Information Sheet on Ramsar Wetlands

Categories approved by Recommendation 4.7 of the Conference of the Contracting Parties.

1. Date this sheet was completed/ updated:
september, 1997/ january, 1998

2. Country: Brazil

3. Name of wetland:

"Área de Proteção Ambiental (APA) das Reentrâncias Maranhenses"
'Reentrâncias Maranhenses' Environmental Protection Area (EPA)

4. Geographical coordinates:

0 degrees 51 minutes - 2 degrees 31 minutes South
44 degrees 0 minutes - 46 degrees 7 minutes West of Greenwich

5. Altitute: (average and/or max.& min.)

0 to 200 m above sea level

6. Area: (in hectares)

2,680,911.20 ha

7. Overview: (general summary, in two or three sentences, of the wetland's principal characteristcs)

The area has remarkable natural features. The coastline is very irregular with several coves, islands and estuaries with enormous mangroves, which serve as home for various species of fishes, crustaceans and molluscs. The predominant plant species are of the genus *Rhyzophora*, *Avicenia*, *Laguncularia* and *Conocarpus*. This vegetation constitutes important protection barriers and contributes to increase the productivity of the fisheries production, which is the major source of food and income for the greater part of the coastal population and of those living by the river banks. One must also take its panoramic value into consideration for it constitutes a combination of ecosystems where one comes across beaches and dunes of unparalleled beauty in the State of Maranhão.

8. Wetland Type: (please circle the applicable codes for wetland types as listed in Annex I of the *Explanatory Note and Guidelines* document)

marine - coastal: **A** - **B** - **C** - **D** - **E** - **F** - **G** - **H** - **I** - J - K

inland: L - **M** - **N** - O - P - Q - **R** - Sp - Ss - Tp - Ts - U - Va - Vt – W - Xf - Xp - Y - Zg - Zk

man made: 1 - 2 - 3 - 4 - **5** - 6 - **7** - 8 - 9

Please now rank these wetland types by listing them form the most to the least dominant:

That's not possible once the environments are on the top of the others, exemple: sedimentary islands covered by mangroves located in estuaries of shallow rivers. Observing the Nautical Chart nº 400 (produced by Direcctory of Hidrography and Navigation - DHN of Ministry of Navy) with the Reentrâncias EPA mapped out, one can observe that nearly 60% of this EPA cover estuarine/ coastal waters with depths till isobath of 15 m. However the environment that calls ones attention when going through the region are the mangroves.

9. Ramsar Criteria: (please circle the applicable criteria; see point 12, next page.)

1a - **1b**- **1c**- 1d / **2a**- **2b**- **2c**- 2d / **3a**- **3b**- 3c / **4a**- **4b**

Please specify the most significant criterion applicable to the site: "1c"

**10. Map of site included? Please tick yes (X) or no ( ) ** (Please refe to the *Explanatory Note and Guidelines* document for information regarding desirable map traits)

- *Sector divisions of Maranhão coast for Gerco/Ma studies*. Scale.:1:1.250.000. 1997. Base: Road Map of DER of Ma.Cover: Gurupi river mouth to Parnaíba river mouth. Gerco/Sema - Ma

- *Conservation units of Maranhão coast zone.* Scale: 1:1.250.000. 1997. Base: Road Map of DER of Ma.Cover: Gurupi river mouth to Parnaíba river mouth. Gerco/Sema - Ma

- *Fitoecological Map.* Scale: 1:1.250.000. Base: RADAM. Cover: Gurupi river mouth to Parnaíba river mouth. (Contents: vegetal cover of Maranhão coast). Gerco/Sema - Ma

- *Climatic Characterization - Climatic Differentiation*. Scale: 1:2.000.000. 1995. Base: Sudene. Cover: Gurupi river mouth to Parnaíba river mouth. Gerco/Sema - Ma

Obs.: all them are elaborated originally in protuguese.

11. Name and address of the compiler of this form: (including telephone/ fax nº and e-mail)

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12. Justification of the criteria selected under point 9, on previus page.

1. Criteria for representative or unique wetlands.

(a) it is particularly good representative example of a natural or near-natural wetland, characteristic of the appropriate biogeographical region;

The coast of Reentrâncias EPA (according to Rebelo-Mochel, 1996) has several bays, rivers, rias, channels and islands banks covered by extensive mangroves, totalizing 3,000 Km^2 of mangroves corresponding to 60% of the mangrove area of the whole state. The biomass estimative for the mangroves of this region vary from 150 to 260 t/ha at the localities of Alcântara, Guimarães, Cururupu and Turiaçu. The medium heigh of the mangrove forest for the region as a whole is estimated in a avarage of 20 m, existing places such as Turiaçu bay where it was observed mangrove trees with 40 m.

In some places occur palms of "babaçu" (*Orbygnia martiana*) and coconut between mangrove forests. Beyond floodplain observed in the Municipality of Bequimão.

Due to difficulties in the access, rural EPA characteristcs, its inhabitants being predominantly artisan fishermen and the low demographic density of the region (total population of 290,583, demographic density avarage 15.95 hab/Km^2), the environment shows natural spaces, and near-natural spaces in the parts occupied by man. And there are spaces, reasonably changed as in the mining areas in the municipalities of Carutapera and Luís Domingues.

In a small scale the physiography observed at Reentrâncias are repeted at the oriental coast of Maranhão till Parnaíba delta, that's because a large part of this side of Maranhão coast is covered by sand fields (dunes and paleodunes). So it's observed that Reentrâncias EPA is a good representative of the wetlands at biogeographycal area where it is located (Maranhão coast).

(b) it is a particularly good representative example of a natural or near-natural wetland, common to more than one biogeographical region;

Among the seven phisiographycal regions presents at Maranhão State, two are verified on this EPA: “Litoral”(coastal) Region and “Pré-Amazônica” Region.

According to IBGE (Brazilian Institute of Geography and Statistic) this area is subdivided into two micro-regions: Gurupi and Maranhão West Coast.

This site is also representative to more than one biogeographycal region, taken in account the macro-region Northeast, where it’s inserted the Maranhão State, and even comparing to others regions of Brazil coast.

(c) it is a particularly good representative example of a wetland which plays a substancial hydrological, biological or ecological role in the natural functioning of an major river basin or coastal system, especially where it is located in a transborder position;

Along 256.44 Km of the Reentrâncias EPA coast extension (estimated value not taking in account rias, coves and bays; Maranhão coast is estimated in 640 Km of extension) constituted at most on low and plain lands with little hill elevations at Carutapera Municipality (frontier with Para State), one can observe 14 principal bays: Gurupi, Irimirim, Iriaçu, Tromaí, Pericucaua, Cararapa, Maracaçumé, Mutuoca, Turiaçu, of Lençóis, of Capim, of Cabelo da Velha, Cumã and São Marcos (this last one form the Maranhão Gulf on the EPA west side) characterizing a big estuarine area. This estuaries permanently receives large amount of sedimments and nutrients from their drainage bays, which are kept and reworked at mangroves and estuaries, where can be found many sand banks that are moved by the expressive tidal power, that rules the region life; it’s medium tidal range is around 6 m. It must be emphasized the importance of sand banks, mangroves and even of the coast cuts into rias on the protection of the coast from the action of tidal power.

