

# The Mouth of the Amazon

Strategic Scenarios for Expanding Scientific Knowledge  
and Protecting Biodiversity

Summer 2025



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Artisanal fishing at  
the mouth of the  
Amazon River







## Preface

# Where the Forest Meets the Sea

Where does the world's largest river system meet the ocean that helps balance the planet's climate? It's the Mouth of the Amazon, where vast mangroves, vibrant reef systems, and unique biodiversity—from whales, schools of fish, and turtles, from migratory birds to invertebrates and microorganisms—form an ecosystem that not only sustains life but also stores carbon essential for global climate balance. For millennia, indigenous and traditional fishing communities have found their livelihood, culture, and history in this place. Studying this region extensively is essential for developing preservation strategies and preparing science-based actions to protect it from socio-environmental disasters that could compromise its rich biodiversity.

The establishment of new marine protection areas in the Mouth of the Amazon ecoregion is a fundamental step in safeguarding one of the richest and most biodiverse ecosystems on the planet, created by the unique integration of the Green Amazon with the Blue Amazon, ensuring the conservation of unique habitats, the sustainability of local communities, and the strengthening of scientific research.

The current moment is particularly propitious for this initiative. The recent

reinstatement of the oceans in global discussions, driven by debates promoted by the United Nations over the past 15 years, highlights their relevance as pillars of climate balance and biodiversity conservation. In parallel, the COP30 in Belém gives Brazil a prominent position on the multilateral stage, reinforcing its leading role in international negotiations where the ocean-climate nexus is central. This unique situation offers the country the opportunity to reaffirm its leadership in global forums, solidifying its commitment to environmental preservation and sustainable development.

Brazilian society, increasingly aware, recognizes that protecting the Mouth of the Amazon and its area of influence is a legacy for future generations. The world's largest continuous mangrove forest, stretching from Amapá to Maranhão, is a natural carbon sink, capturing thousands of tons of gases that warm the planet. As previously stated, a healthy planet depends on healthy oceans. The coastal Amazon, with its mangroves, reef systems, and brackish water plume that extends to the Caribbean, is a pillar of this balance, storing carbon and regulating global temperatures. Preserving this system is essential to mitigating climate change and maintaining the life it sustains.

Brazil is already signaling its commitment. In October 2024, President Luiz Inácio Lula da Silva described the country as a “sustainability giant,” highlighting the responsible exploration of the Equatorial Margin with respect for the environment. In June 2025, at the Oceans Conference in Nice, he reinforced that the seas deserve the same attention given to tropical forests, for their role as climate regulators and cradles of biodiversity. The challenge now is to turn these words into concrete actions.

In this context, the establishment of the Mouth of the Amazon National Institute (INFA, acronym for Instituto Nacional da Foz do Amazonas) emerges as a fundamental initiative. More than a research center, INFA will be a space for convergence, where scientists, traditional communities, and administrators collaborate to expand knowledge about the region. Along with other measures aimed at expanding knowledge in the region, it will provide the tools necessary to understand the role of the Mouth of the Amazon in climate control, natural resource productivity, and sustainable development,

ensuring that decisions are based on sound science and respect for local populations.

Led by the Emílio Goeldi Museum of Pará and the Institute of Advanced Studies at the University of São Paulo, this initiative seeks not only to expand knowledge but also to propose scenarios for the establishment of protected areas along the Amazon’s Equatorial Margin, as well as other measures that expand the conservation of sociodiversity. It is an effort to unite academic and traditional knowledge, transforming the Mouth of the Amazon into a conservation model that balances nature protection with sustainable development and community well-being.

This is an invitation to action. With COP30 in Belém, Brazil has the chance to show the world that protecting the mouth of the Amazon is more than preserving a unique, important, and vulnerable ecosystem—it’s honoring the life that pulses at this meeting point between river and sea, ensuring that it continues to inspire and sustain future generations.

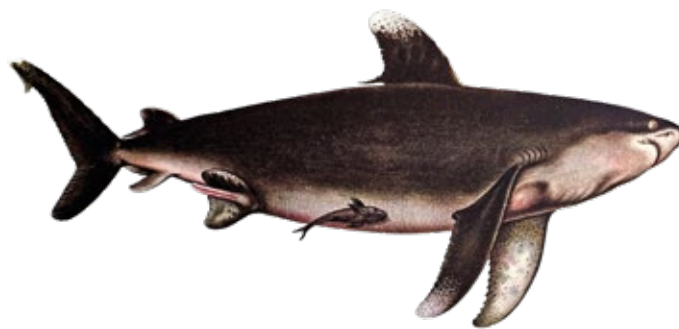
**Nilson Gabas Jr.**

Director of the Museum Emílio Goeldi of Pará

**Roseli de Deus Lopes**

Director of the Institute of Advanced Studies at the University of São Paulo





## Introduction

# Joining Forces to Protect the Mouth of the Amazon

In 2024, the Emílio Goeldi Museum of Pará (MPEG) and the Institute of Advanced Studies (IEA USP) decided to do something special: unite those who live by the sea with those who study it. Thus, the Mouth of the Amazon Biodiversity Protection Working Group was born, formalized by MPEG Ordinance No. 378. This team brings together 21 experts from universities, environmental departments, research institutes, NGOs, and fishing associations, representing the three states that embrace the Amazon: Amapá, Pará, and Maranhão.

The group didn't just want to publish reports—their mission was to create an action plan. To this end, they organized two seminars in 2024, titled “The Mouth of the Amazon: Research, Conservation, and the Future.” The first seminar, held in Belém, was attended by over 400 people. The second, held at the IEA-USP, drew over a thousand attendees. Scientists, fishermen, managers, community leaders, and the general public participated in these meetings, exchanging ideas, stories, and steaming coffee. While researchers showed satellite images, fishermen shared their notebooks about tides. Businessmen discussed offshore energy, while quilombolas shared the wisdom of those who have lived in the mangroves for generations. From these conversations, a

practical manifesto emerged: this document.

The full recordings and strategic summary of the seminars are available to everyone on the IEA's YouTube channel and in Annex 2, respectively. The goal is to transform widespread knowledge into a shared roadmap, ensuring that the sea that sustains the world also continues to sustain the communities that depend on it.

## 2.1 The Need for Connected Research

Anyone who has sailed through the Mouth of the Amazon knows it is immense—bigger than any image can capture. Its waters, mangroves, and reefs hide a complex web of life: schools of fish that dance with the tides, whales following ancient routes, communities that rely on the sea for survival. But although many scientists study the region, each focuses on a piece of the puzzle. One group maps corals, another studies fishing, another analyzes carbon in the deep sea. Everyone brings valuable discoveries, but there's a lack of a vision that unites everything.

This disconnect creates dangerous gaps. We don't know exactly how whales behave there, how industrial fishing affects reefs and vice versa, or where energy can be explored without harming marine life. Fishermen also feel that their knowledge, accumulated over generations, rarely reaches decision-makers.

The solution? Establish the National Institute of the Mouth of the Amazon (INFA). It's not just a building or an idea on paper. INFA is envisioned as a living space, where oceanographers, biologists, engineers, geographers, fishermen, quilombolas, indigenous peoples, and managers work together. A place where satellite imagery meets handwritten tidal calendars, and where science and local wisdom combine to chart the future of the largest tropical river Mouth on the planet.

Because, ultimately, the complexity of this ecoregion cannot be addressed in isolated laboratories. It requires a network of perspectives that intersect, complement each other, and together chart a path to protect the Mouth of the Amazon and all it represents.

## 2.2 Priority Areas for Conservation and Benefit Sharing of Brazilian Biodiversity

Since Brazil signed the United Nations Convention on the Law of the Sea in 1982, the country has made a commitment: the right to exploit the sea's resources is linked to the duty to protect it. The enactment of this convention in 1995 made it clear that each coastal state is the guardian of the waters that bathe its coast. In 1992, the country reinforced this commitment by joining the Convention on Biological Diversity (CBD), an international agreement that places the conservation of life at the center of the global agenda.

In practice, this means that Brazil has committed to preserving not only its forests and rivers, but also the sea that embraces them. In 2010, during the CBD COP-10, held in Nagoya-Aichi, Japan, the Brazilian government adopted the Strategic Plan for the Decade of Biodiversity 2011-2020. Among the 20 Aichi targets, Target 11 stands out: by 2020, at least 17% of land and 10% of marine and coastal areas should be protected, especially those important for biodiversity and ecosystem services.

