Ramsar Information Sheet

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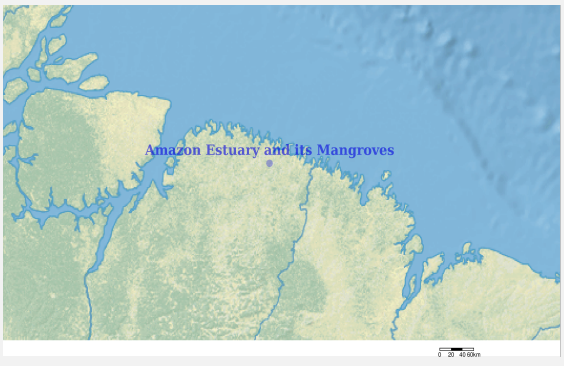
Brazil

Amazon Estuary and its Mangroves



Designation date	19 March 2018
Site number	2337
Coordinates	01°09'17"S 46°48'05"W
Area	3 850 253,00 ha

Color codes

Fields back-shaded in light blue relate to data and information required only for RIS updates.

Note that some fields concerning aspects of Part 3, the Ecological Character Description of the RIS (tinted in purple), are not expected to be completed as part of a standard RIS, but are included for completeness so as to provide the requested consistency between the RIS and the format of a 'full' Ecological Character Description, as adopted in Resolution X.15 (2008). If a Contracting Party does have information available that is relevant to these fields (for example from a national format Ecological Character Description) it may, if it wishes to, include information in these additional fields.

1 - Summary

Summary

The Amazon River and its Mangroves Ramsar Site is conformed by 22 federal conservation units and one state conservation unit. It incorporates several alluvial islands that have extensive wetlands in a landscape of extremely flat plains. In the lower course, the large variations in the water level related to the rainy and dry seasons are replaced by a tidal influence dynamic (Sioli, 1984). Despite the low declivity, the volume of freshwater is so great that the plume of the Amazon River can be noticed 150 km from the coast (Day & Davies, 1986).
The final stretch of the Amazon River composes an immense mosaic of floodplains, igapós, pioneer vegetation under fluvial/lacustrine influence and areas of savannah. Reaching the ocean, the estuarine region presents a continuity of wetlands closely linked to hydrodynamic and depositional processes, influenced by the Amazon River dispersion system and macro-tidal regimes, as well as by trade winds and seasonal equatorial climate (Torres & El-Robrini, 2014; Rodrigues, 2006). These characteristics extend along the North Coast of Brazil, where the Amazon meets the Atlantic Ocean.
In this stretch of the Amazon Coast occurs the biggest continuous mangrove formation in the world. With over 8,900 km2 distributed along 700 km, it corresponds to 70% of the mangroves in the country (Saloma, 2015).
The other Ramsar sites of the region (Cabo Orange, Baixada Maranhense, Reentrancias Maranhenses and Parcel Manuel Luiz) will be managed in a coordinated way to all territorial units that make up the present site.

2 - Data & location

2.1 - Formal data

2.1.1 - Name and address of the compiler of this RIS

Compiler 1

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2.1.2 - Period of collection of data and information used to compile the RIS

From year	2017
To year	2017

2.1.3 - Name of the Ramsar Site

Official name (in English, French or Spanish)	Amazon Estuary and its Mangroves
Unofficial name (optional)	Estuário do Amazonas e seus Manguezais

2.2 - Site location

2.2.1 - Defining the Site boundaries

b) Digital map/image
<1 file(s) uploaded>

Former maps	0

Boundaries description

The northern boundary of the Site is the southern part of the Ramsar Site Cabo Orange. The site follows to the southeast along the Brazilian coast until the borders between the states of Piauí and Ceará. The Site incorporates the area of all Federal Conservation Units and one Estadual Conservation Unit that cross the mangroves influenced directly or indirectly by the Amazon River. Cabo Orange, Reentrancias Maranhenses and Baixada Maranhense Ramsar Sites are adjacent to the Site. The Site advances inland through the mouth of the Amazon River, following the main stem of the river upstream to "Reserva Extrativista Rio Cajari" and "Reserva Extrativista Gurupá-Melgaço", two conservation units with strong tidal influence.

2.2.2 - General location

a) In which large administrative region does the site lie?	Federative Republic of Brazil. States of Pará (Regions of Marajó, Northeast portion of the state of Para and Lower Amazon), of Amapá (Regions of Amapá, Macapá, Itaubal, Santana, Mazagão and Vitória do Jari), of Maranhão (Regions of West, Center and Northe
b) What is the nearest town or population centre?	The main cities are: Macapá (AP), Belém (PA), Santarém (PA), Bragança (PA), São Luiz (MA) and Parnaíba (PI).

2.2.3 - For wetlands on national boundaries only

a) Does the wetland extend onto the territory of one or more other countries? Yes ○ No ◉

b) Is the site adjacent to another designated Ramsar Site on the territory of another Contracting Party? Yes ○ No ◉

2.2.4 - Area of the Site

Official area, in hectares (ha):	3850253
Area, in hectares (ha) as calculated from GIS boundaries	3812595.77

2.2.5 - Biogeography

Biogeographic regions

Regionalisation scheme(s)	Biogeographic region
Marine Ecoregions of the World (MEOW)	Tropical Atlantic Realm
Marine Ecoregions of the World (MEOW)	North Brazil Shelf and Tropical Southwestern Atlantic
Marine Ecoregions of the World (MEOW)	Amazonian and Northeastern Brazil Ecoregions
Udvardy's Biogeographical Provinces	Madeira Province
Udvardy's Biogeographical Provinces	Babaçu Province

Other biogeographic regionalisation scheme

Considering the categories accroding the Freshwater Ecoregions of the World (FEOW), the Site is located in de ecoregion: Amazonas Estuary and Coastal Basins (Abell et al., 2008; Hales & Petry, 2015).

3 - Why is the Site important?

3.1 - Ramsar Criteria and their justification

☑ Criterion 1: Representative, rare or unique natural or near-natural wetland types

Hydrological services provided	In the area of the Marajó archipelago, regional hydrography is vitally important, especially for its economic use: a) as the only means of transportation and communication between cities; b) for its fishing potential; and c) by the sedimentary enrichment of floodplains, through the action of the muddy rivers in the area (GEPLAM, 2007). In all of the rest of the Site, especially in the low stem of the Amazon River, it is crucial the maintenance of the water levels in order to guarantee navigable levels of the river, since the waterways are also the only transportation route used. Moreover, the coastal Amazon ecosystems integrate the biggest tract of continuous mangroves in the planet. The diversity of aquatic ecosystems also makes the Site unique. In general, the ecosystems can be subdivided into two zones: the Amazon Estuary, influenced by the Amazon River; and the Oceanic Coastal Zone, influenced by the Atlantic Ocean. In the unique region of the “Reentrâncias”, mangrove forests occupy the whole extension of land between the river mouths and the upstream limit of tidal influence. These areas – protected from waves, ample tidal ranges in a wet hot tropical climate– are the perfect environment for the establishment of such systems (El-Robrini et al., 2006). Together with estuaries and mangroves, there is a vast area occupied by periodically and permanently flooded herbaceous fields, perennial and intermittent lagoons and coastal lagoons, restingas and beaches with macro-tidal regimes (França et al., 2007).
Other ecosystem services provided	The Amazon River and the Amazon Coast provide resources to extractive communities and industry, as well as for the support of the extremely high and dense biodiversity it presents. The fishery fleet in the region is a mix of industrial and traditional fishing, exploring a high diversity of species that supply both the local and international market (Abdala et al., 2012). The coast shows strong presence of extractivists communities, which develop regulated activities in Conservation Unities aiming the commerce and subsistence. Among the most captured crustaceans are the Uçá crab (Ucides cordatus), the White shrimp (Litopeneaeus schmitti), the Naval shipworm (Teredo sp.), blue crabs (Callinectes sp.), oysters (Crassostrea sp.), the Sururu and other mussels of the Mytella genus (Oliveira, 2016; GEPLAM, 2007). The Uçá crab is considered of high commercial value, being one of the main extractive resources for artisanal fishing in the region (Amaral et al., 2014). Other crustaceans of commercial interest are prawns such as Brown shrimp (Farfantepenaeus brasiliensis and F. subtilis), Atlantic seabob (Xiphopenaeus kroyeri), Acetes marinus, and more characteristic freshwater prawns such as Bigclaw river shrimp (Macrobrachium carcinus) and the Amazonian shrimp (Macrobrachium amazonicum) (Viera & Araújo-Neto, 2006; AECOM, 2015). In addition to the traditional extractivism, the industrial shrimp fishing in the northern region of Brazil is considered one of the most important fishing activities of the country (Asano Filho et al., 2003). Only for the Marnahão state, the shrimp production is estimated around 10,000 tons/year (Rebelo-Mochel, 2011). As for fishes, the main species are the Acoupa weakfish (Cynosciona coupa), mullets (Mugil spp.), King weakfish (Macrodonan ylodon), Whitetip shark (Carcharhinus sp.), snooks (Centropomus spp.) and catfishes (Arius spp.; Sciades spp.) (Oliveira , 2016). The threatened Acoupa weakfish is one of the main species, with high commercial value due to the sale of its gas bladder (“grude”) to the international market (Júnior et al., 2012). There are also several services provided by plants, with wood species of great economic value such as Ucuuba (Virola surinamensis), Kapok (Ceiba pentandra), Andiroba (Carapa guianensis) and Possumwood (Hura crepitans). As suppliers of non-timber products, we can highlight: Rubber tree (Hevea brasiliensis), Açaizeiro (Euterpe oleracea), Pracaxi (Pentaclethra macroloba), Buriti (Mauritia flexuosa) and Taperebá (Spondias mombin) (GEPLAM, 2007). The Açai tree provides one of the main incomes in the region, with the sale of açaí to other regions of Brazil and abroad. In addition, one of the main species managed in the Extractive Reserves present is the Brazil nut tree (Bertholletia excels).