(d) it is an example of a specific type of wetland, rare or unusual in the appropriate biogeographical region.

2. General criteria based on plants or animals.

(a) it supports an appreciable assemblage of rare, vulnerable or endangered species or subspecies of plant or animal, or an appreciable number of individuals of any one or more of these species;

On that EPA live rare and endangered species like *Eudocimus ruber* (“guará”), *Sotalia fluviatilis* (dolphin), *Trichechus manatus* (manatee) and *Jacana jacana* (“jaçanã”).

(b) it is of special value for maintaining the genetic and ecological diversity of a region because of the quality and peculiarities of its flora and fauna;

According to the Fitoecological Chart of Maranhão Coast Zone scale: 1:1,250,000 (Radam, 1973) at Reentrâncias EPA are verified: Pioneer Formation (mangroves and floodplain) and Tropical Forests Regions (dense, secondary "latifoliada" - with wide leafs-, secondary mixed and "babaçual" - formed by palms of "babaçu" *Orbygnia martiana*).

The mangrove ecosystem abundant at Reentrâncias, are recognized of great importance for the maintenance of stocks of fishes, crustaceans and molluscs. Some of these animals spend their whole life in the mangroves, some others spend only the youthfull phase or the reproductive phase, and others one make use of it only as nourishment source. That way, the mangrove works as natural breeding place. Observed and recomended bibliography (originally published in portuguese):

REBELO, F. & MEDEIROS, T.. C. C. 1988. Cartilha do mangue (Mangrove bokklet). UFMA/Labohidro. São Luís/Ma. 31 pág.

SCHAEFFER-NOVELLI, YARA. 1995. Manguezal. Ecossistema entre a terra e o mar (Mangrove. Ecosystem between land and sea). Caribbean Ecological Research. São Paulo. 64 pág.

The mangrove species observed at Maranhão coast are: *Rhizophora mangle, R. racemosa, R. harrisonii, Avicennia germinans, A schaueriana, Laguncularia racemosa* and *Conocarpus erectus*. During field activities done in 1994 at 3 municipalities, with the support of Ramsar Convention (SGF), it was registered the occurrence at this site of: *Rhizophora mangle, Avicennia germinans, A schaueriana, Laguncularia racemosa* (Rebelo-Mochel, 1996).

Beyond the animals listed in the items 2a, 3a, 3b, 4a and 4b it was verified on field activities expressive amounts of animals such as polichaetas, oligochaetas, molluscs and crustaceans. These animals have great importance as nourishment source, specially for birds.

(c) it is of special value as the habitat of plants or animals at a critical stage of their biological cycle;

This region has also grate value for birds, specially the continental migranting birds that use it at wintry time, that gave to the region the status of Hemisphere Reserve for Migratory Birds. Beyond migratory birds this region is of vital importance for waterfowl that lives there such as "guará", heron and spoonbills that make use of this area for feeding and reproduction.

There are some fish families beyond amphibious, reptile, mammals and insects that make use of mangrove as a refuge, nourishment source or only for the reproductive ritual - Schaeffer-Novelli, 1995 - (unfortunally documented data about these questions for this Ramsar site are not available).

(d) it is of special value for one or more endemic plant or animal species or communities.

Works for this site about this question of endemism are not available.

3. Specific criteria based on waterfowl.

(a) it regularly supports 20,000 waterfows;

(b) it regularly supports substantial numbers of individuals from particular groups of waterfowl, indicative of wetland values, productivity or diversity;

(c) where data on populations are available, it regularly supports 1% of the individuals in a population of one species or subspecies of waterfowl.

Through the air census done in january and february of 1982 and 1986, Morrison and Ross (1989) characterized the space between Belém/Pa and São Luís/Ma as a fundamental area in the brazilian coast for shore birds. Observing distribution maps and respective tables of the reaserched sectors that are specifically at Reentrâncias EPA, from sector 43 to 53 of North Ecounit - Brazil Centre, can be verified a total of 196,878 shorebirds. From which 116,196 are birds of small size well represented by the genus *Callidris*; 58,794 birds of medium size mainly represented by *Pluvialis squatarola, Arenaria interpres, Tringa spp* and *Limnodromus spp*; and 21,888 are large birds represented by *Catoptrophorus semipalmatus, Numenios phaeopus* and in a smaller portion *Limosa haemastica*.

Taking in account that the total number of birds for the North/Central coast, space between Belém/Pa and São Luís/Ma is 326,891 and the total number of shore birds for Reentrâncias EPA is 196,878, it's possible to conclude that 60.22% of the total North/Central shore birds are observed at this EPA. That means 49.44% of the total shore birds verified for the whole Brazil and 6.74% of the total shore birds verified for the South America.

Recent studies developed at Maranhão Gulf, pointed that this coast sector can shelter significant populations of neartic shore birds, nearby 150,000 birds were censed during the period between 1991 and 1992 (Rodrigues, 1993).

4. Specific criteria based on fish.

(a) it supports a significant proportion of indigenous fish subspecies, species or families, life-history stages, species interactions and /or populations that are

representative of wetland benefits and/or values and thereby contributes to global biological diversity;

(b) it is an important source of food for fishes, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere, depend.

From the study "Fishery Resources Prospection of Reentrâncias from Maranhão" done in 1976 by Maranhão State Government with Sudepe ("Superintendência de Desenvolvimento da Pesca"- Superadministration of Fish Development) we can get the following list of fish, crustaceans and molluscs living in that region:

Table of fishes found at Reentrâncias

Brazilian Common Name	**Scientific Name**	**Brazilian Common Name**	**Scientific Name**
Bandeirado	*Bagre bagre*	Arriba-saia	*Peprilus paru*
Peixe pedra	*Genyatremus luteus*	Cangatã	*Tachysurus luniscutis*
Cambéu	*Tachysurus grandicassis*	Cabeçudo	*Stellifer rastriter*
Uritinga	*Arius proops*	Uriacica amarelo	*Arius spixii*
Sardinha-de-gato	*Anchoa spiniler*	Corvina dentuça	*Macodron ancylodon*
Guaravira	*Trichiurus lepturus*	Sardinha verdadeira	*Engraulidae sp*
Cururuca	*Micropogon furnieri*	Boca de rato	*Ophioscion brasiliensis*
Xaréu	*Caranx latus*	Galo	*Selene vomer*
Corvina mole	*Cynoscion virescens*	Corvina uçu	*Cynoscion microlepdotus*
Carapitanga	*Lutjanus aya*	Catimbau	*Cycocephalus nasutus*
Camorim branco	*Centropomus undecimalis*	Caica ou tainha pitu	*Mugil curema*
Canguira	*Trachinotus carolinus*	Camorim pena	*Centropomus parallelus*
Urubarana	*Elops saurus*	Escrivão	*Eucinostomus melanopterus*
Palcal	*Ophioscion microps*	Rudela	*Sphyrna tiburo*
Cação ou tubarão	*Rizoprionodon porosus*	Barbudo	*Polydactylus virginicus*
Corvina - manteiga	*Isopisthus parvipinnis*	Sardinha verdadeira	*Anchovia clupeoides*
Arraia - baté	*Gumnura micrura*		

