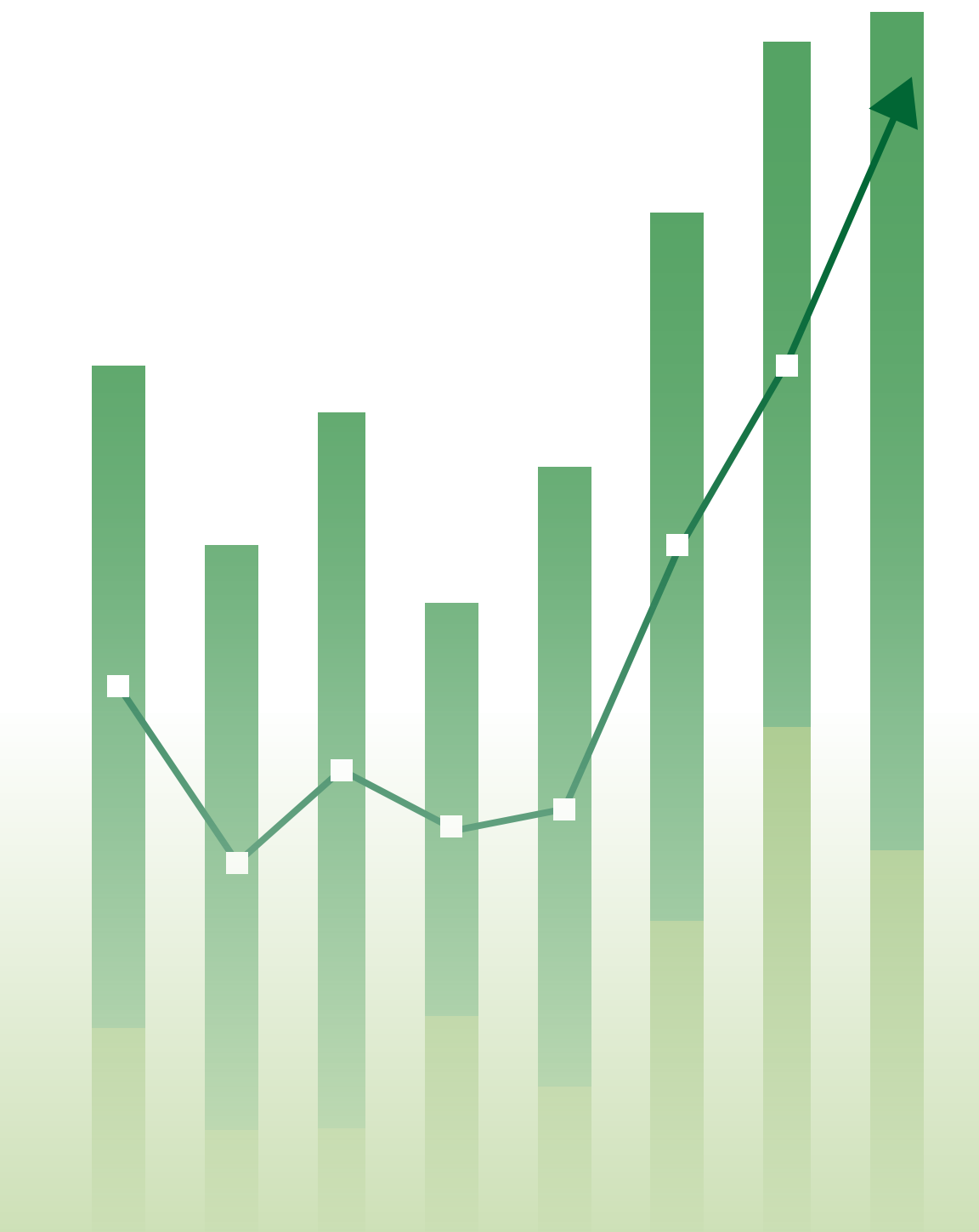


Illegal Deforestation and Conversion in the Amazon and Matopiba: lack of transparency and access to information

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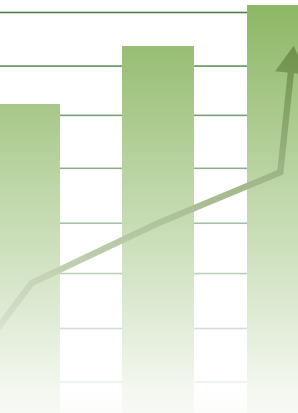
IMPLEMENTATION



SUPPORT



- 1.** The differentiation between legal and illegal deforestation is a key factor to ensure that Brazil's agricultural and forestry production is not contaminated by environmental crimes practiced by a small portion of farmers and land grabbers.
- 2.** This study evaluated the transparency and quality of the deforestation/conversion permits databases issued by 11 states of the Amazon and the Matopiba until the second half of 2020, comparing this information to the clear-cutting rates from INPE's Deforestation Satellite Monitoring Project in the Brazilian Amazon (PRODES).
- 3.** The overall situation of the states' official databases is worrying due to the low-quality of the data, as well as a limited or even impaired access to environmental information that, according to the Brazilian law, should be available to the public.
- 4.** The comparison between deforestation/conversion permits and the PRODES indicates that 94% of the converted area in the analyzed period can be considered illegal, amounting 18 million hectares – an area superior to the combined territories of Denmark, the Netherlands, Belgium, and Switzerland.
- 5.** Urgent action is needed in terms of greater technical efforts and political willingness to comply both with Brazil's environmental legislation as well as with the Access to Information Brazilian Law (LAI). Otherwise, the lack of transparency will continue to mask the ongoing destruction of ecosystems.