Other reasons	One of the singularities of the wetlands encompassed by the Site is its continental proportion. It is located on the estuary of the Earth's most powerful river, where it drains about 20% of the fresh water of the rivers of all continents together, after draining millions of km2 through the Amazon (Sioli, 1984). At its mouth, the Amazon River forms the Marajó archipelago, the largest fluvial-maritime archipelago on the planet (Meirelles-Filho, 2010). This enormous system also plays a crucial role in the global carbon biogeochemical cycle, as mangroves represent the types of forests with the highest carbon per area sequestration rates in the tropics (Donato et al., 2011). Primary estuarine producers contribute significantly to life in the seas and oceans and thus play a key ecological role in maintaining these ecosystems (Mello & Mochel, 1999). This makes the North Coast region being of "extremely high" importance for conservation, sustainable use and benefit sharing of the Brazilian biodiversity (MMA, 2007). The high productivity associated with ideal climatic and geomorphological conditions attracts an enormous amount of migratory birds to the region. Many species of shorebirds spend the winter on this coast, such as sandpipers, which after breeding in the northern hemisphere, migrate to the southern hemisphere, wintering in the northern regions of Brazil (Rodrigues, 2006). Many species of birds occur throughout the entire coastal area covered by the Site, suggesting an ecological continuum of systems with similar characteristics, although with different degrees of anthropic disturbance (Rodrigues, 2006; Aguiar & Naiff, 2010; AECOM, 2015). In addition, the presence of species in reproductive plumage indicates that the area is of great importance in its biological cycle, providing support for the maintenance of the migratory route of these species (Rodrigues, 2006).

☑ Criterion 2 : Rare species and threatened ecological communities

☑ Criterion 3 : Biological diversity

Justification: The estuary of the Amazon River and all its area of influence present extremely high biodiversity, of great international relevance. Records in Conservation Units and adjacent areas covered by the Site showed 40 species threatened with extinction according to the IUCN and Brazil red lists, and 21 more exclusive to the Brazilian red lists, both marine, freshwater and terrestrial, among mammals, reptiles, birds and fishes. In the case of avifauna, the Site comprises part of the area of endemism (EBA) "flooded forest of the Amazon", and it includes eight Important Areas for Birds and Biodiversity (IBA) of the final stretch of the Amazon and surrounding areas (BirdLife, 2017). The region displays high richness mainly of waterbird species. A survey focused on birds related to aquatic environments in the coastal complex of the Piratuba Lake Biological Reserve and its surrounding area recorded 139 species (Rodrigues, 2006); for the Curiaú Environmental Protection Area, a relatively small area of 23,000 ha, 214 species were recorded, in 55 families, mainly in the floodplain wetlands (Agira & Naiff, 2010). The estimations for the archipelago of Marajó are of 540 species (WWF, 2017b).
Important aquatic species also occur. There is record of sympathry of marine and freshwater manatees both to the East of the island of Marajó, and to the islands of Amapá at the end of the Amazonas mouth (AECOM, 2015; Luna et al., 2008). The five species of sea turtles that occur in Brazil, all threatened with extinction, frequent the coastal and estuarine region (Meirelles-Filho, 2010). There are also three species of freshwater dolphins, with varying conservation status, as well as six species of marine dolphins (AECOM, 2015).
The Site possesses enormous biodiversity of coastal fishes, mainly represented in the Silurifomes (catfishes), Carcharhiniformes (sharks) and Perciformes (Sciaenidae family), with also a significant biomass of crustaceans and mollusks. For the Northern Coast of Brazil, approximately 925 marine species are recorded (Menezes et al., 2003). The region of the proposed Site is of high relevance for aquatic fauna since it shelters fish, aquatic mammals and chelonians that are threatened with extinction, and acts as high productivity spawning grounds for several of these species. Studies have recorded 138 species of fish in the Caeté-Taperaçú Extractivist Reserve alone (Abdala et al., 2012). In relation to freshwater fishes, in the flooded fields (savannahs) of the island of Marajó 254 species are recorded, with estimates of more than 300 possible occurrences (Montag, 2009).
In relation to the herpetofauna, inventories are scarce. Local studies in the RESEX Rio Cajari detected the occurrence of 118 taxa of amphibians and reptiles. On the island of Marajó, 61 species of amphibians and 86 of reptiles are recorded (Meirelles-Filho, 2010). The high biodiversity of the island of Marajó, specifically, stands out in the number of vertebrate species (862).

☑ Criterion 4 : Support during critical life cycle stage or in adverse conditions

☑ Criterion 5 : >20,000 waterbirds

Overall waterbird numbers: 334,000

Start year: 1982

Source of data: Atlas of Nearctic shorebirds on the coast of South America (Scott & Carbonell, 1986; Morisson & Ross, 1989); Global-Scale Shorebird Distribution in Relation to Productivity of Near-Shore Ocean Waters (Butler et al., 2001).

☑ Criterion 6 : >1% waterbird population

☑ Criterion 7 : Significant and representative fish

Justification: The Site has special importance to elasmobranch conservation, because it works as nursery to several species and harbor the last populations of endemic and critically endangered species, as the Sawfish (ICMBio, 2016a). As for freshwater ichthyofauna, we can find the pirarucu (Arapaima gigas), which is included in Appendix II of CITES (Cites, 2017) with international trade restrictions, and the Laulao catfish (Brachyplatystoma vaillantii), which was the dominant species in exports over several years and had its stock drastically reduced (Junk et al., 2007).

☑ Criterion 8 : Fish spawning grounds, etc.

Justification	The estuarine region of the Amazon River and the mangroves of the Northern Coast serve as an important nursery for several species of fish in the Amazon and marine basins. Even species that spawn in the upper reaches of the river, such as the Gilded catfish (Brachyplatystoma rousseauxii) and Laulao catfish (B. vaillantii), have their eggs and larvae carried to the estuarine region where they develop (Barthem & Golding, 1997). Other important groups use the area as a nursery, as the Amazonian turtle (Podocnemis expansa), the largest freshwater chelonium in South America. Islands of the archipelagos present on the Site are recognized as important spawning grounds of this species, whose annual recruitment is hundreds of thousands of eggs. The nesting occurs preferentially on sandy beaches in the region of the Amazon mouth (Alho & Pádua, 1982). The vast preserved areas of the estuary also form the perfect environment to reproduction of the two manatee species found, particularly important for the American manatee, which seeks sheltered environments from the waves to avoid the risks of giving birth in the open sea, where waves can cause separation between the mother and the cub causing posterior beaching (Luna et al., 2008). Moreover, estuarine regions are fundamental for reproduction of several shrimp species. The juvenile and post-larval stages of brown shrimp species are found in protected waters, with emphasis on the estuaries of the Sucuriju and Amapá rivers (Amapá municipality), as well as the mouth of the Calçoene River (Vieira, 2006). According to Vieira (2006), for the estuary of the Sucuriju River alone, 24 species of crustaceans were identified, including juveniles and post-larval stages of Farfatepenaeus subtilis (Brown shrimp), Litopenaues schmitti (White shrimp), Nematopalaemon schmitti (White-bellied shrimp) and Xiphopenaeus kroyeri (Atlantic seabob) (AECOM, 2015).