Source: Maranhão, 1976

Table of crustaceans found at Reentrâncias:

Brazilian Common Name	Scientific Name	Brazilian Common Name	Scientific Name
Camarão (shrimp)	*Trachypennaeus constrictus*	Camarão (shrimp)	*Sicyonia dorsalis*
Camarão piticais (shrimp)	*Xiphopennaeus kroyeri*	Camarão vermelho (red shrimp)	*Pennaeus aztecus*
Camarão papudo (shrimp)	*Macrobachium achanturus*	Camarão papudo (shrimp)	*Macrobachium amazonicum*
Caranguejo (crab)	*Ucides cordatus cordatus*		

Source: Maranhão, 1976

Table of molluscs found at Reentrâncias:

Brazilian Common Name	Scientific Name	Brazilian Common Name	Scientific Name
Sururu-a- punho	Mytella falcata	Sururu-de-pau	Mytella falcata
Sururu-de-porta	Mytella falcata	Sururu-de-dedo	Mytella guayanensis

Source: Maranhão, 1976

There are no studies about ecology of the fauna listed above that allow us to inform about their relations intra or inter-specific, or about behaviour habits.

Field activities at EPA, promoted with the support of Ramsar in 1994, allowed to register the occurrence of the follwing animals, used as man food too: crustacean - crab (*Callinectes sp*); bivalve molluscs - "tarióba" (*Lucina pectinata*), "turu" or teredo (Teredinidae) and oster (*Crasostea mangle*).

13. General location: (including the nearest large town and its administrative region)

Reach the municipalitiees of Alcântara (closest town to the capital, São Luís) Cedral, Porto Rico do Maranhão, Guimarães, Mirinzal, Central do Maranhão, Bequimão, Cururupu, Serrano do Maranhão, Bacuri, Apicum-Açu, Turiaçu, Candido Mendes, Luís Domingues, Godofredo Viana and Carutapera totalizing 16 municipalities.

Maranhão West Coast, is at Amazon Province, Sub-Province of Terciary Plain, Southeast Sector, in accordance to Rizzini; and for Uduardy, biogeographyc province of "Babaçu" (Fund.Nac.próMem.,s.d.).

14. Physical features: (e.g., geology, geomorphology; origins - natural or artificial; hydrology; soil type; water quality; water depht water permanence; fluctuations in water level; tidal variations; catchment area; downstream area; climate)

According to Sousa (1993) on his work Climatic Characterization of Maranhão Coast Zone (see item 25a) Reentrâncias EPA region is mostly characterized as humid with 3 dry months (sep./ oct./ nov.), but in the space between the bays of Cumã and Turiaçu clima is predominatly semi-humid with 4 to 5 dry months (sep./ oct./ nov./ dec.). The maxim precipitation reach 6,000 mm at Mirinzal, Guimarães and Cedral municipalities, having a predominance of the avarage of 4,000 mm anual on the others municipalities. Yet the minim precipitation oscillate between 400 and 600 mm at Bequimão and Alcântara municipalities, and is 600 mm at Bacuri, Turiaçu and Cururupu, rising to an avarage of 800 to 1,600 mm in the EPA west direction.

The Geological Units that can be observed on this region according to Brasil (1991) are: Maracaçumé Complex that emerge in small isolated strecth of Gurupi low river and in the north of the state.On this Complex predominate: magnetite, gneiss, quartzite, granite and marble limestone. The Gurupi Group emerge showing northwest-southeast direction, at Gurupi Micro-region. It's constituted into a predomminium of phyllites and schists, cutted indiscriminatly by quartz veins, carrying in large scale gold minerals. The Alluvions are deposits constituted by gravel, sand and inconsolidate clays. Arranged longside the coast of Gurupi micro-region among others, are enriched with heavy minerals such as gold, cassiterite, magnetite, turmalina and zircon. The occurrence of gold at Gurupi-Maracaçumé region are known since XVIII century, emphasizing the rivers valleys of Turiaçu, Maracaçumé, Grajaú (this last one out of Reentrâncias EPA) and Gurupi, being the biggest mining areas concentrated at municipalities of Luís Domingues (mainly at Aurizona locallity) and Carutapera. The municipalities of Guimarães and Mirinzal are quoted as impotant clay reserves. At Alcântara occur an important potecial reserve of kaolin. The sea salt shows regular extractive activity at Maranhão coast, existing salt (bed) company at Reentrâncias region although mostly are shutted down. There are signs of galena (Pbs) and cassiterite (SnO_2) at Cândido Mendes. Guimarães is one of the most impotant municipalities with the incidence of quartz.

Upon geomorphology of Reentrâncias coast, it's described on Brasil (1991) as a coast with drowned rias converted into alluvial plains that are externally framed by muddy points and islands formed by tidal power.

In some places, like Bequimão Municipality, floodplains are observed.

During field activities executed at 1997, Sema/ Acqua Marítma team verified that at Guimarães Municipality region, between Itacolomi stone and Outeiro (in an extension of near 45 Km) occurr rocky formations submerged in the coast, where can be found corals (we still don't have its identification confirmed, but we believe they are octocorals). It's possible that these events will be verified above Turiaçu bay too, according to fishermen relates.

Upon soils can be told, according to Brasil (1991) too, that at west side there is Hydromorphyc Laterite, at the EPA central portion, on the continent, there is Quartz Sands, while on the coast it's observed Mangrove Indiscriminated Soil. At low

Pericumã there is Indiscriminated Hydromorphyc soil. On the region of Bequimão Municipality there is Laterite Concretionary Soil.

According to Stride (1992) at Maranhão coast, the tidal range is a very important characterist. At São Luís the average tidal range is around 7 m. It fall down to an average of 5 m at São João lighthouse (obs.: tidal cycle happens twice each day - author note).

Tidal currents are strong, notably at São Marcos bay, where a velocity of 7.5 knot has been registered. At open sea, velocities of up to 3.6 knot are nocticed by DHN around São Marcos bay and up to 1.6 knot around reentrâncias on northwest side.

Nine nautical miles north from São Luís, at São Marcos bay mouth, flood tide get in the bay with southwest direction reaching 3.9 knots. Ebb tide runs to north with more intensity reaching maximum of 5.6 knots.

Along reentrâncias coast, between Cumã and Lençóis bays, currents runs WSW-SW perpendicular to the coast, while flood tide, and N-NE, at reciprocal direction. There is a residual current going to northwest that correspond with Guianas' current. Flood tide is significantly stronger than ebb tide.