### Priority areas and actions for conservation, sustainable use, and sharing the benefits of Brazilian biodiversity

#### LEGEND

##### Priority Areas

Importance

- Extremely High
- Very High
- Insufficiently Known

##### Conservation

##### Units

- Comprehensive Protection
- Sustainable Use
- Reefs

--- Study Area

FRANCH  
GUIANA

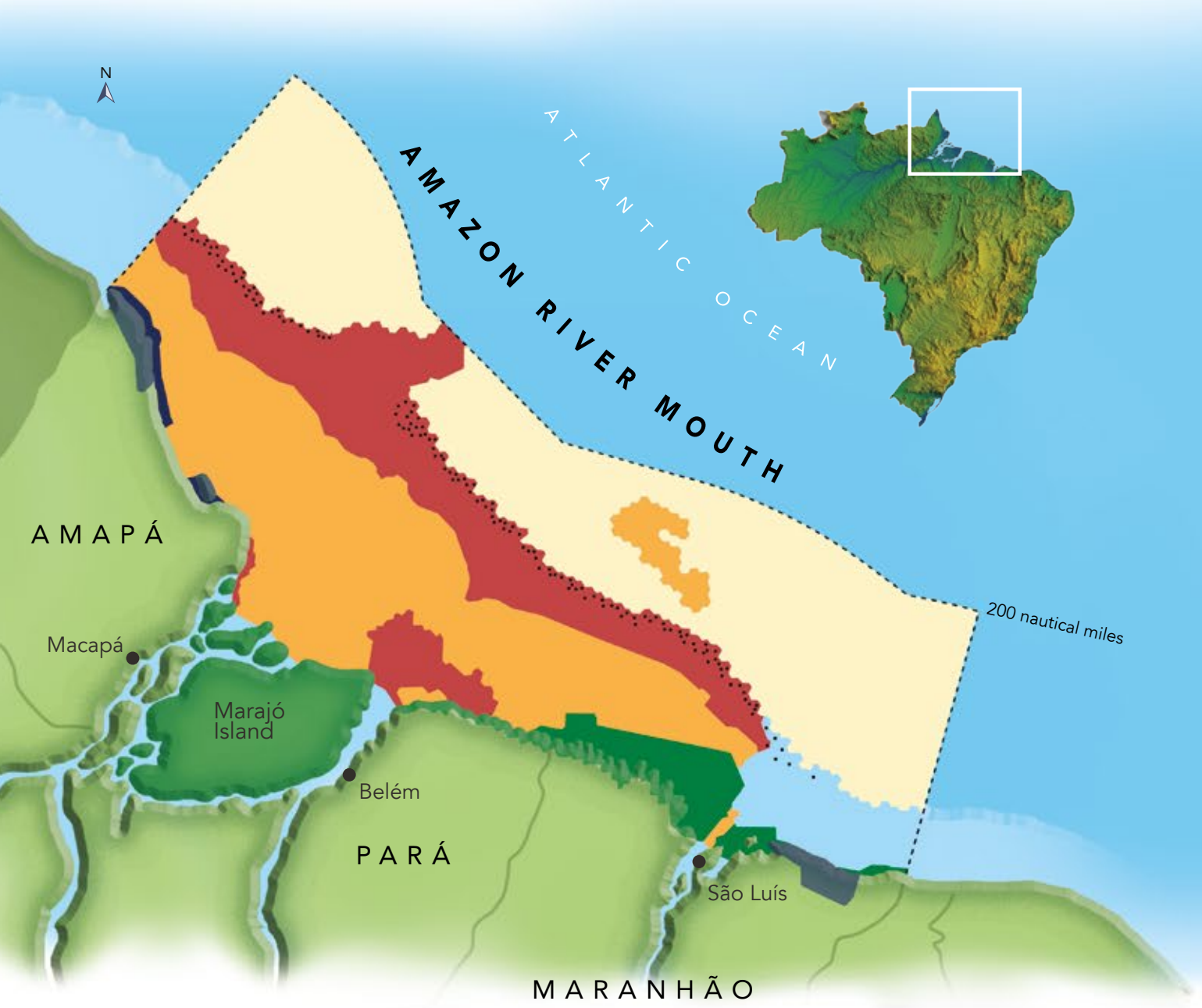
Source: adapted from MMA, 2023



To achieve this goal, Brazil established the Priority Areas Program for the Major Brazilian Biomes. Between 1998 and 2000, dozens of researchers, managers, community representatives, and NGOs gathered in workshops by biome. The result was a set of maps that showed, in vibrant colors, where life needed shelter. In 2002, the coastal zone was prioritized, with areas classified as extreme priority, very high priority, high priority, or insufficient data.

The maps were updated in 2018 and 2023, incorporating new findings. The Ministry of Environment and Climate Change then published the “2nd Priority Areas Update,” which confirms that the Mouth of the Amazon remains in intense red—high priority.

Based on these studies, 54 Conservation Units, protected areas under Brazil’s National System of Conservation Units, have been established over the past few decades



## Ramsar site at the mouth of the Amazon



Source: Adapted from [rsis.ramsar.org](https://rsis.ramsar.org)

along the coasts of Maranhão, Pará, and Amapá. These include Extractive Reserves where artisanal fishers manage their own resources, Environmental Protection Areas that balance use and conservation, and Parks with stricter regulations to protect entire ecosystems.

But there's a detail: these units mostly protect the coastal area. In the open ocean, beyond the 12-mile coastline, there are only three small marine parks in Maranhão. It's like having a bulletproof safe in your living room and leaving the front door wide open.

Scientific assessments, such as the Ministry of Environment and Climate Change's "Priority Areas for the Protection of Biodiversity in the Coastal Marine Zone," conducted on the equatorial margin—deep waters that begin where the continental shelf ends and extend to

200 nautical miles—indicate the need for caution.

The challenge has persisted since the earliest studies: transforming what science already knows into real action. The most appropriate measure is to establish and implement the protected areas identified as conservation priorities over two decades ago. And this need becomes urgent given the discussions about energy developments in an ecosystem that is still virtually untouched and largely unknown.

The example comes from the seas of Rio Grande do Norte and Espírito Santo: in 2016, a joint effort between the Federal Government, the Navy, businesses, and civil society created two giant mosaics of protected areas around the archipelagos of São Pedro and São Paulo and Trindade and Martim Vaz. If it worked there, why not replicate the success at the Mouth of the Amazon?

## 2.3. National Action Plans

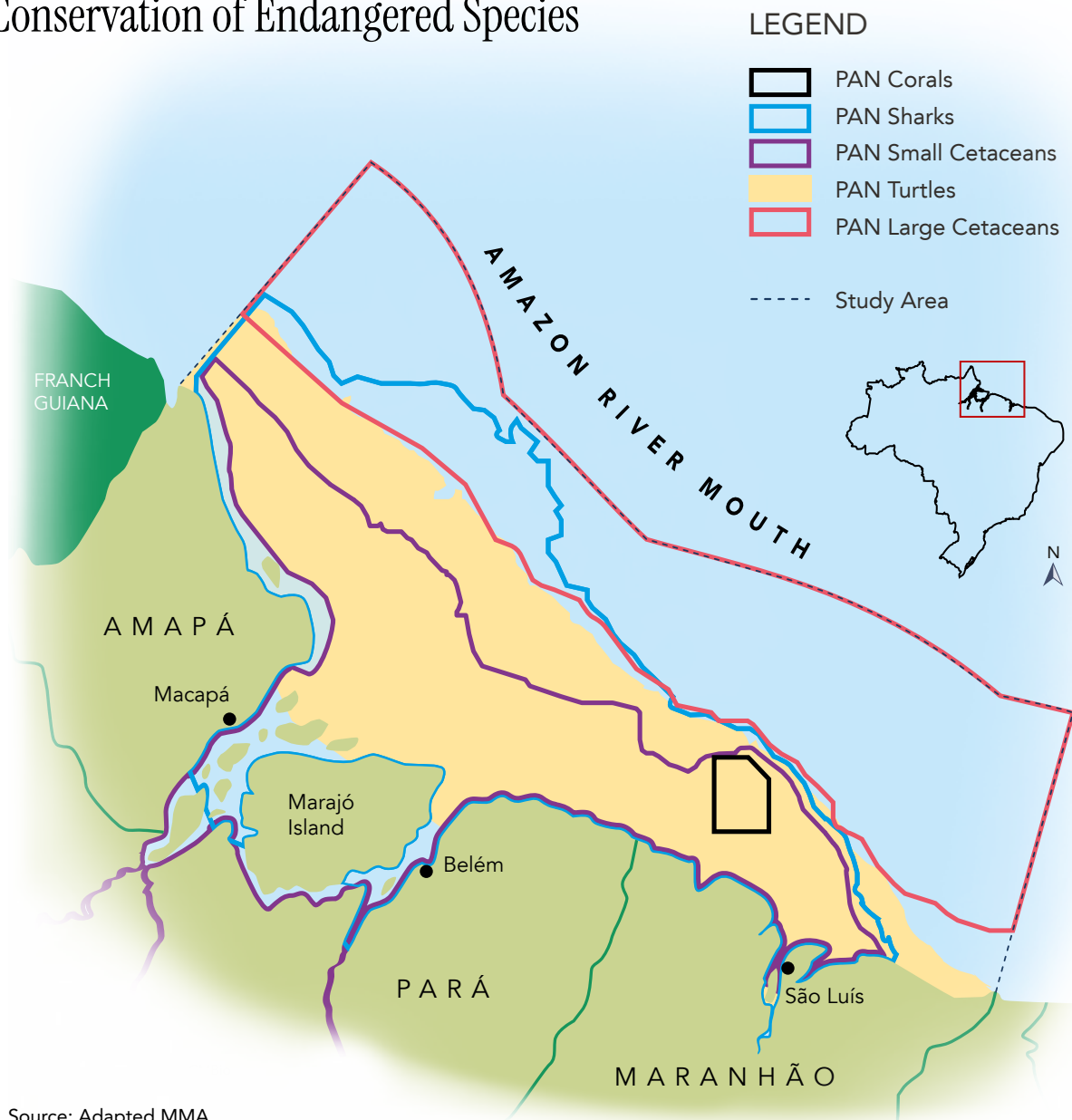
The National Action Plans for the conservation of endangered species and their associated ecosystems, are strategic planning instruments created by the Chico Mendes Institute for Biodiversity Conservation (ICMBio). The main objective of these Plans is to reduce extinction risks and promote the sustainable use of these resources.

It is a document detailing strategic actions for the conservation of endangered species, involving collaboration between

various institutions, such as government agencies, non-governmental organizations, researchers, and local communities. Each Plan establishes specific goals and actions for each species, or groups of species, aiming at their protection and habitat restoration.

For the Mouth of the Amazon ecoregion, a series of National Action Plans were developed, the most notable of which refer to large and small cetaceans, corals, turtles and sharks, whose maps are shown below.