3.2 - Plant species whose presence relates to the international importance of the site

Scientific name	Common name	Criterion 2	Criterion 3	Criterion 4	IUCN Red List	CITES Appendix I	Other status	Justification
Aniba rosaeodora		☑	☑	☐		☐	EN in brazilian list	
Bertholletia excelsa		☑	☑	☐	VU	☐		
Ceiba pentandra		☐	☑	☐	LC	☐		
Manilkara huberi		☐	☑	☐		☐		
Virola surinamensis		☑	☑	☐	EN	☐		

Regarding the Virola surinamensis tree species, even with its widely occurrence in Amazon floodplain environments, its overexploitation resulted in population reductions of up to 90% (Pinã-Rodrigues & Mota, 2000). Its wood has high commercial value, both for industry as well as riverine and indigenous populations, being also exploited the oil and seeds. With an average generation time of 30 years, it is estimated that the annual extraction is of more than 10,000 individuals, what makes the specie threatened of extinction (CNCFlora, 2012).
The species Aniba rosaeodora (Ducke), which was widely distributed along the banks of the Amazonian rivers in the 1950 's, suffered a drastic population reduction due to the demand for the essential oil of high commercial value that it produces. The species has suffered population reductions of up to 50%, also suffering from the alteration of its habitat due to logging, extractivism, cattle raising and agriculture (CNCFlora, 2012).
The species known as maçaranduba (Manilkara huberi (Ducke) A.Chev.), although not listed as threatened in the IUCN and national lists, is identified as Vulnerable (VU) in the Threatened Species List of Pará state (COEMA, 2007). The Sumaúma (Ceiba pentandra) is the largest tree in the Amazon and one of the largest in the world, reaching 70 meters high and 40 meters of canopy. Typical of várzea environments (also occurring on dry land), it is under pressure because of the quality of its wood.
Bertholletia excelsa (Brazil nut) is a species of great commercial value, widely distributed and quite frequent in the Brazilian Amazon. Although it is protected by law, B. excelsa suffers from a strong extractive pressure due to the collection of its seeds for industrial and food purposes, which has already restricted the recruitment of new individuals in some subpopulations (CNCFlora, 2012).

3.3 - Animal species whose presence relates to the international importance of the site

Phylum	Scientific name	Common name	Species qualifies under criterion				Species contributes under criterion				Pop. Size	Period of pop. Est.	% occurrence 1)	IUCN Red List	CITES Appendix I	CMS Appendix I	Other Status	Justification
			2	4	6	9	3	5	7	8								
Birds																		
CHORDATA / AVES	*Actitis macularius*	Spotted Sandpiper	☐	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐		migratory
CHORDATA / AVES	*Anas bahamensis*	White-cheeked Pintail	☐	☐	☐	☐	☑	☐	☐	☐					☐	☐		
CHORDATA / AVES	*Arenaria interpres*		☐	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐		migratory
CHORDATA / AVES	*Calidris alba*	Sanderling	☐	☑	☐	☐	☑	☐	☐	☐	3000			LC	☐	☐		migratory
CHORDATA / AVES	*Calidris canutus*	Red Knot	☑	☑	☐	☐	☑	☐	☐	☐	7000				☐	☐	CR in brazilian list	migratory
CHORDATA / AVES	*Calidris fuscicollis*		☐	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐		migratory
CHORDATA / AVES	*Calidris himantopus*		☐	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐		migratory
CHORDATA / AVES	*Calidris minutilla*	Least Sandpiper	☐	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐		migratory
CHORDATA / AVES	*Calidris pusilla*	Semipalmated Sandpiper	☑	☑	☐	☐	☑	☑	☐	☐	67400			NT	☐	☑	EN in brazilian list	migratory
CHORDATA / AVES	*Charadrius collaris*	Collared Plover	☐	☑	☐	☐	☑	☐	☐	☐					☐	☐		migratory
CHORDATA / AVES	*Charadrius wilsonia*	Wilson's Plover	☑	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐	VU in brazilian list	migratory
CHORDATA / AVES	*Coryphaspiza melanotis*	Black-masked Finch	☑	☐	☐	☐	☑	☐	☐	☐				VU	☐	☐		
CHORDATA / AVES	*Cranioleuca muelleri*	Scaled Spinetail	☑	☐	☐	☐	☑	☐	☐	☐				EN	☐	☐		

Phylum	Scientific name	Common name	Species qualifies under criterion				Species contributes under criterion				Pop. Size	Period of pop. Est.	% occurrence 1)	IUCN Red List	CITES Appendix I	CMS Appendix I	Other Status	Justification
			2	4	6	9	3	5	7	8								
CHORDATA/ AVES	*Gelochelidon nilotica*		☐	☑	☐	☐	☑	☐	☐	☐					☐	☐		migratory
CHORDATA/ AVES	*Guaruba guarouba*		☑	☐	☐	☐	☑	☐	☐	☐				VU	☐	☐		
CHORDATA/ AVES	*Limnodromus griseus*	Short-billed Dowitcher	☑	☑	☐	☐	☑	☑	☐	☐	3900			LC	☐	☐	CR in brazilian list	migratory
CHORDATA/ AVES	*Limnodromus scolopaceus*		☐	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐		migratory
CHORDATA/ AVES	*Limosa fedoa*		☐	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐		migratory
CHORDATA/ AVES	*Neomorphus geoffroyi*	Rufous-vented Ground-Cuckoo; Rufous-vented Ground Cuckoo	☑	☐	☐	☐	☑	☐	☐	☐				VU	☐	☐		
CHORDATA/ AVES	*Pandion haliaetus*	Western Osprey; Osprey	☐	☑	☐	☐	☑	☐	☐	☐					☐	☐		migratory
CHORDATA/ AVES	*Patagioenas subvinacea*		☑	☐	☐	☐	☑	☐	☐	☐				VU	☐	☐		
CHORDATA/ AVES	*Phoenicopterus ruber*	American Flamingo	☐	☑	☐	☐	☑	☐	☐	☐					☐	☐		migratory
CHORDATA/ AVES	*Pluvialis dominica*		☐	☑	☐	☐	☑	☐	☐	☐					☐	☐		migratory
CHORDATA/ AVES	*Pluvialis squatarola*		☐	☑	☑	☐	☑	☑	☐	☐	2200		50	LC	☐	☐		migratory
CHORDATA/ AVES	*Procellaria aequinoctialis*		☑	☐	☐	☐	☑	☐	☐	☐				VU	☐	☐		
CHORDATA/ AVES	*Pyrrhura lepida*	Pearly Parakeet	☑	☐	☐	☐	☑	☐	☐	☐				VU	☐	☐		
CHORDATA/ AVES	*Ramphastos tucanus*	White-throated Toucan	☑	☐	☐	☐	☑	☐	☐	☐				VU	☐	☐		
CHORDATA/ AVES	*Ramphastos vitellinus*	Channel-billed Toucan	☑	☐	☐	☐	☑	☐	☐	☐				VU	☐	☐		
CHORDATA/ AVES	*Sterna dougallii*	Roseate Tern	☑	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐	VU in brazilian list	migratory
CHORDATA/ AVES	*Sterna hirundo*	Common Tern	☐	☑	☐	☐	☑	☐	☐	☐					☐	☐		migratory
CHORDATA/ AVES	*Sula sula*		☑	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐	EN in brazilian list	migratory
CHORDATA/ AVES	*Thalassarche chlororhynchos*		☑	☐	☐	☐	☑	☐	☐	☐				EN	☐	☐		
CHORDATA/ AVES	*Thalasseus maximus*	Royal Tern	☑	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐	EN in brazilian list	migratory