- 1 Introduction
- 2 Access and Availability of Deforestation and Conversion Permit Databases
- 3 The Condition of the OEMAs
- 4 Quality Assessment of the Accessed Databases
- 5 Final considerations



1. Introduction

Between 1996 and 2005, Brazil was one of the world leaders in deforestation rates, with an average of 19,500 km² of forest lost per year. This scenario began to change when the world public pressure to protect forest areas stimulated different initiatives that generated a consistent reduction in deforestation beginning in 2005.

Among the initiatives, the implementation of a set of public and private policies was the highlight, including the creation of new protected areas and indigenous lands, law enforcement supported by satellite monitoring, credit restrictions for farmers in jurisdictions with high deforestation rates, and the adoption of moratoriums on the purchase of soy and cattle from recently deforested areas.

Despite the success in reducing deforestation in the last decade, more recent data has shown an alarming increase in deforestation and conversion rates in the Amazon¹ and in the Cerrado.² Deforestation has increased again since 2013, and the trend is for this high-rate movement to continue if new command and control measures are not taken.

1. Silva Junior et al. (2021). The Brazilian Amazon deforestation rate in 2020 is the greatest of the decade. *Nature Ecology & Evolution*, v. 5, p. 144–145. DOI: [10.1038/s41559-020-01368-x](https://doi.org/10.1038/s41559-020-01368-x)

2. Strassburg et al. (2017). Moment of truth for the Cerrado hotspot. *Nature Ecology & Evolution*, v. 1, 0099, DOI: [10.1038/s41559-017-0099](https://doi.org/10.1038/s41559-017-0099)

In 2020 alone, more than 11,000 km² of forest were destroyed in the Legal Amazon states, according to INPE data.³ It was the highest rate of forest loss in the past 12 years. This can have disastrous consequences for climate change, as recently warned in a study published in the *Frontiers in Forests and Global Change*⁴ academic journal. The study showed that the Amazon already emits more greenhouse gases than it takes in, thus, contributing to the warming of the planet.

One of the ways to combat this sad reality is with greater transparency of data and environmental policies. Differentiating legal ecosystem clearing from illegal conversion can help control ecosystem-degrading practices. This begins by ensuring that society has access to data on state-issued forest/ecosystem clearing permits (*Autorizações para Supressão de Vegetação*, or ASVs in Portuguese).

To understand the current data availability in the Amazon and the Cerrado (focusing on the Matopiba region, which includes the state of Tocantins and parts of the states of Maranhão, Piauí, and Bahia), the Instituto Centro de Vida

3. INPE / Terra Brasilia. Available at http://terrabrasilis.dpi.inpe.br/app/dashboard/deforestation/biomes/legal_amazon/increments

4. Covey, K. et al. (2021) Carbon and Beyond: The Biogeochemistry of Climate in a Rapidly Changing Amazon. *Frontiers in Forests and Global Change*, v. 4, p. 11. DOI: [10.3389/ffgc.2021.618401](https://doi.org/10.3389/ffgc.2021.618401)

(ICV), the Forest and Agricultural Management and Certification Institute (IMAFLOA), and the Federal University of Minas Gerais (UFMG) surveyed the databases of the forest/ecosystem clearing permits issued until the second half of 2020 in 11 states. This work builds upon the efforts ICV⁵ has already made to assess the transparency of environmental data from the Amazon states as well as the analyses by MapBiomas⁶, ICV⁷, and Rajão et al.⁸ estimating the total legal ecosystem clearing and illegal deforestation and conversion areas.

The data obtained was evaluated based on a set of criteria essential for transparency in the ecosystem clearing processes, such as identifying applicants, format, date of issue, expiration date, and area. Our report shows the results of these diagnostics, followed by conclusions and recommendations for advancing transparency and fostering studies on the legality of deforestation/conversion.

5. Transparência Florestal Mato Grosso: avaliação da transparência das informações ambientais na Amazônia/ Ana Paula Valdiones, Alice Thuault. Ano 6, n. 10 (fev. 2019). – Cuiabá: Instituto Centro de Vida, 2019.

6. MapBiomas Alerta (2020). Relatório anual do desmatamento no Brasil. 49p. Available at: <http://alerta.mapbiomas.org/>

7. ICV (2020). Caracterização do desmatamento na Amazônia Mato-grossense. Available at: <https://www.icv.org.br/website/wp-content/uploads/2020/12/2020-caracteristicasdesmatamentoamazoniamt.pdf>

8. Rajão et al. (2020). The rotten apples of Brazil's agribusiness. *Science*, v. 369, n. 6501, p. 246–248. DOI: [10.1126/science.aba6646](https://doi.org/10.1126/science.aba6646)



2. Access and Availability of Deforestation and Conversion Permit Databases

The first stage of this research was to access the deforestation/conversion permit databases⁹ from the 11 states analyzed in this study. For this, the following steps were carried out:

- (a)** Consultation of the state environmental agencies and the Brazilian Institute of Environment and Renewable Natural Resources (IBAMA) websites to analyze the level of active transparency for the deforestation/conversion permits information;
- (b)** Request of the databases contents via the Access to Information Act (Law No. 12527/2011), seeking to obtain information through passive transparency;
- (c)** Demand for support from other public bodies, such as control agencies, which also use these databases in their procedures;
- (d)** Analyses on the public data contained in the states' official registries.

⁹. States and the federal government use different terminology to indicate forest clearing permits linked to alternative land use and licensing processes. This study sought to access these bases, focusing on the classification of each licensing body.