### National Action Plan for the Conservation of Endangered Species





## 2.4 Strategies for a Sustainable Future at the Mouth of the Amazon

In 2024, two interdisciplinary seminars organized by the Mouth of the Amazon Working Group brought together scientists, communities, and managers to discuss the region's future. From these discussions, 18 major strategies were created to guide actions that protect nature and promote sustainable development in the Mouth of the Amazon. See what was planned:

1. Strengthen networked research: Create partnerships between scientific institutions in the northern coastal states of Amapá, Pará, and Maranhão to form research networks focused on the mouth of the Amazon. This will help unite efforts and generate more knowledge about the region and promote technology and innovation;
2. Increase critical mass: Expand the number of dedicated researchers at universities and research institutes in the region, as well as the number of courses and places available in undergraduate and graduate programs on topics related to the sustainability of the Mouth of the Amazon;
3. Foster knowledge generation: increase and diversify funding opportunities for research development in the region;
4. Map and protect sensitive areas: develop a system to identify the most fragile points of the Amazon coast, creating models and methods that study how the region functions, from the rivers to the sea, and effectively protect it;
5. Monitor nature closely: conduct annual scientific expeditions to map and monitor geodiversity, such as rocks and soils, and biodiversity, including animals such as fish, corals, and rhodolith beds. These campaigns will help better understand the region and protect its riches;
6. Protect species threatened by fishing: catalog vulnerable animals impacted by industrial fishing and create ways to monitor and regulate fishing activities to reduce damage to biodiversity;
7. Include traditional communities: involve indigenous peoples, quilombolas, and fishermen in the creation and management of the mosaic of marine protected areas, fostering networking and ensuring that their ways of life are respected and included in the plans;
8. Create dialogue with communities: promote direct conversations with traditional communities, especially in estuarine and marine areas, and develop ways to connect communities, scientists, and government to make decisions together;

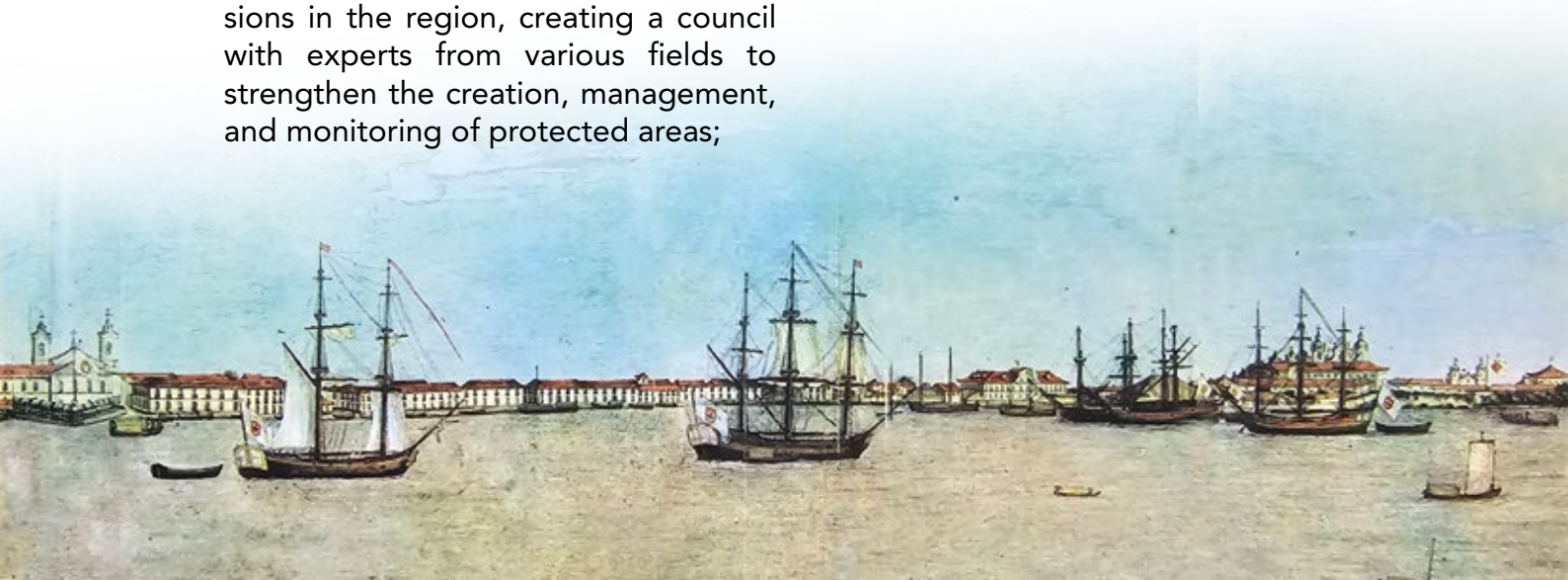


Illustration: Nossa Senhora de Belém do Grão Pará. Viagem Filosófica de Alexandre Rodrigues Pereira



9. Unite nature and culture data: create a public database that brings together information on biodiversity, plants and animals, and the sociodiversity, cultures, and ways of life of the communities of the Mouth of the Amazon;
10. Expand the SOMAR Amazônia Program: strengthen this program, which connects the terrestrial and marine biomes of the Amazon, with actions to reduce pollution in coastal and marine areas;
11. Implement the SisGAAz Program on the Equatorial Margin: creating the Blue Amazon Management System is essential for continuous and integrated monitoring and control of the region;
12. Balancing production and protection: work to ensure that the Mouth of the Amazon has a system that combines economic activities, such as aquaculture, fishing, and tourism, with the protection of nature, ensuring sustainable development and the safeguarding of the livelihoods of traditional populations;
13. Implement public policies: develop and implement public policies that address the region's sustainability, such as: Master Plans, Basin Plans, Climate Change Adaptation Plans;
14. Strengthen laws and management: improve the rules that guide decisions in the region, creating a council with experts from various fields to strengthen the creation, management, and monitoring of protected areas;
15. Create and implement management plans: use existing tools and methods and new funding arrangements to create and implement management plans for protected areas, especially in the Marajó Island Environmental Protection Area, and form management councils for all conservation units;
16. Promote the Blue Economy: structure a Blue Economy development agency in the region to create business opportunities and promote the natural beauty and importance of the Mouth of the Amazon, encouraging ecotourism and demonstrating how the protected areas system contributes to sustainable development;
17. Strengthen the geopolitical approach with other countries: promote dialogue focused on exchanging experiences and collaboration to expand knowledge of the region and strengthen actions aimed at sustainability;
18. Expand the dissemination of existing knowledge, both scientific and related to nature production and conservation, in language accessible to all levels of the population.

These strategies are a roadmap for protecting the Mouth of the Amazon, valuing its biodiversity, communities, and economic potential in a balanced and sustainable way.

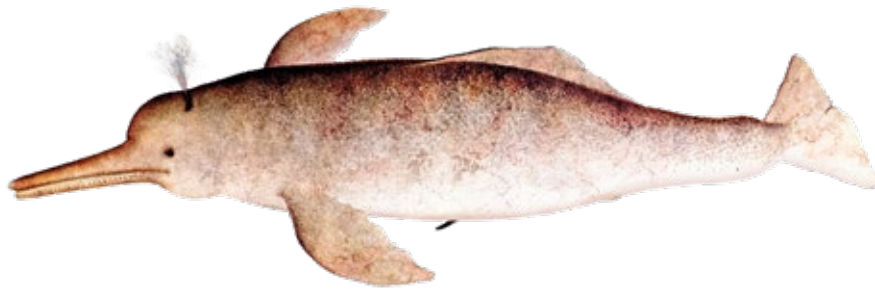




Flock of birds at the mouth  
of the Amazon River







# The Amazon Fluvial–Marine Ecoregion

## 3.1 Characteristics and Importance

### Protected Areas

The richest estuary on the planet is home to an incredible system of preserved mangrove areas, the largest in the world. The highlight is the “Amazon Macrotidal Mangrove Coast,” the largest continuous protected mangrove forest we have. This unique ecosystem has earned international recognition through the Ramsar Convention, which emphasizes the importance of protecting wetlands like these. One example is the Ramsar Site of the Mouth of the Amazon, recognized in 2018, with an impressive 3.8 million hectares. It encompasses a corridor of 23 Conservation Units in the states of Maranhão, Pará, and Amapá.

Managing such a vast and diverse place is no easy task, but initiatives like the Pro-Mangrove Program, created by the Ministry of Environment and Climate Change, have helped. The program works to organize the territory’s governance, promoting integrated management that values this fascinating environment.

On the coast of Pará and Maranhão, many of these protected areas are already in advanced stages of implementation, as Extractive Reserves or Sustainable Development Reserves, managed by the state or federal governments. The exception is the Marajó Island Environmental Protection Area, which still requires further efforts to promote sustainable development. This region is home to some of Brazil’s poorest populations, who depend on a healthy environment for food security. In Amapá, the protection of some areas still depends on agreements.

The Marajó Archipelago Environmental Protection Area, the largest conservation unit on Brazil’s northern coast, is a sustainable use area. Within it, there are three extractive reserves—Mapuá, Marinha de Soure, and Terra Grande-Pracuúba—and the fully protected Charapucu State Park. Despite its natural wealth, the archipelago faces significant challenges. It has the lowest municipal Human Development Index (HDI) in Brazil, with 14 of its 17 municipalities having a low or very low HDI. Ecologist Ima Vieira of the Emílio Goeldi Museum of Pará sums it up well: Marajó is like the Amazon in miniature, with incredibly rich biodiversity and culture, but marked by inequality and poverty.

Climate change is also hitting Marajó hard. Coastal erosion, exacerbated by human actions and climate factors, threatens six of the island's twelve municipalities. Deforestation and uncontrolled urbanization worsen the situation, increasing vulnerability. Furthermore, 68.6% of the population lacks access to treated water, and sewage collection is virtually non-existent, leading to widespread disease. COP30 could be a golden opportunity to shed light on these problems and seek solutions.

### **Why Is This Region so Special?**

The Amazon Fluvial-Marine Ecoregion, as the region of the Mouth of the Amazon and its area of influence is scientifically known, has been inhabited by indigenous peoples for thousands of years. Today, it is home to indigenous communities, quilombolas, fishermen, and city dwellers. Settlement began along riverbanks and coastal cities, blending ancient traditions with modern urbanization, creating a vibrant cultural diversity.

This region is where the world's largest freshwater discharge meets the ocean. Its plume connects the Amazon rainforest to the sea, carrying organic carbon and nutrients from the Amazon basin. In the ocean, these nutrients feed phytoplankton, which help absorb carbon and drive marine life. It is an essential cycle for climate balance.

