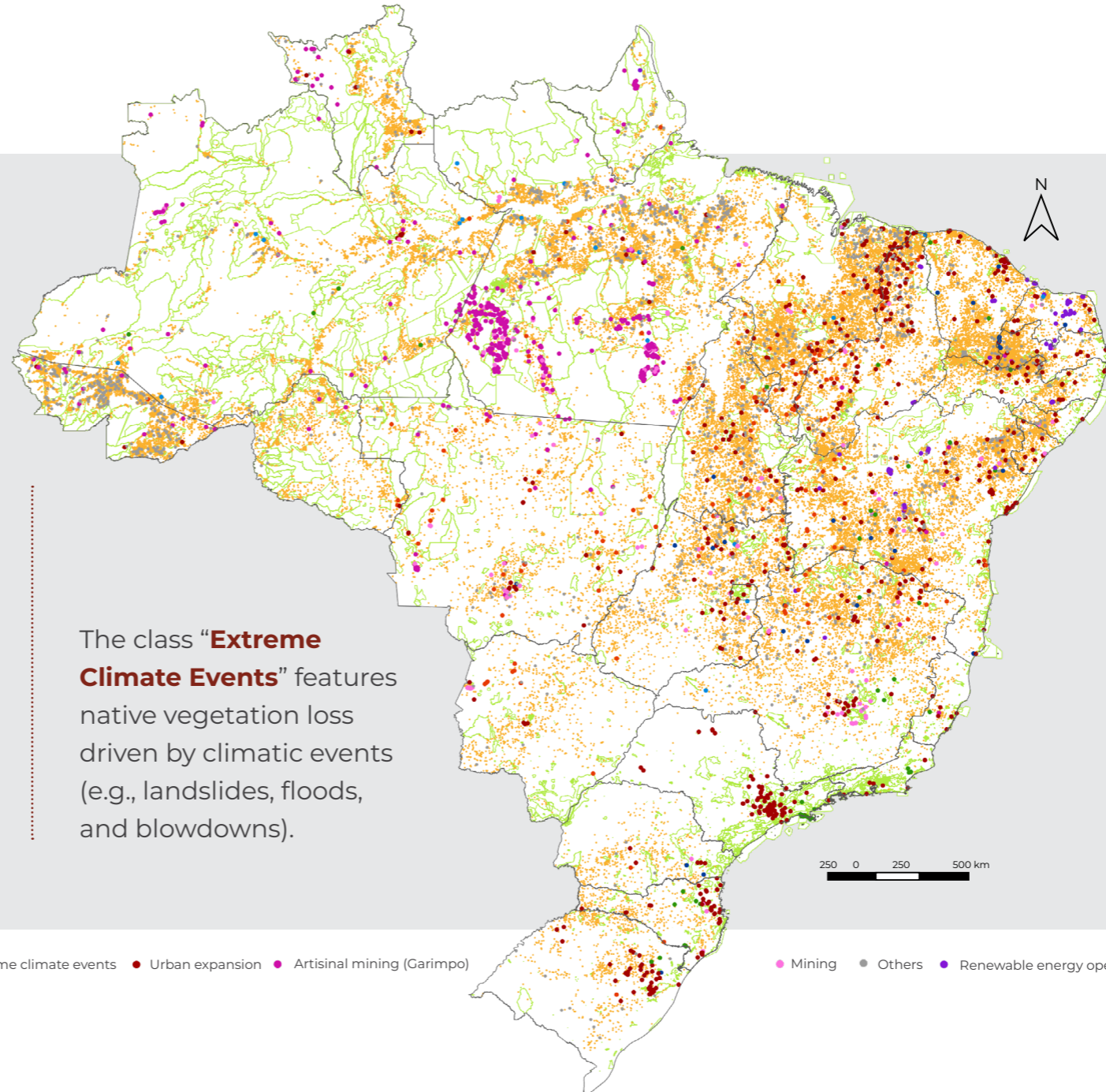


of all native vegetation loss in Brazil over the last five years.

In the **Caatinga**, deforestation driven by **solar and wind energy projects** increased by



with the loss of more than **4,302 hectares**.



The class "**Extreme Climate Events**" features native vegetation loss driven by climatic events (e.g., landslides, floods, and blowdowns).

IN THE PAST FIVE YEARS

Urban expansion cleared **18,560 ha** of native vegetation.

37,175 ha were deforested due to **Garimpo**, mostly in the state of **Pará**.

Protected areas States Drivers Farming Aquaculture Roads Extreme climate events Urban expansion Artisanal mining (Garimpo)

Mining Others Renewable energy operations Dams

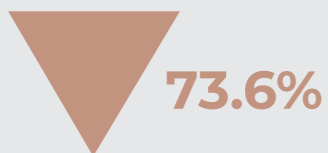
CRITICAL AREAS OF DEFORESTATION

In the last 5 year, the **LEGAL AMAZON** territory lost 5,895,301 ha of native vegetation. In 2023, the region lost 973,018 ha, a decrease of