Phylum	Scientific name	Common name	Species qualifies under criterion				Species contributes under criterion				Pop. Size	Period of pop. Est.	% occurrence 1)	IUCN Red List	CITES Appendix I	CMS Appendix I	Other Status	Justification
			2	4	6	9	3	5	7	8								
CHORDATA / AVES	*Tringa flavipes*	Lesser Yellowlegs	☐	☑	☐	☐	☑	☑	☐	☐	320			LC	☐	☐		migratory
CHORDATA / AVES	*Tringa melanoleuca*	Greater Yellowlegs	☐	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐		migratory
CHORDATA / AVES	*Tringa semipalmata*	Willet	☐	☑	☐	☐	☑	☑	☐	☐	6500		50	LC	☐	☐		migratory
CHORDATA / AVES	*Tringa solitaria*	Solitary Sandpiper	☐	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐		migratory
CHORDATA / AVES	*Tyrannus savana*	Fork-tailed Flycatcher	☐	☑	☐	☐	☑	☐	☐	☐					☐	☐		migratory
Fish, Mollusc and Crustacea																		
CHORDATA / ACTINOPTERYGII	*Arapaima gigas*	Arapaima; Arapaima; Arapaima	☐	☐	☐	☐	☑	☐	☐	☑					☐	☐		
CHORDATA / ACTINOPTERYGII	*Brachyplatystoma filamentosum*	Kumakuma	☐	☐	☐	☐	☑	☐	☐	☑					☐	☐		
CHORDATA / ACTINOPTERYGII	*Brachyplatystoma rousseauxii*	Gilded catfish	☐	☐	☐	☐	☑	☐	☐	☑					☐	☐		
CHORDATA / ACTINOPTERYGII	*Brachyplatystoma vaillantii*	Laulao catfish	☐	☐	☐	☐	☑	☐	☐	☑					☐	☐		
CHORDATA / ELASMOBRANCHII	*Carcharhinus longimanus*		☑	☐	☐	☐	☑	☐	☐	☑				VU	☐	☐		
CHORDATA / ELASMOBRANCHII	*Carcharhinus obscurus*		☑	☐	☐	☐	☑	☐	☑	☑				VU	☐	☐		
CHORDATA / ELASMOBRANCHII	*Carcharhinus porosus*	Small-tailed shark	☑	☐	☐	☐	☑	☐	☐	☑					☐	☐	CR in brazilian list	
CHORDATA / ACTINOPTERYGII	*Colossoma macropomum*	Red bellied pacu	☐	☐	☐	☐	☑	☐	☐	☑					☐	☐		
CHORDATA / ACTINOPTERYGII	*Epinephelus itajara*		☑	☐	☐	☐	☑	☐	☐	☑				CR	☐	☐		
ARTHROPODA / MALACOSTRACA	*Farfantepenaeus brasiliensis*		☐	☐	☐	☐	☑	☐	☐	☑					☐	☐		
ARTHROPODA / MALACOSTRACA	*Farfantepenaeus subtilis*	southern brown shrimp	☐	☐	☐	☐	☑	☐	☐	☑					☐	☐		
CHORDATA / ELASMOBRANCHII	*Isogomphodon oxyrhynchus*	Daggernose shark	☑	☐	☐	☐	☑	☐	☐	☑				CR	☐	☐		
CHORDATA / ACTINOPTERYGII	*Lutjanus purpureus*		☑	☐	☐	☐	☑	☐	☐	☑					☐	☐	VU in brazilian list	
ARTHROPODA / MALACOSTRACA	*Macrobrachium carcinus*		☐	☐	☐	☐	☑	☐	☐	☑					☐	☐		

Phylum	Scientific name	Common name	Species qualifies under criterion				Species contributes under criterion				Pop. Size	Period of pop. Est.	% occurrence 1)	IUCN Red List	CITES Appendix I	CMS Appendix I	Other Status	Justification
			2	4	6	9	3	5	7	8								
CHORDATA / ACTINOPTERYGII	*Macrodon ancylodon*		☐	☐	☐	☐	☑	☐	☐	☑					☐	☐		
CHORDATA / ACTINOPTERYGII	*Makaira nigricans*		☑	☐	☐	☐	☑	☐	☐	☑				VU	☐	☐		
CHORDATA / ACTINOPTERYGII	*Megalops atlanticus*	Atlantic tarpon	☑	☐	☐	☐	☑	☐	☐	☑				VU	☐	☐		
CHORDATA / ACTINOPTERYGII	*Micropogonias furnieri*	Rocando; Cro cro	☐	☐	☐	☐	☑	☐	☐	☑					☐	☐		
CHORDATA / ACTINOPTERYGII	*Mugil liza*		☐	☐	☐	☐	☑	☐	☐	☑					☐	☐		
ARTHROPODA / MALACOSTRACA	*Panulirus argus*	Caribbean spiny lobster	☐	☐	☐	☐	☑	☐	☐	☑					☐	☐		
CHORDATA / ELASMOBRANCHII	*Prionace glauca*	Blue whaler shark	☐	☐	☐	☐	☑	☐	☐	☑					☐	☐		
CHORDATA / ELASMOBRANCHII	*Pristis pectinata*	Smalltooth Sawfish; Comb shark; Common sawfish; Common sawfish	☑	☐	☐	☐	☑	☐	☐	☑				CR	☑	☐		
CHORDATA / ELASMOBRANCHII	*Pristis pristis*		☑	☐	☐	☐	☑	☐	☐	☑				CR	☑	☑		
CHORDATA / ACTINOPTERYGII	*Sciades parkeri*	Gillbacker sea catfish	☑	☐	☐	☐	☑	☐	☐	☑				VU	☐	☐		
CHORDATA / ELASMOBRANCHII	*Sphyrna lewini*		☑	☐	☐	☐	☑	☐	☐	☑				EN	☐	☐		
CHORDATA / ELASMOBRANCHII	*Sphyrna tiburo*		☑	☐	☐	☐	☑	☐	☐	☑				LC	☐	☐	CR in brazilian list	
CHORDATA / ELASMOBRANCHII	*Sphyrna tudes*		☑	☐	☐	☐	☑	☐	☐	☑				VU	☐	☐		
CHORDATA / ACTINOPTERYGII	*Thunnus obesus*		☑	☐	☐	☐	☑	☐	☐	☑				VU	☐	☐		
ARTHROPODA / MALACOSTRACA	*Ucides cordatus*		☐	☐	☐	☐	☑	☐	☐	☑					☐	☐		
Others																		
CHORDATA / MAMMALIA	*Alouatta belzebul*	Red-handed Howler	☑	☐	☐	☐	☑	☐	☐	☐				VU	☐	☐		
CHORDATA / MAMMALIA	*Alouatta ululata*	Maranho Red-handed Howler	☑	☐	☐	☐	☑	☐	☐	☐				EN	☐	☐		
ECHINODERMATA / ASTEROIDEA	*Astropecten marginatus*		☑	☐	☐	☐	☑	☐	☐	☐					☐	☐	VU in brazilian list	
CHORDATA / MAMMALIA	*Balaenoptera physalus*		☑	☐	☐	☐	☑	☐	☐	☐				EN	☑	☑		
CHORDATA / REPTILIA	*Caretta caretta*		☑	☐	☐	☐	☑	☐	☐	☐				VU	☑	☑		
CHORDATA / AVES	*Charadrius semipalmatus*		☐	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐		migratory
CHORDATA / REPTILIA	*Chelonia mydas*		☑	☐	☐	☐	☑	☐	☐	☐				EN	☑	☑		

Phylum	Scientific name	Common name	Species qualifies under criterion				Species contributes under criterion				Pop. Size	Period of pop. Est.	% occurrence 1)	IUCN Red List	CITES Appendix I	CMS Appendix I	Other Status	Justification
			2	4	6	9	3	5	7	8								
CHORDATA / MAMMALIA	*Chiropotes satanas*	Black Bearded Saki; Black Saki	☑	☐	☐	☐	☑	☐	☐	☐				CR	☐	☐		
CHORDATA / MAMMALIA	*Chiropotes utahickae*	Uta Hick's Bearded Saki	☑	☐	☐	☐	☑	☐	☐	☐				EN	☐	☐		
CNIDARIA / ANTHOZOA	*Condylactis gigantea*		☑	☐	☐	☐	☑	☐	☐	☑					☐	☐	EN in brazilina list	
CHORDATA / REPTILIA	*Dermochelys coriacea*		☑	☐	☐	☐	☑	☐	☐	☐				VU	☑	☑		
CHORDATA / REPTILIA	*Eretmochelys imbricata*		☑	☐	☐	☐	☑	☐	☐	☐				CR	☑	☑		
CHORDATA / MAMMALIA	*Inia geoffrensis*		☑	☐	☐	☐	☑	☐	☐	☐					☐	☐	EN in brazilina list	
CHORDATA / MAMMALIA	*Leopardus tigrinus*		☑	☐	☐	☐	☑	☐	☐	☐				VU	☑	☐		
CHORDATA / MAMMALIA	*Leopardus wiedii*		☑	☐	☐	☐	☑	☐	☐	☐				NT	☑	☐	VU in brazilian list	
CHORDATA / REPTILIA	*Lepidochelys olivacea*		☑	☐	☐	☐	☑	☐	☐	☐				VU	☑	☑		
ECHINODERMATA / ASTEROIDEA	*Linckia guildingi*		☑	☐	☐	☐	☑	☐	☐	☐					☐	☐	VU in brazilian list	
ECHINODERMATA / ASTEROIDEA	*Luidia senegalensis*		☑	☐	☐	☐	☑	☐	☐	☐					☐	☐	VU in brazilian list	
CHORDATA / MAMMALIA	*Myrmecophaga tridactyla*	Giant Anteater	☑	☐	☐	☐	☑	☐	☐	☐				VU	☐	☐		
ECHINODERMATA / ASTEROIDEA	*Oreaster reticulatus*		☑	☐	☐	☐	☑	☐	☐	☐					☐	☐	VU in brazilian list	
CHORDATA / MAMMALIA	*Panthera onca*		☑	☐	☐	☐	☑	☐	☐	☐				NT	☑	☐	VU in brazilian list	
CHORDATA / REPTILIA	*Podocnemis expansa*		☐	☐	☐	☐	☑	☐	☐	☐					☐	☑		
CHORDATA / REPTILIA	*Podocnemis unifilis*		☑	☐	☐	☐	☑	☐	☐	☐				VU	☐	☐		
CHORDATA / MAMMALIA	*Priodontes maximus*	Giant Armadillo	☑	☐	☐	☐	☑	☐	☐	☐				VU	☑	☐		
CHORDATA / MAMMALIA	*Pteronura brasiliensis*	Giant Otter	☑	☐	☐	☐	☑	☐	☐	☐				EN	☑	☐		
CHORDATA / MAMMALIA	*Puma concolor*		☑	☐	☐	☐	☑	☐	☐	☐				LC	☐	☐	VU in brazilian list	
CHORDATA / MAMMALIA	*Sotalia fluviatilis*		☐	☐	☐	☐	☑	☐	☐	☐					☑	☐		
CHORDATA / MAMMALIA	*Sotalia guianensis*		☑	☐	☐	☐	☑	☐	☐	☐					☑	☐	VU in brazilian list	