2.1 Active Transparency of Ecosystem Clearing Permits

Active transparency is when government agencies provide information of general interest to the public, regardless of whether it has been requested. Thus, we found that five states (Acre, Amapá, Bahia, Maranhão, and Piauí) have no ecosystems clearing permit databases available on their websites.

The Federal Government and the other states, in turn, keep some data available to the public. We then analyzed the quality of the information on each databases, considering the detailing and format and if it was up-to-date (**Table 1**). We consider that the ecosystem clearing permit database meets the expected quality criteria in each of the analyzed aspects if: 1) the data is available online; 2) the level of detail includes the exact location, the size of the area and the expiration date of the permits; 3) the data format is polygonal, to allow the comparison be-

tween the authorized and the deforested/converted area within the properties; and 4) the data is updated automatically or at least weekly.

The information available on two different sites was evaluated using Sinaflor, a system managed by IBAMA. A part of it can be accessed on the [IBAMA Open Data Portal](#), and vector data can be found on [Geoserver](#). However, these databases only include the ecosystem clearing permits for alternative land use (UAS) issued after the state data was integrated with Sinaflor, a process which was initiated in May 2018.

Among the states, Mato Grosso and Amazonas are the ones that provide the highest-quality databases. However, the challenge for using the Amazonas database is its lack of information in vector format, which makes spatial analysis difficult. Despite being the best among the states, the Mato Grosso database is not frequently updated (usually every two months), making more precise analysis also difficult.

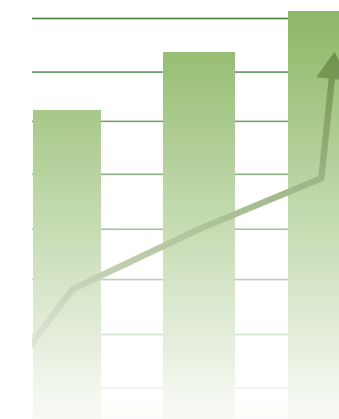


Table 1 •

Availability and quality of the ecosystems clearing permit databases in the states of Amazonia and the Cerrado's Matopiba

Criteria	Union	AC	AP	AM	BA	MA	MT	PA	PI	RO	RR	TO
Availability on the internet	●	●	●	●	●	●	●	●	●	●	●	●
Level of detail	●	●	●	●	●	●	●	●	●	●	●	●
Format provided	●	●	●	●	●	●	●	●	●	●	●	●
Updating of information	●	●	●	●	●	●	●	●	●	●	●	●

Legend: AC: Acre; AP: Amapá; AM: Amazonas; BA: Bahia; MA: Maranhão; MT: Mato Grosso; PA: Pará; PI: Piauí; RO: Rondônia; RR: Roraima; TO: Tocantins.

● Completely meets the analysis criteria ● Does not meet the analysis criteria ● Does not apply due to lack of data

For Pará, Rondônia, Roraima, and Tocantins, the information available on the websites can be used for individual verification, but they can hardly be used for more systematic analyses, as they are not in an appropriate format or are limited in relation to other criteria, such as completeness of data, the possibility of single download.

2.2 Passive Transparency of the Ecosystem Clearing Permits

Passive transparency refers to the provision of information by the government upon applications and requests

made by the public. Thus, the 11 states were asked to provide their complete ecosystems clearing permit databases, preferably in vector format, from 2008 to the date of the request. The requests were made between March and October, and it was expected to obtain the answer by the legally established deadline of 30 days maximum.

For many states, the request was submitted more than once. However, for eight of them, the response received was different from what was requested (**Table 2**). In this process, only three states sent their databases, one of which (from Mato Grosso) was the same as the one on the website. Pará

and Rondônia also sent databases in the requested format, but they did not cover the entire period from 2008 to 2020.

Acre, Amazonas, and Piauí did not respond to the request for information, disregarding what is defined by the Access to Information Act and the state decrees that regulate it. Maranhão indicated that the information was temporarily unavailable. The responses from Amapá, Roraima, and Tocantins indicated that these states do not have the information in the requested form. That indicates a difficulty in organizing this information in a digital database and in vector format.

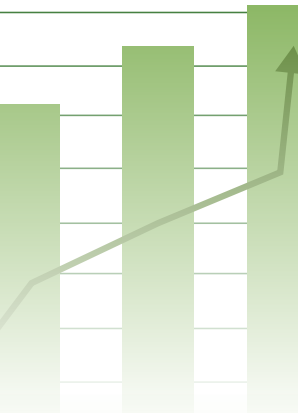


Table 2 •

Compliance with the request submitted for information on ecosystem clearing permit databases in shapefile format.

Access to information in the States	Condition of the databases
● AC	No response given.
● AP	They responded to the request for information stating that they are available to transfer the data but that a longer period is needed to organize it and make it available. The order was placed in April 2020, and we received no response by the end of the research.
● AM	No response given.
● BA	The agency's response referred us to a search system whose key information for the search is the case number of each forest clearing permit. The intermediate appeals, which reinforced the request for the complete database, were not answered.
● MA	They said the information is temporarily unavailable.
● MT	The agency referred us to the link to obtain the information online.
● PA	The agency forwarded the database in shapefile format.
● PI	No response given.
● RO	The agency forwarded the database in shapefile format.
● RR	They replied that they do not have this information since the database in shapefile format is under construction.
● TO	The agency informed that it does not have this systematized information to transfer.

2.3 Databases Transferred by Other Institutions

Databases were made available by control agencies, specifically, for five states: Acre, Amapá, Mato Grosso, Pará, and Tocantins. The detailed analysis is in **table 3**.