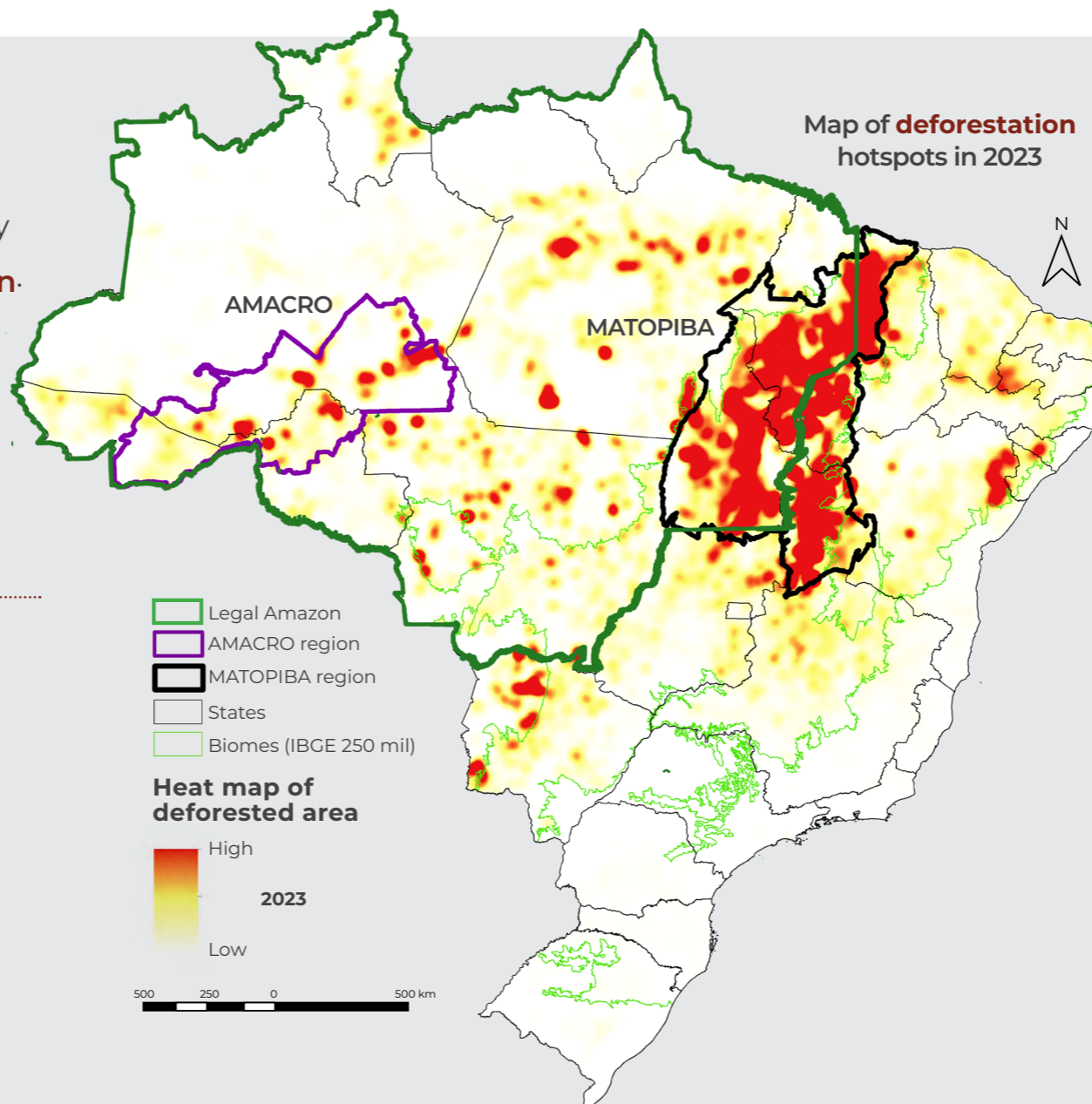


relative to 2022.

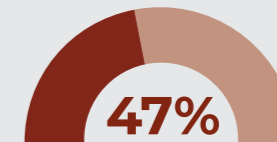
The **AMACRO** region had a decrease of



in deforestation compared to 2022. There were **5,587 alerts** registered in 2023, a total of 102,956 ha.



IN 2023



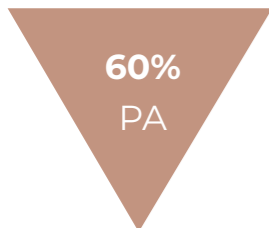
of all native vegetation lost across the country occurred in the **MATOPIBA** region, with a total of 858,952 ha cleared.

This represents an **increase of**



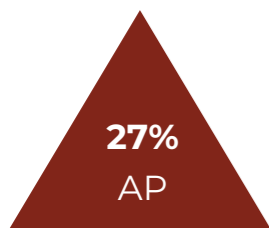
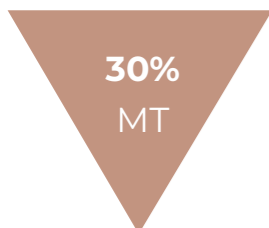
relative to 2022, which had already registered record deforestation rates compared to 2021.

DEFORESTATION BY STATE

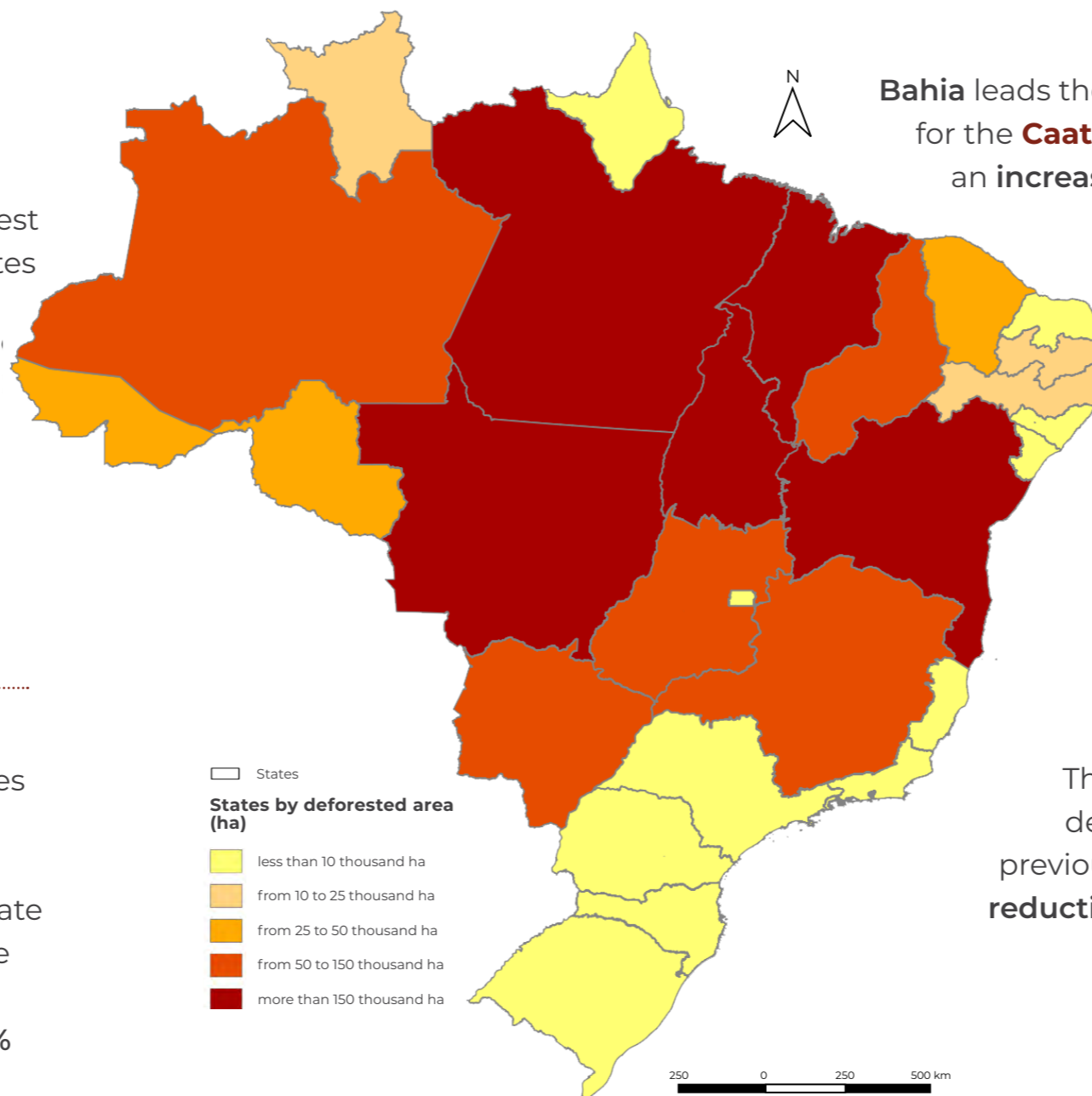


Pará and **Mato Grosso** are still within the top 5 states with highest deforestation rates in 2023.