Going to the north direction, aound São João lighthouse, currents generally flows to NW, but it turns to west, getting into Turiaçu bay while flood tide. (Stride, 1992).

15. Hydrological values: (groundwater recharge, flood control, sdiment trapping, shoreline stabilisation etc.)

In accordance with Maranhão (1976) it's verified the following hydrological data (physical-chemical paramaters) of Reentrâncias waters, which shows oscillation depending on spaces of studied bays:

- salinity: minim between 13.96 and 31.98‰, maxim between 32.25 and 33.60‰ and average between 21.60 and 32.80‰;
- temperature: minim between 26.1 and 27.6ºC, maxim between 28.5 and 31.5ºC and average between 27.6 and 28.3ºC;
- pH: minim between 6.5 and 7, maxim between 7.0 and 7.2 and average between 6.8 and 7.0;
- clearness: minim between 0.07 and 0.20 m, maxim between 0.20 and 1.39 m and average between 0.30 and 0.55 m; and
- turbidity: minim between 6 and 18.80 mg/l, maxim between 122.80 and 2,011.0 mg/l and average between 54.76 and 301.50 mg/l.

Turiaçu and Maracaçumé rivers are of equatorial regime which springs are arising from meridional state table lands.

Due to this region pluviosity, both rivers looks like Amazon river affluents.

Turiaçu river arises at Tiracambu mountain watershed. It's basin of dendrittic form, has 17,502 Km^2 and go through 720 Km of extension in a sinuous regular form towards Turiaçu bay. It receives Paraná and Caxias rivers by left bank and many channels or small rivers by right bank.

Pericumã river, flows into Cumã bay, occupy an area of 4,500 Km^2 located in side "Baixada Maranhense" (Maranhão lowland, physiografyc region - author note). Intending to reduce saltwater penetration and consequently turn better water quality, as well as make navigation easier, Barrage of Pericumã was done by DNOS (extint National Departament of Construction and Sanitation - author note). After barrage construction as well as irrigation and fish-pond building at Pericumã banks, upstream place used for intake water in order to supply Pinheiro town, many problems in the water quality of this river happened.

Viability Studies of Hydroagriculture of Maranhão western lowland mention dredging of Pericumã river upstream barrage, in an extension of 35 Km, and argue the implications due to this action in the acquatic life. That study also refers to a massacre of fish with hard roe in february of 1986 because of the oppening of the barrage floodgates. Another impacting action at Pericumã river waters is the throwing of sewage in nature downstream barrage (Brasil, 1991).

In accordance with document of Secretariat of Transport and Public Building, Hydroway Sector, january 1988, and with the National Plan of Inside Navigable Ways (PNVNI) may 1989, it's gotten the follwing informations about principals rivers from 'Reentrâncias Maranhenses':

- The Gurupi river, on natural conditions, is fully navigable from its mounth to Viseu (Pará State), totalizing 25 Km, presenting a medium depth of 3.00 m 90% of the time. Upstream from Viseu, up to Gurupi Mirim bar, navigation has been verified possible during flood time. This stretch has near 135 Km extension. Due to land low declivity where develops Gurupi river, tidal influence can be affected up to 140 Km from river mouth;

- Maracaçumé river can be considerable navigable almost at its whole extension (150 Km) during flood tide;

- Turiaçu river, from its mouth to Laranjal locality, in a stretch of 192 Km, has its navigation is permitted during flood tide;

- Cururupu river has 60 Km navigable;

- Pericumã river has 50 Km navigable during flood time between Guimarães (100 Km distant) and its mouth.

The area of influence of Gurupi, Maracaçumé and Turiaçu rivers has intermodal connections, across three hihgway, out of Ramsar site.

The BR-316 originating from Belém/Pa cut Gurupi river nearby "Colônia Osório" locality. This highway cross Maracaçumé river too in the city of the same name, and also Turiaçu river at Alto Turi, making connection with Santa Inês city already at Pindaré river.

The MA-006 make the connection of Cocalinho at BR-316 with Pinheiro town at Pericumã river.

The MA-106 make the connection of Santa Helena at Turiaçu river with Pinheiro at Pericumã river.

Reentrâncias coast is characterized for a great sedimment moviement, which gives some instability as regards to sand bank location formation and destruction of sedimmentary islands and natural landfilling over vegetation cover, specially mangrove, due to dunes movement.

> Far off "reentrâncias", the bottom are wavy and consist of series of lengthened sand banks, aligned with sea currents direction. Fishermen says that muddy bottom are found at broken channels that separate sand banks. At coast waters, shallow sand banks that movie periodically causing breaking wave in places far off 10 nautical miles from coast, representing great danger to navigation. Large areas of muddy and sand banks (locally called "lavados"- washed out, author note) emerge at "reentrâncias" at low tide. At estuaries these "lavados" have a tendency to leave one only and well defined channel, while wider bays are crossed over by a number of less developed channels (Stride, 1992).

16. Ecological fetures: (main habitats and vegetation types)

In accordance with Fitoecological Chart of Maranhão Coast Zone, Scale: 1:1,250,000 (Radam, 1973) at Reentrâncias EPA are verified Pioneer Formation (mangroves and floodplain) and Tropical Forests Regions (dense, secondary "latifoliada" - with wide leafs-, secondary mixed and "babaçual" - palms of "babaçu" *Orbygnia*).

Vegetation is mainly composed of mangrove, with the following prevailed species: *Avicenia germinans* and *Rhizophora mangle*. At sand bar (locally called "restinga") can be found: *Chrysobalamus icaco, Bulbostylis capillaris* and *Ipomea Pescaral*.

The main tree groups are from pre-Amazon equatorial forest. coastal and estuarine habitats are important as much for resident birds as for migratory birds that cross great distances.

A big area (near 254 Km of extension) of low land with series of islands, bays, inlets and complex estuaries, connected by channels called “furos” (hole), which are cutted even more by smaller channels locally called “igarapés”, covered with mangroves, where live many species of fishes, crustaceans and molluscs as well as birds, mainly the migratory ones, that looks for rest, food and reproduction place. It’s an important place too for *Eudocimus ruber* (“guará”) reproduction, threaten of extinction.

Sites’ vegetation contributes for fish production increase proctivity, important source of food and work for people that lives at coast and river sides (riverine). Its’panoramic value must be taken in consideration, once this site cover ecosystems series with beaches and dunes of singular natural beauty.

17. Noteworthy flora: (indicating, e.g., which species/ communities are unique, rare, endangered or biogeographically important, etc)

Upon the main flora species see above item 12 (1a and 2b). Researches on endemism, rareness, endangered or biogeographycal importance are not available.

On this EPA can be found mangroves, sand bar (“restinga”) vegetation, dunes, flodplain and tropical forests like dense, secondary shadow wet (“latifoliada”), mixt secondary and “babaçual” (palms of *Orbygnia martiana*).

