

Maranhão, Brazil



Jurisdictional indicators brief

| | |
|--|--|
| State area: | 331,937 km ² (3.9% of Brazil) |
| Original forest area: | 143,963 km ² |
| Current forest area (2019): | 40,641 km ² (12.2% of Maranhão) |
| Yearly deforestation (2019) | 237 km ² |
| Yearly deforestation rate (2019) | 0.58% |
| Interannual deforestation change (2018-2019) | -6% |
| Accumulated deforestation (2001-2019): | 11,376 km ² |
| Protected conservation areas: | 60,076 km ² (18.1% of Maranhão) |
| Carbon stocks (2015): | 312 millions tons (above ground biomass) |
| Representative crops (2018): | Soybean (2,751,206 tons); Sugarcane (2,427,984 tons); Cassava (681,018 tons) |
| Value of agricultural production (2016): | \$1,926,549,032 USD |
| More on jurisdictional sustainability | State of jurisdictional sustainability |

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Forest and people

In 2019, the estimated area of tropical forest in the state of Maranhão was 40,641 km², equivalent to 12.2% of the state's total area, and to 1.3% of the tropical forest remaining in the nine states of the Brazilian legal Amazon. The total accumulated forest lost during the period 2001-2019 was 11,376 km², equivalent to 46.8% of the forest area remaining in 2001. Maranhão concentrated about 0.8% of the carbon reserves stored in the biomass of the Brazilian tropical forest (about 312 mt C as of 2019).

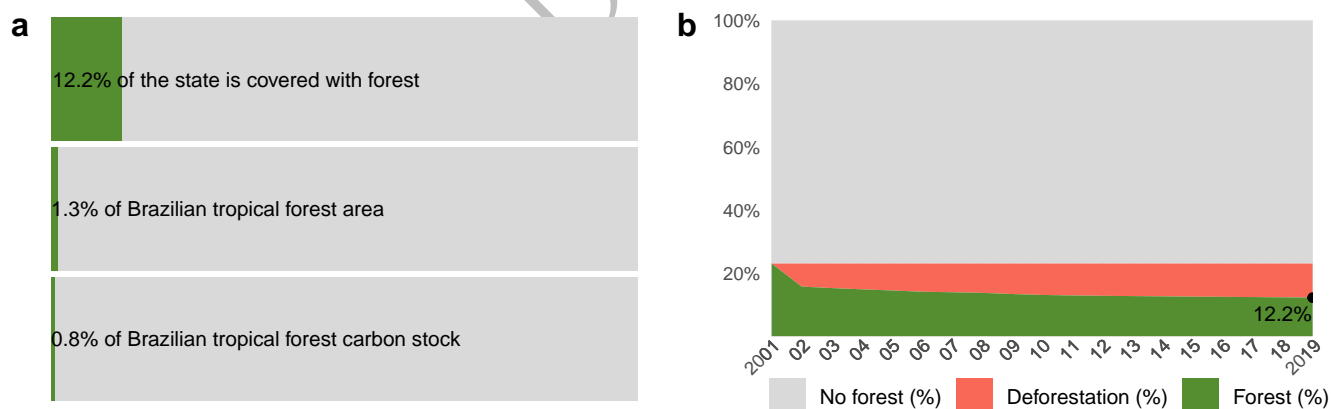


Figure 1: a) forest share and b) transition of forest to deforestation over the last years

There were 7.1 million people living in Maranhão as of 2020, distributed in 19 municipalities, with 1.1 million people living in the capital city of Sao Luís. The state has formally designated conservation areas and indigenous territories, which respectively represent 18% and 7% of the state. There were an estimated 34,334 indigenous people living in the state in 2010 (see Figure 2).