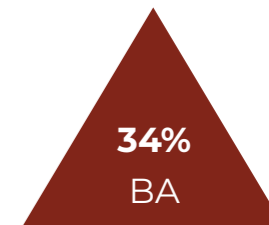
However, there was a **decrease of more than 60% in the Para and over 30% in Mato Grosso.**



All **Amazon** states had a decrease in deforestation, except for the state of **Amapá**, where deforestation **increased in 27%**



Bahia leads the deforestation rank by state for the **Caatinga** biome, with 93,437 ha – an **increase in 34%** compared to 2022.



Except for Piauí, São Paulo, and Paraná, all states part of the **Cerrado** biome registered a **deforestation increase in 2023** compared to 2022.



The **Atlantic Forest** featured a decrease in 59% relative to the previous year, with a **deforestation reduction** in all states in the biome.



DEFORESTATION BY STATE

Maranhão went from 5th to the top position in the deforestation ranking for the first time. It **increased 95.1%** compared to 2022, a total of **331,225 ha** of native vegetation loss.

Deforestation in the states of **MA**, **TO**, and **BA** surpassed the Amazon states. Deforestation in the state of **PI** continued stable since last year.

States	Native vegetation area (ha) in 2022**	Deforested area (ha)					Rank 2022	Rank 2023	Participation 2023	2022-2023 Variation	Percentage of native vegetation loss in the state
		2019	2020	2021	2022	2023					
Maranhão	20,596,929	81,224	232,584	178,984	169,802	331,225	5	1 ↑	18.1%	95.1%	1.61%
Bahia	30,053,407	64,561	113,073	152,644	227,991	290,606	4	2 ↑	15.9%	27.5%	0.97%
Tocantins	17,116,783	104,169	109,824	63,386	82,853	230,253	9	3 ↑	12.6%	177.9%	1.35%
Pará	101,012,736	300,256	385,963	469,423	465,074	184,763	1	4 ↓	10.1%	-60.3%	0.18%
Mato Grosso	54,931,809	201,086	200,126	204,990	237,619	161,381	3	5 ↓	8.8%	-32.1%	0.29%
Piauí	19,630,808	42,458	77,035	68,887	148,282	135,985	6	6 ●	7.4%	-8.3%	0.69%
Amazonas	152,913,166	126,245	133,747	214,304	275,319	87,762	2	7 ↓	4.8%	-68.1%	0.06%
Mato Grosso do Sul	14,371,402	28,784	52,036	56,260	49,073	82,695	11	8 ↑	4.5%	68.5%	0.58%
Minas Gerais	21,416,949	26,353	46,449	47,497	50,346	74,517	10	9 ↑	4.1%	48.0%	0.35%
Goiás	10,368,422	33,678	54,456	32,098	30,869	69,541	12	10 ↑	3.8%	125.3%	0.67%
Rondônia	14,425,742	122,725	119,796	146,476	139,824	41,747	7	11 ↓	2.3%	-70.1%	0.29%
Ceará	10,137,714	849	8,860	20,474	23,205	32,486	14	12 ↑	1.8%	40.0%	0.32%
Acre	14,002,621	57,238	58,058	75,748	92,677	28,707	8	13 ↓	1.6%	-69.0%	0.21%
Roraima	21,169,744	24,189	23,153	23,669	23,624	21,792	13	14 ↓	1.2%	-7.8%	0.10%
Pernambuco	4,924,108	132	3,766	14,442	21,886	16,236	15	15 ●	0.9%	-25.8%	0.33%
Paraíba	3,089,999	11	2,751	6,834	6,421	13,258	16	16 ●	0.7%	106.5%	0.43%
Rio Grande do Norte	2,790,013	71	3,927	6,597	3,500	9,135	20	17 ↑	0.5%	161.0%	0.33%
Alagoas	600,082	60	952	918	3,149	5,361	21	18 ↑	0.3%	70.2%	0.89%
Sergipe	399,040	258	846	1,495	3,658	5,076	19	19 ●	0.3%	38.8%	1.27%
Rio Grande do Sul	14,486,050	1,125	2,159	3,748	5,231	2,343	17	20 ↓	0.1%	-55.2%	0.02%
Amapá	13,928,176	1,461	1,628	784	1,095	1,392	23	21 ↑	0.1%	27.1%	0.01%
Paraná	5,888,783	2,140	5,559	6,987	4,035	1,180	18	22 ↓	0.1%	-70.7%	0.02%
Santa Catarina	4,446,214	487	1,761	1,471	2,320	734	22	23 ↓	<0.1%	-68.4%	0.02%
Distrito Federal	235,210	95	153	125	90	638	27	24 ↑	<0.1%	612.5%	0.27%
Espírito Santo	1,229,706	86	217	114	503	349	25	25 ●	<0.1%	-30.6%	0.03%
São Paulo	5,911,264	370	530	462	754	281	24	26 ↓	<0.1%	-62.7%	0.00%
Rio de Janeiro	1,546,556	125	321	161	495	155	26	27 ↑	<0.1%	-68.6%	0.01%
TOTAL (BRAZIL)	561,623,430	1,220,236	1,639,730	1,798,978	2,069,695	1,829,597				-11.6%	0.33%