Mangroves: *Rhizophora mangle, Avicennia germinans, A schaueriana, Laguncularia racemosa* (Rebelo-Mochel, 1996)

Sand Bar (“restinga”) Vegetation: *Oxypetalum sp* (“cipó-de-leite”), *Epidendrum ellipticum* (“orquídea-da-restinga”), *Marcethia taxifolia* (“guaco-da-restinga”), *Clusia lanceolata* (“cebola-da-restinga”), *Melocatus violacens* (“coroa-de-frade”) e *Allagoptera areraria* (“guriri”), (Brasil,1991).

Dunes: *Panicum racemosum* (“capim-da-areia”), *Iresine portucaloides* (“capotiraguá” or “pirix”), *Hybanthus ipecacuamha* (“alecrim-da-praia”), *Cordia curassaviaca* (“pimenteira”), *Spartina alternifolia* (“capim paraturá”), *Acicarpha spatulata* (“carrapicho-da-praia”), *Sporobolus virginians* (“grama-da-praia”), *Canavalia obtusifolia* (“feijão-da-praia”), being *Ipomea* one of the most comonn genus happening at Maranhão dunes (Brasil, 1991).

Floodplain:: or swamp fields have vegetation composed mainly by Cyperaceas (*Cyperos sp* e *Heleocharis sp*) followed by grasses (mainly *Panicum sp*) and herbaceous plants (Brasil, 1991).

Dense Forest: known as alluvial shadow wet forest, rich on palms like *Euterpe oleracea* (“juçara”), *Mauritia aculeata* (“buritirana”) and some plants are rosette as *Heliconia*. This forest has emergent trees, provided with tabular roots (locally called “sapopemas”) and with its funnel-shapped trunk or in a jug form as *Ceiba pentandra* Gaerthn (“sumaumeira”). But dense forests regions of metasedimmentary sub-region can be found low tables with *Eschweilera odorata* (poepp) Micas (“matamatá-branco”), *Couratari sp* (“tauari”), and plained areas with meta-sedimment characterized by *Bertholetia excelsa* H.B.K. (“castanheira”- chestnut tree), (Radam, 1973).

Secondary “Latifoliada” (with wide leafs) Forest: or big “capoeira latifoliada” (secondary vegetation with wide leafs), characterize deforested areas that have been burned, generally with reduced number of species such as *Cecropia spp* (“imbaúba”) and *Viscomia spp* (“lacre”), (Radam, 1973).

Secondary Mixt Forest: this formation has its origin at devasted forest, which ground is left thus naturally regenerated, at first with herbs and heliophyte shrubs of large distribution and then dominated with big big shrubs, trees and palms of fast growth. There is a domminiun of *Eschweilera sp.* (“matamatá-branco” and “matamatá-ci”) and *Carapa guianensis* Aubl. (“andiroba”), (Radam,1973).

Babaçual: palms of *Orbygnya martiana* is commonly associated with shadow species subhydrophyte like C*assia reticulata*, *Euterpe oleracea* (“juçara”), *Phenakospermum guianensis* (“pavoca sororoca”), *Mauritia vinifera* (“buriti”), *Mauritia armata* (“buritirana”), (Brasil, 1991).

18. Noteworthy fauna: (indicating, e.g., which species are unique, rare, endangered, abundant or biogeographically important, include count data, etc)

We still don’t have research on endemism, rareness, or biogeographycal importance.

In this EPA there are rare and/ or threaten species like *Eudocimus ruber* (“guará”), *Sotalia fluviatilis* (dolphin), *Trichechus manatus* (manatee), and *Jacana jacana* (“jaçanã”).

The herpetology is represented by *Cheolonya mydas* (green turtle), *Dermochelis coriacea* (giant turtle) and *Eretmochelys imbricata* (turtle - “tartaruga-pente”) all them considered as threaten of extinction (BIODIVERSITAS, 1990 apud BRASIL, 1991).

That is an important area for birds, especially for neartic migratory, among them *Calidris alba, C. pusilla, C. minutilla, C. bairdii, C. melanotos, C. canatus*; *Pluvialis squatarola, Arenaria interpres, Tringa spp, Limnodromus spp*; *Catoptrophorus semipalmatus, Numenios phaeopus* and *Limosa haemastica*. Its also an important area for living waterfowls such as *Eudocimus ruber* (“guará”), *Casmeroius albus, Egreta thula, Florida caerula* (“garças” - heron), “spoonbills” and even *Alder cocoi* and *Mycteria americana* that make use of this region for feeding and reproduction. There is

still an expressive amount of birds, unfortunally not scientifically identified, that visit this area especially at winter (rainy time) come from fields of Maranhão lowland, a next region, at south/ southeast, of Reentrâncias.

Mammals are well represented at faun of Maranhão (which include 54 identified species and others 15 registered as threaten of extinction), however researches on this group are rare (especially for this EPA), only allowing to point out cultural knowledge about the existence of fox, mangrove raccon (*Procyon* sp) and by primate like *Alouatta sp* ("guariba"), *Cebus apella libidinosus* ("macaco-prego") and "sagui", beyond the two mentioned before dolphin (*Sotalia fluviatilis*) and manatee (*Trichechus manatus*).

As regards to crustaceans, beyond crab (*Callinectes sp*) verified during field activities, Maranhão (1976) quote shrimps (*Trachypennaeus constrictus, Sicyonia dorsalis*), shrimp "piticais" (*Xiphopennaeus kroyeri*), red shrimp (*Pennaeus aztecus*), shrimp "papudo" (*Macrobachium achanturus*), shrimp "papudo" (*Macrobachium amazonicum*) and crab (*Ucides cordatus cordatus*).

The molluscs are characterized by *Mytella falcata* bivalve locally known as "sururu-a-punho", "sururu-de-pau", "sururu-de-porta" and *Mytella guayanensis* known as "sururu-de-dedo" (Maranhão, 1976); *Lucina pectinata* ("tarióba"), Teredinidae (teredo worm) and the oyster *Crasostea mangle*, (REBELO-MOCHEL,1996). During field activities in 1997 was registered the incidence of squid too (Sema Field Report, set./1997).