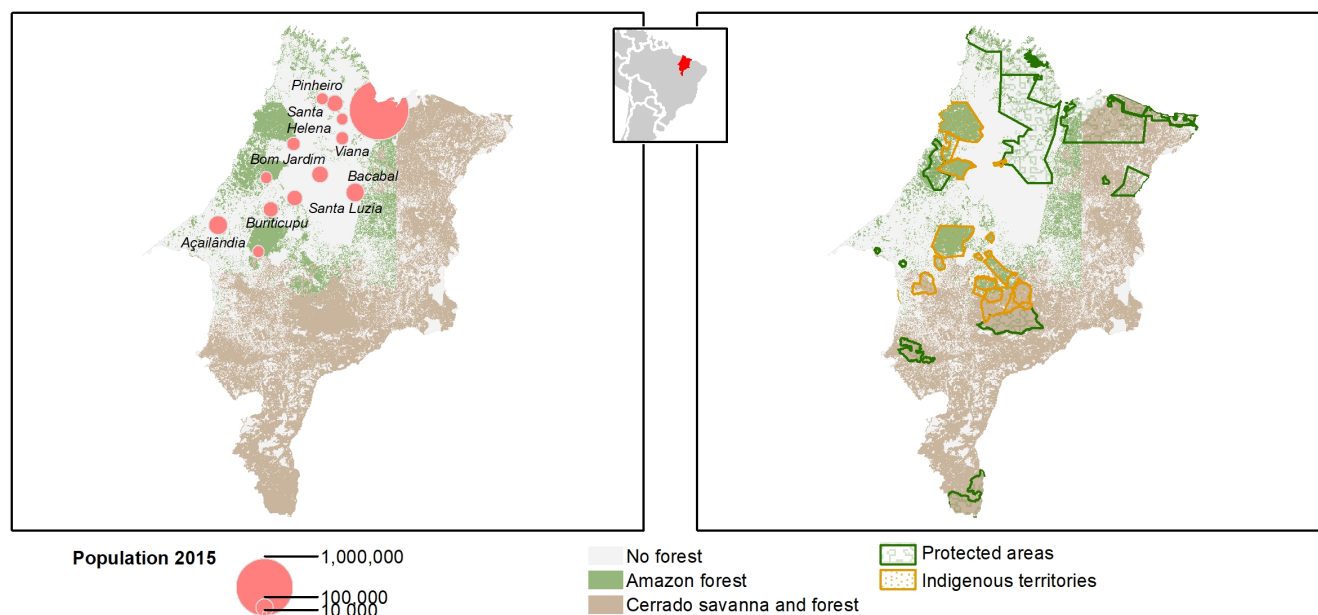


Figure 2: Map of most populated places (> 40,000 people) and indigenous and protected areas in Maranhão

Deforestation

The state of Maranhão reduced its yearly deforestation rate rapidly after recording yearly forest losses above 1,000 km between 1998 and 2002. Deforestation decreased rapidly after 2013 and has remained under 300 km² since then. The deforestation in the state of Maranhão in 2019 was 237 km², amounting to less than 2.34% of the total deforestation in the legal Amazon. While deforestation in the Brazilian legal Amazon in 2019 the deforestation in Maranhão decreased by -6%.

The deforestation rate in the state in 2019 was 0.58%, larger than the average of the legal Amazon states in 2019 (0.43%). The analysis of deforestation in Cerrado (2018), which represents 85% of the state area (see Figure 3).

The state's current deforestation is 75% below the reference baseline 1996-2005, and 69% below the reference baseline 1996-2015.

41% of the deforestation is located in the five most affected municipalities in the state (see Figure 4). The municipality of Arame consistently registered the largest loss of tropical forest over the last years, reaching a maximum of 56 km² lost in 2002. In 2019 the deforestation in Arame was 26 km².