Phylum	Scientific name	Common name	Species qualifies under criterion				Species contributes under criterion				Pop. Size	Period of pop. Est.	% occurrence 1)	IUCN Red List	CITES Appendix I	CMS Appendix I	Other Status	Justification
			2	4	6	9	3	5	7	8								
CHORDATA / MAMMALIA	*Tapirus terrestris*	Brazilian Tapir; South American Tapir	☑	☐	☐	☐	☑	☐	☐	☐				VU	☐	☐		
CHORDATA / MAMMALIA	*Trichechus inunguis*	Amazonian Manatee	☑	☐	☐	☐	☑	☐	☐	☐				VU	☑	☐		
CHORDATA / MAMMALIA	*Trichechus manatus*		☑	☐	☐	☐	☑	☐	☐	☐				VU	☑	☑		

1) Percentage of the total biogeographic population at the site

3.4 - Ecological communities whose presence relates to the international importance of the site

Name of ecological community	Community qualifies under Criterion 2?	Description	Justification
Waterbird community	☑	High abundance and diversity of waterbirds, nearctic wading birds and other migratory, some endangered in national red list	Coastal region of high productivity and ideal geomorphology that supports dozens of thousands waterbirds associated to wetlands
Aquatic mammals community	☑	Co-occurrence of two species of manatee, and several marine and freshwater cetaceans	Rare species, endangered, cetaceans endangered nationally and regionally
Sea turtle community	☑	Five species occur, some breed in local beaches	Endangered species, individuals present transcontinental migratory behavior
Fish community	☑	High species richness, especially for Siluriformes, Carcharhiniformes and Perciformes; species of estuary, coast, ocean and coral reefs environments	Endangered and vulnerable species internationally; area of high fishery productivity

4 - What is the Site like? (Ecological character description)

4.1 - Ecological character

The lower most portion of the Amazon River, contiguous to the delta and its mouth, is represented by extensive floodplains in a tangle of channels and archipelagos. The erosion and depositional processes in this flat, very low, unstable and straight portion – submitted to fluvial hydrological and coastal (tides) processes – end up contributing to the development of floodplains. (Torres & El-Robrini, 2006).
Várzea forests (Alluvial Tropical Rainforest) are found in these floodplains, mainly on the numerous islands of the estuary and on the river banks (IBGE, 2012; GEPLAM, 2007), where emergent trees of more than 45 m high standout. It is important to note that, in number of plant species, this floodplain forest represents the richest forested wetland in the world (Wittmann et al., 2006).
In depressed areas, with a longer period of flooding by water ranging from brackish to freshwater, populations of palm trees as well as herbaceous and grassy cover are found. There are also flood-free land areas with Tropical Rainforest per se, mainly in the interior of the islands and continental areas, where it can be found dense populations of Brazil nut trees and Açaí palms (ISA, 2017b). The influence of the tides is determinant for the existence of extensive stretches of pioneer vegetation in this area (BirdLife, 2017).
The Coastal Zone of Amapá (ZCA) presents sedimentary formations characterized by sandy alluvial sediments, muddy floodplains, tidal plains and coastal lagoons. These characteristics are the result of the dispersal system of the Amazon River. The estuarine plume of the river causes the salinity of regions undergoing its influence to fall to very low levels. The seasonal and daily movement of the waters is the main defining element of the landscape of the region, which in the delta region is responsible for the formation of mangroves, lagoons and beaches (Torres & El-Robrini, 2006).
The coastal plains of Pará and Maranhão are characterized by a dynamic transgressive coast dominated by macro-tidal regime (~ 6 m). The “Reentrances” are formed by estuarine-fluvial bays, forming a coast of "false rias" (dendritic pattern), with drowned fluvial valleys. These "false estuaries" have rich biotic communities, which form a macro system of mangroves, bordering the bays and the fluvial-estuarine channels. There are also humid fields with grass-herbaceous physiognomy, tidal plains with presence of cheniers, and numerous coves, bays and archipelagos interconnected by channels and cut by streams (El-Robrini et al., 2006).
Trees from 25 to 35 meters in height are common, and the diameter at breast height can reach 1 m (Abreu et al., 2016).

4.2 - What wetland type(s) are in the site?

Marine or coastal wetlands

Wetland types (code and name)	Local name	Ranking of extent (1: greatest - 4: least)	Area (ha) of wetland type	Justification of Criterion 1
A: Permanent shallow marine waters		4		
B: Marine subtidal aquatic beds (Underwater vegetation)		4		Representative
D: Rocky marine shores		4		
E: Sand, shingle or pebble shores	Praias arenosas	3		
F: Estuarine waters		2		Representative
G: Intertidal mud, sand or salt flats	Apicum*, Planícies de maré lamosa	2		Representative
H: Intertidal marshes	Campos inundáveis e Planícies Flúvio-Estuarinas	1		Representative
I: Intertidal forested wetlands	Manguezal	1		Representative

Inland wetlands

Wetland types (code and name)	Local name	Ranking of extent (1: greatest - 4: least)	Area (ha) of wetland type	Justification of Criterion 1
Fresh water > Flowing water >> M: Permanent rivers/ streams/ creeks		4		Representative
Fresh water > Flowing water >> N: Seasonal/ intermittent/ irregular rivers/ streams/ creeks		4		
Fresh water > Lakes and pools >> P: Seasonal/ intermittent freshwater lakes		3		Representative
Saline, brackish or alkaline water > Lakes >> R: Seasonal/ intermittent saline/ brackish/ alkaline lakes and flats		2		Representative
Saline, brackish or alkaline water > Marshes & pools >> Ss: Seasonal/ intermittent saline/ brackish/ alkaline marshes/ pools		4		
Fresh water > Lakes and pools >> Ts: Seasonal/ intermittent freshwater marshes/ pools on inorganic soils		3		
Fresh water > Marshes on inorganic soils >> Xf: Freshwater, tree-dominated wetlands	Floresta de várzea e Igapó	1		Representative

Other non-wetland habitat

Other non-wetland habitats within the site	Area (ha) if known
Tropical Rainforest (Florestas de Terras Firme)	
Transitional Forests (Florestas de Transição)	
Savannah (Cerrado)	
Dunes (Dunas)	
«Restinga» (Restinga)	

4.3 - Biological components

4.3.1 - Plant species

Other noteworthy plant species

Scientific name	Common name	Position in range / endemism / other
Avicennia germinans		
Avicennia schaueriana		
Carapa guianensis		
Conocarpus erectus		
Euterpe oleracea		
Hevea brasiliensis		
Hura crepitans		
Laguncularia racemosa		
Mauritia flexuosa		
Pentaclethra macroloba		
Rhizophora harrisonii		
Rhizophora mangle		
Rhizophora racemosa		
Spondias mombin		

4.3.2 - Animal species

Other noteworthy animal species

Phylum	Scientific name	Common name	Pop. size	Period of pop. est.	%occurrence	Position in range /endemism/other
CHORDATA/AVES	*Eudocimus ruber*	Scarlet Ibis				
ARTHROPODA/MALACOSTRACA	*Xiphopenaeus kroyeri*					

Invasive alien animal species

Phylum	Scientific name	Common name	Impacts
CHORDATA/MAMMALIA	*Bubalus bubalis*	water buffalo	Actually (major impacts)

4.4 - Physical components

4.4.1 - Climate

Climatic region	Subregion
A: Tropical humid climate	Af: Tropical wet (No dry season)
A: Tropical humid climate	Am: Tropical monsoonal (Short dry season; heavy monsoonal rains in other months)
A: Tropical humid climate	Aw: Tropical savanna (Winter dry season)

With almost 20 cm of in sea level rise observed in the last century, and projections of increase of up to 1 m for the year 2100 (IPCC, 2014), climate change already affects and is expected to further increase its impact over estuarine and coastal areas.
The vast floodplains sheltered by the Site suffer with changes in the number, duration and height of unexpected floods, both by tidal influence and extreme rainfall/drought events in the basin. These changes alter the environmental conditions of these sensitive ecosystems, adapted to regular flood patterns.
Climate change also may cause changes in the biological clock of migratory birds (FMNH, 2017). Baker et al. (2005) warned of a significant reduction in migratory wading birds in the Reentrâncias Maranhenses, comparing the 1980s censuses, which estimated 198,600 birds against the 2005 census, which totaled only 24,000.