For the state of Pará, a database transferred by UFMG was also accessed, which recently obtained the data as part of a cooperation with the Pará State Department of Environment and Sustainability (SEMAS).

Legend: AC: Acre; AP: Amapá; AM: Amazonas; BA: Bahia; MA: Maranhão; MT: Mato Grosso; PA: Pará; PI: Piauí; RO: Rondônia; RR: Roraima; TO: Tocantins.

- Responded to the request.
- Responded, but unsuccessful in making the data available.
- No response given to the request.

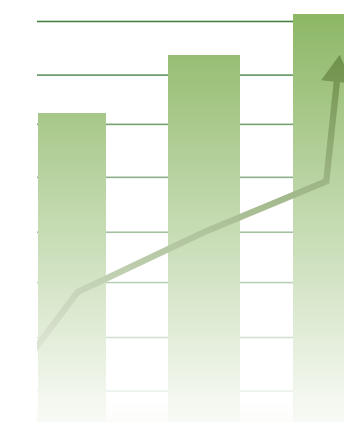
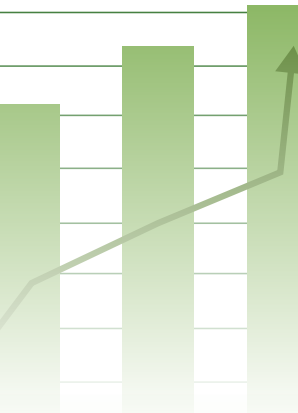


Table 3 •

Analysis of the characteristics of the databases transferred by other institutions

State	Content	Attributes	Format	Database Date
AC	Ecosystem Clearing and Burn Permits for agricultural activity classified as subsistent	Case number; Project name; (CPF/CNPJ); Condition; Data.	xls.	July 2008 to August 2018.
AP	Forest clearing permit below three hectares.	Name of holder; CPF (in some cases).	Shape - Polygons	No data.
	Ecosystem clearing permit above three hectares.	Name of holder; Name of property; CPF (in some cases); Case number; Area.	Shape - Polygons	Years associated with the 2017 and 2018 case numbers.
MT	Ecosystem clearing permit, forest exploration permit, deforestation permit renewal, ecosystem permit extension, forest exploration permit extension	Case number; Project name; Area; Expiration date.	Shape - Polygons	December 2000 to February 2020
	Ecosystem clearing permits linked to projects licensed by SEMA Mato Grosso	Case number; Project name; Area; Sector.	Shape - Polygons	2015 to 2019
PA	Ecosystem clearing permits linked to projects licensed by SEMAS	Case number; Project name; Area; Sector	Shape - Polygons	2015 to 2019
RO	Ecosystem clearing permits	Case number; Name of holder; CPF/CNPJ; Date of issue; AUTEX No.; Area.	Shape - Polygons	Permits issued in 2019

Legend: **AC:** Acre; **AP:** Amapá; **MT:** Mato Grosso; **PA:** Pará; **RO:** Rondônia. **CPF/CNPJ:** Brazilian Tax ID No; **SUIMI:** Infrastructure, Mining, and Services Office; **SEMA:** State Department of Environment; **AUTEX No.:** Environmental Permit Number.



2.4 Analysis of the Data Published in the Official State Registries

Ecosystem clearing permits are issued through an administrative process mainly conducted by the environmental protection state agencies (OEMAs), although some municipalities also have this task.

Article 4, paragraph II of the Environmental Transparency Act (Law 10650/2003) establishes that ecosystem clearing permit requests and licenses must be published in the Official State Registry, and the respective agency must make it available somewhere with easy access to the public, with records and links. To guarantee the transparency of the process, information of public interest is expected to be published, whether a ecosystem clearing permit is requested by the producer/project sponsor, or the OEMAs decide to grant or deny the permit via Official State Registries (DOEs), which are the primary official means of communication and records the executive branch's acts at the state level.

An individual assessment was carried out for each of the states of the Legal Amazon and Matopiba to better understand environmental transparency concerning ecosystem clearing permits made available in the DOEs. Firstly, we

sought to assess which DOEs have something published referencing the ecosystem clearing permits. It was verified that the states of Amapá, Piauí, Rondônia, Roraima, and Tocantins do not provide any information on ecosystem clearing permits. This assessment was hampered because, although all states have a search field for keywords or key phrases, some have restrictions. For example, the Amapá system limits searches to 20 characters, making it impossible to search for terms such as "ecosystem clearing" (supressão de vegetação, in Portuguese, the language used for all searches). Therefore, it is necessary to search for partial terms such as "suppression" or "vegetation" (supressão, or vegetação, in Portuguese) which brings imprecise results.

The Rondônia and Roraima search engines do not directly search the DOEs. They only return the search result made by Google. Thus, if Google has not indexed each of the DOEs' pages, the search results will be partial. As such, it is not possible to categorically state that these states have not published any information on ecosystem clearing permits.

The DOEs for Acre, Amazonas, Bahia, Maranhão, Mato Grosso, and Pará provide, to a greater or lesser degree of detail, data on the granted ecosystem clearing permits (**Table 4**). There are references to ecosystem clearing per-

mits with the beneficiary's name and CPF (personal identifying number) or CNPJ (company identifying number) in all of these states, except for Mato Grosso, which only lists the name. Maranhão, Mato Grosso, and Pará also list addresses with partial data (e.g., name of the farm or municipality), while the others publish the complete addresses.