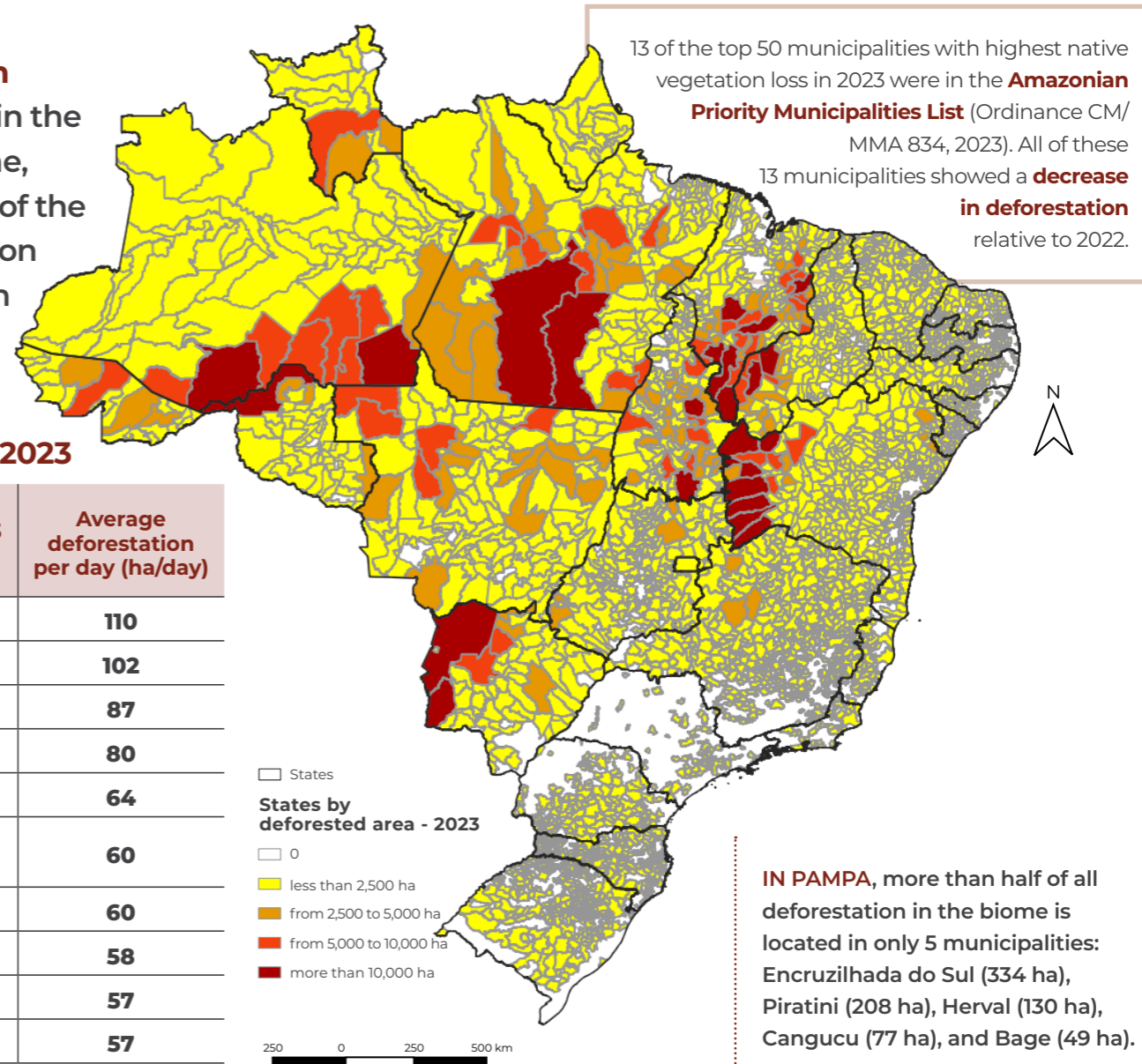
*States of MATOPIBA: Maranhao, Tocantins, Piaui and Bahia.
** Source: MapBiomas Collection 8 - year 2022.

DEFORESTATION BY MUNICIPALITY

63%

of the 5,572 Brazilian municipalities (**3,511**) had at least one deforestation event detected and validated in 2023.

8 of the top 10 municipalities with highest deforestation rates were in the Cerrado biome and for the first time, 1 in the Pantanal (Corumbá). Only 1 of the top municipalities was in the Amazon (Altamira), which had a reduction in deforestation relative to 2022.



Top 10 municipalities in the country with the highest deforestation rates in 2023

Rank	UF	Municipality	2019	2020	2021	2022	2023	2022-2023 variation	Average deforestation per day (ha/day)
1	BA	São Desidério	2,312.4	12,470	17,428	36,594.8	40,052.3	9%	110
2	MA	Balsas	8,010.6	22,744	17,637	28,156.9	37,363.1	33%	102
3	BA	Jaborandi	7,799.0	7,626	13,467	20,927.5	31,626.0	51%	87
4	MA	Alto Parnaíba	1,773.5	3,332	4,639	7,407.6	29,236.8	295%	80
5	MS	Corumbá	6,570.4	13,985	10,832	15,756.6	23,425.6	49%	64
6	PI	Baixa Grande do Ribeiro	8,150.4	8,955	4,190	11,774.4	21,768.8	85%	60
7	TO	Rio Sono	2,455.1	3,009	1,271	2,258.4	21,767.7	864%	60
8	BA	Cocos	3,800.7	1,531	9,156	3,614.1	21,290.1	489%	58
9	PA	Altamira*	54,250.6	60,676	71,261	61,486.3	20,920.1	-66%	57
10	BA	Barreiras	5,390.6	5,001	5,319	13,623.5	20,881.6	53%	57

IN PAMPA, more than half of all deforestation in the biome is located in only 5 municipalities: Encruzilhada do Sul (334 ha), Piratini (208 ha), Herval (130 ha), Canguçu (77 ha), and Bage (49 ha).

*Municipalities presented in the list of priority municipalities in the Amazon according to Ordinance GM/MMA No. 834, of November 9, 2023.

DEFORESTATION THROUGHOUT THE YEAR AND DEFORESTATION SPEED

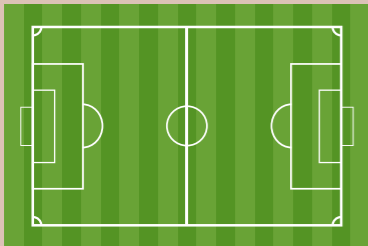
In **2023**, the mean deforested area per day was 5,013 ha for the entire country - or **228 ha per hour**.

The **Cerrado** biome alone accounted for **3,042 ha of daily** native vegetation loss

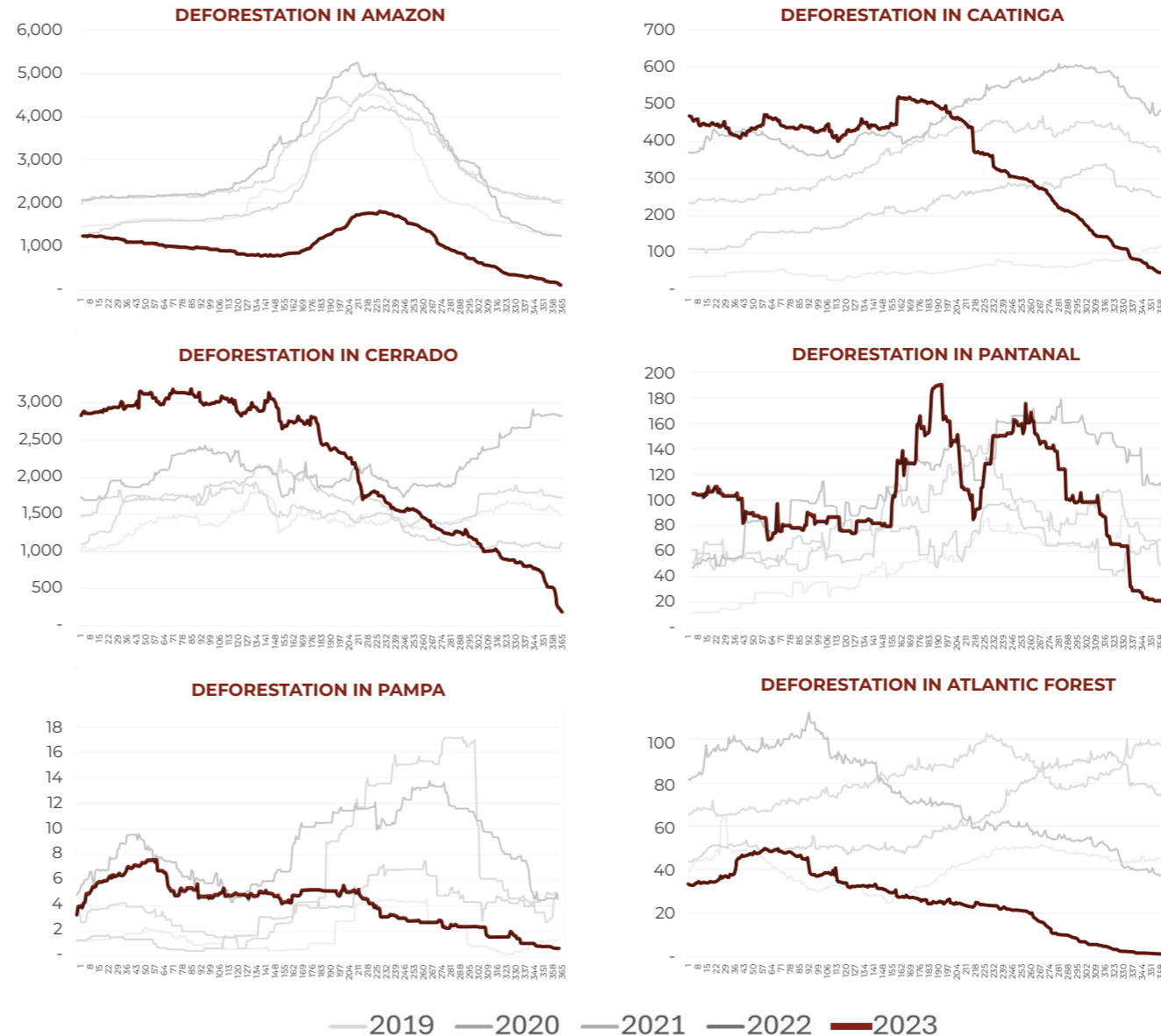
1,245 ha of native vegetation were lost per day in the Amazon, which corresponds to **8 trees per second**.