Between fishes we can found: *Bagre bagre* ("bandeirado"- american haverst fish), *Peprilus paru* ("arriba-saia"- torroto grunt), *Genyatremus luteus* ("peixe pedra"- stone fish), *Tachysurus luniscutis* ("cangatã"), *Tachysurus grandicassis* ("cambéu"), *Stellifer rastriter* ("cabeçudo"- rake stardrum), *Arius proops* ("uritinga"), *Arius spixii* ("uriacica amarela"), *Anchoa spiniler* ("sardinha-de-gato"- cat' sardine), *Macodron ancylodon* ("corvina dentuça"- king weak fish), *Trichiurus lepturus* ("guaravira"- atlantic cutlassfish), *Engraulidae sp* ("sardinha verdadeira"- sardine), *Micropogon furnieri* ("cururuca"- croaker), *Ophioscion brasiliensis* ("boca de rato"), *Caranx latus* ("xaréu"- horse eye jack), *Selene vomer* ("galo"- look down, horsehead), *Cynoscion virescens* ("corvina mole"- green weakfish), *Cynoscion microlepdotus* ("corvina uçu"), *Lutjanus aya* ("carapitanga"- red snappers), *Cycocephalus nasutus* ("catimbau"), *Centropomus undecimalis* ("camorim branco"- snook), *Mugil curema* ("caica" or "tainha pitu"- white mullet), *Trachinotus carolinus* ("canguira"- pampano), *Centropomus parallelus* ("camorim pena"- small scale fat snook), *Elops saurus* ("urubarana"- lady fish), *Eucinostomus melanopterus* ("escrivão"- flag fin Mojarra), *Ophioscion microps* ("palcal"), *Sphyrna tiburo* ("rudela"- bonne thead), *Rizoprionodon porosus* ("cação" or "tubarão"- caribean sharp nose shark), *Polydactylus virginicus* ("barbudo"- barbu), *Isopisthus parvipinnis* ("corvina–manteiga"- short fin corvina), *Anchovia clupeoides* ("sardinha verdadeira"- sardine), *Gumnura micrura* ("arraia - baté"- ray), (Maranhão, 1976). During field activities in 1997 it was verified the occurrence of *Dasyatis americana* ("arraia manteiga"- southern stingray), "bagre bandeirado"- gaff top sail catfish, "papa-terra", "bagre amarelo"- madamango sea

catfish, “bagre cinza”, “peixe cachorro”, “peixe pedra” and “meros”- jewfishes of near 250 kg each, these last were fished at channels of Mungunça beach (Field Report Sema, sep./1997)

19. Social and cultural values: (e.g., fisheries production, forestry, religious importance, archaeological site, etc.)

In accordance with the research “Chararacterization of artisanal fishermen of Maranhão north coast”, done in july/1983 (Martins, 1983), that covered the municipalities of Bacuri, Cururupu, Cedral, Mirinzal and Guimarães we got the following information which data were from “Statisc ‘Sinopse’of Municipalities” - Vol. I, São Luís, Institute of Social Economic Research, 1980:

The Municipality of Guimarães has an area of 940 Km^2 and is 120 Km far from São Luís. Its’population census indicate 12,647 inhabitants, being 9,807 off them living at rural zone, distributed in 2,340 residences (according to IBGE census of 1991, population fell to 12,375 inhabitants - author note).

In 1980 Guimarães had 3 industrial and 38 comercial establishments. On education area it had 50 primary schools, 1 secondary school and 1 suplementary primary school. Regarding to medical service there were 2 para-hospitals establishments. In the town can be found 1 post office.

The fish production in 1978 was of 1,805 tons.

The Municipality of Cedral has an area of 487 Km^2, with 13,138 inhabitants, being rural census population of 12,097 inhabitants living in 2,444 residences (according to IBGE census of 1991, population increased to 15,112 inhabitants - author note).

By the year of 1980 could be found in Cedral 1 industrial and 35 comercials establishments. As to teaching units, there were 2 with pre-schooll and 43 primary schools. At town centre could be found one post office.

The fish production in 1978 was of 2,230 tons.

The Municipality of Cururupu has 1,615 Km^2 of area, with population of 39,271 inhabitants indicated by census, from which 28,604 are at rural zone distributed in 6,311 residences (according to IBGE census of 1991, population increased to 41,422 inhabitants - author note).

This municipality had, in 1980, 4 industrials and 157 comercials establishments. Working, there were 88 primary schools, 1 secondary school and 1 suplementary primary school. In the city there were 1 hospital with 22 beds, 2 libraries, 1 cinema, 1 post office and some bank agencies.

The fish production in 1978 was of 7,608 tons.

The Municipality of Bacuri has an area of 1,560 Km^2, far from São Luís 137 Km, by air. With a population of 19,026 inhabitants, being 16,836 off them at rural zone living in 3,860 residences (according to IBGE census of 1991, population increased to 22,308 inhabitants - author note).

In 1980 Bacuri had 1 industrial and 137 comercials establishments. Regarding to education units there were 60 primary schools. At the town centre worked a post office.

The fish production in 1978 was of 2,064 tons.

About social organization of fishing could be affirmed, in accordance with gotten data (1983), that at Guimarães and Cedral muncipalities are a predominance of the rank of "thing's boss (as locally is called the owner of tackles - author note), representing near 62% of the interviewed on both municipalities. While the ranks of companion fishermen and fishing boss mean near 38% of interviewed on these municipalities.

The Cururupu Municipality showed a more homogeneous distribution between ranks of owners and of employee fishermen (whom work for tackles'owner), representing 52.1% and 47.9% respectively of the interviewed on this municipality.

The Bacuri Municipality is characterised by s predominance of owners rank, meaning 58.6% and 41.4% of the interviewed on this municipality.

From the whole sample 91.7% of the interviewed declared living on houses of their ownership (this research don't mention about the existence of regulated documents - author note). All the ranks presents a high rate of residence ownership. In the rank of companion fishermen is verified that 14.6% of them don't own their houses, which is significant when compared with others ranks.

On the other side, among the interviewed whom don't own their houses (8.3% of the whole interviewed) it's noticed that 9.2% off them live on rent houses, thus not having any expenses for using them, near 2/3 of these people are in the rank of companiom fishermen and the remaining 1/3 are distributed between the ranks of tackle's boss and fishing boss. On tackle's boss/ trader all them have their own houses. Now, on the resident condition at relative homes (lodger) were found 27.8% off those that don't own a house, whom basically are from companion fishermen rank.

As for water supplying it was observed that 85.1% off the inerviewed are supplyed from individuals artesian wells, which are ordinary, many times without covered with minim care about its location and use. Then we verified that 8.6% off interviewed are supplyed by water through commonalty artesian wells (locally called "cacimba" - author note).

The use of state net for water supplying was only found on beaches close to the centre of municipalities of Guimarães and Cedral, meaning only 6.2% off the interviewed have access to this kind of water supplying. And found only one declared case of water used direct from a small river.

With reference to electricity source 96.1% off interviewed make use of kerosene lamp. The electric energy as light source is seen only at some beaches close to the centre of Guimarães and Cururupu municipalities, once there are few beaches on this condition, only 3.1% off the interviewed had electric light in their residences. The others kinds of light source (generator and coal) appeared in an insignificant way, are used only for 0.8% off the interviewed (during field activities in 1992, Sema technician noticed the precariousness of electric energy supply at Carutapera, having had a lack in the energy supplying, even at the municipality centre, for periods above 15 days consecutive; in january/ 1997, technicians from Gerco/Sema-Ma observed that at Bacuri Municipality, with the exception of town centre, there were still few localities that may count with energy supply; in july/ 1997, technician from Gerco/Sema-Ma noticed the lack of electric energy at Bate-Vento, a Cururupu locallity, which according to residents is frequent - author note).

At researched beaches there are not a sewerage collecting system. That situation get worse while we verify that only 7.4% of interviewed have septic tank at their residences. Absolutely the majority make use of rudimentary septic tanks, popularly known as “black septic tanks”, meaning that 68.5% of reaserched residences have this sort of sanitary installation. Finally it’s noticed that 24.1% of interviewed don’t have any sort of septic tank, neither sanitary installation.