4.4.2 - Geomorphic setting

a) Minimum elevation above sea level (in metres): 0

a) Maximum elevation above sea level (in metres): 170

- Entire river basin ☐
- Upper part of river basin ☐
- Middle part of river basin ☐
- Lower part of river basin ☑
- More than one river basin ☑

Not in river basin ☐

Coastal ☑

Please name the river basin or basins. If the site lies in a sub-basin, please also name the larger river basin. For a coastal/marine site, please name the sea or ocean.

Coastal part in the Atlantic Ocean. Lower Amazon River, stretches of the rivers Cunani, Calçoene, Araguari, Jari, in the northern part, and basins of the rivers Pará, Anapu, Jacundá, Anajás, with its numerous tributaries in the region of the Delta.
In the Pará dendritic coast stand out the rivers Mocajuba, Marapanim, Caripi, Maracanã, Piria and Gurupi. Two independent drainage basins flows into the Big Gufl («Golfão Maranhense»), the system of Mearim/ Pindaré/ Grajaú, in São Marcos bay, and the river Itapecurú, in São José bay (ISA, 2017).

4.4.3 - Soil

Mineral ☑

Organic ☑

No available information ☐

Are soil types subject to change as a result of changing hydrological conditions (e.g., increased salinity or acidification)? Yes ○ No ◉

Please provide further information on the soil (optional)

Mangrove Indiscriminate Soils are very poorly developed, muddy, dark, salt-rich saline soils formed in mangrove environments from recent fluvial-marine sediments mixed with organic debris (Embrapa, 2017).
In the Várzea areas, Gley type hydromorphic (humic and low humic) soils are also found, developed on recent sediments of the quaternary, generally acidic and clayey. These soils present a superficial horizon around 25 to 30 cm, with high percentage of organic matter, on a mineral layer originating of sedimentary material (GEPLAM, 2007).
On the other hand, the floodplains behind the mangrove areas are characterized by pelitic sediments (clay and silt), of a yellowish-gray color, rich in organic matter, usually in its innermost part (Cunha & Pires, 2010). On land, a large expanse of the area is covered by yellow Latosol, being also found the Podzols and the Hydromorphic Laterites (GEPLAM, 2007).

4.4.4 - Water regime

Water permanence

Presence?
Usually permanent water present

Source of water that maintains character of the site

Presence?	Predominant water source
Marine water	☑
Water inputs from surface water	☐
Water inputs from rainfall	☑
Water inputs from groundwater	☐

Water destination

Presence?
Marine

Stability of water regime

Presence?
Water levels fluctuating (including tidal)

Please add any comments on the water regime and its determinants (if relevant). Use this box to explain sites with complex hydrology.

The tidal influence is greatly variable along the area. Specifically, tree zones can be separated in the Amazonas estuary according the tides. One region where the astronomic components are dominant, near the river mouth and the shelf. An intermediary region, where the shallow waters and the astronomic components are strong. And a upper region where the fluvial component is dominant (Vinzon et al., 2007). Daily variations in tidal regimes can pass 3 meters (GEPLAM, 2007), with records of 4.7 m in the estuary (Lima, 1956).
The whole North Coast is influenced by meso and macro-tides. The amplitude of the macro-tides can reach more than 7 m during the syzygy, and of the meso-tides almost 4 m. The tidal currents are strong: 2.5 m/s, and the height of the waves stay around 0.6 to 1.4 m (El-Robrini et al., 2006)
In the other way, variations of the water level in the lower Amazonas can reach 4-6 m, influenced by the amount of pluvial waters coming from upstream in each season (Junk, 1986). Even with the extensive tidal regimes and great variations during the seasons, the dominance of the flow is fluvial (Vinzon et al., 2007), and only exceptionally marine water has stronger influence in the flooded areas, for example in the oriental part of the Marajó Island and Arari Lake (Lima, 1956).

4.4.5 - Sediment regime

Significant erosion of sediments occurs on the site ☐

Significant accretion or deposition of sediments occurs on the site ☑

Significant transportation of sediments occurs on or through the site ☑

Sediment regime is highly variable, either seasonally or inter-annually ☐

Sediment regime unknown ☐

Please provide further information on sediment (optional):

In general, dynamic conditions are observed in the sedimentary pattern, separated in: erosion zones, aggradation zones, zones of formations and migrations of sandy banks and islands, coastline development zones, muddy accretion zones and ephemeral depositional zones. Changes in a seasonal pattern reflect the balance between the coastal and fluvial processes of erosion and sedimentation (Torres & El-Robrini, 2006).
The Brazilian North Coast region is formed by dynamic estuaries, where mangroves are submitted to erosion by the action of the waves and tides. Sedimentary dynamics in this region is one of the most significant in the occidental Atlantic coast. It occurs both mangrove suppression, and creation of new ones, due to sandy banks movement and complex sedimentary dynamics influenced by tides (Abdala et al., 2012; Rebelo-Mochel, 2011).

(ECD) Water temperature: In the Amazonas lower course: around 29° C ± 1; In the ocean in this coast is 25/28°C

4.4.6 - Water pH

Acid (pH<5.5) ☐

Circumneutral (pH: 5.5-7.4) ☑
Alkaline (pH>7.4) ☑
Unknown ☐

Please provide further information on pH (optional):

The main channel of the Amazon River, that presents withe turbid waters, shows pH values ranging from acidic to alkaline, around 6.5 and 7.8 (Silva et al., 2015). The marine water between the Cabo Orange National Park to the city of Maguari (PA) is alkaline, with pH ranging from 7.6 to 8.2 (Siqueira et al., 2003).

4.4.7 - Water salinity

Fresh (<0.5 g/l) ☑
Mixohaline (brackish)/Mixosaline (0.5-30 g/l) ☑
Euhaline/Eusaline (30-40 g/l) ☑
Hyperhaline/Hypersaline (>40 g/l) ☑
Unknown ☐

Please provide further information on salinity (optional):

The Site comprehends a large continuum of salinity, where interior freshwaters meet with marine salty waters, changing the dominance according the seasons and tides. The normal dominance of the flow in the Amazonas estuary is of freshwater, that advances to the ocean through the Amapá coast. Salinity levels in the coast of the Cabo Orange tend to maintain values of 20 ppt (Cunha & Pires, 2010).
On the coast of Pará one can find from rivers and freshwater rias in the “rainy” season to apicuns (salt marshes), defined as areas of hypersaline soils situated in the region between tides, where salinity can passes 100 g/l. It also occurs mixtures of brackish water in estuaries and bays, forming a continuum of salinity that can greatly vary in function of the seasons.

4.4.8 - Dissolved or suspended nutrients in water

Eutrophic ☐
Mesotrophic ☐
Oligotrophic ☐
Dystrophic ☐
Unknown ☑

4.4.9 - Features of the surrounding area which may affect the Site

Please describe whether, and if so how, the landscape and ecological characteristics in the area surrounding the Ramsar Site differ from the site itself: i) broadly similar ○ ii) significantly different ◉

Surrounding area has greater urbanisation or development ☑
Surrounding area has higher human population density ☑
Surrounding area has more intensive agricultural use ☑
Surrounding area has significantly different land cover or habitat types ☑

Please describe other ways in which the surrounding area is different:

This ecoregion distinguishes itself from others in surrounding by the seasonal floods, and the presence of species adapted to these floods (WWF, 2017). The surrounding vegetation is mainly composed by Ombrophilous Dense Forest (Tropical Rainforest) and non-flooded Savannas.
From the coast to the interior, the mangroves begin to give way to plains, shrubs and arboreal fields, open forests (babassu forest) and in certain places the dense forest. Many of these areas are used for agricultural production, mainly cassava, rice, pineapple and watermelon (Sagrima, 2016).
Areas adjacent to mangroves, such as apicuns*, are targeted by shrimp farmers, where the main shrimp farms in these states are located. The main cities of the surroundings, São Luiz (MA) and Belém (PA), represent a significant change of scenery in relation to the site, and risks of effects in these systems mainly with urban pollution and sewage.
* Apicum is one of the features of the mangrove ecosystem.