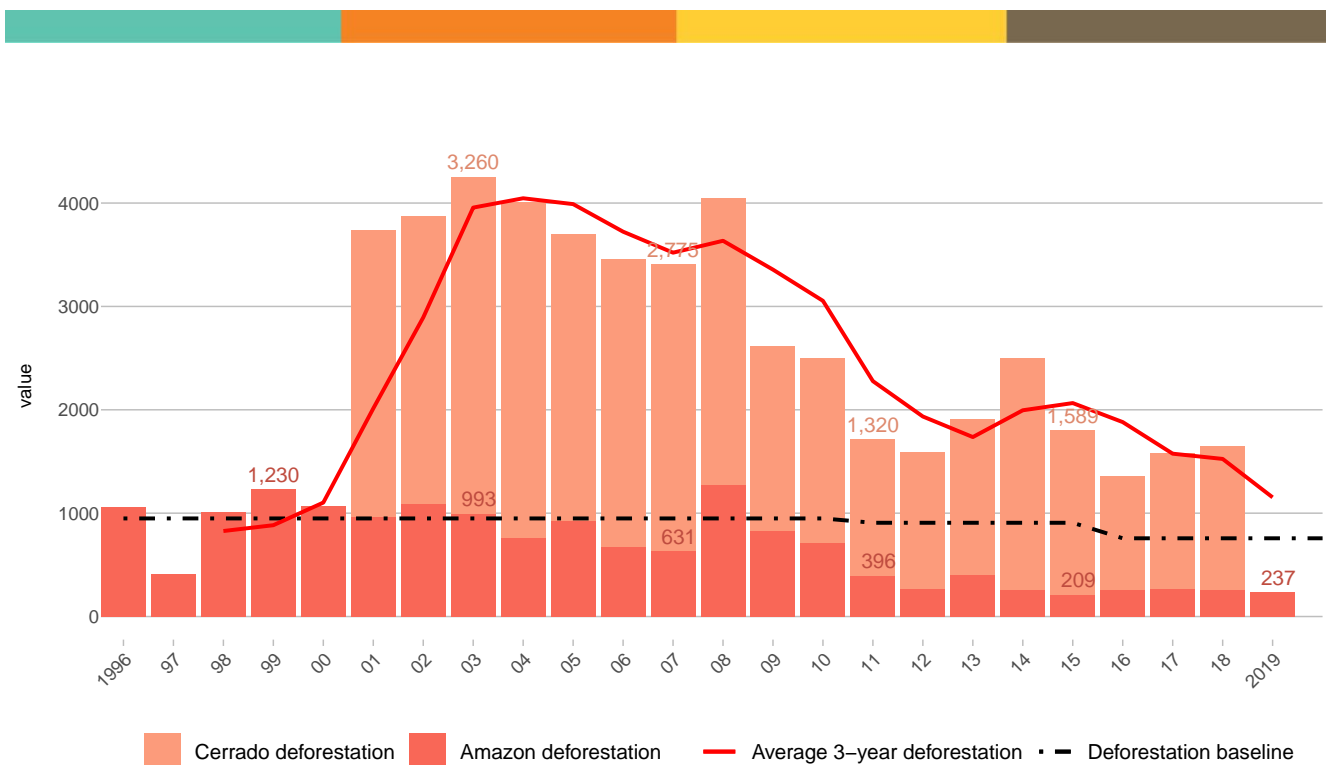


Figure 3: Yearly deforestation (km^2) and deforestation baseline

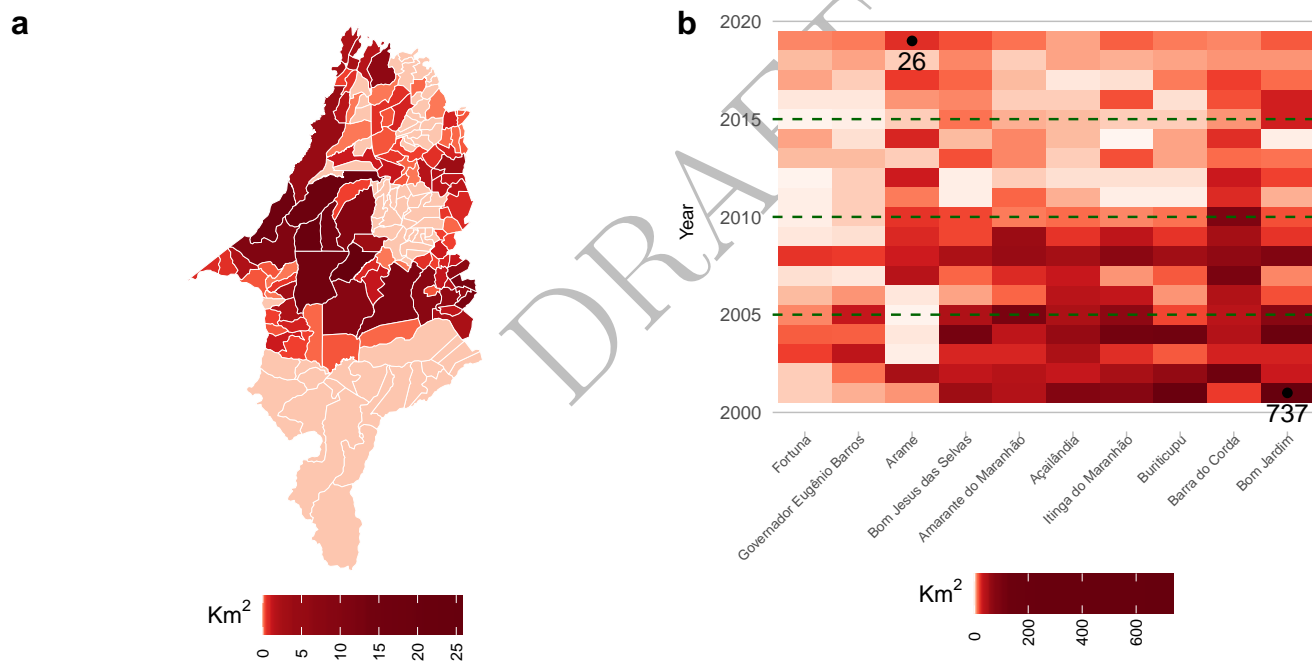
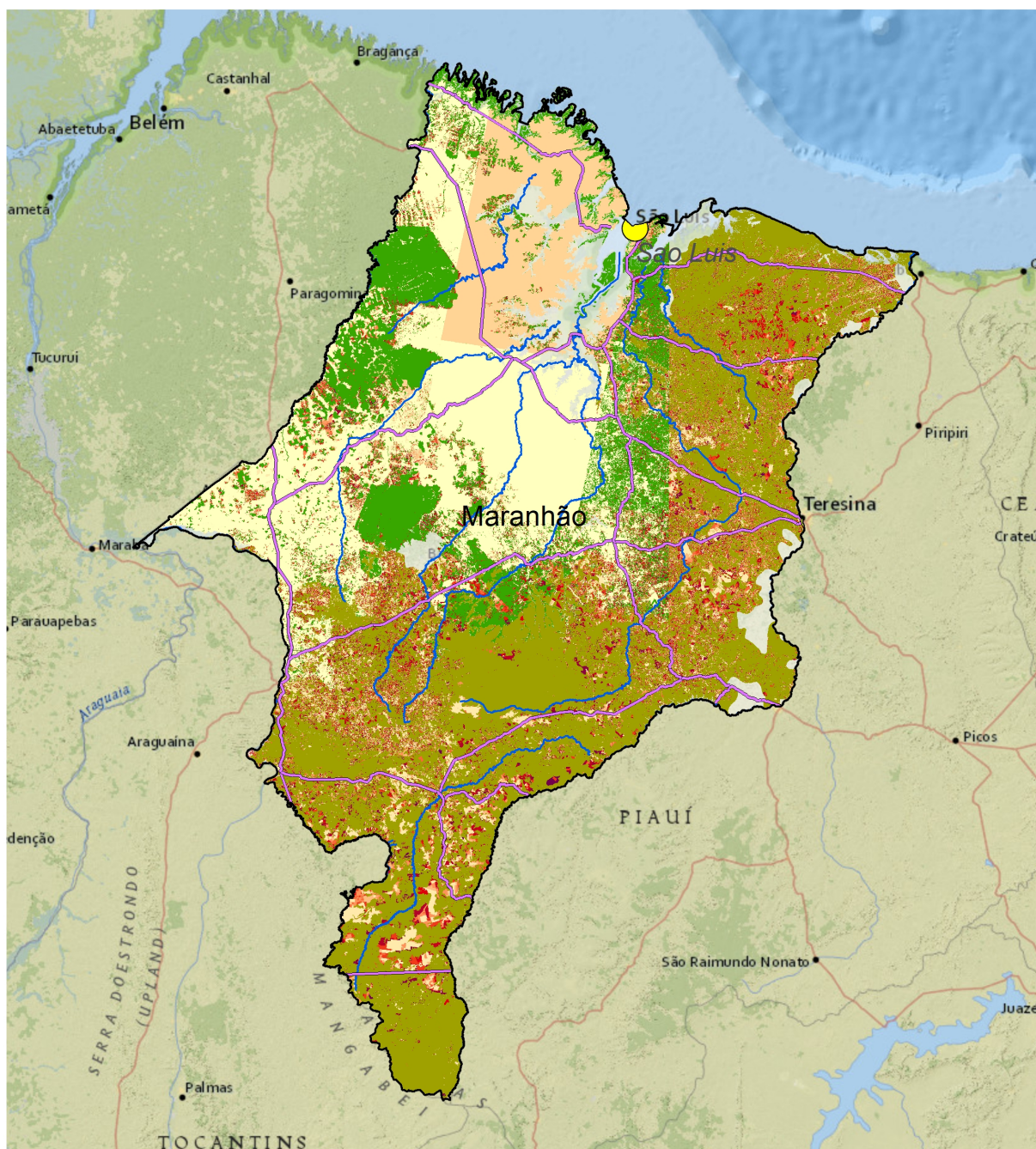


