



The Amazon, pollination and the Peabiru Institute

A quick view about the Amazon and its
socioenvironmental challenges

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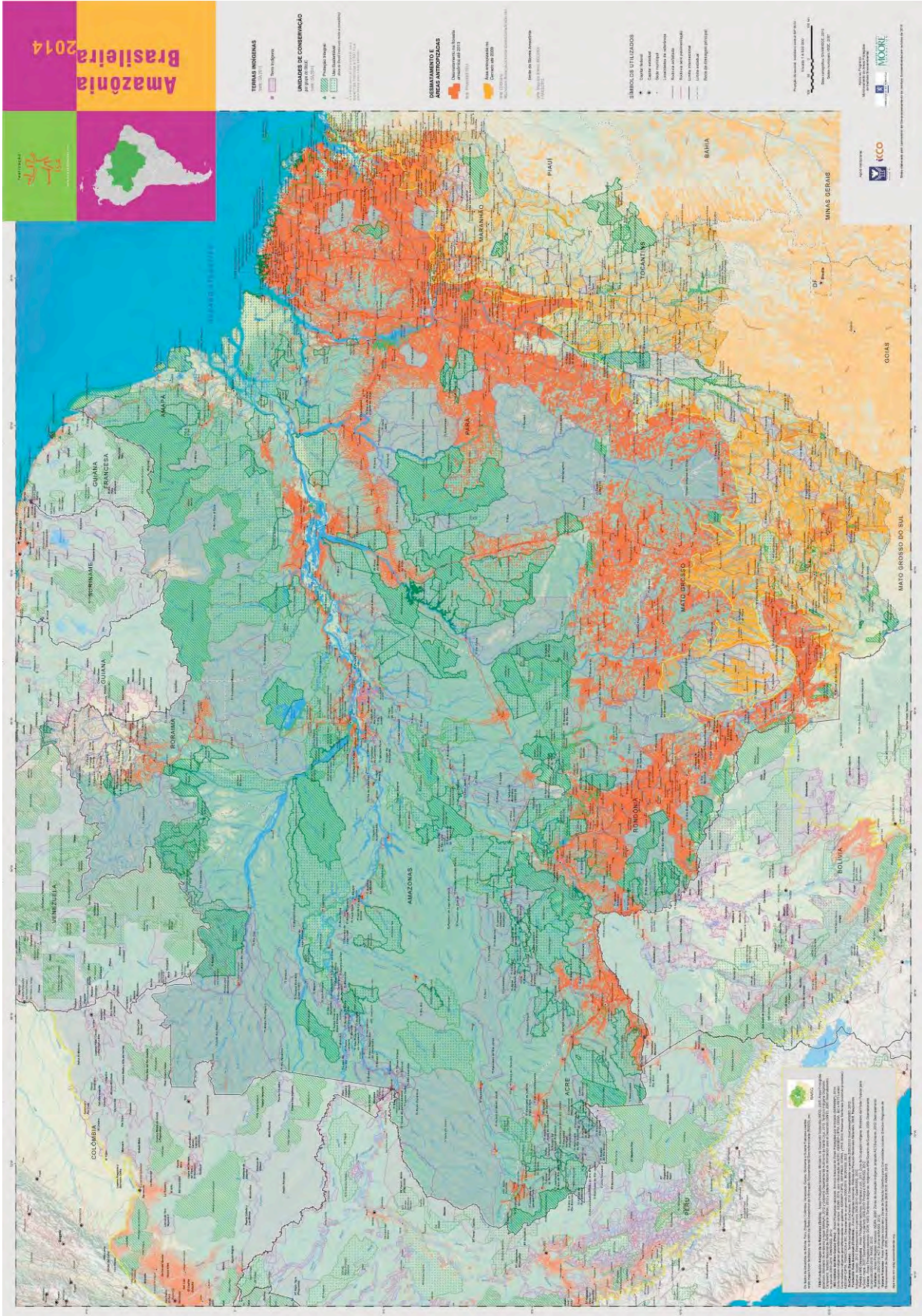


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1.1. Dimensions

- **The biome** – The Amazon is the largest biome on Earth and it occupies 5% of Earth's surface. It covers 7.8 million sq km (equivalent to Australia) and encompasses 9 countries. Thirty-three million people live in the region, including 385 original people, besides isolated groups [RAISG, 2012].
- **Brazilian Amazon** – The Amazon occupies half the territory of Brazil (4.9 million sq km), equivalent to the European Union's 28 countries all together). 25 million people live in the Brazilian Amazon, among which are 1 million families in traditional communities dedicated to family agriculture.
- **Geology** – The Amazon has two major granite massifs in the South and North, with the Amazon plains in the middle as a more recent formation. In the Amazon estuary, many of the islands we see here in Belém are very recent (some are less than 4 thousand years). Marajó Island separated from the continent only 5 thousand years ago [ROSSETTI, 2006].
- **Relief** – 96% of the Amazon is considered lowlands, where more than half lies below 100 m above sea level, and less than 5% lies above 500 m.
- **Soils** – Less than 5% of the Amazon soils contain natural fertility [IBGE, BDIA, 2012]. In most soils, 4/5 of the nutrients are in the vegetation. Comparatively, in the temperate zones, such as Europe, more than 4/5 of the nutrients are in the soil. The surface covered by roots from tropical forest trees is 3 times wider than in the temperate zones [MEIRELLES, 2007].
- **Nutrients factory** – Because of the poor soils, recycling of nutrients in leaves, trunks and dead animals by fungus, insects (ants, termites etc.) is very important. The forest grows *over* the soil and not *from* the soil, using it merely as a base and not as a source of nutrients [SIOLI, 1984].