The region's great tides and unique geography are intersected by dozens of estuaries, as well as an offshore reef system. These ecosystems are veritable nurseries for various species, including mammals, manatees, migratory birds, turtles, invertebrates, and even microorganisms that are still little studied. The reef system, formed by sponges and calcareous algae, is one of the most diverse habitats on the Brazilian coast, home to a multitude of marine life.

Mangroves and reef systems are also climate heroes. Mangroves store more carbon than forests, both in trees and roots, and in the soil. Reefs use carbon dioxide to form calcium carbonate, helping combat global warming and ocean acidity. Furthermore, mangroves act as natural barriers, protecting the coast from storms and erosion.

The region also has economic potential. There are large oil and natural gas reserves at the Mouth of the Amazon, as well as potential for offshore wind energy offshore wind energy and tidal energy generation. This can generate jobs and income, but it must be done carefully to avoid harming the environment and local communities, as well as other socioeconomic activities relevant to the development of the Blue Economy, which still needs to be strengthened in the region.



Monoliths of the Solstice  
Archaeological Park, in  
Calçoene, Amapá



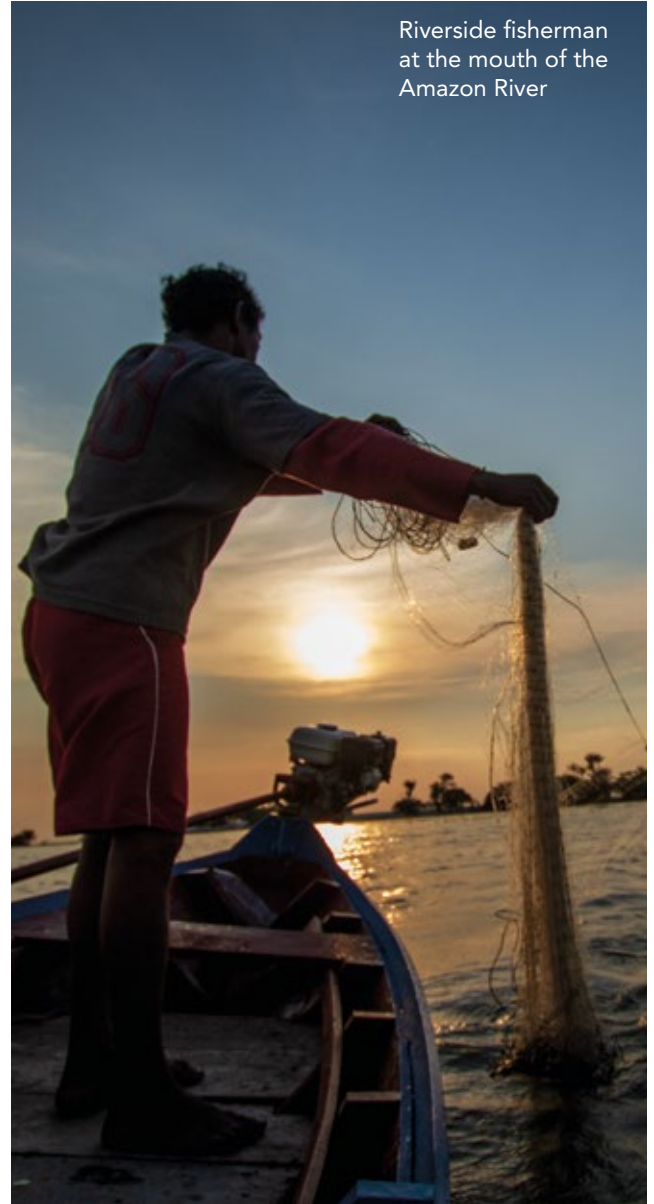
Fishing boat sailing  
at the mouth of the  
Amazon River



Pink Shrimp from the Afuá  
fish market - Marajó



Riverside fisherman  
at the mouth of the  
Amazon River



## Fishing and Traditional Communities

The region's biodiversity supports a rich fishery, ranging from crustaceans such as pink shrimp, lobster, and mangrove crab to fish like piramutaba, snapper, and yellow hake. Artisanal fishing is the heart of the local economy, providing food and preserving the culture of riverside communities. These communities have a deep connection with the sea, which goes beyond survival—it's part of their identity.

But the lives of artisanal fishermen are not easy. They face daily risks, such as accidents and illness, due to the hard work and weather conditions. Artisanal fishing is highly informal, with no labor protections, which makes fishermen even more vulnerable. Furthermore, there are conflicts with

predatory industrial fishing, the arrival of outside fishermen, improperly disposed of waste, and other contaminants that are increasingly present in the sea.

Historically, traditional communities have had insufficient say in decisions regarding protected areas. Therefore, the creation of the National Commission for the Strengthening of Extractive Reserves (CONFREM) was a milestone. It gave a voice to coastal extractivists, helping to secure their rights and territories. Extractive Reserves are seen by fishermen as the best model for protecting the environment without harming their way of life. With shared management with ICMBio, communities have a greater capacity to participate in decision-making.

## 3.2 Challenges and Threats

The Mouth of the Amazon is a delicate area, and there are many challenges to protecting its biodiversity, culture, and social balance. Traditional communities—indigenous people, quilombolas, and fishermen—are rarely consulted on development plans, which threatens their way of life and ancestral knowledge. This also reduces cultural diversity and the use of local techniques that could contribute to sustainable development.

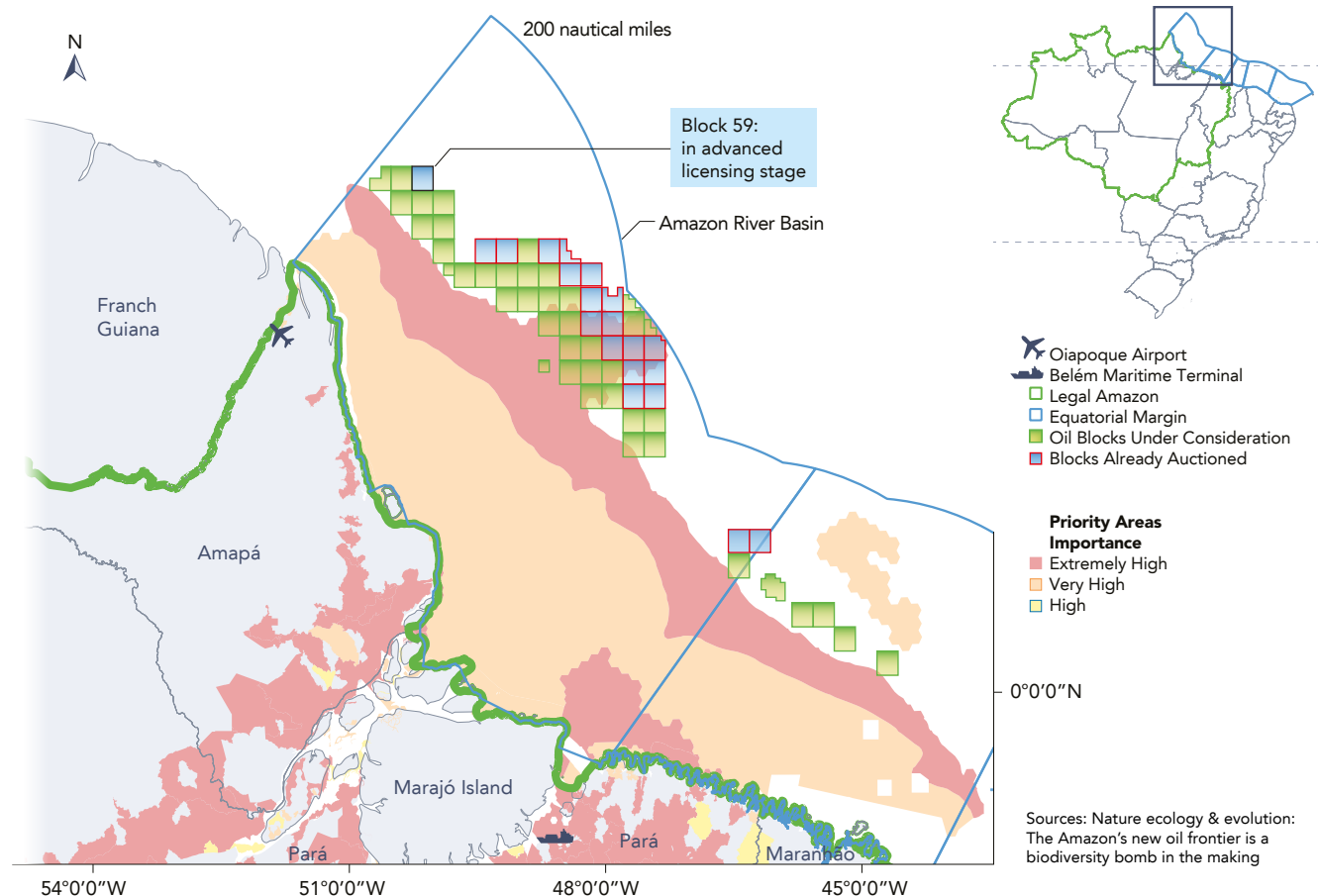
Disorderly urbanization, with buildings that seal off the soil and deforest, increases the risk of flooding during rainy seasons. Outside protected areas, slums and poor communities spread along riverbanks and mangroves, where vegetation is essential for preventing erosion and regulating the climate. Many rivers receive sewage, garbage, and pesticides, polluting the Amazon's

plume and harming marine life, fisheries, and economic development.