It’s concluded that two social ranks take part in the process of artisanal fishing production - boss and fishermen - presenting themselfs near equal on number terms at Maranhão north coast.

Their families are in general numerous, with 5 to 10 members, having only one resident exercising a remunareted work. The familiar income vary from 1 to near 4 regional annual minim salary, except for boss ranks - traders, that because of their acting on marketing, at majority get incomes equal or above 7 regional annual minim salary.

Stability is the mark of work trajectory, either for boss as for employee fishermen, shows the rigidity of social structure at artisanal fishing production, because the possibilities that someone descend from boss rank are so small as the possibilities for someone ascend from employee fishermen.

The production process of artisanal fishing has as basic relation the employment, that implicate on the dependence of employee fishermen with reference to their boss, as much regarding to the productive act, as for the maintenance of individual and familiar subsistence standard.

It’s through employment and marketing net of existence productive act that commercial capital get owner of the greater part of value generated at production, and make that local representative, tackle/ marketing boss, become differentiated from others productive agents involved on artisanal fishing.

On the work named “Diagnosis and directions of fishing sector for Bacuri Municipality - Maranhão” (Maranhão, 1992), done in the early 90 decade can be verified that social-economic conditions related above had not much or not any changes on this region (that was checked along field activities of coast mangement - Gerco/Ma - on this site).

It’s emphasizing on this second researched work the inferences on habitation conditions: at some localities as Apicum-Açu houses are made basically of adobe and/or “taipa” (structure of wood plastered with clay), with ground of beaten soil and roof of tile, having houses covered by straw and around 90% are residences of big and medium sizes, varying from 4 to 7 rooms. At “Cajual dos Pereiras” habitations are built mainly of wood with tile or straw roof, having a reasonable number of houses with walls and roof made of straw, having generally 3 rooms, and being land in irregular situation, once all them are “sea lands” (as its called lands of Union property located around tide line, rivers side and islands). In the town centre can be verified that 44.44% of fishermen own houses with straw roof and 55.56% with tile roof; about ground, 50% of interviewed have houses with beaten soil, 33.33% are of cement and 16.67% of soil; as for walls, 50% of interviewed have houses with “taipa” walls, 44.44% adobe walls and 5.56% wood walls.

It’s observed that only in the town centre there are electric energy, but not all the resident have access to it.

About leisure, the reaserched fishing community of Bacuri don’t have leisure infrastructure, and the most frequent activities are domino and football plays, beyond ‘having baths’ (swiming) at beaches, a children practice.

Seldom there are parties on these communities and when that happens, they are realized at residences or in improvised shed done for this aim.

There are, still, some resident that frequent some bars at town centre.

The main cultural events of Bacuri can be listed as Saint parties like São Sebastião (12 to 20, january) when are done novena, mass, procession and dance parties at improvised shed built for this aim. It’s improvised tents too around the church at this time, they are covered by straw, and there are sales of drinks and foods.

At carnival time, the community make their parties at residences, once there is not any club at this municipality; some people go to Cururupu Municipality, in order to enjoy their carnival parties, that are becoming famous in Maranhão.

Another event that must be emphasized is the “Junina”party (that happens along june month), that’s one of the most important party at this region, when happens a sort of local dances such as: “boiadeiro” dance (inspired on men who lead a cattle herb), indian dance, portuguese dance, creole drum, “xaxado”, quadrille, “bumba-meu-boi”(folk dance inspired in a legend about an indian that desired to eat an ox tongue), gincasa and coconut dance.

On the report “Socio-Economic and Cultural Diagnosis of the Municipalities Forming Maranhão Gulf. Vol. 1, Alcântara Municipality” (Sema, 1997) on final stage of elaboration by consultants we may get down information.

The urban population of this municipality correspond to 3,993 inhabitants in 1991, registering a relative increase of 87.46% over 1980 census. This high growth is due, in great part, to population transfering from rural area to the town centre, mainly after the incorporation of 52% of the rural land to the area of “Centro de Lançamento de Alcântara” (CLA - Throuing Centre of Alcântara).

This municipality presented in 1980 a rural population of 16,385 inhabitants, which was reduced in 1991 to 15,594 inhabitants. That means a relative decrease of 4.82% on the period of 1980-1991.

In 1995 Alcântara had 82 education establishment of primary school, from which 80 units were situated at rural zone and only 2 at urban area. The management of fundamental teaching is conducted mainly by municipal public authority that keep 81 schools, only one unit being kept by state government.

At Alcântara is reproduced in a notable way the historical behaviour of high incidence of giving up along school cicle of fundamental teaching. There, for each 100 people registered at 1º grade of primary school, only 2 are registered at the 8º grade of the same course, representing an evasion rate of 98%. It’s worthing to emphasize that is equally expressive the repetition numbers, mainly at nocturnal teaching.

There is only one establishment of secondary school kept by state government at Alcântara centre, offering courses of General Education and Formation for Teaching. As well as in the primary school, the evasion rate is quite a lot high 83%.

The Health Service at this municipality have a mixt unit at the town centre and have 23 health centre at different locallities.

At the mixt unit there are 47 beds, 1 surgery centre and offer services like clinic medical, surgery, paediatrics, gynaecology and obstetrics, beyond odontological service.

The health centres offer services like dressing, injection application, surgery hours and small surgery, when doctors are dislocated to localities.

The most frequent illness at Alcântara are: diarrhoea, worms, malaria, tuberculosis, “hanseniase”, “leishmaniose”, anemia, high blood pressure, cardiac and breath illness and illness resulting from malnutrition.

Data got at National Foundation of Health demonstrated that, in 1995, there were registered 48 malaria cases at Alcântara, that means a reduction of 21 cases with reference to 1994. The “leishmaniose” cases were reduced too for 9 in 1995, from 13 happening during the 1991 and 1993 years.

Only 1 case of AIDS was registered by Health Secretariat in 1991.

There is a water supplying system at Alcântara which local net has 12.8 Km of extention, enough to attend only 32.8% of urban population at this municipality.

There is not a sewerage collecting system at this municipality, with a predominium of septic tanks and black septic tanks. The National Foundation of Health has installed sanitary kits in many residences at outskirts town; this programme, that should benefit rural families too, was suspended because of resources lack.

The public city cleanliness is responsability of Secretariat of Urban Building and Services. The streets and squares are periodically weeded; waste is dayly collected in every street and deposited in a ground far 2 Km from town centre, the hospital waste is burned at mixt unit.

From 199 rural localities existing at Alcântara, only 15 beyond urban district are supplyed by electric energy.

Beyond residencial and comercial service, the firm Maranhão Telecomunication (Telma), keeps 4 service posts, being 1 in the town centre and others at the localities of São João de Cortes, Oitiua and Raimundo Su.

The municipality is served by a post office of Brazilian Firm of Mail and Telegraph (EBCT - “Empresa Brasileira de Correios e Telegrafos”).