1.2. Environmental Services

- **Water** – The Amazon and the Tocantins Mega-estuary contains 1/5 of the planet's river water. Deforestation, cattle ranching and the soy industry destroy small creeks. Most river sources become intermittent in the dry season or simply disappear, thus affecting the water cycle.
- **Evapotranspiration** – The Amazon Forest is a sponge that absorbs water from the Atlantic Ocean and keeps it in the environment (100 billion tons of water stay in the region, giving it its humidity). Some of the moisture travels to neighboring regions in the form of "flying rivers". These currents of moisture carry more water than the terrestrial rivers. Without the forest, the water vapor (humidity) in the region drastically diminishes. The regions that receive humidity from the Amazon are thus also affected.

Below, a scheme with the Amazon region water balance:



Below, a diagram with the Amazon's water recycling system:

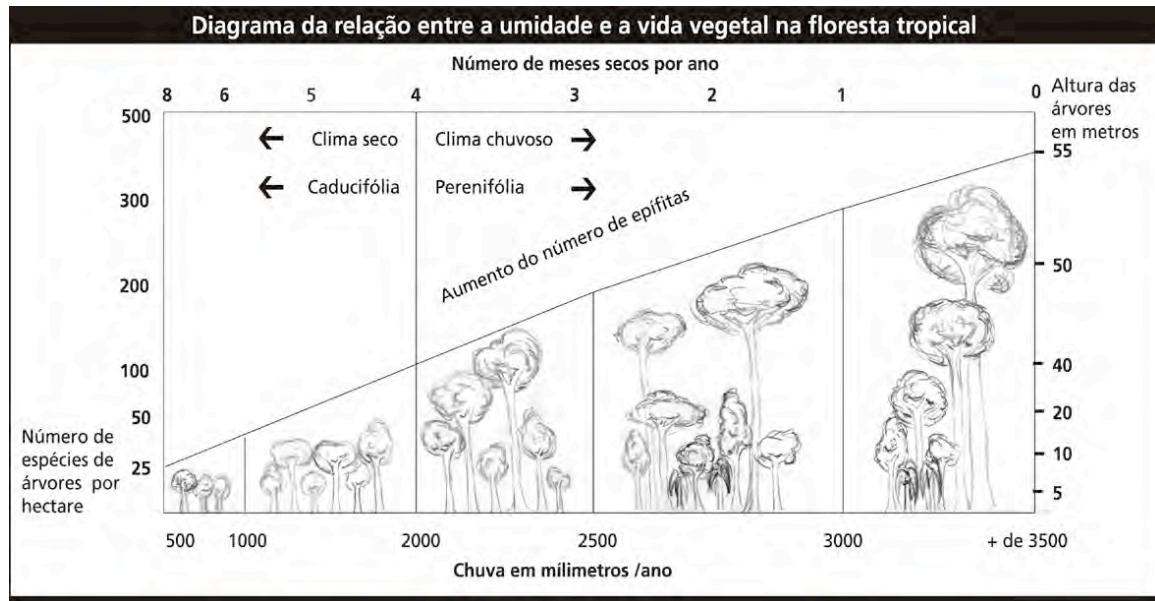


- **Biotic pumping** – A grown tree pumps 1 ton of water/day from the soil into the atmosphere [NOBRE, 2014]. The Amazon region pumps 20 billion tons of water/day. Trees function as woody geysers, gushing this absurd volume of water vapor into the atmosphere [NOBRE, 2014].
- **Environmental services** are more valuable than the short-lived uses that replace the forest. *These services include maintenance of biodiversity, of water cycling and of the stocks of carbon that avoid further intensification of the greenhouse effect. Feedback between climatic changes and the forest through such processes as forest fires, tree mortality from drought and heat and the release of carbon stocks in the soil represent dangers for the climate, the forest and the Brazilian population* [FEARNSIDE, 2005].
- **Bioclimate** – The Amazon bioclimate will not endure too much deforestation. Large-scale deforestation increases extreme phenomena such as longer droughts as well as heavier river floods. In regions where more than 60% of the forest is gone (such as the Northeast of Pará state), the microclimate has already changed.
- **World climate** can be affected if the scale of deforestation augments. 40% deforestation of the Amazon could cause a large-scale shift to grasslands, which could alter global weather patterns and affects world climate [NOBRE, 2014].
- **Carbon dioxide** – The Brazilian Amazon is believed to house 82,100.00 million tons of CO₂ (based on INPE, which estimates that an average hectare stocks 167,7 tons of CO₂)[INPE, 2014]. Deforestation, forest fires (and fire for agriculture) and other land uses can release significant amount of carbon dioxide, contributes to global warming.

1.3. Biodiversity

- The Amazon holds more than half of the largest remaining tropical forest in the planet. Seventy six countries holds the other half in three continents.
- **Vegetation** – In the Brazilian Amazon there are 70 types of natural environments (ecosystems) and another 6 types of anthropic environments. If subsystems are considered, there are 224 different vegetation classes [SAE/IBGE 2005]. Open and dense forests cover more than ¾ of the biome.
- **Flooded forests** – What we see here in the Islands of Belem are tidal floodplain forests. In the whole Amazon, less than 4% of the forests are subject to flood (half of these are perennial flooded forests).