These states also do not inform the requested clearing area, making it difficult to survey the total area of deforestation/conversion granted in the period. Finally, only Bahia's DOE lists the geographic coordinates, making it possible to cross-reference it with spatial data, such as the Rural Environmental Registry (CAR), the deforested/converted area mapped by PRODES Cerrado or another monitoring system. This analysis indicates that DOEs are, in general, ineffective sources for obtaining ecosystem clearing permit data since the published information cannot be integrated into spatially explicit analyses.

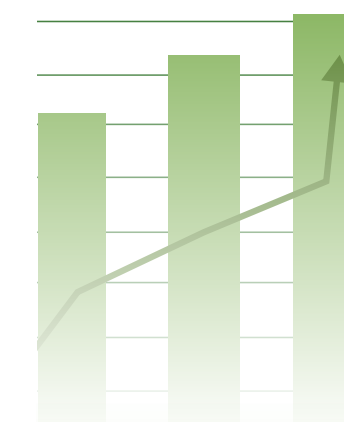


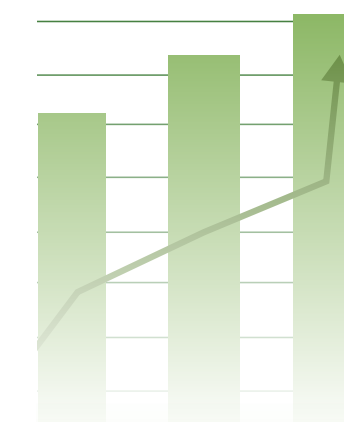
Table 4 •

Analysis of information on ecosystem clearing permits published in the Official State Registries (DOEs)

DOE with published ecosystem clearing permits

State	Name	CPF/CNPJ	Address	Geographic coordinates	Required Area	Future Activity	No. Application Receipt
AC	Yes	Yes	Complete address	No	Yes	Yes	Yes
AM	Yes	No	Complete address	No	Yes	Yes	Yes
BA	Yes	Yes	Complete address	Yes	Yes	Yes	Yes
MA	Yes	Yes	Name of Farm	No	No	Yes	Yes
MT	Yes	No	Municipality	No	No	No	Yes
PA	Yes	Yes	Municipality	No	No	Yes	Yes

Legend: **AC:** Acre; **AM:** Amazonas; **BA:** Bahia; **MA:** Maranhão; **MT:** Mato Grosso; **PA:** Pará.



3. A situação das OEMAs

To assess the condition of the OEMAs, we conducted interviews with their managers and technicians. Among the 11 focus states in this study, only five (AC, AP, MT, PI, and RR) answered us¹⁰.

Amapá and Piauí are states that do not have an organized database of ecosystem clearing permits. In Amapá, the agency responsible for environmental licensing was recently extinguished¹¹ and its duties were assumed by the Amapá State Department of Environment (SEMA/AP). Even in this transition phase, SEMA does not have full access to data or a systematic vector database.

In Piauí, the situation is very similar. The state does not have an organized vector database with issued permits and, with the implementation of Sinaflor, it is understood that the data will be stored there.

On the other hand, the state of Roraima does not have a single integrated database of ecosystem clearing permits but is trying to organize a spreadsheet with the permits that have been issued over the years. A spreadsheet containing only the case number, the brief description of the request, and the holder's name was transferred through a request for information.

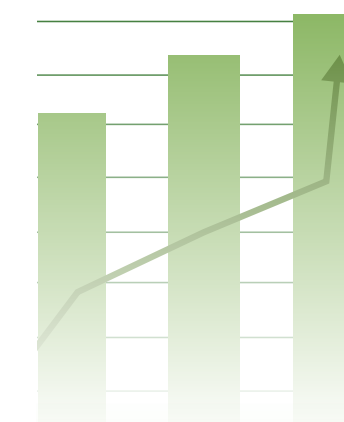
Despite not having public information on ecosystem permits in Acre, an OEMA representative said that there is an organized and vector database with this information.

In Mato Grosso, information is public and in different formats, including shapefile. According to the interviewees, a massive effort was made to organize and vector all permits issued by the OEMA. Due to the State Prosecutor's Office (MPMT) action and the demands of civil society, this and other databases were made available at [SEMA-MT Transparency Portal](#) as of September 2018.

It was also emphasized that permits issued via Sinaflor are stored in the federal system, and for states to have access to a complete database, they must download each of the issued permits individually.

¹⁰. Several attempts were made with the other states by phone and email, but without success.

¹¹. Law No. 2425, of July 15, 2019.



4. Quality Assessment of the Accessed Databases

While going through the steps described above, a set of databases from different sources were accessed (**Table 5**). In total, 56 databases were analyzed for the 11 focus states of this study.

In each of the accessed databases, the data format was analyzed, the quantity and quality of the information in its attributes, the number of cases, the total areas authorized for clearing, the timeframe of the information, and the overlaps/repetitions between records of the same file and between records from different databases. Based on these analyses, the best and most complete databases were chosen for each of the states:

Table 5 •

Type of sources of the different accessed state databases*

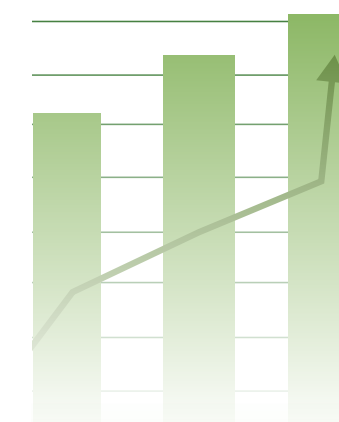
Source Type	AC	AM	AP	BA	MA	MT	PA	PI	RO	RR	TO
Available online	●	● ³	●	●	●	● ¹	●	●	●	●	●
Request for Information	●	●	●	●	●	*● ¹	●	●	● ²	● ¹	●
Transfer from control body	● ³	●	● ²	●	●	● ¹	● ³	●	●	●	● ²
Sinaflor (ecosystem clearing permit and alternative land use)	● ⁴	● ⁴	● ⁴	● ⁴	● ⁴	●	●	● ⁴	● ⁴	● ⁴	● ⁴
Other sources	●	●	●	●	●	●	● ²	●	●	●	●
Total Databases	7	7	6	4	4	2	5	4	6	5	6

Legend: AC: Acre; AP: Amapá; AM: Amazonas; BA: Bahia; MA: Maranhão; MT: Mato Grosso; PA: Pará; PI: Piauí; RO: Rondônia; RR: Roraima; TO: Tocantins.

* Same database available online.

● Does not present a database in the referred source.

●^{Numbers} Numbers indicate the number of databases available from each source.



- The selected database in **Mato Grosso** is the one available in the [SEMA-MT Transparency Portal](#);
- In **Acre** and **Bahia**, the only file suitable for use is the database with tabular data from Sinaflor, available at the [IBAMA Open Data Portal](#);

- In **Pará**, the best database to use was made available by SEMAS-PA;
- In **Rondônia** e **Roraima**, the final database was formed using a file from the Sinaflor tabular database and a file obtained from the Access to Information Act;

- In **Tocantins**, the database was composed of a file accessed by Sinaflor and a file transferred by the control agency;
- In **Amapá**, three files from the Sinaflor database and two files transferred by the control agency were used;
- In **Amazonas**, the selected databases were those found on the Amazonas Environmental Protection Institute (IPAAM) website (three separate files) and available in the Sinaflor database (two files);
- In **Piauí** and **Maranhão**, three databases available from Sinaflor were used.

Table 6 •

Characteristics of the databases selected for each state

Characteristics	AC	AM	AP	BA	MA	MT	PA	PI	RO	RR	TO
Shapefile (polygons)	●	●	●	●	●	●	●	●	●	●	●
Coordinates (points)	●	●	●	●	●	●	●	●	●	●	●
Property or applicant identification	●	●	●	●	●	●	●	●	●	●	●
Issue date	●	●	●	●	●	●	●	●	●	●	●
Expiration date	●	●	●	●	●	●	●	●	●	●	●
Quality level	Low	Medium	Low	Low	Medium	High	High	Low	Low	Medium	Medium

The **Table 7** shows the timeline for the distribution of data obtained from different sources in each state.

Legend: **AC:** Acre; **AP:** Amapá; **AM:** Amazonas; **BA:** Bahia; **MA:** Maranhão; **MT:** Mato Grosso; **PA:** Pará; **PI:** Piauí; **RO:** Rondônia; **RR:** Roraima; **TO:** Tocantins.

- **Absence of the characteristic.**
- **Presence of the characteristic in the available databases.**

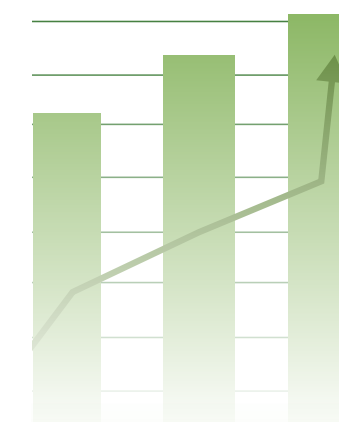


Table 7.

Distribution of ecosystem clearing permits by the year of issue

Year	AC	AP	AM	BA	MA	MT	PA	PI	RO	RR	TO
2008	0	0	0	0	0	6	0	0	0	0	0
2009	0	0	0	0	0	8	0	0	0	0	0
2010	0	0	0	0	0	12	1	0	0	44	0
2011	0	0	0	0	0	26	4	0	0	0	0
2012	0	0	0	0	0	21	5	0	0	28	0
2013	0	0	0	0	0	17	3	0	0	7	8
2014	0	0	0	0	0	31	5	0	0	33	671
2015	0	0	0	0	0	22	2	0	0	39	194
2016	0	0	0	0	0	30	3	0	0	55	189
2017	0	0	0	0	0	45	1	0	0	37	259
2018	0	0	21	0	1	117	2	3	0	50	86
2019	3	61	1	0	104	94	10	13	17	75	170
2020	11	76	3	2	89	93	2	26	18	50	303
Total	14	137	25	2	194	522	38	42	35	418	1.880

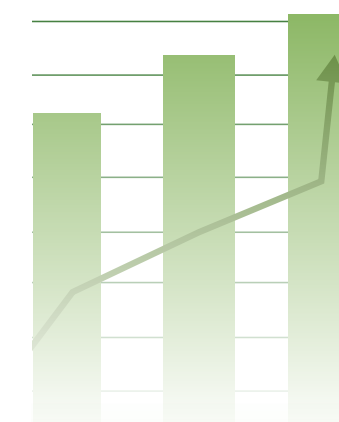
Legend: AC: Acre; AP: Amapá; AM: Amazonas; BA: Bahia; MA: Maranhão; MT: Mato Grosso; PA: Pará; PI: Piauí; RO: Rondônia; RR: Roraima; TO: Tocantins.