February 15th was the day with the largest deforested area in 2023 – in a single day, an area of about

5,884 soccer fields was cleared.



Monthly distribution of deforestation per biome in 2023 – estimated deforested area per day in Brazil over the last 5 years (in hectares).*



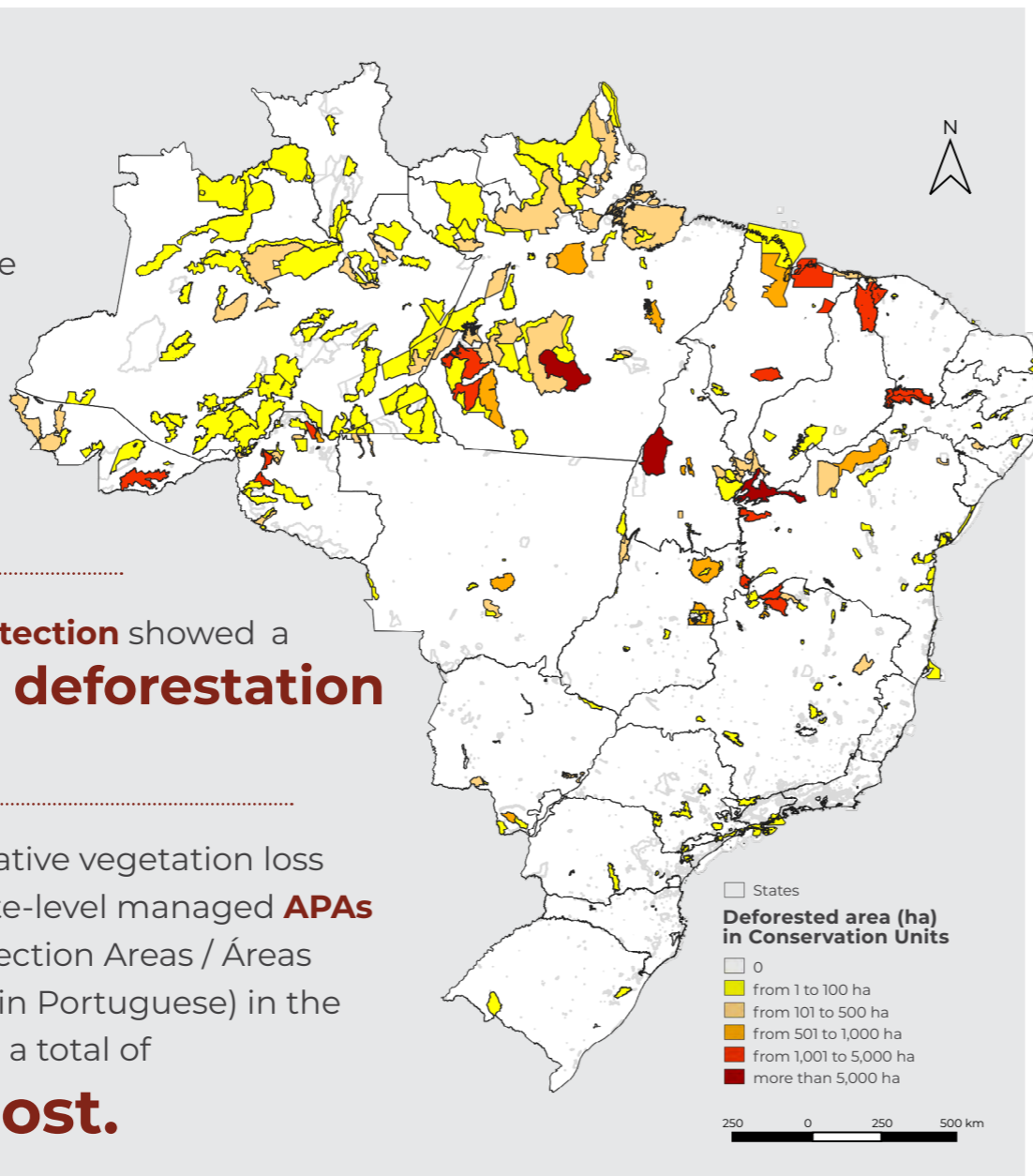
*The area of alerts reported in the second semester of 2023 might suffer small alterations in the next year's annual report due to differences in the "before and after deforestation" imagery used for validation and refinement.

DEFORESTATION IN PROTECTED AREAS

96,761 ha of native vegetation in **UCs** (Conservation Units protected areas) were lost in 2023, which corresponds to a **decrease in 53.5%** relative to 2022.