Below, a diagram showing a general relation between humidity and biodiversity in the Amazon:



- **Biodiversity** – the Amazon is the most complex known biome. It houses an estimated 1.5 million species. This means that presumably in an area of 5% of the Earth's surface, ¼ of all living species are found. Most diversity is found in inferior plants (algae, fungi etc.) and invertebrates. With one single footstep in the upland forest, a person steps on close to 1.500 small animals, a true zoological tractate [SCHUBART in MEIRELLES, 2007].
- **Plant diversity** – There are more plant species in the Amazon forest than on the whole European continent. The record is 454 species of woody plants in a single hectare. In the same space in a Northern Hemisphere forest we will find a maximum of 25 species.
- **Hyperdominant plant species** – Our analyses suggest that lowland Amazonia harbors 3.9×10^{11} trees and ~16,000 tree species. We found 227 hyperdominant species (1.4% of the total) to be so common that together they account for half of all trees in Amazonia, whereas the rarest 11,000 species account for just 0.12% of trees. Most hyperdominants are habitat specialists that have large geographic ranges but are only dominant in one or two regions of the basin [STEEGE, 2013]. Here in the Islands of Belem among dominant species are palms such as açai (*Euterpe oleracea*) and miriti (*Mauritia flexuosa*), as well as sumaúma (*Ceiba pentandra*).
- **Rarity** – Compared to temperate zones' species, tropical species are rare. The majority of trees, for example, present no more than 1 or 2 specimens. Species also vary significantly from region to region. In two 1-hectare (10 thousand m²) plots in Manaus at a distance of 15 km from each other, 50% of the plant species were different [MEIRELLES, 2007].
- **Endemism** – The Amazon is known for high endemism (species that are found only in a limited area). Invertebrates represent 95% of animal species. More than 70% of Amazon species don't

yet have a scientific name [OVERALL in MEIRELLES, 2007]. For amphibians (frogs, toads, etc.) endemism reaches 87%, and for reptiles (snakes, turtles, crocodiles) 62% are endemic.

- **Butterflies** – One fourth of the 7,500 world species of butterfly are found the Amazon [GOELDI MUSEUM, 2015]. In a single scientific expedition over 3 weeks in the Caxiuanã Scientific Station, the Goeldi Museum team found more than 90 species (more than 1% of world species) [OVERALL].
- **Fish** – 1,400 species are estimated in the Amazon (circa 5,6% of global species). This is more than all the species of all the rivers on the planet together and more than in the Atlantic Ocean.
- **Avifauna** – The Amazon has about 1,000 species (10% of those found on the planet). From those, 283 are rare or have limited distribution [GOELDI MUSEUM, 2015]. Species such as the mangrove-parrot (*Amazona amazonica*), found here in the Islands of Belém are being collected indiscriminately. In the Belém Endemism Center (see section below) there are 680 species (equivalent to the Pantanal biome known for its avian diversity). About ¼ of the bird species are under some kind of threat. Considered endangered is the Golden Parakeet or Ararajuba, (*Guaruba guarouba*), a Psittacidae related to parakeets and parrots, menaced by animal traffic and habitat disappearance.
- **Bats** – 146 species are found in the Amazon of which ¼ are endemic. In the largest concentration of bats in the world, 72 species were found in a 300 sq km area. Comparatively, in the United States there are 45 species in 9.36 million sq km [BERNARD, 2006].
- **Mammals** – In the Belem Endemism Center, 70% of big and middle size mammals are under some kind of threat [GOELDI MUSEUM, 2015].
- **Primates (monkeys)** – Brazil is the country with the highest primate diversity with 118 species, 92 of which are found in the Amazon. In the Belem Endemism Center there is a species critically endangered and endemic to the region – the Ka'apor Capuchin (*Cebus kaapori*) [GOELDI MUSEUM, 2015].
- **Conservation** – Although half of the Brazilian Amazon is protected, either by conservation units or Indian Reserves [ISA, AMAZON, 2011], this is not sufficient because many regions such as the Belem Endemism Center are not sufficiently represented with protected areas. In order to protect the Amazon biodiversity and different natural landscape we should consider all 225 types of vegetation. For example, in the islands of Belem there is no integral protection conservation unit.

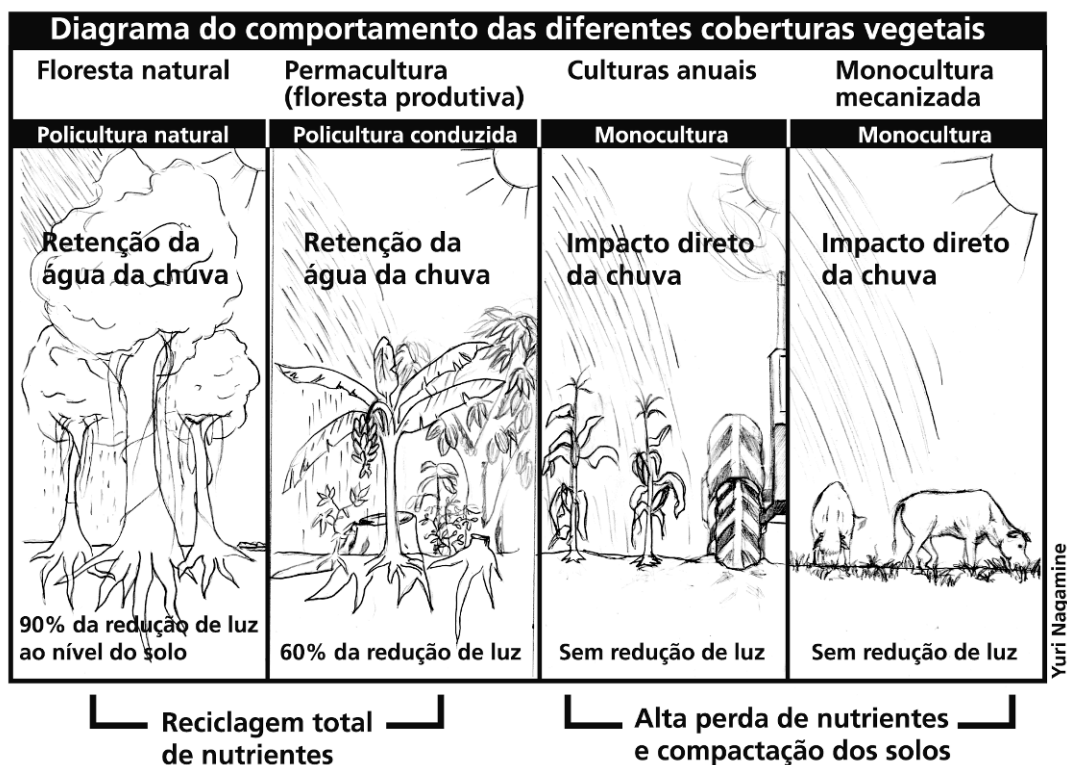
1.4. Causes of deforestation:

- **Deforestation** – We must consider that in the last 40 years, the area altered by human activity in the Brazilian Amazon was 762.9 thousand sq km (76.2 million hectares), equivalent to the area of Norway and Sweden together [INPE, 2014]
- **Billions of trees** – It is estimated that the Amazon biome used to house over 400 billion trees with a diameter of more than 10 cm at breast height. Calculating the distribution of a population of trees on an area basis, it can be inferred that clear cut deforestation has destroyed over 42

billion trees in Brazil alone, in the last 40 years (...) This destruction rate means (on average) that more than 1 billion trees are cut down every year; that is nearly 3 million per day [NOBRE, 2014].

- **Deforestation rate** – Although the rate of deforestation has declined, deforestation continues. It is just a matter of time to reach a point of collapse.
- **Causes of deforestation** – The beef value chain is the main driver of deforestation in the Brazilian Amazon. It is followed by soy, produced mainly to feed chicken and pork in Europe and China. The growing consumption of meat nationally and worldwide are therefore the No. 1 threat to the Amazon.
- **The growth of cattle ranching** – From 1990 to 2008, the Brazilian Amazon cattle herd grew from 25.7 million to nearly 71.5 million heads, an increase from 18% to 35% of the total Brazilian herd [BARRETO, 2010]. In the last 50 years, the transfer of cattle production to the Amazon has been the largest in history. If we project the growth of the Amazon cattle herd for the next 20 years based on the 1.7% growth of country's herd from 1994 to 2007, we will have 103.7 million head of cattle in the Amazon [MEIRELLES, 2013].
- **Growing demand for meat** – Worldwide, there is pressure to double livestock production by 2050, from 228 to 463 million tons. [FAO, 2009].
- **Expensive food** – The price of a beefsteak fails to incorporate the real cost of its production footprint. For example, in order to produce a kilogram of beef, 27 kilos of carbon dioxide are produced among other gases and 14 ton. of water are required.

Below, a diagram showing the impact of rain, light and other environmental services in 4 different scenarios – forest, agroforestry, annual crop and cattle ranching:

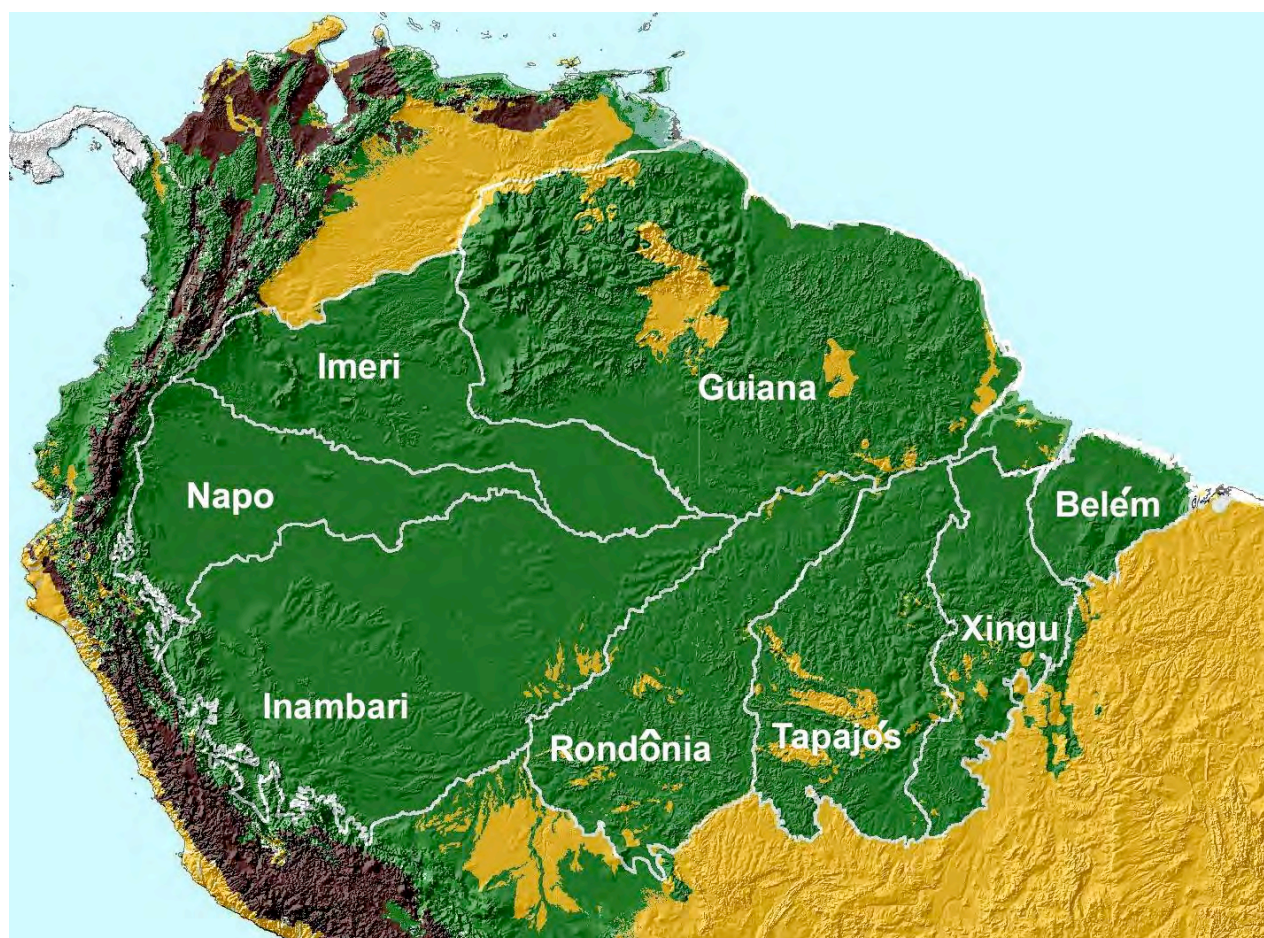


2. Amazon Endemism Centers & Belem Endemism Center

Os Centros de Endemismos da Amazônia & Centro de Endemismo Belem

One of the best ways to understand conservation in the Amazon is to divide it into centers of endemism, according to Goeldi Museum & Conservation International proposal. Special attention should be given to the area most impacted by human action – the Belem Endemism Center – where biodiversity is at risk of collapse [SILVA, 2005; VIEIRA et al., 2005; GARDA et al., 2010; SILVA & GARDA, 2011].

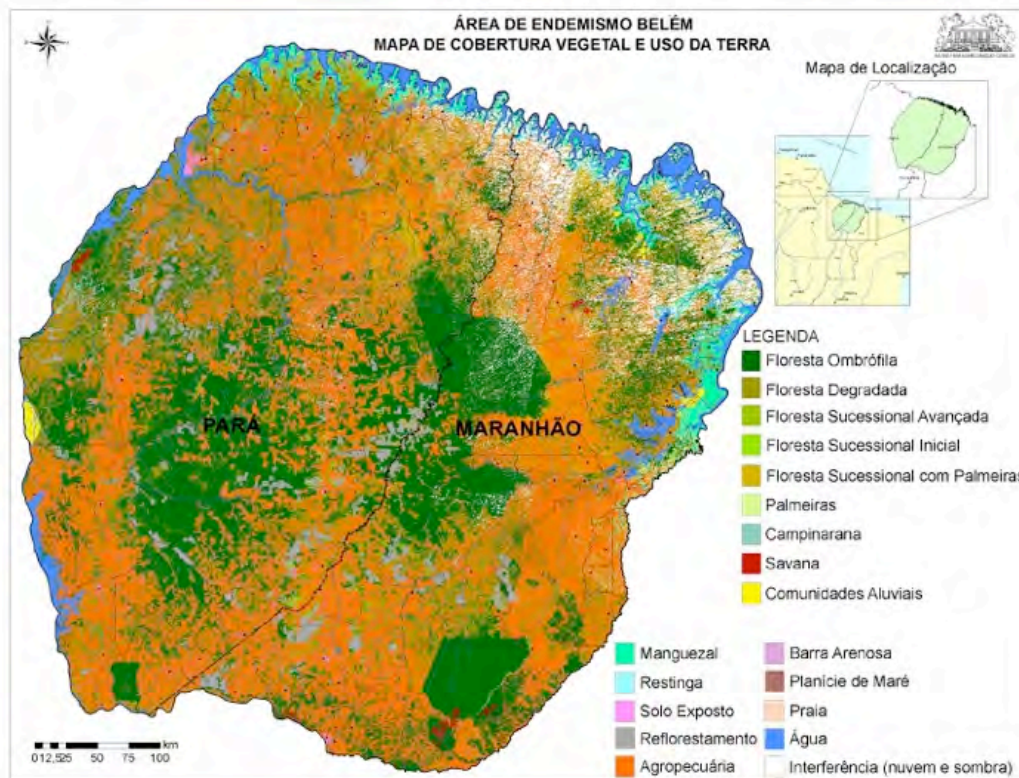
Bellow, map of the continental Amazon devided by Endemism Centers



Source: Conservation International & Goeldi Museum, 2005.

- **The Belem Endemism Center** – Covering an area of 243 thousand sq km (24.3 million ha), Belem's Endemism Center is equivalent to the area of the United Kingdom. It covers the west of Maranhão and the east of Pará states. The original forest was reduced to less than 27.98%. From the 46 endangered species in the Amazon, more than 50% are found in the Belem Endemism Center [ALMEIDA et alii, 2014]. The Islands of Belem are part of this area.
- **Conservation** – Together, Indian Territories and full protection Conservation Units make up less than 3 million hectares (under 12% of the total). There is a single full protection area equivalent to 1.2% of the Belem Endemism Center [OREN, 2011]. The few primary and secondary forest fragments are in private properties [PEABIRU, 2010].

Bellow, map of the Belem Endemism Center



Source: ALMEIDA et ali, 2014.