Distribution of permits over the years: Smallest amount in the state Highest amount in the state

The **Tables 6 e 7** show the main characteristics of the databases selected by state, serving as input to establish which analyses could be performed with this data. Thus, it is possible to identify Mato Grosso as the state with the best database for analyzing illegal deforestation/conversion because, in addition to the completeness of the information and the appropriate format, the data provided covers almost 20 years.

Pará, in turn, also has polygon-type vector information over a relatively large interval (10 years) but has only 38 forest clearing permits. In Tocantins, the compiled database has forest clearing permits spread over seven years, but it was not possible to obtain information before 2013. The other states have more limited databases. They comprise a period of a maximum of three years, starting from 2018 in most cases. Bahia, for example, has only two deforestation permits dated of 2020, with surveys that indicate a much more significant number of permits issued¹².

¹². "Legalizando o ilegal: legislação fundiária e ambiental e a expansão da fronteira agrícola no Matopiba," published by the Associação de Advogados de Trabalhadores Rurais (AATR). Available at: <https://www.aatr.org.br/post/matopiba-estudo-sobre-institucionaliza%C3%A7%C3%A3o-da-grilagem-%C3%A9-lan%C3%A7ado>



To approximate the relation between ecosystem clearing permits and deforestation/conversion in the states, we compared the total area deforested/converted in the period measured by PRODES Amazônia and Cerrado and the sum of the ecosystems clearing permit areas for the same period. As each state has a ecosystem clearing permit database from different periods, the sum of the deforestation from PRODES sought to reflect the same years. This comparison was also limited because some states have other biomes that do not have official annual deforestation/conversion data, such as Caatinga and Mata Atlântica; therefore, they were excluded from that analysis.

The results confirm other studies by indicating that the ecosystems clearing permit areas correspond, on average, to 5% of the total deforestation/conversion observed in the states altogether.^{13,14} However, there is a significant variation between states, as shown in **Table 8**. While Amazonas, Roraima, Pará, and Bahia have a total of ecosystem clearing permits that correspond to less than 2% of the deforestation in the period, in Amapá and Roraima, this value exceeds 30%. Despite these differences between the states, confirming other studies on the topic, it was observed that 94% of the deforested/converted area in

Table 8 •

Approximate relation between deforestation and forest clearing permits in the databases*, by state

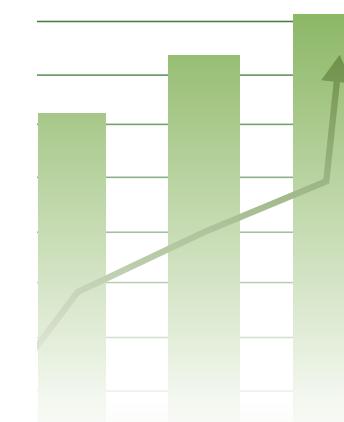
State	Period covered by the forest clearing permit database	Number of forest clearing permits	Area covered by forest clearing permits (thousand ha)	Total deforestation* (thousand ha)	Deforestation and forest clearing permit ratio (%)
AC	2019 – 2020	14	5,98	133	4,5
AP	2018 – 2020	226	4,12	13,7	30
AM	2018 – 2020	34	4,16	400	1
BA	2020	2	0,32	91,9	0,3
MA	2018 – 2020	194	124	539	23
MT	2000 – 2020	1.028	442	12.399	3,6
PA	2010 – 2020	38	9,0	3.243	0,3
PI	2018 – 2020	42	1,64	155	1,1
RO	2019 – 2020	35	5,34	251	2,1
RR	2010 – 2020	418	87,4	248	35
TO	2013 – 2020	1.880	395	1.633	24

Legend: AC: Acre; AP: Amapá; AM: Amazonas; BA: Bahia; MA: Maranhão; MT: Mato Grosso; PA: Pará; PI: Piauí; RO: Rondônia; RR: Roraima; TO: Tocantins.

* Total deforestation corresponds to the period covered by the forest clearing permits accessed.

13. Rajão et al. (2020). The rotten apples of Brazil's agribusiness. *Science*, v. 369, n. 6501, p. 246-248. DOI: 10.1126/science.aba6646

14. "Desmatamento ilegal e exportações de soja: o caso de Mato Grosso," a joint publication between Trase, ICV, and IMAFLORA. Available at: <https://www.icv.org.br/publicacao/desmatamento-ilegal-e-exportacoes-de-soja-o-caso-de-mato-grosso/>