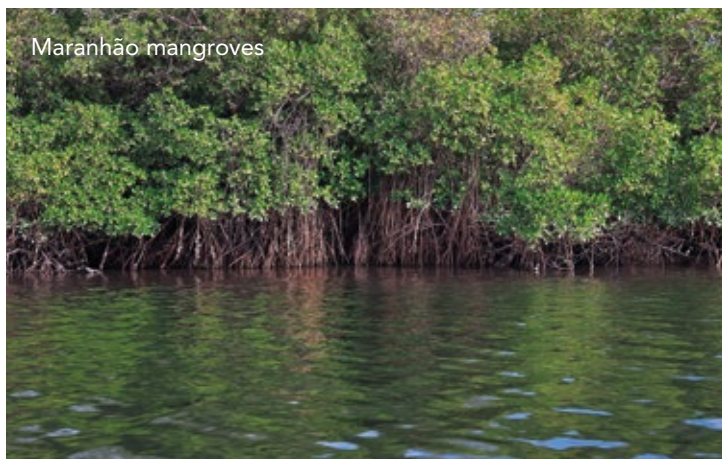
Industrial fishing is also a threat. It damages habitats and accidentally catches species with no commercial value, which are discarded. The lack of enforcement on the high seas makes it difficult to combat overfishing and illegal fishing by foreign vessels. Climate change makes matters worse, with the destruction of mangroves increasing the risk caused by extreme events such as storms and sea level rise.

Oil exploration and wind farms, while bringing immediate economic benefits, also pose risks. Oil spills or changes in fishing routes can affect biodiversity and fishing communities. To address these threats, it is essential to invest in ongoing monitoring, scientific research, and conservation strategies that consider both the environment and the people who live there.

## Oil and Gas Blocks







### 3.3 Mapping the Risks

Amid the expansion of energy development on the Brazilian coast, an inevitable question arises: how to balance energy development with the protection of one of the world's richest ecosystems? To address this, ICMBio developed the Plan for the Reduction of Impacts from Oil and Gas Exploration and Production Activities on Marine and Coastal Biodiversity, PRIM PGMar, a detailed plan to mitigate the impacts of oil and gas activities on marine biodiversity.

The result of extensive collaboration between government agencies, companies, researchers, and NGOs, the plan integrates environmental data and advanced analytical methods. Its goal is to provide a guide for the "Impact Mitigation Hierarchy": first, avoiding damage by selecting sites of lower sensitivity for projects; second, mitigating impacts that cannot

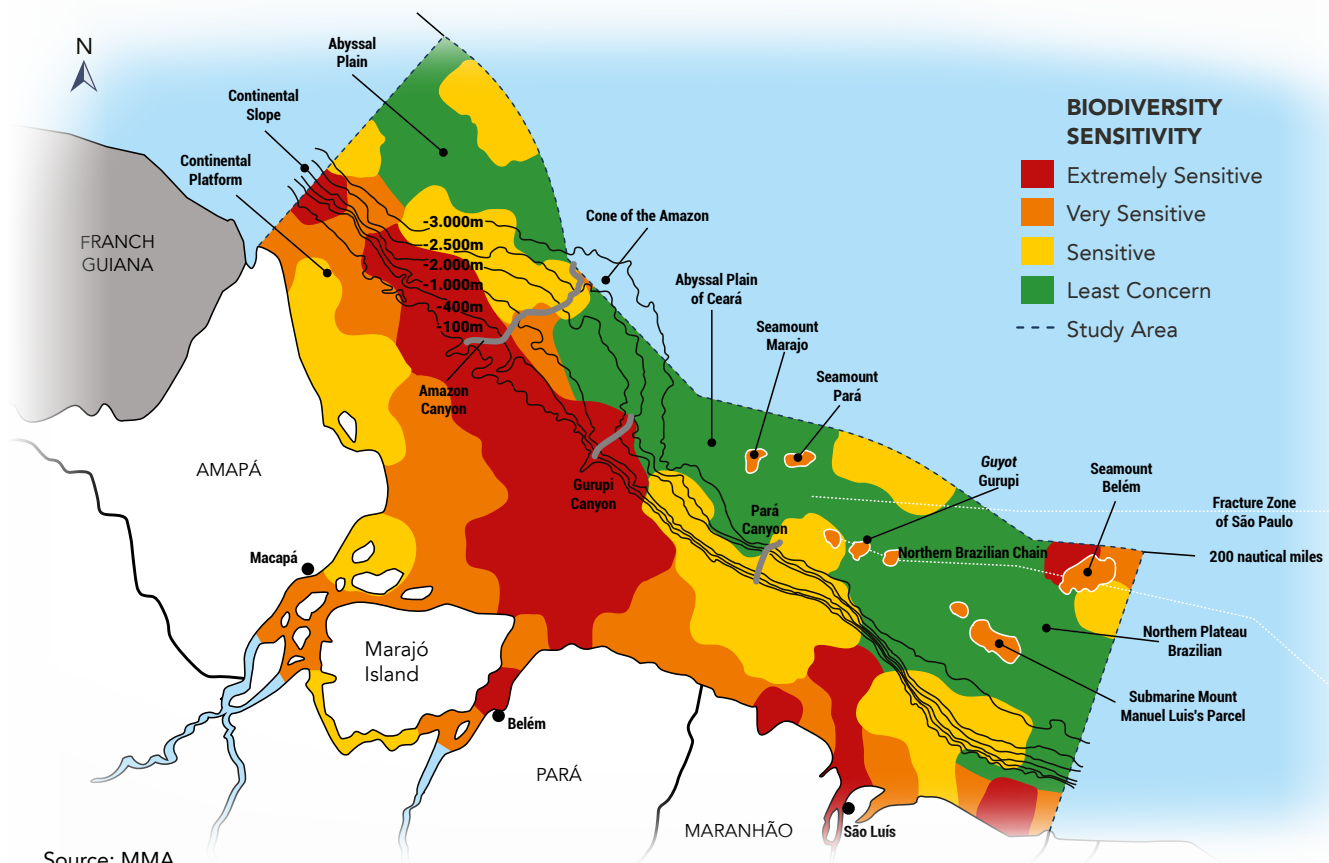
be avoided; and finally, compensating for residual damages to ensure no net loss of biodiversity. In essence, the plan aims to guide project developers and regulatory authorities so that the expansion of the energy frontier does not lead to species extinction or ecosystem destruction.

In the Amazon ecoregion, the PRIM PGMar identified 99 fauna species sensitive to oil and gas activities. The report states: "The greatest sensitivity of marine biodiversity is concentrated on the continental shelf, with emphasis on the mouths of the Amazon and Mearim rivers, and extends from the center of the ecoregion northwestward over the Amazon Cone and the Amazon and Gurupi canyons. These areas receive significant freshwater and continental sediment inputs, making them highly productive, limited only by water turbidity, which results in moderately diverse

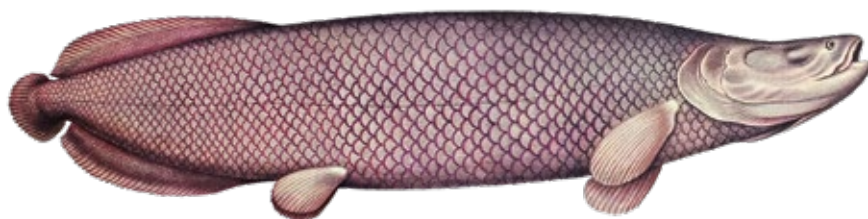
food webs with a high degree of endemism. Additionally, they host an extensive formation of mesophotic reefs that aggregate biodiversity. There are also two other regions of notable sensitivity located northeast of the ecoregion: a small area west of the North Brazilian Chain and the Parcel do Manuel Luís, where there is a notable concentration of benthic biodiversity and fish. These areas of greatest sensitivity are suggested as priorities for the creation of fully protected marine conservation units. Among areas of lower sensitivity, Sensitive Areas cover the rest of the continental shelf and most of the continental slope, with emphasis on the Pará Canyon, while Less Concerning Areas extend over the North Brazilian Plateau and part of the

Ceará Abyssal Plain, where the Marajó and Pará Seamounts, the Gurupi Guyot, and the western end of the São Paulo Fracture Zone are located. In the coastal environment of the Amazon ecoregion, Extremely Sensitive Areas are distributed mainly in the inner regions of Maranhão, from the eastern limit of the Maranhão coast to the mouth of the Amazon River. Very Sensitive Areas are scattered along the ecoregion's coast, with a higher concentration on the Amapá coastline. Together, these two coastal areas encompass the world's largest mangrove area, providing significant ecosystem services for primary productivity and coastal protection against extreme weather events."

## Biodiversity Sensitivity Map to Marine and Coastal Oil and Gas Exploration and Production over the Amazon Ecoregion







# Strategic Scenarios: Plans to Protect and Understand the Mouth of the Amazon

Science has already shown that the region is larger than political borders. When analyzing the flow of nutrients, it's found that the Amazon plume reaches the Caribbean. When mapping artisanal fishing, it's clear that a single family can depend on the waters from three States.

For this reason, it is essential to integrate studies on the region, otherwise there is a risk of creating conflicting solutions – and, worse, leaving room for activities that compromise local balance.

Therefore, to protect the Mouth of the Amazon, two major plans were created that align with the region's 18 sustainability strategies: one focused on generating knowledge and the other on protecting nature. Both seek sustainable development—that is, growth without harming the environment or people. Each plan outlines: (a) what to do, (b) what can happen with these actions, and (c) who should participate.

## 4.1 Better Understanding the Mouth of the Amazon

The first plan is to learn more about this unique region. The idea is to create actions that increase our knowledge about the Mouth of the Amazon.

### **Action 1: Create the National Institute of the Mouth of the Amazon (INFA)**

Today, Brazil has three major institutes that study the Amazon: the National Institute for Amazonian Research, the Mamirauá Institute, and the Emílio Goeldi Museum of Pará. But none of them focuses directly on the Mouth of the Amazon and its socio-biodiversity—the blend of nature and local cultures. Nor is there a research center in Brazil dedicated to studying the Mouth of the Amazon. In this sense, to meet this strategic importance, a potential research center on the Mouth of the Amazon should focus on the following areas, as already specified in the Strategies for a Sustainable Future at the Mouth of the Amazon:

## 1. Ecology and Biodiversity:

- **Research:** Study of local fauna and flora, including marine, mangrove, and flooded forest species. Monitoring of endangered species and mapping of habitats.
- **Conservation:** Development of strategies to protect sensitive ecosystems, such as mangroves, and restore degraded areas.
- **Bioprospecting:** Identification of bioactive compounds for use in pharmaceuticals, cosmetics, or other industries, with respect for the rights of local communities.