UCs under **strict protection** showed a **reduction in deforestation of 72.3%**

The largest area of native vegetation loss was identified in state-level managed **APAs** (Environmental Protection Areas / Áreas Proteção Ambiental in Portuguese) in the **Cerrado** biome, with a total of **41,934 ha lost.**



Deforestation area (ha) in Brazilian protected areas from 2019 to 2023

Level of management and category of UCs	2019	2020	2021	2022	2023	2022-2023 variation	Total
Federal - strictly protected	6,520	6,532	6,792	9,318	1,974	-78.8%	31,136
Federal - Sustainable use	38,257	41,420	56,929	48,234	22,160	-54.1%	207,000
State - strictly protected	13,147	20,210	26,513	29,417	8,758	-70.2%	98,044
State - sustainable use	88,737	98,345	111,179	120,593	62,365	-48.3%	481,220

In 2022, **APA Rio Preto** was in 2nd in the deforestation ranking with 33,348 ha, a **reduction of 57.8%**

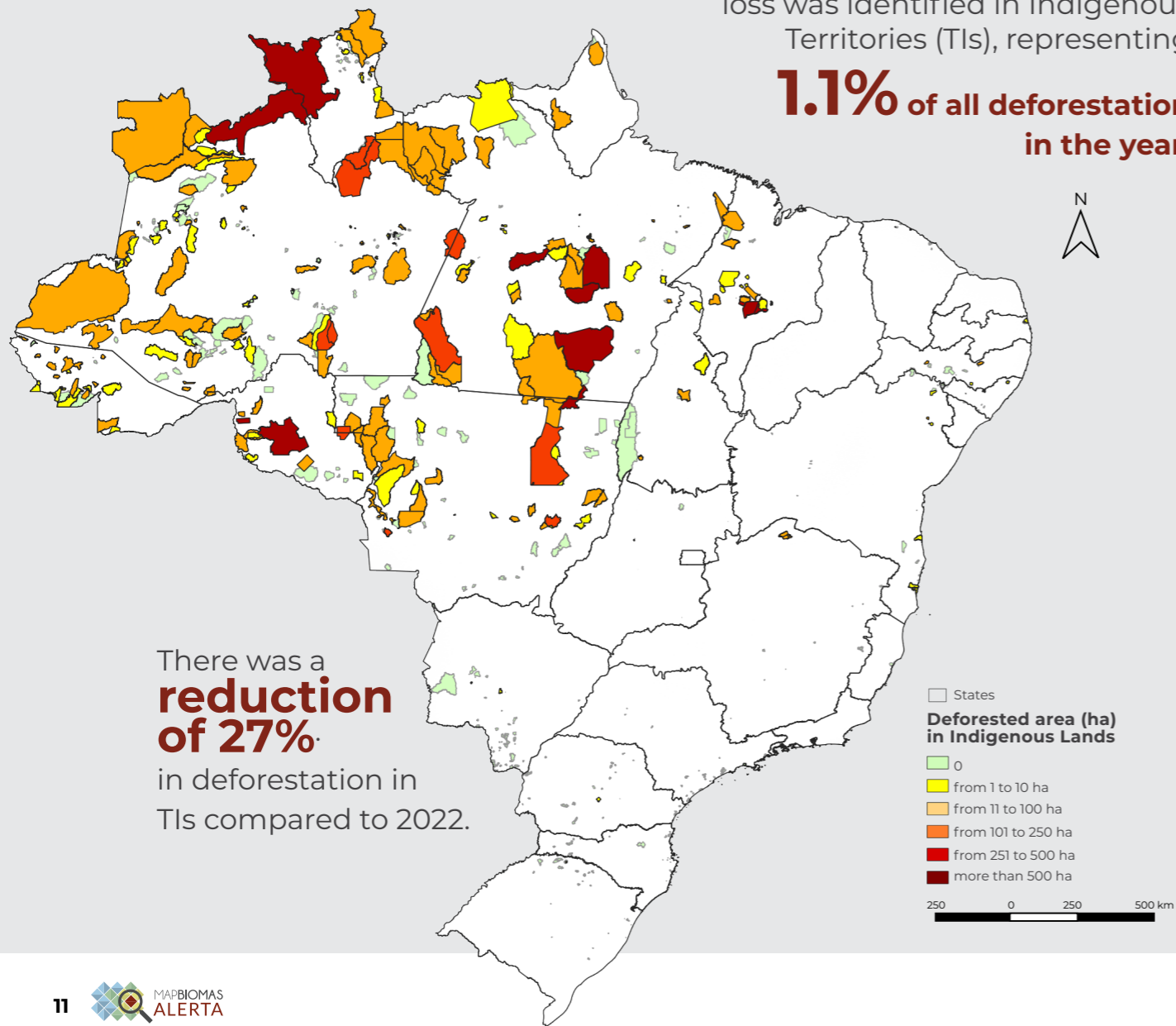
57.8%

RANK	NAME AND ID CODE OF EACH UC ON SNUC	ALERT COUNT	DEFORESTED AREA (HA)
1	APA do Rio Preto (0000.29.1016)	223	14,066
2	APA Ilha do Bananal/Cantão (0000.17.1501)	223	11,638
3	APA Triunfo do Xingu (0000.15.1039)	200	9,391
4	APA Serra da Ibiapaba (0000.00.0029)	413	4,691
5	APA da Chapada do Araripe (0000.00.0008)	656	4,636

DEFORESTATION IN INDIGENOUS LANDS

In 2023, 20,822 ha of native vegetation loss was identified in Indigenous Territories (TIs), representing

1.1% of all deforestation in the year.



There was a **reduction of 27%** in deforestation in TIs compared to 2022.

Deforestation area (ha) in Indigenous Lands (TIs) in Brazil from 2019 to 2023

Deforestation in TIs compared to the total deforestation in Brazil	2019	2020	2021	2022	2023	2022-2023 variation	Total
Deforested area (ha) in TIs	35,912	33,806	32,543	28,502	20,822	-26.9%	151,585
Deforested area (ha) in Brazil	1,220,236	1,639,730	1,798,978	2,069,695	1,829,597	-11.6%	8,558,237
% deforestation in TIs	2.9%	2.1%	1.8%	1.4%	1.1%	-21%	1.8%

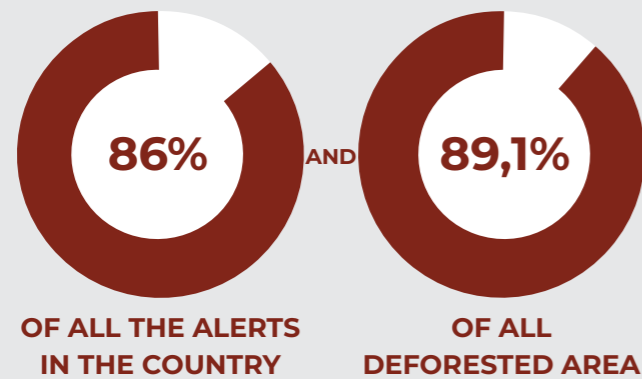
RANK	NAME OF THE TI AND ID CODE FROM FUNAI'S DATABASE	ALERT COUNT	DEFORESTED AREA (HA)
1	Porquinhos dos Canela-Apãnjekra (36602)	32	2,750
2	Kanela Memortumré (20702)	17	2,006
3	Apyterewa (3002)	265	1,458
4	Kapôt Nhinore (64501)	7	1,228
5	Cachoeira Seca (7601)	199	1,084

The area is **74% smaller** than the area observed in the **TI Apytarewa** that ranked first in this category in 2022.