- The Brazilian Government’s economic development model for the Eastern Amazon basically encouraged occupation of land that in reality benefited few; on the contrary, it has contributed to exacerbate the socioeconomic exclusion of traditional rural communities. Social groups such as Indigenous communities, Afro-descendents, Riverside Communities (riberinhos), and peasants are still living in isolation in a subsistence and/or informal economy, lacking access to: a) basic services (education, health, electricity, transport etc.); b) land security; c) access to markets; and d) technical knowledge and expertise.



- **Belém is a floating metropolis** – In the municipalities of Belém there are 39 islands, covering a surface larger than the continental area. Outside the urbanized islands of Mosqueiro, Caratateua (Outeiro) and Cotijuba with their larger populations, the other islands are densely forested [SILVA, 2010].
- **Vegetation** – Most of the landscape we see is floodplain forest (tidal forests as we have in the Mega-estuary of the Amazon/Tocantins river). People have been selecting for trees for dozens of generations, especially to provide fruits such as açaí, miriti, cocoa, cupuaçu and taperebá.
- **Traditional communities** – more than 3 thousand families live in the Islands of Belem (probably, 10 thousand families if all municipalities are considered – Barcarena, Ananindeua and Belém).
- **Traditional Economic model** – Most families earn their living collecting açaí palm berries and other fruits (cocoa, cupuaçu, taperebá etc.), through family agriculture and fishing (shrimp and fish) and with complementary income from other informal work (including weekend tourism in some cases). On Combu Island where we are visiting there are a few restaurants and leisure areas, functioning mainly on weekends;
- **Environmental issues** – among main issues are: disorganized settlement and population growth in the islands; deforestation to use timber and produce charcoal; transforming açaí in a monoculture (increase chances of erosion, loss of biodiversity and loss of houses for pollinators).
- **Polluted waters** – The Belem Metropolitan area has less than 5% of sewage and everything goes to the Estuary.
- **Major social issues** – Islanders are highly dependent on Belem for basic services. The majority has no access to clean water, sewage treatment, garbage collection or energy. Transportation, communication, education and health assistance are crucial items. Security is a real problem. Furthermore, lack of social representation in the municipal chamber and through local associations is also a key issue.
- **Invisibility** – maybe, the worst problem for the people living in the islands is to be invisible to the majority of the 2.4 million people living in the Belem Metropolis. Valorizing the family agriculture products, services and cultural is a real challenge. There are people living in the islands and they are not merely a part of the landscape.
- **Peabiru & Islands of Belem** – Peabiru has been working in the area for 10 years, particularly on the island of Cotijuba. Most of our work is with Belem's Islands Women Movement (MMIB) on various local agendas (income generation, gender issues, computer literacy, ecotourism, arts crafts etc.). Recently, Peabiru started working with 1,000 families offering rural assistance (according to Federal Land Reform Institute – INCRA).

4. The Islands of Belem – Challenges & Opportunities

- **Sustainable agroforestry** – To improve the position of local producers in agroforestry value chains (including açaí, cocoa, fruits, shrimp, arts & crafts, herbs, and honey from wild bees), by assisting them in accessing formal and institutional markets (supplying public school canteens and federal government native food (sociobiodiversity products) acquisition);
- **Land security** – To reach all riverine traditional family farmers (ribeirinhos) through federal land reform policy, recognizing their status as agroforestry rural settlements. Presumably this will mean doubling the 1,852 families recognized by INCRA [INCRA, 2013] in the 3 municipalities (Ananindeua, Barcarena and Belem);
- **Global Gastronomic Center** – To play an important role in the proposed state government's new organization, families living in the islands of Belem could offer products with quality, freshness and identity (*terroir* concept), valuing the traditional knowledge associated to biodiversity. We need to remember that many products widely consumed today were domesticated in the Amazon, such as brazil nuts, cocoa, manioc, passion fruit, peach palm (palm heart and fruit), red pepper, rubber and most recently, açaí (palm heart and fruit) and a cornucopia of tropical fruits (cupuaçu, taperebá, bacuri etc.). It will also increment community-based ecotourism through visits to the producers.
- **Conservation** – one of the agendas is to create full protection conservation units, such as the one proposed for the conservation of the mangrove-parrot (*Amazona amazonica*) at the Parrot Island near Combu.

Part 2

The Peabiru Institute (Instituto Peabiru)