## 2. Climate Change and Sustainability:

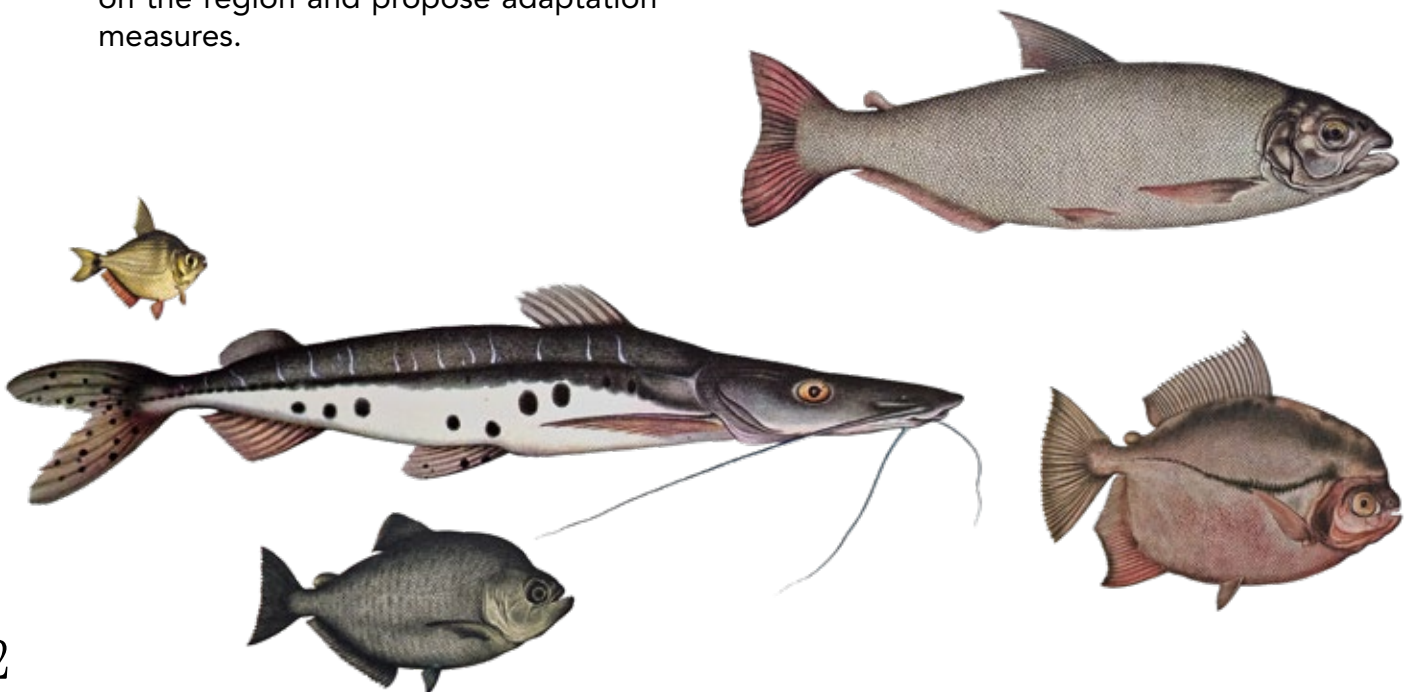
- **Environmental Monitoring:** Study of the impact of climate change, such as ocean acidification, sea-level rise, and changes in rainfall patterns.
- **Carbon Sequestration:** Quantification of the role of the mouth's ecosystems in carbon storage and development of carbon credit projects.
- **Climate Modeling:** Development of models to predict long-term impacts on the region and propose adaptation measures.

## 3. Natural Resource Management:

- **Sustainable Fishing:** Studies to regulate fishing, ensuring the sustainability of fish stocks and the livelihoods of local communities.
- **Responsible Energy Exploration:** Environmental impact assessment of energy projects.
- **Ecotourism:** Development of guidelines for tourism that minimizes environmental impacts and benefits local communities.

## 4. Geopolitics and Monitoring:

- **Remote Sensing:** Use of satellites, drones, and other technologies to monitor illegal activities, such as deforestation and predatory fishing.
- **Maritime Security:** Collaboration with the Brazilian Navy to protect maritime routes and the Exclusive Economic Zone (EEZ).
- **International Cooperation:** Partnerships with research centers in neighboring countries to share data and conservation strategies.



## 5. Social and Cultural Development:

- **Traditional Knowledge:** Integration of the knowledge of indigenous and riverside communities into research projects, respecting their rights and promoting inclusion.
- **Education and Training:** Training programs for local communities in areas such as sustainable management, environmental monitoring, and entrepreneurship.
- **Environmental Health:** Study of the impact of pollutants, e.g., mercury, on human health and ecosystems.

## 6. Technology and Innovation:

- **Green Technologies:** Development of technological solutions for environmental monitoring, such as IoT sensors for water quality or drones for mapping.
- **Open Data:** Creation of accessible databases for global researchers, promoting transparency and collaboration.
- **Artificial Intelligence:** Use of AI to analyze large volumes of environmental data, predict climate impacts, and optimize sustainable production chains.

Therefore, it is essential to create the National Institute of the Mouth of the Amazon (INFA), linked to the Ministry of Science, Technology, and Innovation (MCTI) and possibly with support from energy companies, since the region is considered for oil exploration and also requires studies to ensure protection and sustainability. In the 2000s, the Brazilian Society for the Advancement of Science (SBPC), under the leadership of Prof. Ennio Candotti, attempted to create something like this, but it failed. Negotiations are underway between the Amapá state government, its Secretariat for Science and Technology, the Ministry of Science, Technology, and Innovation, and IEPA staff to federalize the Institute of Scientific and Technological Research of Amapá (IEPA).

### What might happen?

#### Scenario 1: If INFA is created

INFA will boost scientific knowledge about the Mouth of the Amazon, a region rich in natural resources. Through detailed studies, it will be possible to identify the most fragile areas and work to enhance them, allowing economic activities, such as fishing and energy exploration, to occur in harmony with nature and the well-being of communities.



## Scenario 2: If INFA is not created

Without a dedicated institute, studies on the region will remain fragmented and disorganized. This could lead to research that fails to prioritize what Brazil needs: sustainable development that benefits everyone. Furthermore, the lack of integration will waste time and money, hindering the protection of the Mouth of the Amazon.

### Who should participate?

- Ministry of Science, Technology, and Innovation (MCTI)
- Ministry of Environment and Climate Change (MMA)
- Brazilian Navy
- Traditional communities (indigenous, quilombola, and fishing communities)
- Emílio Goeldi Museum of Pará (MPEG)
- Universities and research centers in the region
- Institute of Advanced Studies (IEA USP)
- National Institute for Amazon Research
- Mamirauá Institute
- Civil society institutions and interested companies

## 4.2 Protection: Caring for Nature and People

The goal is to protect the biodiversity of the Mouth of the Amazon, with actions to monitor and inspect the region.

### Action 2: Create a Mosaic of Marine Protected Areas

In October 2024, the Mouth of the Amazon Working Group discussed the creation of a set of protected areas at sea, with varying levels of protection. The idea is that these areas will be defined in conjunction with traditional communities, artisanal fishermen, and economic sectors, such as commercial fishing. This way, the rules will respect the needs of everyone, especially those who rely on fishing for their livelihood.

This set, called a mosaic of protected areas, would be managed by a council with representatives from the federal, state, and municipal governments, traditional communities, and productive sectors. In the future, it could include Conservation Units that are already in place in the region. The goal is to create a robust system that protects artisanal and commercial fishing, encourages ecotourism, prevents harm to communities, and enables other sustainable activities.

Based on studies of “Priority Areas for Biodiversity Conservation,” recommended by the Ministry of Environment and Climate Change (MMA) over two decades ago, the proposal seeks to formally protect a region with extreme and high conservation needs. The proposed mosaic’s boundaries utilize ICMBio’s National Action Plans for the creation of Ecological Corridors, protecting the habitats of endangered species such as sharks, cetaceans, turtles, and corals.

Three scenarios were considered, based on the categories of the National System of Conservation Units (SNUC) Law 9.985/2000:





1. **Ecological Corridors:** Areas to protect endangered animals, such as sharks, cetaceans, turtles and corals, based on ICMBio's National Action Plans.
2. **Sustainable Development Areas:** Such as Environmental Protection Areas, which allow sustainable use based on studies carried out to indicate Priority Areas for Biodiversity Conservation.
3. **Strictly Protected Areas:** Such as Wildlife Refuges, adjusted so as not to interfere with activities such as fishing and mining, based on studies carried out to indicate Priority Areas for Biodiversity Conservation.

Maps to illustrate these scenarios are presented below.

- **Scenario 1:** Larger protected area, covering more sea space.
- **Scenario 2:** Smaller ecological corridor on the Equatorial Margin.
- **Scenario 3:** Fewer areas of sustainable use, but a larger ecological corridor, reaching 200 nautical miles.

These scenarios should be discussed with communities and economic sectors. The mosaic should connect to existing Conservation Units in Amapá, Pará, and Maranhão, strengthening biodiversity protection and supporting sustainable development for the region's population.