Figure 4: a) Yearly deforestation by municipalities in 2019 b) Yearly deforestation in top 10 most affected municipalities (km^2)



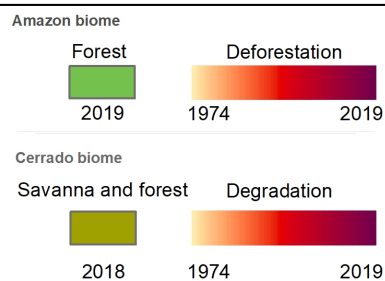
Table 1: Forest and deforestation indicators in the state of Maranhão

| Year | Forest (km ²) | Deforestation | Deforestation rate (%) | Annual variation (%) |
|------|---------------------------|---------------|------------------------|----------------------|
| 2001 | 76,392 | 958 | 1.25 | -10.1 |
| 2002 | 52,147 | 1,085 | 2.08 | 13.3 |
| 2003 | 50,547 | 993 | 1.97 | -8.5 |
| 2004 | 49,295 | 755 | 1.53 | -24 |
| 2005 | 48,052 | 922 | 1.92 | 22.1 |
| 2006 | 46,770 | 674 | 1.44 | -26.9 |
| 2007 | 46,182 | 631 | 1.37 | -6.4 |
| 2008 | 45,581 | 1,271 | 2.79 | 101.4 |
| 2009 | 44,323 | 828 | 1.87 | -34.9 |
| 2010 | 43,360 | 712 | 1.64 | -14 |
| 2011 | 42,782 | 396 | 0.93 | -44.4 |
| 2012 | 42,446 | 269 | 0.63 | -32.1 |
| 2013 | 42,137 | 403 | 0.96 | 49.8 |
| 2014 | 41,854 | 257 | 0.61 | -36.2 |
| 2015 | 41,575 | 209 | 0.50 | -18.7 |
| 2016 | 41,362 | 258 | 0.62 | 23.4 |
| 2017 | 41,117 | 265 | 0.65 | 2.7 |
| 2018 | 40,832 | 253 | 0.62 | -4.5 |
| 2019 | 40,641 | 237 | 0.58 | -6.3 |



Maranhão, Brazil Forest and accumulated deforestation

The map shows the most recent forest cover and yearly deforestation mapped by PRODES, Brazil. Intense red colors represent the most recent deforestation whereas light orange colors earlier deforestation as noted in the legend



Prepared by Earth Innovation Institute

Burned area

According to the NASA-USGS analysis of MODIS satellite observations, the average yearly burned area in Maranhão was 20,300 km² for the period 2010-2020. This figure includes burned areas due to fires in forest, savannahs and opened agricultural areas. The burned area in 2019 was 16,499 km² and the worst year in the last decade was 2012 with 38,556 km² burned. In most years, the months of September and August represented the peak of the fire season (see Figure 5).