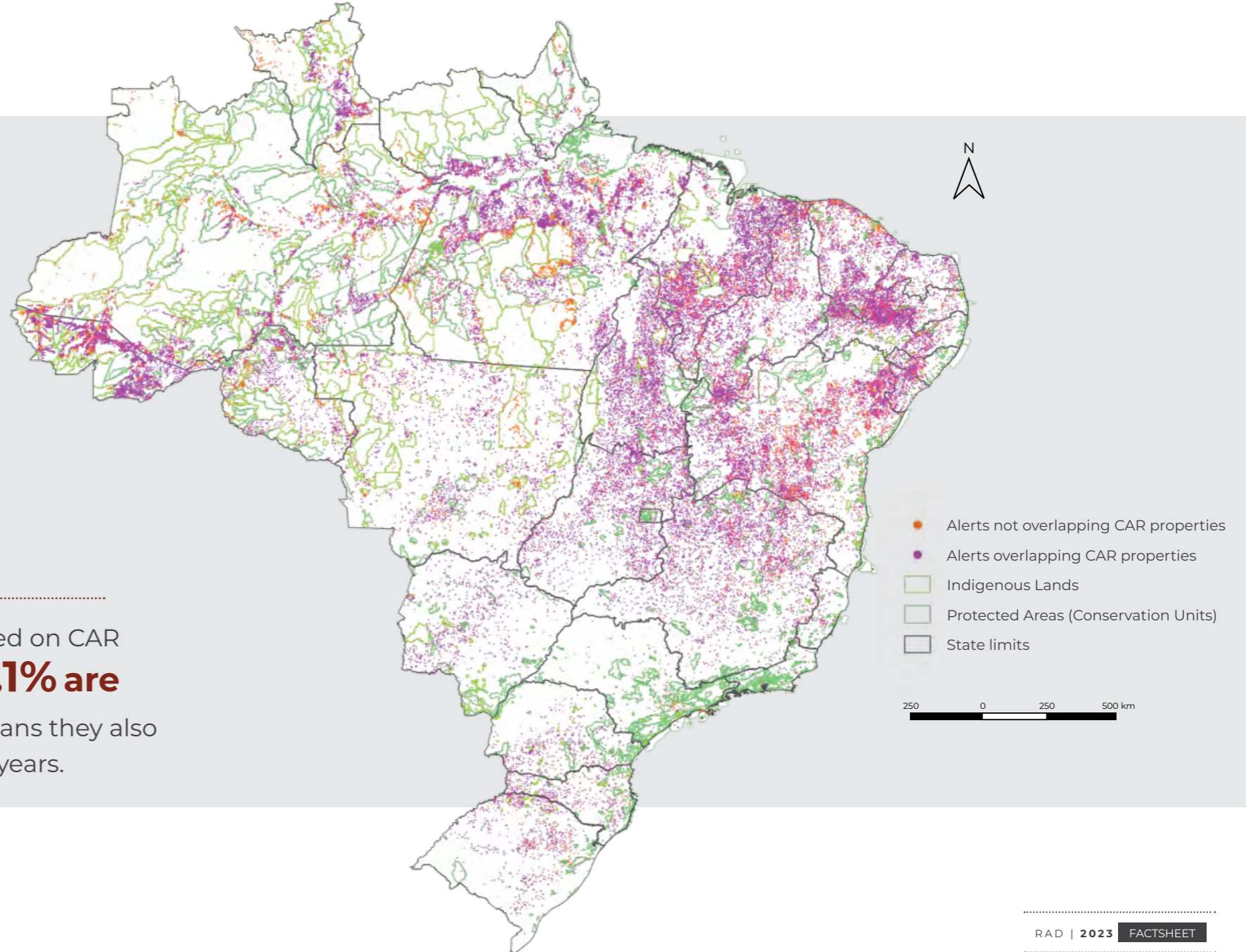
74%

DEFORESTATION IN PRIVATE LANDS REGISTERED ON SICAR

Although **0.96% of all properties registered on CAR** had deforestation records in 2023, they were responsible for



From a total of **71,689 properties** registered on CAR with validated deforestation in 2023, **43.1% are recurrent deforesters**, which means they also featured deforestation events in previous years.

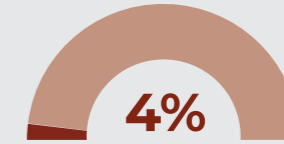
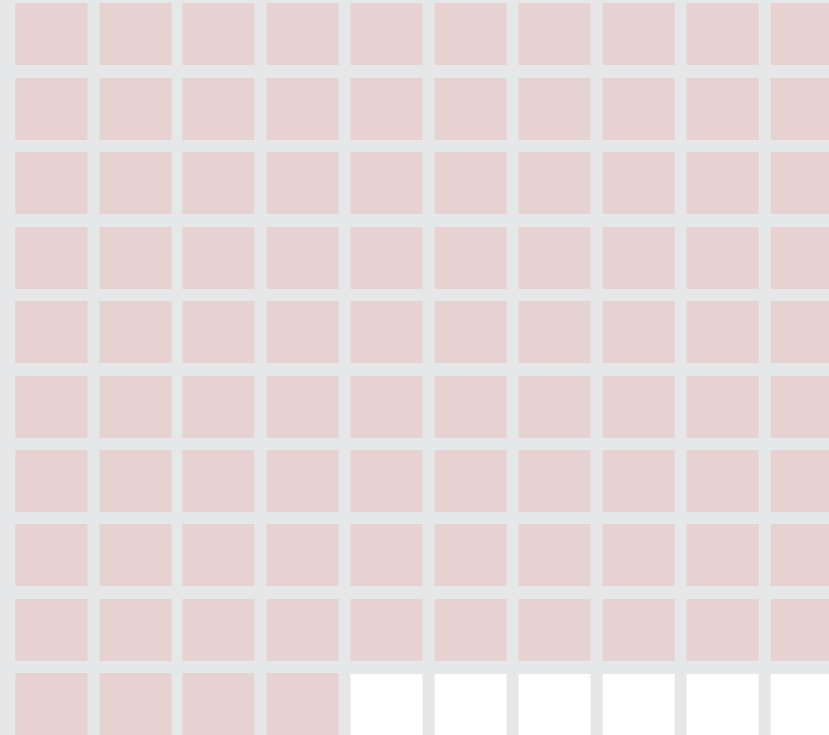


INDICATION OF ILLEGALITY

CRITERIA:

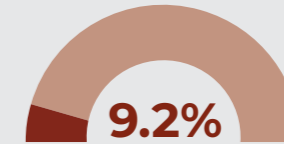
- (i) Overlap with authorized areas for suppression of native vegetation;
- (ii) No overlap with Indigenous Territories or strictly protected Conservation Units;
- (iii) No overlap with Legal Reserves and Permanent Preservation Areas;
- (iv) No overlap with areas covered by Sustainable Forest Management Plans
- (v) No overlap with embargoed areas

Over 93% of the deforested area in Brazil in 2023 had at least one indication of illegality.



4%

of the total deforested area in Brazil over the past five years **has no indications of illegality** or irregularity.



9.2%

In the **Cerrado**, 9.2% of the deforested area in 2023 **has no indication of illegality**.