4.5 - Ecosystem services

4.5.1 - Ecosystem services/benefits

Provisioning Services

Ecosystem service	Examples	Importance/Extent/Significance
Food for humans	Sustenance for humans (e.g., fish, molluscs, grains)	High
Wetland non-food products	Other	High
Biochemical products	Extraction of material from biota	Low
Genetic materials	Genes for tolerance to certain conditions (e.g., salinity)	Low

Regulating Services

Ecosystem service	Examples	Importance/Extent/Significance
Maintenance of hydrological regimes	Groundwater recharge and discharge	High
Erosion protection	Soil, sediment and nutrient retention	High
Pollution control and detoxification	Water purification/waste treatment or dilution	High
Climate regulation	Regulation of greenhouse gases, temperature, precipitation and other climactic processes	High

Cultural Services

Ecosystem service	Examples	Importance/Extent/Significance
Recreation and tourism	Nature observation and nature-based tourism	High
Scientific and educational	Important knowledge systems, importance for research (scientific reference area or site)	High

Supporting Services

Ecosystem service	Examples	Importance/Extent/Significance
Biodiversity	Supports a variety of all life forms including plants, animals and microorganizms, the genes they contain, and the ecosystems of which they form a part	High
Soil formation	Sediment retention	High
Nutrient cycling	Storage, recycling, processing and acquisition of nutrients	High
Nutrient cycling	Carbon storage/sequestration	High

Other ecosystem service(s) not included above:

The trees of the mangroves are used by extractive populations to various functions, and have importance for construction, fishing equipment, handicrafts and fuel.

Within the site: 1000000

Outside the site: 3000000

Have studies or assessments been made of the economic valuation of ecosystem services provided by this Ramsar Site? Yes ◉ No ○ Unknown ○

Where economic studies or assessments of economic valuation have been undertaken at the site, it would be helpful to provide information on where the results of such studies may be located (e.g. website links, citation of published literature):

It's hard to estimate and valuate so many services provided by the Site's region. Economic valuation is known in parts only for commercialized products, basically fish production. Still, in terms of fish production is almost impracticable determining the origin of all the products.
Stats from the Environment Ministry estimated the annual extractive fishing, only of crustaceans and mollusks of saltwater, for both states of Maranhão and Pará, in amounts of R$ 163 million. The traditional crab fishing in Pará state corresponded to R$ 10 million, and of Maranhão state of R$ 2.5 million (Ibama, 2008). Data available in the Environment Ministry website:
.
The commercialization of the "grude" (swim bladder of fishes) reaches high values due to the international interest. The most valuable is extracted from the Acoupa weakfish, that can be sold up to R$ 1,200 per kilo (Souza-Júnior et al., 2012).

4.5.2 - Social and cultural values

i) the site provides a model of wetland wise use, demonstrating the application of traditional knowledge and methods of management and use that maintain the ecological character of the wetland ☐

ii) the site has exceptional cultural traditions or records of former civilizations that have influenced the ecological character of the wetland ☐

iii) the ecological character of the wetland depends on its interaction with local communities or indigenous peoples ☑

Description if applicable

In parts, the ecological character of the Site has influences of the interaction with the traditional communities present, although it cannot be said that it is shaped by them. As most of the Protected Areas that make up the Site are of sustainable use, and occupied by traditional and indigenous extractive communities, the management of biota is frequent and part of the ecosystems end up reflecting this interaction. Nevertheless, since the Site covers an enormous area, with large spaces without human occupation and high resilience potential, its ecological character is highly independent of human action on its ecosystems.

iv) relevant non-material values such as sacred sites are present and their existence is strongly linked with the maintenance of the ecological character of the wetland ☐

4.6 - Ecological processes

<no data available>

5 - How is the Site managed? (Conservation and management)

5.1 - Land tenure and responsibilities (Managers)

5.1.1 - Land tenure/ownership

Public ownership

Category	Within the Ramsar Site	In the surrounding area
National/Federal government	☑	☑
Provincial/region/state government	☑	☑
Local authority, municipality, (sub)district, etc.	☑	☑

Private ownership

Category	Within the Ramsar Site	In the surrounding area
Cooperative/collective (e.g., farmers cooperative)	☑	☑
Other types of private/individual owner(s)	☑	☑

Provide further information on the land tenure / ownership regime (optional):

There are Quilombolas Land, that are communities formed from refugee slaves.

5.1.2 - Management authority

Please list the local office / offices of any agency or organization responsible for managing the site:

Secretaria de Biodiversidade do Ministério do Meio Ambiente

Provide the name and title of the person or people with responsibility for the wetland:

José Pedro de Oliveira Costa

Postal address:

Secretaria de Biodiversidade do Ministério do Meio Ambiente
Ed. Marie Prendi Cruz
SEPN 505 Norte, Bloco "B" 5 º andar sala 504
70.730-542 - Brasília DF - Brazil
FAX: 2028-2145

E-mail address:

jose.pedro@mma.gov.br

5.2 - Ecological character threats and responses (Management)

5.2.1 - Factors (actual or likely) adversely affecting the Site's ecological character

Human settlements (non agricultural)

Factors adversely affecting site	Actual threat	Potential threat	Within the site	In the surrounding area
Housing and urban areas	Medium impact	High impact	☑	☑
Commercial and industrial areas	Low impact	High impact	☐	☑
Tourism and recreation areas	Low impact	Low impact	☑	☑

Water regulation

Factors adversely affecting site	Actual threat	Potential threat	Within the site	In the surrounding area
Water abstraction	Low impact	Medium impact	☑	☑
Canalisation and river regulation	Low impact	High impact	☑	☑

Agriculture and aquaculture

Factors adversely affecting site	Actual threat	Potential threat	Within the site	In the surrounding area
Annual and perennial non-timber crops	Low impact	Medium impact	☑	☑
Livestock farming and ranching	High impact	High impact	☑	☑
Marine and freshwater aquaculture	High impact	High impact	☑	☑

Energy production and mining

Factors adversely affecting site	Actual threat	Potential threat	Within the site	In the surrounding area
Oil and gas drilling	Low impact	High impact	☐	☑
Mining and quarrying	High impact	High impact	☑	☑

Transportation and service corridors

Factors adversely affecting site	Actual threat	Potential threat	Within the site	In the surrounding area
Roads and railroads	Low impact	High impact	☑	☑

Biological resource use

Factors adversely affecting site	Actual threat	Potential threat	Within the site	In the surrounding area
Hunting and collecting terrestrial animals	Medium impact	High impact	☑	☑
Logging and wood harvesting	High impact	High impact	☑	☑
Fishing and harvesting aquatic resources	Medium impact	High impact	☑	☑

Human intrusions and disturbance

Factors adversely affecting site	Actual threat	Potential threat	Within the site	In the surrounding area
Recreational and tourism activities	Low impact	Medium impact	☑	☑

Natural system modifications

Factors adversely affecting site	Actual threat	Potential threat	Within the site	In the surrounding area
Fire and fire suppression	High impact	High impact	☑	☑
Vegetation clearance/ land conversion	High impact	High impact	☑	☑

Pollution

Factors adversely affecting site	Actual threat	Potential threat	Within the site	In the surrounding area
Household sewage, urban waste water	Low impact	High impact	☑	☑

Please describe any other threats (optional):

The Foz do Amazonas Basin is characterized by the National Agency for Petroleum, Natural Gas and Biofuels (ANP), as a new frontier basin, which presents potential for gas and light oil discoveries, with several potential wells already delimited.
Federal government planning takes into account the prediction of constructing passageways of oil and gas pipelines in the area, aiming to utilize the potential of these resources. Nevertheless, construction projects need to be approved by regular environmental licensing of Brazilian laws.
In this way, there is a strong resistance represented mainly by environmentalists and local communities because of the environmental importance of the region and the risk of spills and leakage related to the activity.
Recently, the Brazilian Institute for the Environment and Renewable Natural Resources (IBAMA) denied the environmental license for the French oil company Total E & P regarding the exploration of a well at the mouth of the Amazon River. In that case, additional information on the environmental impact is still under requested, and if the entrepreneur does not meet the points demanded by the technical team of that institution, the licensing process will be archived (Rodrigues, 2017).
Despite the rational use of the region´s natural resources is guaranteed by the commitments assumed by the country, and by the implementation of national environmental laws, the construction of a new port in Amapá state and the passage of pipelines, as well as a carrying out other infrastructure necessary for the development the region are planned. These initiatives, once licensed by the competent governmental bodies, and the infrastructure necessary for the exercise of the Armed Forces, in order to guarantee the National Defence, should not be subject to restrictions in the face of the recognition of the Site.