Fishing boat at the mouth of the Amazon River

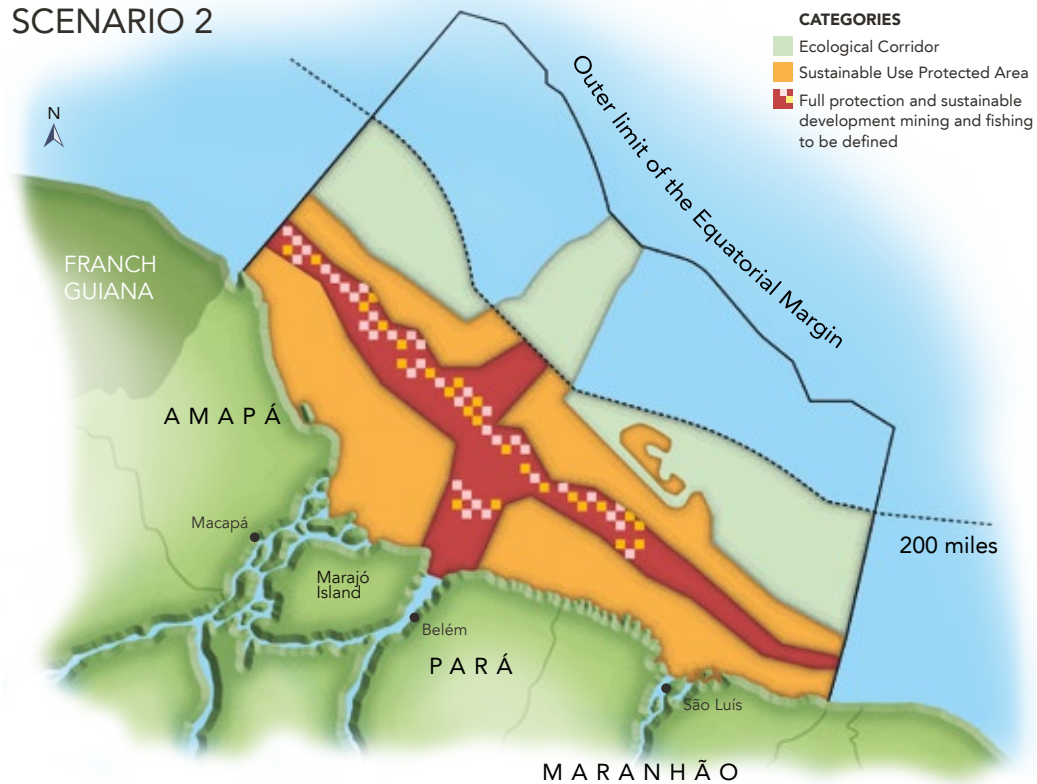


# Schematic Proposals for Conservation Units

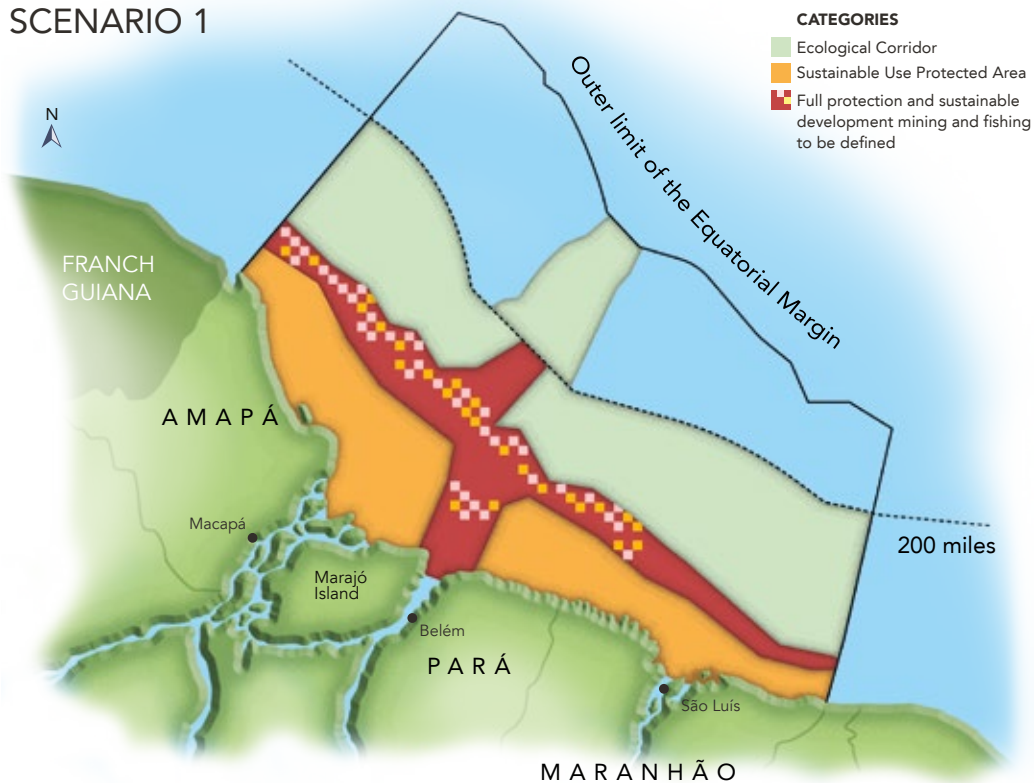
SCENARIO 1



SCENARIO 2



## SCENARIO 1



## Conclusão

The Mouth of the Amazon is a Brazilian heritage site of global importance that is at risk, and hosting COP30 in Belém, in the heart of the Amazon, represents a historic opportunity for Brazil to turn words into action and demonstrate to the world its commitment to protecting an ecosystem that is vital for the planet's balance.

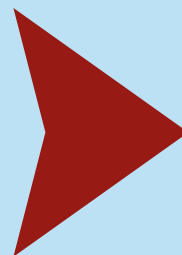
Faced with this situation, specialists and institutions such as the Emílio Goeldi Museum of Pará and the Institute of Advanced Studies at USP, along with other scientists, experts, and local residents, propose concrete, science-based solutions to ensure a sustainable future. The proposal is based on two interconnected lines of action that contribute

to the implementation of the 18 major strategies identified: the creation of the National Institute of the Mouth of the Amazon (INFA) and the establishment of a broad mosaic of marine protected areas. INFA will fill knowledge gaps, providing robust data to harmonize conservation with economic activities, while the mosaic of Conservation Units will ensure the effective protection of marine biodiversity and the way of life of the traditional populations that depend on it.

Together, these actions represent a robust plan to protect biodiversity, ensure the well-being of local communities, and promote truly sustainable development in the Mouth of the Amazon region.



# One Pager Executive Summary



1ST SEMINAR: THE MOUTH OF THE AMAZON: RESEARCH, CONSERVATION AND FUTURE.



2ND SEMINAR: THE MOUTH OF THE AMAZON: RESEARCH, CONSERVATION AND FUTURE.



CONSERVATION UNITS EXISTING IN THE AMAZON FLUVIAL-MARINE ECOREGION.

New information reaches us every day on these issues. It's necessary to constantly update research and introduce new elements for discussion.



LOCATION OF THE MAIN COMMERCIAL FISHING AREAS AT THE MOUTH OF THE AMAZON RIVER.



STATEMENT BY THE ABC - BRAZILIAN ACADEMY OF SCIENCES - ON THESE FACTS. 06/08/25

## GOELDI-IEA PROTOCOL OF INTENT

In a joint effort to address the socio-environmental challenges of the mouth of the Amazon River, the Emílio Goeldi Museum of Pará of the Ministry of Science, Technology, and Innovation and the Institute of Advanced Studies of the University of São Paulo signed a Memorandum of Understanding (MOU) with the aim of expanding scientific knowledge about the region, proposing a system for protecting its biodiversity, and promoting sustainable development.

The institutions committed to sharing human, material, and infrastructure resources, and may invite external experts. The initiative should ensure that the traditional populations inhabiting these ecosystems have their rights respected and participate in the decisions and benefits generated by these actions. The results and studies will be compiled into a report and disseminated so that their knowledge reaches all interested parties.



Source: Viagem Filosófica

# The Mouth of the Amazon:

## Strategic Scenarios for Expanding Scientific Knowledge and Protecting Biodiversity

The Mouth of the Amazon, where the world's largest river system converges with the Atlantic Ocean, constitutes a critical ecoregion of global significance. This dynamic interface drives climate regulation, facilitates carbon capture, and supports extensive marine and coastal biodiversity, underpinning regional fisheries.

Recognized as a Ramsar Site for being a wetland of international importance, the region sustains Indigenous peoples, quilombolas, and artisanal fishers whose livelihoods are intricately tied to its ecological health.