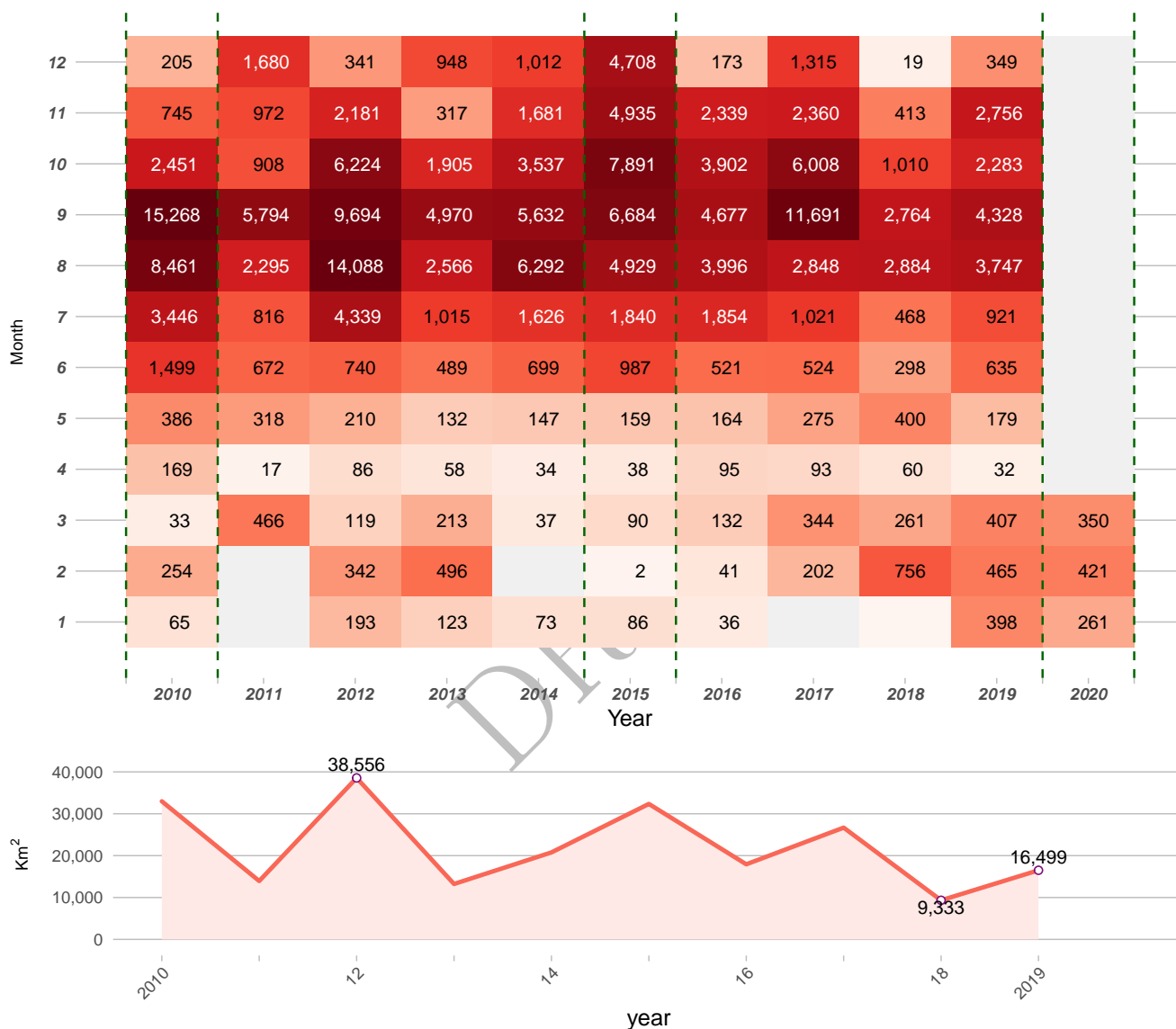


Figure 5: Monthly burned area since 2010 (km²). Source: EII analysis of MODIS-MCD64



Emissions from deforestation

The accumulated emissions from deforestation in the state of Maranhão between 2000 and 2019 amount to 497 million tons of CO₂eq, which was equivalent to 3.8% of the total emissions from deforestation in the legal Amazon during this period. Considering the observed yearly deforestation, the mean carbon density of the state's forest and the business as usual deforestation baseline, the accumulated gross avoided emissions from deforestation during the period from 2006 to 2019 was 329 million tons of CO₂eq. This results from summing avoided emissions during the period from 2006 to 2019 in which the deforestation was lower than the business as usual deforestation baseline.