5.2.2 - Legal conservation status

National legal designations

Designation type	Name of area	Online information url	Overlap with Ramsar Site
federal conservation unit	Estação ecológica de Maracá Jipiuoca	http://www.icmbio.gov.br/portal/unidadesdeconservacao/biomas-brasileiros/marinho/unidades-de-conservacao-marinho/2253-esec-de-maraca-jipioca	whole
federal conservation unit	Parque nacional dos Lençois Maranhenses	http://www.icmbio.gov.br/portal/unidadesdeconservacao/biomas-brasileiros/marinho/unidades-de-conservacao-marinho/2264-parna-dos-lencois-maranhenses	whole

Designation type	Name of area	Online information url	Overlap with Ramsar Site
federal conservation unit	Reserva biológica do Lago Piratuba	http://www.icmbio.gov.br/portal/unidadesdeconservacao/biomas-brasileiros/amazonia/unidades-de-conservacao-amazonia/2001-rebio-lago-piratuba	whole
federal conservation unit	Reserva de desenvolvimento sustentável Itatupã-Baquiá	http://www.icmbio.gov.br/portal/unidadesdeconservacao/biomas-brasileiros/amazonia/unidades-de-conservacao-amazonia/1993-rds-itatupa-baquia	whole
federal conservation unit	Reserva extrativista Chocoaré-Mato Grosso	http://www.icmbio.gov.br/portal/unidadesdeconservacao/biomas-brasileiros/marinho/unidades-de-conservacao-marinho/2285-resex-chocoare-mato-grosso	whole
federal conservation unit	Reserva extrativista Gurupá-Melgaço	http://www.icmbio.gov.br/portal/unidadesdeconservacao/biomas-brasileiros/amazonia/unidades-de-conservacao-amazonia/2018-resex-de-gurupa-melgaco	whole
federal conservation unit	Reserva extrativista Mapuá	http://www.icmbio.gov.br/portal/unidadesdeconservacao/biomas-brasileiros/amazonia/unidades-de-conservacao-amazonia/2004-resex-mapua	whole
federal conservation unit	Reserva extrativista Maracanã	http://www.icmbio.gov.br/portal/unidadesdeconservacao/biomas-brasileiros/marinho/unidades-de-conservacao-marinho/2292-resex-maracana	whole
federal conservation unit	Reserva extrativista Marinha Arai-Peroba	http://www.icmbio.gov.br/portal/unidadesdeconservacao/biomas-brasileiros/amazonia/unidades-de-conservacao-amazonia/2281-resex-ar ai-peroba	whole
federal conservation unit	Reserva extrativista Marinha Caetétaperaçu	http://www.icmbio.gov.br/portal/unidadesdeconservacao/biomas-brasileiros/marinho/unidades-de-conservacao-marinho/2107-resex-marinha-de-caete-taperacu	whole
federal conservation unit	Reserva extrativista Marinha Mestre Lucindo	http://www.icmbio.gov.br/portal/unidadesdeconservacao/biomas-brasileiros/amazonia/unidades-de-conservacao-amazonia/5070-resex-marinha-mestre-lucindo	whole
federal conservation unit	Reserva extrativista Marinha Mocopajuba	http://www.icmbio.gov.br/portal/unidadesdeconservacao/biomas-brasileiros/amazonia/unidades-de-conservacao-amazonia/5069-resex-marinha-mocapajuba	whole
federal conservation unit	Reserva extrativista Marinha Tracuateua	http://www.icmbio.gov.br/portal/unidadesdeconservacao/biomas-brasileiros/marinho/unidades-de-conservacao-marinho/2293-resex-marinha-de-tracuateua	whole
federal conservation unit	Reserva extrativista Marinha de Gurupi-Piriá	http://www.icmbio.gov.br/portal/unidadesdeconservacao/biomas-brasileiros/marinho/unidades-de-conservacao-marinho/2290-resex-guru pi-piria	whole
federal conservation unit	Reserva extrativista Mãe Grande de Curuça	http://www.icmbio.gov.br/portal/unidadesdeconservacao/biomas-brasileiros/marinho/unidades-de-conservacao-marinho/2279-resex-mae-grande-de-curuca	whole

Designation type	Name of area	Online information url	Overlap with Ramsar Site
federal conservation unit	Reserva extrativista Quilombo do Frechal	http://www.icmbio.gov.br/portal/unidadesdeconservacao/biomas-brasileiros/amazonia/unidades-de-conservacao-amazonia/2005-resex-quilombo-do-frexal	whole
federal conservation unit	Reserva extrativista Terra Grande Pracuuba	http://www.icmbio.gov.br/portal/unidadesdeconservacao/biomas-brasileiros/amazonia/unidades-de-conservacao-amazonia/2046-resex-terra-grande-pracuuba	whole
federal conservation unit	Reserva extrativista de Cururupu	http://www.icmbio.gov.br/portal/unidadesdeconservacao/biomas-brasileiros/marinho/unidades-de-conservacao-marinho/2288-resex-de-cururupu	whole
federal conservation unit	Reserva extrativista do Rio Cajari	http://www.icmbio.gov.br/portal/unidadesdeconservacao/biomas-brasileiros/amazonia/unidades-de-conservacao-amazonia/2038-resex-do-rio-cajari	whole
federal conservation unit	Reserva extrativista marinha Cuinarana	http://www.icmbio.gov.br/portal/unidadesdeconservacao/biomas-brasileiros/amazonia/unidades-de-conservacao-amazonia/5071-resex-marinha-cuinarana	whole
federal conservation unit	Reserva extrativista marinha de Soure	http://www.icmbio.gov.br/portal/ resex-marinha-de-soure	whole
federal conservation unit	Área de proteção ambiental Delta do Parnaíba	http://www.icmbio.gov.br/portal/unidadesdeconservacao/biomas-brasileiros/marinho/unidades-de-conservacao-marinho/2246-apa-delta- do-parnaiba	whole
state conservation unit	Área de proteção ambiental do rio Curiaú		whole

Non-statutory designations

Designation type	Name of area	Online information url	Overlap with Ramsar Site
Important Bird Area	Delta do Parnaíba	http://datazone.birdlife.org/site/factsheet/delta-do-parna%C3%AD ba-iba-brazil	whole
Important Bird Area	Goiabal / Piratuba	http://datazone.birdlife.org/site/factsheet/goiabal--piratuba-ib a-brazil	partly
Important Bird Area	Ilha de Marajó	http://datazone.birdlife.org/site/factsheet/ilha-de-maraj%C3%B3- iba-brazil	whole

5.2.3 - IUCN protected areas categories (2008)

- Ia Strict Nature Reserve ☐
- Ib Wilderness Area: protected area managed mainly for wilderness protection ☐
- II National Park: protected area managed mainly for ecosystem protection and recreation ☑
- III Natural Monument: protected area managed mainly for conservation of specific natural features ☐
- IV Habitat/Species Management Area: protected area managed mainly for conservation through management intervention ☐
- V Protected Landscape/Seascape: protected area managed mainly for landscape/seascape conservation and recreation ☑
- VI Managed Resource Protected Area: protected area managed mainly for the sustainable use of natural ecosystems ☑

5.2.4 - Key conservation measures

Legal protection

Measures	Status
Legal protection	Implemented

Habitat

Measures	Status
Land conversion controls	Implemented

Species

Measures	Status
Threatened/rare species management programmes	Implemented

5.2.5 - Management planning

Is there a site-specific management plan for the site? No

Has a management effectiveness assessment been undertaken for the site? Yes ○ No ◉

If the site is a formal transboundary site as indicated in section Data and location > Site location, are there shared management planning processes with another Contracting Party? Yes ○ No ◉

5.2.6 - Planning for restoration

Is there a site-specific restoration plan? Please select a value

5.2.7 - Monitoring implemented or proposed

Monitoring	Status
Birds	Implemented

6 - Additional material

6.1 - Additional reports and documents

6.1.1 - Bibliographical references

Attachments “References” in 6.1.2

6.1.2 - Additional reports and documents

i. taxonomic lists of plant and animal species occurring in the site (see section 4.3)
<no file available>

ii. a detailed Ecological Character Description (ECD) (in a national format)
<no file available>

iii. a description of the site in a national or regional wetland inventory
<no file available>

iv. relevant Article 3.2 reports
<no file available>

v. site management plan
<no file available>

vi. other published literature
<1 file(s) uploaded>

6.1.3 - Photograph(s) of the Site

Please provide at least one photograph of the site:

ICMBio (*ICMBio archive, 2011*)

ICMBio (*ICMBio archive, 2015*)

ICMBio (*ICMBio archive, 2012*)

Helder Lana (*Helder Lana, 2017*)

ICMBio (*ICMBio archive, 2017*)

6.1.4 - Designation letter and related data

Designation letter
<1 file(s) uploaded>

Date of Designation: 2018-03-19