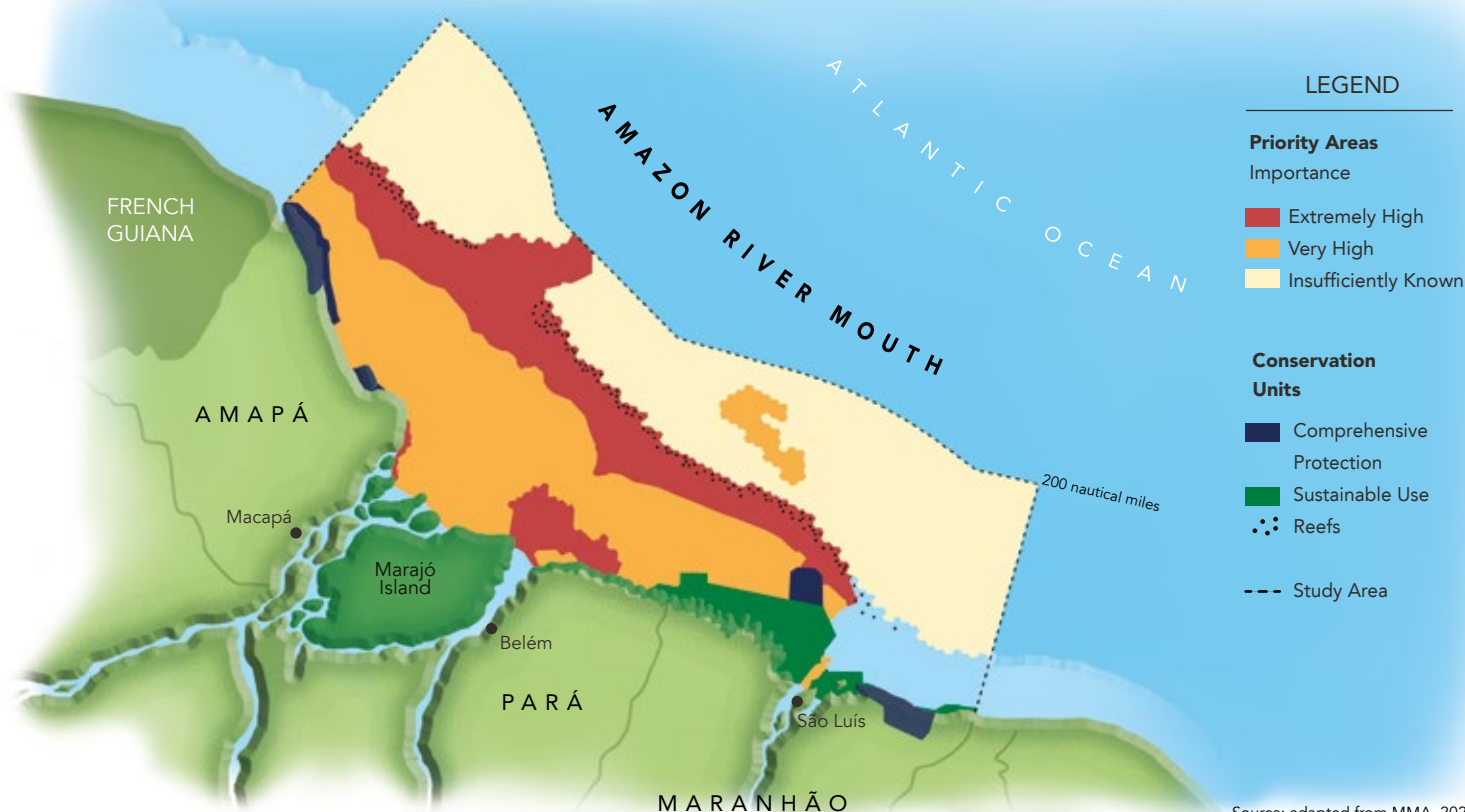
### Advancing Knowledge for Conservation

The ecological and socioeconomic significance of the Mouth of the Amazon has been recognized since 2002 by Brazil's Ministry of Environment and Climate Change, MMA, mapping Priority Areas for Conservation to highlight its critical importance. The possibility of oil exploration in the region calls for special precautions.

In 2024, the Emílio Goeldi Museum of Pará and the Institute of Advanced Studies at the University of São Paulo established the Mouth of the Amazon Working Group, "GT Foz do Amazonas". This interdisciplinary coalition conducted two fundamental seminars to refine diagnostic assessments and formulate evidence-based conservation strategies.

### Priority areas and actions for conservation, sustainable use, and benefit sharing of Brazilian biodiversity

Scan to access the full report



Source: adapted from MMA, 2023

## Balancing Ecological Wealth with Vulnerability

Despite its global importance, the Mouth of the Amazon faces escalating threats and significant gaps in scientific understanding, worsened by fragmented research efforts.

Key challenges include:



### Limited Conservation Measures:

While 54 protected areas exist along the coast, the oceanic expanse of the Mouth remains largely unprotected.



### Overfishing:

Unregulated industrial fishing depletes reef ecosystems, threatens endangered species, and undermines traditional fishing communities.



### Socioeconomic Disparities:

The Marajó Archipelago exhibits some of Brazil's lowest Human Development Indices, HDI, exacerbating social vulnerabilities.



### Pollution and Economic Pressures:

Rivers transport sewage, mining residues, and pesticides, while potential offshore oil and gas exploration risks environmental contamination.



### Climate Change Impacts:

Coastal erosion and deforestation degrade mangrove ecosystems, impairing their carbon sequestration capacity critical for climate mitigation.

## Strategic Proposals for COP 30

To address these challenges and leverage the global platform of COP 30 in Belém, the Working Group proposes 18 strategies based on sustainable development, with two actions standing out:

- 1. National Institute of the Mouth of the Amazon, INFA:** A research institute under the Ministry of Science, Technology, and Innovation, MCTI, to consolidate scientific efforts, generate robust data for evidence-based policymaking, and align economic activities with conservation objectives.
- 2. Mosaic of Marine Protected Areas:** To ensure biodiversity and sustainable development, a set of areas with different levels of use is proposed, designed based on scientific data, such as the ICMBio National Action Plans for Threatened Species Conservation, PANs:
  - **Ecological Corridors:** Designated zones to safeguard migratory routes of endangered species.
  - **Áreas de Desenvolvimento Sustentável:** Areas enabling regulated, sustainable resource extraction to support local livelihoods.
  - **Strictly Protected Zones:** Reserves prioritizing biodiversity conservation, harmonized with sustainable economic activities.

These initiatives emphasize inclusive governance, prioritizing active engagement with local communities to address historical exclusion. A comprehensive outreach strategy is proposed to communicate the ecological and cultural value of the Mouth, fostering public support for conservation efforts.

## Science and Dialogue in Action

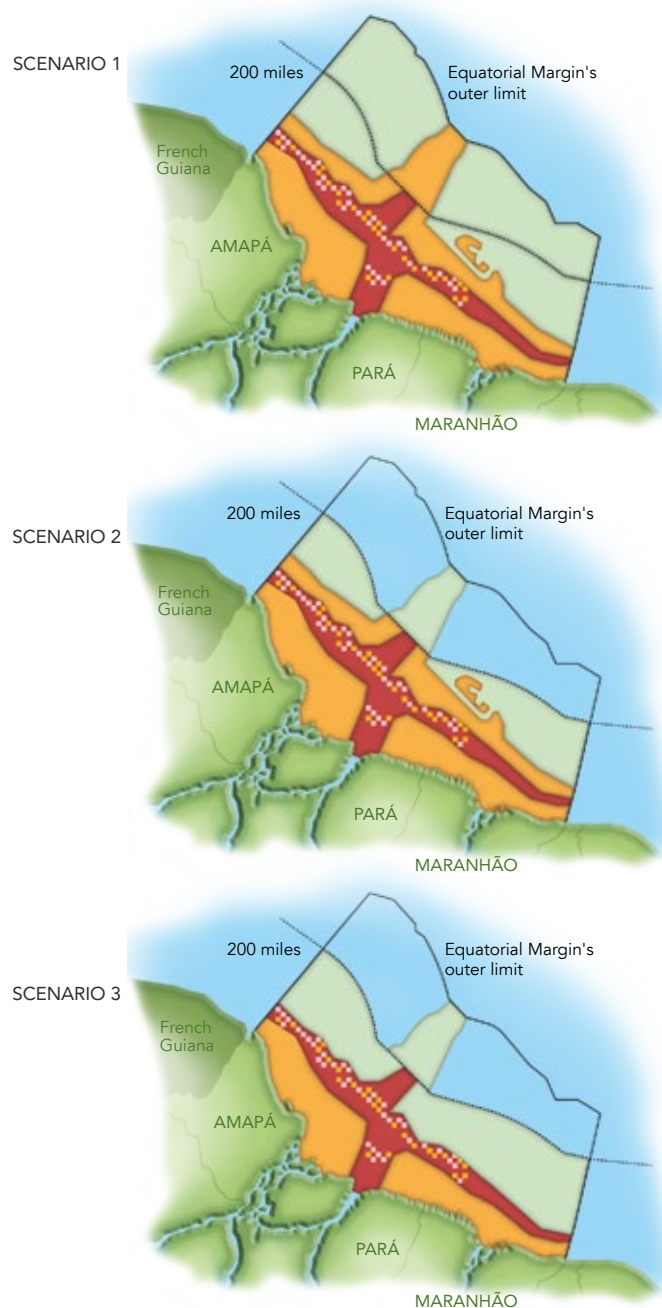
Led by the Goeldi Museum and IEA-USP, the Mouth of the Amazon Working Group brings together experts from various institutions and the states of Amapá, Pará, Maranhão, and São Paulo; as well as traditional communities, represented by the National Commission for the Strengthening of Extractive Reserves and Coastal-Marine Extractivist Peoples, CONFREM.

The Mouth of the Amazon is a Brazilian and global heritage at a critical juncture. COP 30 provides a pivotal opportunity to advance conservation through the establishment of INFA and a mosaic of Marine Protected Areas. These measures offer a science-based, inclusive framework to safeguard biodiversity, enhance local well-being, and promote sustainable development.

## Schematic Proposals for Conservation Units

**CATEGORÍAS**

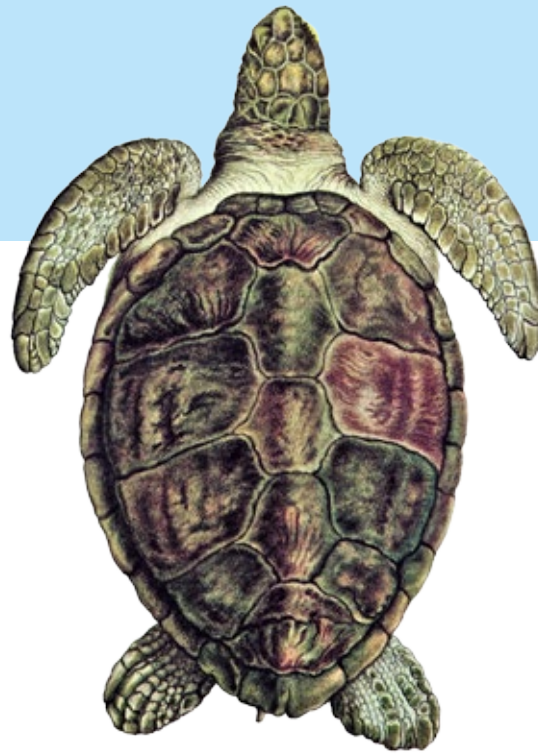
- Ecological Corridor
- Protected Area for Sustainable Use
- Integral protection, sustainable development, mining, and fishing – to be defined.







The Amazon river mouth ecoregion needs further research and greater protection of its biodiversity, with or without oil exploration.



The scientific knowledge already gathered indicates the pressing need to create large marine protected areas in the Amazon river mouth ecoregion.