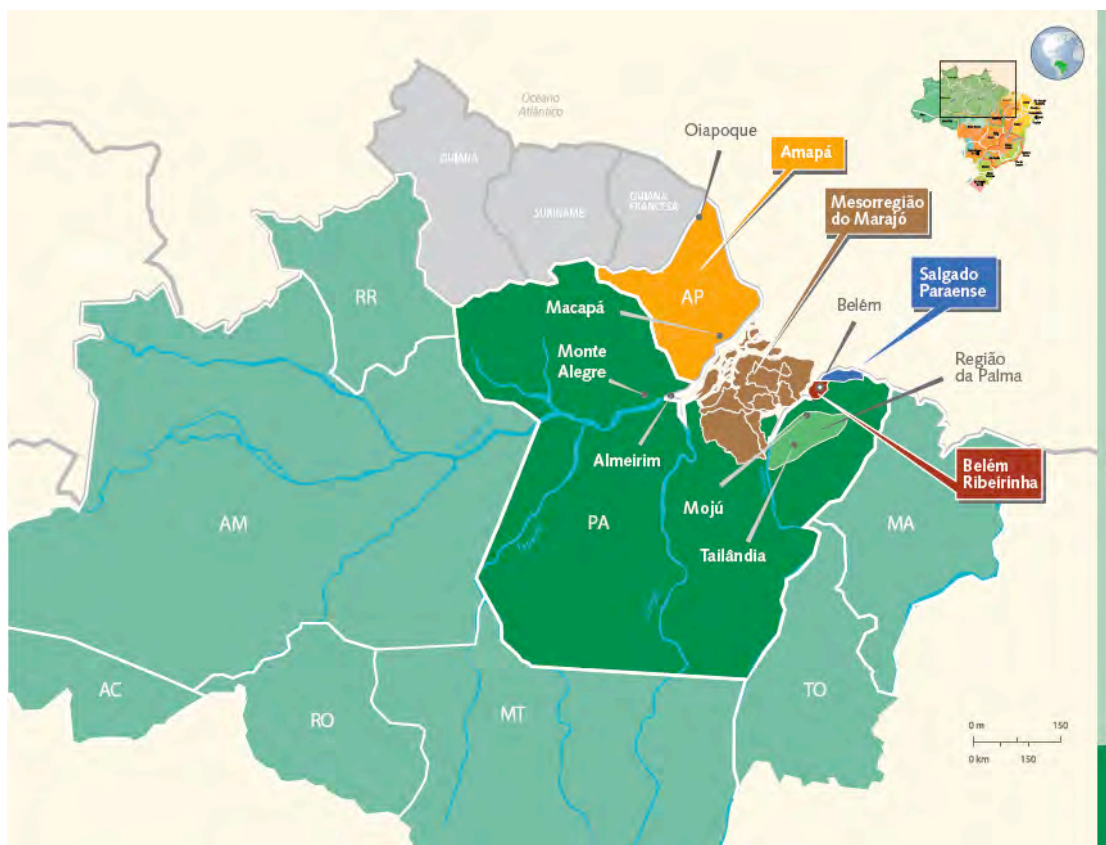
Instituto Peabiru is a Civil Society Organization of Public Interest (OSCIP), headquartered for the past 18 years in Belém, Pará, Brazil. The organization's purpose is to address the socio-economic and environmental issues related to the long-term sustainability of the Brazilian Amazon. We work alongside communities and local civil society organizations to increase the capacity of residents to exercise their citizenship to the fullest extent and enjoy the benefits of a sustainable economic model while promoting conservation in the Amazon. We facilitate processes of transformation within communities, civil society organizations and enterprises, and we strive to address exclusion and inequality.

Most of Instituto Peabiru's work takes place in the estuary of the Brazilian Amazon with rural communities (family agriculture and traditional communities). These communities include ribeirinhos (river settlements), Quilombolas (afro-descendents) and indigenous communities. We emphasize women and youth in all of our work. In addition to the organization's community based projects, Instituto Peabiru engages in local and national dialogues on sustainable development and the impact of business activities on communities in the Amazon.

Instituto Peabiru's Area of Action

We work in four territories, as the map below illustrates: in the Amapá state; and in Pará – the Marajó region; The Salgado region (salty region), in the coastal area of Pará; and The Islands of Belém (Belém Ribeirinha).

Through its research activities, Instituto Peabiru addresses issues in rural technical assistance (for 2,000 families in 16 rural federal settlements), traditional fishing agreements (for 1,500 families in Marajó), managing wild bees (for 310 families in different areas of Pará and Amapá states), community-based ecotourism, environmental conservation, coastal ecosystem research, REDD+Bees, the impact of palm oil on family agriculture and the impact of rice plantations on the Amazon Estuary floodplains.



We also work with UNICEF in all 9 states of the Amazon region to assist 650 municipalities in using social indicators to monitor their public policies for youth and children.

With the Goeldi Museum (Museu Paraense Emílio Goeldi), now commemorating its 150th anniversary, we have a long-term partnership in order to support the renovation of its Zoobotanical Park in Belem.

Funding sources during the last two years include private companies (Agropalma SA, Dow Corning, Imerys, Lojas Renner, Philips do Brasil, Suzano Papel e Celulose SA) public companies through bids (Brazilian Development Bank - BNDES, Petrobras); multilateral organizations (UNDP, UNICEF, UNESCO) and federal government agencies such as INCRA - the federal Land Reform Institute. We have partnerships with NGOs (IDEAAS, IEB and others) scientific and educational institutions such as the Goeldi Museum, Federal University of Pará, Federal University of Amapá and ISS/Erasmus University (Holland).

Part 3

The Amazon Néctar (Néctar da Amazônia)

1. About the bees

On a recent field visit, a four-year-old girl stood next to her mother, watching a training session around a hive. After listening carefully, she turned and looked up at her mother who was expecting her next child. She wanted to know whether they could raise a hive of bees for her new sister. This child had understood the essence of native beekeeping. The new hive would represent an investment for the future in which her sister would be born. The bees, naturally stingless, would be a safe and gentle presence in the baby's life. She and her sister may well be a part of the new generation of Amazonian youth making their living from the forest and helping to ensure its continuity.

- Most of the food we eat is produced thanks to pollinators. Globally, the economic value of bee pollination is estimated at 1/10 of the value of agriculture – US\$ 153.10 billion [Gallai et al, 2009];
- Scientists estimate that there are 25,000 species of bees in the world. Among them is the *Melipona* family (stingless bees), with 600 species worldwide. Brazil has 244 named species and 89 species not yet described, among which are 114 species in the Amazon [Pedro, 2014];

2. The problem

- Bees are disappearing worldwide; between 1947 and 2005 in the United States, domesticated honeybee colonies decreased by 60% [Meet our prime pollinators – Nature];
- At the same time, in the last 50 years, global agriculture that depends on animal pollination increased by 300% [Aizen, M. A. & Harder, L. D. *Curr. Biol.* **19**, 915–918 (2009)];
- In the Amazon, if wild bees disappear, local biodiversity will be seriously compromised. Major crops will also suffer—all palms including açai (*Euterpe oleracea*), Brazilian nut (*Bertholletia excelsa*), cocoa (*Theobroma cacao*), cupuaçu (*Theobroma grandiflora*), peppers (*Capsicum spp*) and most fruits;
- The Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES), created to monitor global loss of biodiversity, has an agenda that includes pollinators, pollination and food production. The assessment will be evaluated at a Kuala Lumpur meeting in February 2016, after which it will be delivered worldwide through outreach programs.