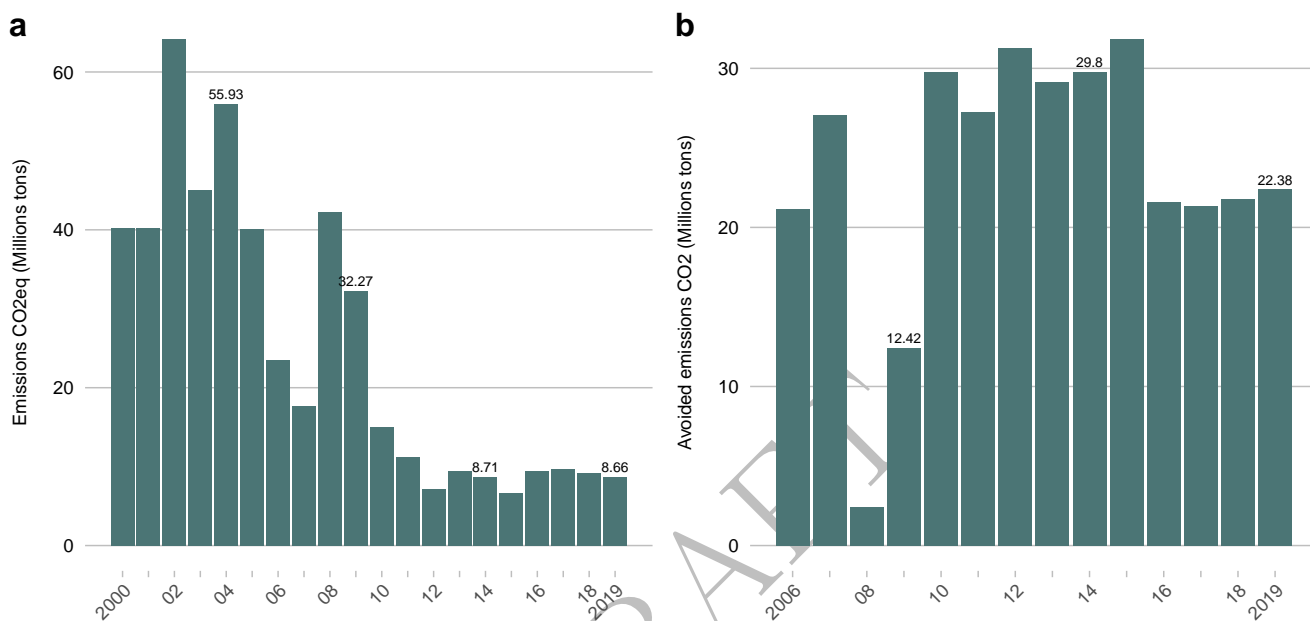




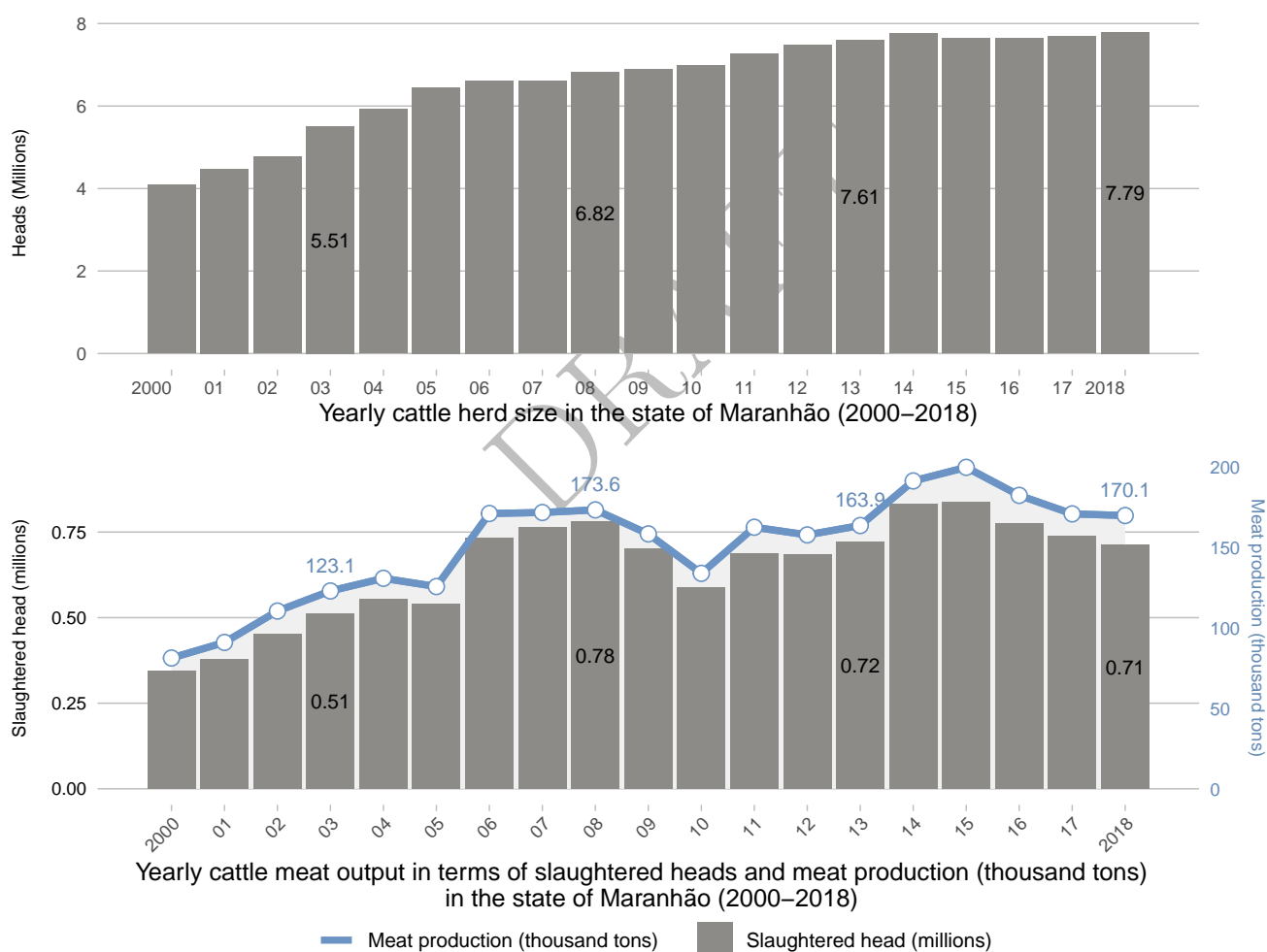


Figure 6: Emissions from deforestation (left) and avoided emissions (right) (CO₂eq Millions tons)