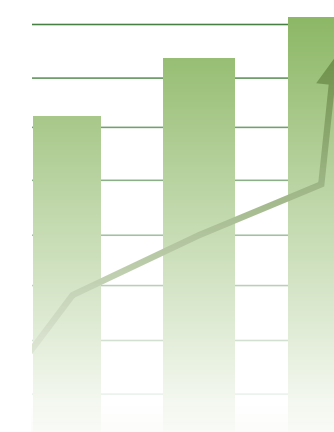
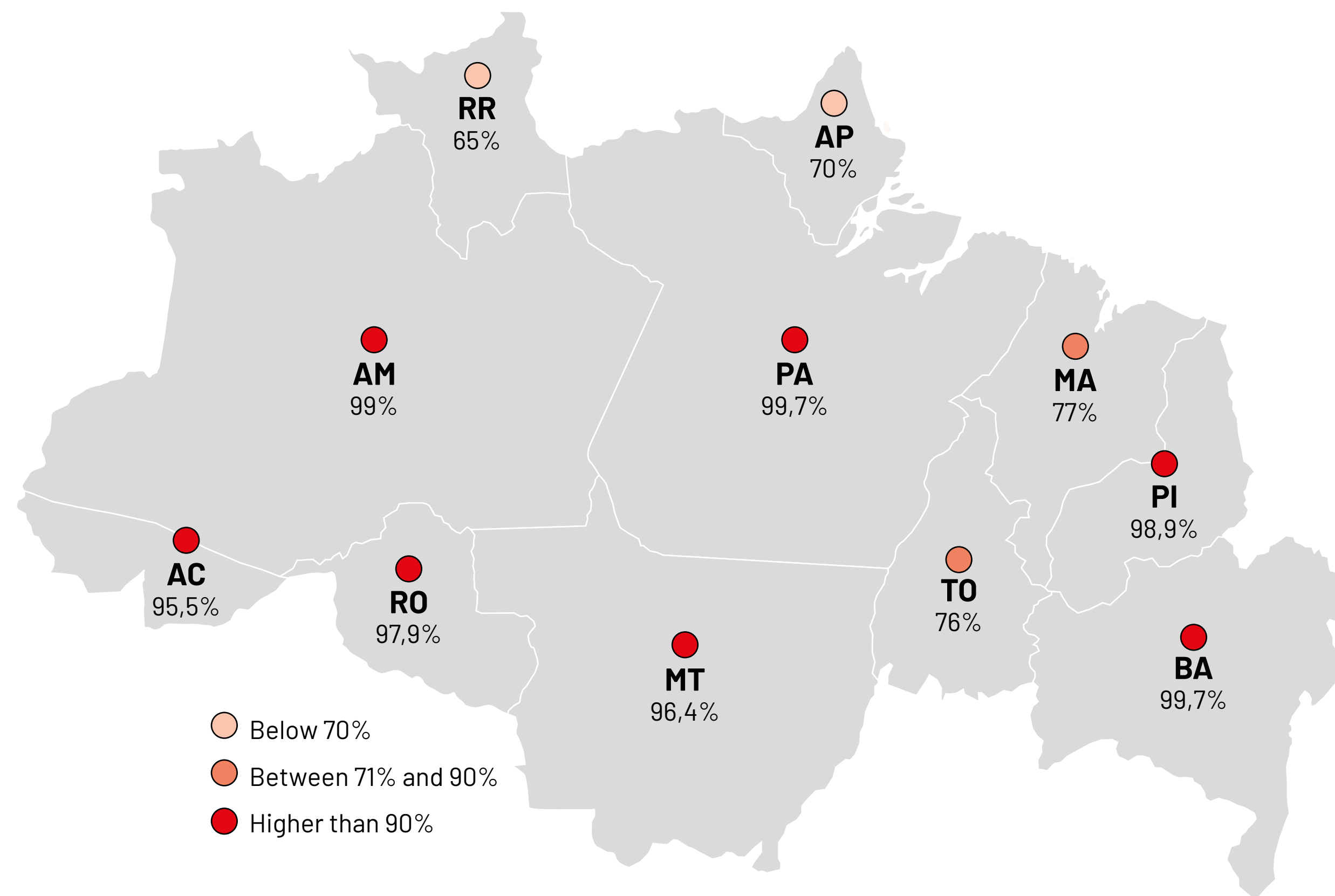


the Amazon and Cerrado biomes in the states included in the analysis have no ecosystem clearing permits publicly available and, therefore, can be considered illegal.

It must be noted that the deforested/converted areas do not always coincide with those indicated on the ecosystem clearing permits, and there are also situations where the ecosystem clearing permit is issued, but the deforestation/conversion does not occur, or the deforestation/conversion happens after the ecosystem clearing permit expires. Therefore, the total level of illegality can be even higher, and georeferenced analyses are essential to obtaining a minimally reliable estimate of illegality, as described in the next section.

More detailed information about the study can be found [here](#).

Map 1 • Proportion of illegal deforestation in the states of Amazon and Matopiba



Illegal Deforestation and Conversion in the Amazon and Matopiba: lack of transparency and access to information

5. Final considerations

The great limitation for analyzing the illegalities of deforestation/conversion is evident. This is due to the poor quality of the deforestation permit data that the states and the federal government make available, or even not having the data at all.

Our different analyses showed that the main limitations are: (i) lack of a systematized database with ecosystem clearing permits issued by the state; (ii) inadequate database format, without spatial information; (iii) incomplete data, without reference to the holder, area, and expiration date; and (iv) existing databases which are not made public, indicating a lack of transparency.

Despite the apparent difficulties listed by state and federal agencies, Mato Grosso's example demonstrates the feasibility of organizing a spatial database with the history of ecosystem clearing permits issued by OEMA which is entirely accessible to the public.

Based on the characteristics presented, we categorized the quality of ecosystem clearing permit databases as low, medium, and high. The databases considered as low-quality present only one spatial reference point for the permit (making it impossible to precisely locate the authorized area and choose the location of the clearing) and do not have information on the validity of the ecosystem clearing permit. The databases of Acre, Amapá, Bahia, Piauí, and Rondônia are identified as low-quality.

The medium-quality databases have only one spatial reference point but have an expiration date. The forest clearing permit databases for Amazonas, Maranhão, Roraima, and Tocantins were classified as medium-quality. Lastly, a high-quality database has information on the ecosystem clearing permit's expiration date and is in vector format. Only Mato Grosso's and Pará's databases are considered high-quality.

Given these reflections, it is vital to reinforce actions that lead to the organization and management of public data on deforestation/conversion permits. The integration of data between systems must also be improved to strengthen the culture of transparency within environmental agencies and establish a continuous dialogue between the agencies that provide information and the different institutions and citizens that use this data.