DEFORESTATION IN LEGAL RESERVES (CONSERVATION SET ASIDES IN PRIVATE LANDS)

Over the past five years, Brazil lost **1,215,096 hectares of native vegetation** within RLs. This corresponds to **14.2% of the total deforestation area in the country** during this period.

The Cerrado was the biome with the highest increase in deforestation within RLs. There was a 136% increase, totaling 136,368 hectares of native vegetation lost in RLs across the biome in 2023.

136%
CERRADO

AUTHORIZATIONS AND LAW ENFORCEMENT ACTIONS

The proportion of deforested area accumulated since 2019 that wasn't authorized or monitored by authorities went **down from 65% in 2022 to 59% in 2023**.

Deforested area from 2019 to 2023:

1,344,078 hectares of deforested area spatially intersect with authorizations, which means that **15.7% of the total deforested area in the country was authorized**.

439,376 hectares deforested in Bahia in the last five years were authorized (51.8% of the total deforested area). In Tocantins, there were 281,444 hectares (47.7%).

More than 2/3 of the deforested area has federal and/or state law enforcement actions in only 2 states: **Paraná** (66.3%) and **Espírito Santo** (90.5%).

In the Amazonian **Priority Municipalities**, 4.8% of the deforested area has authorizations and **46.5% of the deforested area had law enforcement actions**.

DEFORESTED AREA IN BRAZIL AND STATES FROM 2019 TO 2023

overlapping with authorizations and law enforcement actions by State and/or Federal Agencies

STATE	Deforested Area 2019-2023 (ha)	Total area overlapping authorizations (ha)	% of the area with authorization	Total area overlapping with law enforcement actions (ha)	% of the area with law enforcement actions	% of the area overlapping authorizations and law enforcement actions
AC	312,428.4	5,855.7	1.87%	33,142.1	10.61%	12.30%
AL	10,440.1	79.7	0.76%	1,871.2	17.92%	18.69%
AM	837,376.4	932.1	0.11%	413,100.9	49.33%	45.65%
AP	6,361.1	325.3	5.11%	772.5	12.14%	20.96%
BA	848,874.3	439,376.0	51.76%	71,892.0	8.47%	55.48%
CE	85,873.6	3,446.2	4.01%	4,270.5	4.97%	8.53%
DF	1,101.2	184.6	16.76%	0.0	0.00%	16.77%
ES	1,269.6	499.9	39.37%	1,149.4	90.53%	99.14%
GO	220,641.8	14,858.7	6.73%	119,446.3	54.14%	59.24%
MA	993,818.4	129,613.3	13.04%	12,863.4	1.29%	14.21%
MG	245,161.7	36,509.8	14.89%	108,604.2	44.30%	51.45%
MS	268,847.6	15.9	0.01%	1,874.9	0.70%	0.70%
MT	1,005,202.7	273,737.5	27.23%	543,066.1	54.03%	78.88%
PA	1,805,479.1	13,901.7	0.77%	694,832.4	38.48%	39.10%
PB	29,274.1	1,566.9	5.35%	1,699.8	5.81%	10.74%
PE	56,462.9	2,103.0	3.72%	654.3	1.16%	3.70%
PI	472,645.8	116,774.7	24.71%	119,063.5	25.19%	47.02%
PR	19,901.4	441.0	2.22%	13,198.5	66.32%	57.94%
RJ	1,257.5	45.3	3.60%	694.1	55.19%	55.71%
RN	23,230.7	3,363.8	14.48%	12.3	0.05%	14.53%
RO	570,567.6	3,548.8	0.62%	158,047.8	27.70%	28.37%
RR	116,427.1	14,200.9	12.20%	13,015.8	11.18%	23.64%
RS	14,605.6	745.7	5.11%	6,987.2	47.84%	53.61%
SC	6,772.1	211.3	3.12%	147.8	2.18%	5.09%
SE	11,333.5	5.5	0.05%	669.2	5.90%	11.95%
SP	2,397.8	290.7	12.13%	665.1	27.74%	33.41%
TO	590,484.2	281,444.0	47.66%	63,054.0	10.68%	54.69%
BRAZIL	8,558,236.7	1,344,078.2	15.71%	2,384,795.5	27.87%	41.73%



Some states stand out for their increase in percent deforested area with authorization or monitoring in recent years. **Goiás**, for example, **jumped from 58% authorized or monitored area in 2021 and 2022 to 74.5% in 2023**. **Piauí** went from **33% in 2021 to 57.2% in 2023**. Espírito Santo, Mato Grosso and Tocantins kept their rates of authorized or monitored deforested area above 60%.




Standing Atlantic Forest Operation reported monitoring 1,399 alerts in 17 states in 2023, allowing the identification of almost **18 thousand hectares of illegal deforestation**, a 49% increase compared to the previous year.

◆ less than or equal to 10% ◆ from 40 to 70%
◆ from 10 to 40% ◆ over 70%

ABOUT MAPBIOMAS ALERTA


WHAT IS MAPBIOMAS ALERTA

1




MapBiomias Alerta is a **validation** and refining system for deforestation alerts based on **high-resolution satellite images**.

2




In a single platform, we bring together alerts from several detection systems for **all of Brazilian biomes**. We cross-reference them with relevant territorial data (e.g. municipalities, rural properties, protected areas, authorizations, embargoes, etc.) and provide **detailed ready-to-use reports** for each deforestation event in a free and open-access way.


3




The MapBiomias Alerta initiative publishes **any and all losses of native vegetation**, without assessing the legality, regularity or responsibility for the suppression of the vegetation.



Every week you will find new deforestation alerts validated for all Brazilian biomes, with several filter options for temporal and territorial analysis.



By selecting one alert, you can view high-resolution images of before and after the deforestation occurred.



Access the full report for each rural property that overlaps a deforestation alert and search by CAR code.

PROCESS


1

Compilation of alerts from detection systems

- DETER / INPE
- SAD / Imazon
- SAD Caatinga / Geodatin
- SIRAD-X / ISA
- SAD Mata Atlântica / SOS Mata Atlântica and ArcPlan
- SAD Pantanal / SOS Pantanal and ArcPlan
- SAD Pampa / GeoKarten and UFRGS
- SAD Cerrado / IPAM
- GLAD / Maryland University
- PRODES / INPE


2

Validation and selecting images of before and after




3

Refining the polygon based on high resolution images



4

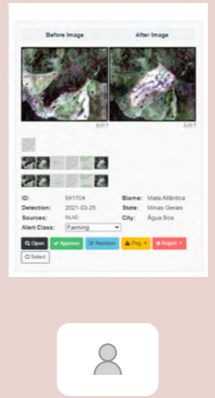
Cross-referencing with public data sets



FUNAI
ICMBIO
IBAMA
INCRA
SFB
IBGE
ANA
(...)


5

Audit of images and crossings



6

Publication on the platform and API



HOW TO REFERENCE

The MapBiomias data is public, open, and free under the Creative Commons CC-BY-SA license and with attribution to the source.
 RAD2023: Annual Report on Deforestation in Brasil 2023 - São Paulo, Brazil - MapBiomias, 2024.

<http://alerta.mapbiomas.org>

Find out more at mapbiomas.org