3. Native bees: key to conservation in the Amazon

- **Fighting deforestation** – Native beekeeping generates forest-based income for traditional populations. In this way it discourages forest fires and deforestation while providing an incentive for the conservation of forest biodiversity.
- **Putting a value on environmental services to help combat climate change** – Through this REDD mechanism (Reducing emissions from deforestation and forest degradation), Peabiru believes that native honey production has the potential to prevent an equivalent of 16 kilos of carbon for each kilo of honey from native bees [PEABIRU, 2014];
- **Same investment, bigger harvest** – Encouraging pollinators can increase the efficiency and yield in agricultural and non-timber forest production. The açai market, currently booming and enjoying growing demand worldwide, depends on ongoing pollination.
 - a. Only in the state of Pará, the açai value chain equals an annual income of US\$ 500 million, involving more than 300 thousand people. It represents more than 70% of income in traditional communities [CONAB, 2013];
 - b. Açai (*E. oleracea*) depends on meliponini as major pollinators. In the Amapá National Forest, 17 species of bees were linked to açai [Frazão, 2009];
 - c. Each community, whether indigenous or afro-descendent, can offer a different honey with a different story. Flavor profiles reflect the characteristics of each region of origin (the concept of *terroir*).

4. Keeping traditional families in the forest

- a. **Community-based development** – native honey production is, at its heart, a community-based enterprise. In this context, local associations and family involvement are vital.
- b. **Local income and job generation** – According to Peabiru's field research, in some regions, 1 kg of honey (US\$ 10 to 15) can represent 10-20% of average monthly income per capita. It can provide an anchor to rural youth, thus helping to stem regional urban migration.
- c. **Money in the hands of women** – native honey production provides a source of income accessible to women and compatible to their daily activities. Women's income can have a direct impact on the security and wellbeing of rural families.
- d. **Bees are the best environmental educators** – Raising native bees provides an effective lens through which traditional families can consider environmental impacts and outcomes, from logging and burning to better forest management.

5. The whole forest in a spoonful

- a. In the Amazon forest, up to 90% percent of native trees depend on bees as prime pollinators [KERR et alii, 1996];
- b. In turn, bees depend on forest. An old growth Amazon forest can carry many dozens of species of Meliponini bees; in degraded pastureland this number drops to 0-2 species;

- c. Native bees are generalists in their searches for nectar and pollen. The honey they produce can be said to bring together the whole forest in a spoonful.
- d. This is a new product in a budding market. Commercial pathways are still to be developed, but in just the last ten years the price has risen tenfold. What was once only used medicinally in rural interiors is now highly valued by chefs and discerning consumers alike.

6. Peabiru Institute – Our experience and approach:

- Our work spans the past 10 years, during which diverse institutions have funded diverse initiatives in traditional Amazonian communities. These have included the BNDES (Fundo Amazônia), Dutch Embassy, ABN AMRO Foundation (where Peabiru worked in partnership with The Royal Tropical Institute, from Holland), Petrobras and The Nature Conservancy.

7. The Fundo Amazônia (Amazon Fund) finances “Amazon Nectar”

- The main goal of the Amazon Nectar project is to strengthen the native honey value chain, providing a sustainable alternative to deforestation. Our approach focuses on four areas: increasing sustainable production, reaching the formal economy, building capacity, and integrating participatory monitoring and evaluation. The project also includes a “Honey House” processing facility at the central location of Macapá.
- Beneficiaries of the project are 310 producers from 5 regions, distributed in 30 rural villages. Among the groups involved are Indians, African-Americans (quilombolas), traditional fishermen and family farmers from river communities.
- The Amazon Nectar project is a two-year initiative valued at nearly half a million Euros. We estimate that the project, upon completion, will help to protect over seventeen thousand hectares of Amazon rainforest, savannah and floodplain.
- The native bees producers (such as Dona Nena) in the Combu Island are supported by EMBRAPA, and are not directly linked to the Amazon Nectar, financed by BNDES Amazon Fund at this present stage. The Amazon Nectar is fund raising to work with the family agriculture in the Islands of Belem.

8. Next steps

- There are more than one million families living in rural underdevelopment in the Brazilian Amazon. How powerful it would be if each of these families worked to raise native bees. We envision every Amazonian home garden flourishing under the enterprising activity of these small workers. We see the Amazon Nectar initiative as a pilot project with the potential to eventually reach a greater population, preparing the forest farmers of the future.
- A next phase of this project is to reach a wider audience of rural families. We intend to produce a short film and web page to make our work public and accessible. Many communities have sought our support in beekeeping. To respond to this demand, we would like to build a Demonstration Center to train field technicians to carry this expertise further.

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- This center will be a pilot: we also see an opportunity to assist forestry and agricultural university programs and technical schools, throughout Brazil and tropical countries of the world, to adopt their own native beekeeping demonstration centers.
- By generating income from standing forest and thus discouraging carbon emissions from deforestation, this project aligns closely with the objectives of funding sources such as REDD+.

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