Livestock

Table 2: Livestock indicators in Maranhão

| |  |  |  |  |
|-------------------------|---|---|---|---|
| | <i>Cattle</i> | <i>Pig</i> | <i>Poultry</i> | <i>Fish</i> |
| Year | 2018 | 2018 | 2018 | 2015 |
| Herd size: | 7,793,180 | 1,031,962 | 12,134,673 | |
| Slaughtered heads: | 712,944 | 13,748 | 2,067,745 | |
| Meat production (tons): | 170,070 | 1,036 | 4,939 | |
| Value (thousands): | | | | R\$135,562 BRL |



Agriculture

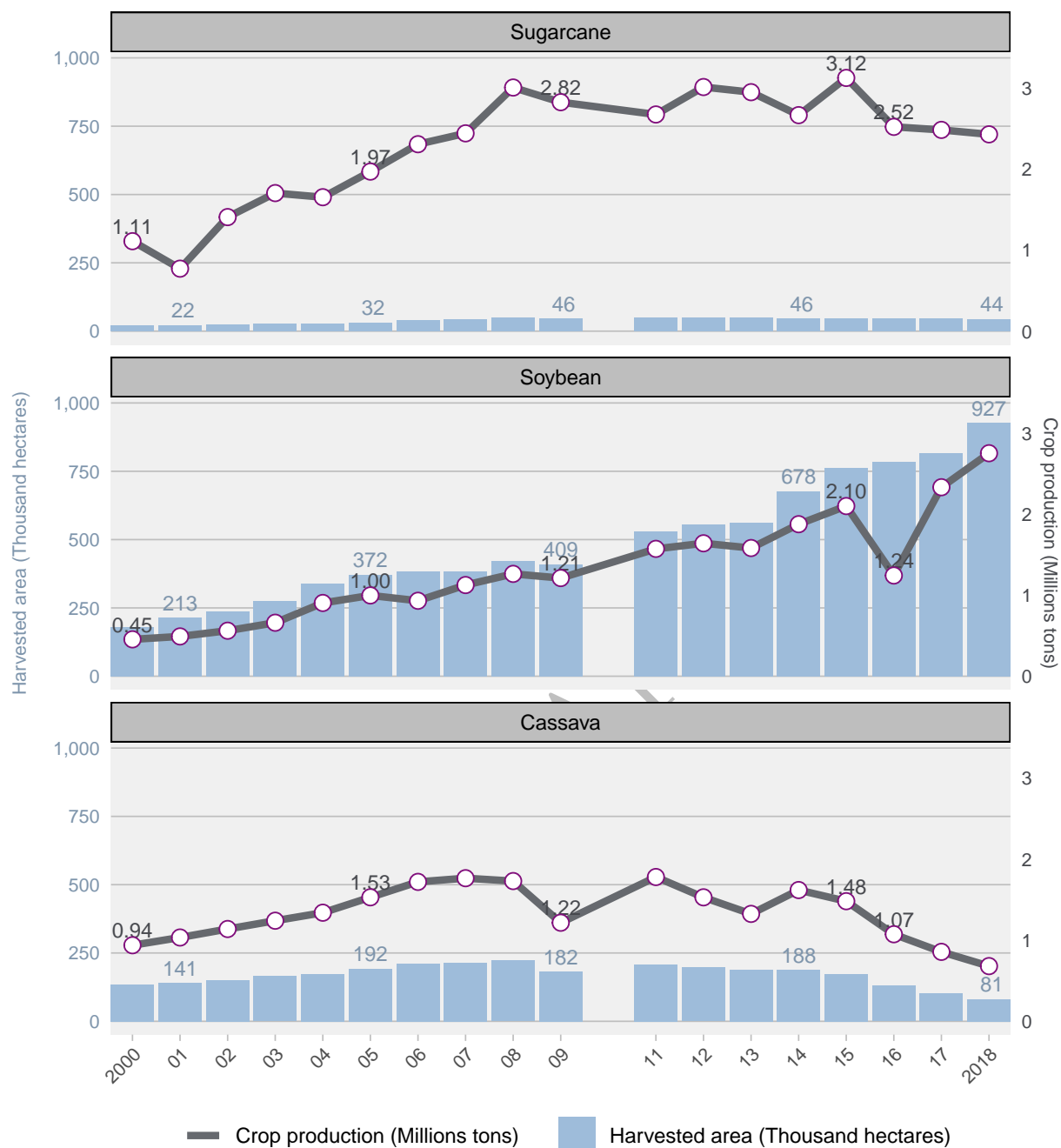


Figure 7: Harvested area and production of the three crops most produced in Maranhão



Aquaculture

The plot shows the aquaculture production in the state of Maranhão over the last 6 years and the value of this production. The data includes production of fish such as Tambaqui, Skunk catfish, Tilapia or Tarpon prochilodus and includes only activities related with fish farming under controlled conditions. Does not include fishing activities.¹

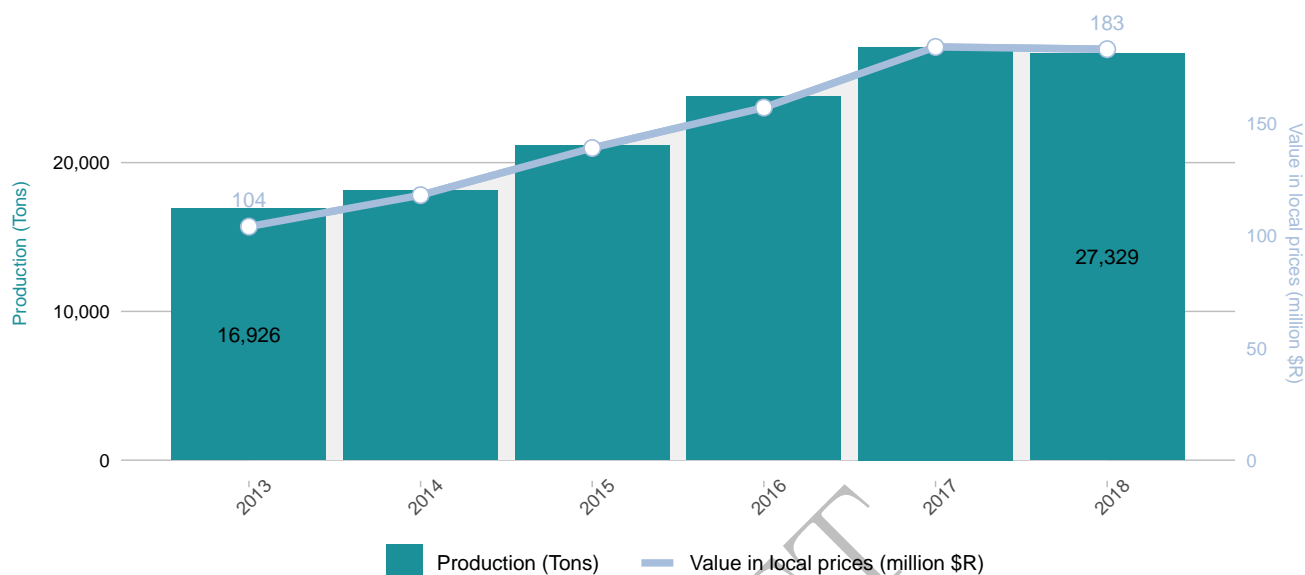


Figure 8: Yearly aquaculture production (tons) and value of production (Reales) in Maranhão

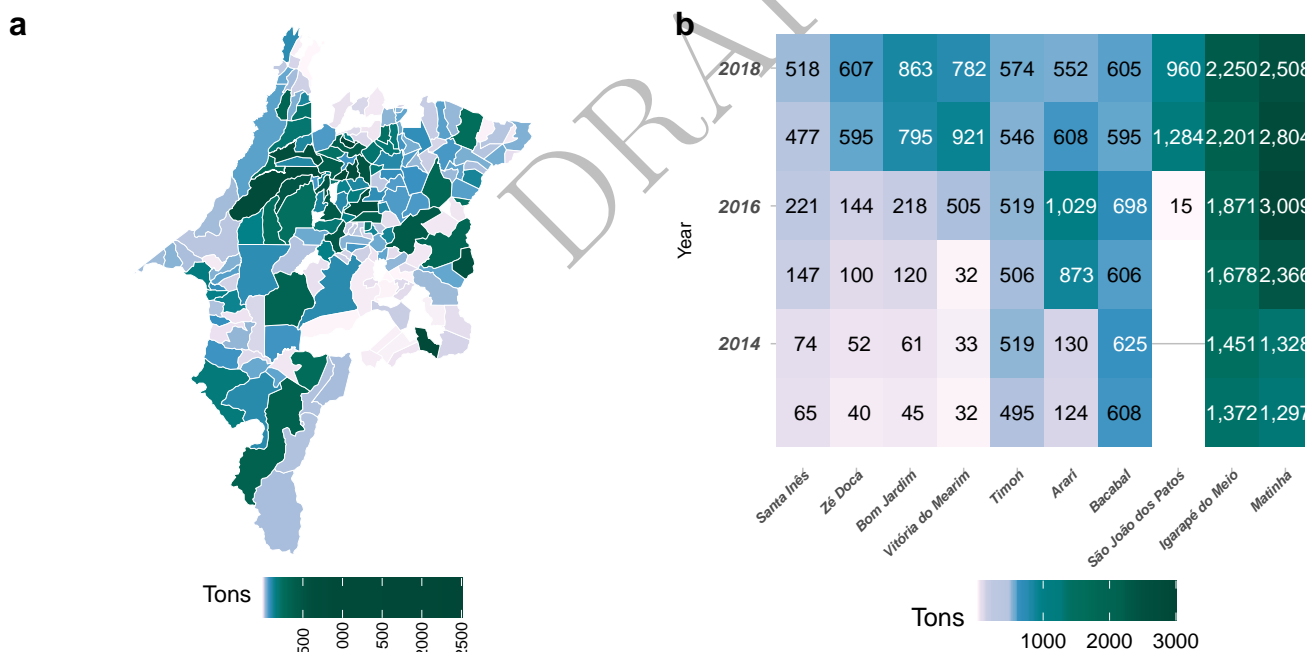


Figure 9: a) Yearly aquaculture production (tons) in municipalities of Maranhão in 2018. b) Yearly aquaculture production by municipalities (Tons)

¹The value of production don't include the class Shellfish seeds, Shrimp, Shrimp larvae and post-larvae, Oysters, scallops and mussels, Other products (frog, alligator, crab, lobster, etc.) and Alevinos.