The newspaper that circulate at Alcântara centre are the same published at São Luís, not having a local newspaper.

The herd of cattle raising is extensive and sanitary control is done sporadically without the necessary regularity with vaccines and such illness preventive actions as for ulcerous, “brucelose”, rabies, “manqueira” and others common at this municipality. The herd of pigs is constituted, too, at most of animals with low weight, resulting from race degeneration because of extensive raising.

The vegetable extractive production has demonstrated a production decreasing of “babaçu” almond - in 1992 the production was smaller 18,2% than the 1989 production . The wood log produced is very small and is intended for civil building and there are

boats and canoe manufactored at small shipyard. The firewood is taken at most from mangrove and sold to bakeries (including from São Luís) and to local brick-works, by the time between 1988 and 1992 there was a decreasing at production of 18,0%. The charcoal produced at small furnace, it's intended for families consumption and only a small portion is sold for residents from municipality town.

Agricultural production in Alcântara is based on temporary cultivation of rice, maize, beans and manioc, cultivated in small plantations, with tecnology from the early colonization, without technical assistance and with low productivity.

Despite the economic importance of fishing and the great fishing potencial observed along Maranhão north coast, the fishing developed in Alcântara is still made in an artisanal way, reaching an anual production of around 110 tons of fishes.

According to a research done by Gerco/Ma in 1993 (Portela, J.B.V. et all, 1993 - see item 25), among fishermen there is a conscience that there is having an exhaustion of fishing resources very quickly at this region. This fact was being attributed to the incidence of a high fishing effort practiced in a disordered way mainly at estuaries, adding climatic changes such as the reduction of rainny season.

The fishing tackle most used are: dragging sieve ("puça"), shimp dragnet, blocked out net and "serreira" (saw shapped). The main vessels used are canoe (with oar or sail), "biana" (a little bigger than a canoe with sail or engine), "bastardo" (bigger than a "biana", its a fisherman sailboat) and motor-boat.

It can be satnded out many fish species at Alcântara region such as: *Cijannoscion acoupa* ("pescada amarela" - acoupa weakfish), *Aurius proops* ("uritinga"), *Macrodon ancylodon* ("corvina-gó" - king weakfish), *Mugil sp* ("sajuba" - black mullet.), *Tachgsurus sp* ("cangatã") and *Scomberomorus maculatus* ("serra" - spanish mackerel). And shrimps of greater comercial value, its standed out: *Panaeus schmitti* ("camarão branco" - white shrimp), *Panaeus subtilis* ("camarão vermelho" - red shrimp) and *Xiphopeenaus kroyeri* ("camarão sete barbas" - seven beard shrimp).

> The wages of capture process work obey to criterion that, generally, are adopted at all fishermen colony. At the end of capture and after deduction of travel expenses (food bought and other expenses with tackles' maintenance) it's done the net income division in two parts: 50% to the owner (tackle and/or vessel owner) and 50% distributed among others crew members (fishermen on boarded). When the tackles have more than one owner, the sharing among them is done in a equitable way.That means, if one owner has the right of 50%, two should receive individually 25% of total net income
>
> The process of marketing and fish preservation has been practiced in such a way that become clear there is a lack of support infrastructure, so that it will permit better quality conditions of the product offered to the consumer.

The presence of a considerable number of middlemen on the marketing net has been one of the sector problems that are resulting in low salary for fishermen, which has condened them to live on poverty and subsistence conditions.

The fish preservation process at Alcântara is equally deficient. The ice offer is insufficient, once there is not disponibility of frozen confection at this municipality, it must be bought at Outeiro/ Cedral and /or at São Luís. Beyond that information got at community, showed that fish/ice production is not correctly used, compromising the fish quality in the end of the net marketing.

The fish preservation by salty process, a tradicional technique at west "Baixada" (lowland), got problems in the marketing process too. Fishermen don't have knowledge about techniques inherent to this process. Indeed, the product is offered to consumer with organic properties totally changed, sometimes showing rancidness.

The main cultural show of this municipality present characteristics predominantly religious or folks.

The most traditional religious party is the "Divino Espirito Santo" (Divine Holy Spirit), realized for more than 200 years in Alcântara and that matchs with Whitsun party of Catholic Church religious calendar.

There is still the "São Benedito" (St. Benedict) party realized on august, "Nossa Senhora do Rosário dos Pretos" (Our Lady of Black's Rosary) and the pary of "Nossa Senhora da Livramento" (Our Lady of Realising).

On folck parties can be emphasized the pastorals parties, realized at dawn of 25th december after midnight mass; "mina"drum, religious party of "jejenagôs" blackman, kept by their descendent; creole drum, different from "mina"drum once there is not a religious cult; "taboca"drum, variation from creole drum; "baralho"and "fofões" (cuteman), traditional carnival plays; "reisado"(king like party) realized during Christmas time, Newyear and Epiphany; coconut dance; quadrille; country marriage; old saw; Judas'testament and "bumba-meu-boi".

The population laisure is completed by sports activities (mainly football) and dance parties realized on weekends and, not much time ago, there is a "radiola"(combination of radio and disc player equipment) with a predominium of "Reggae", rhythm from Jamaica.

There is in Alcântara, at Cajual island and in the town centre, archaeological sites with fossil like dinossaur, that are being researched by teachers from Federal Universities from Maranhão and from Rio de Janeiro (Portela, J.B.V. et all, 1993).

In Alcântara there is a historical place registered by a Federal Decree, that has goods of nature urban, architectural, archaeological and of natural property, as well as materials goods and cultural traditions that make part of local community property.

With reference to mining areas at Luís Domingues and Carutapera, at Brasil (1991), there is reference to its complexity involving socio-environmental aspects:

> ...with the establishment of 'familiar mine'. that means the miner settle down at the region, form a family and live from extraction activities. Children learn this profession very early, and will constitute a future work market. There are miners that live there, doing this activities for 43 years. Despite this familiar characteristic, prostitution is present, co-existing at residence area, although there is a concentration of brothels on the way between residence and mines.
>
> Veneral disease and infect-parasitize illness (skin disease, worm, protozoonoses, etc..) are constant and are a serious population problem affecting from children to adults (aldemir Moreira, geologist, UNAGEM, personal communication). There is not a constant doctor at this localities, generally are made visits every month or less than this.

General Data of Reentrâncias EPA Municipalities

Municipality	**Nº of Industries**	**Instalations of Circulatio**	**Turist Instalations**	**Agriculture Activities**	**Fisherman Colony**
Alcântara	- 01 food product. - improved rice - 02 wood, door production.	- 01 airport - 01 moorage	- "Pousada do Pelourinho", lodging with 55 beds - "Pousada do Imperador", lodging with 35 beds - "Pousada do Mordomo Régio", lodging with 134 bes	pineaple, rice, sugar cane , bean, watermelon, manioc, banana, coconut, orange	01
Bacuri	- 01 improving rice factory	- 01 land field - 01 moorage	- small restaurants	rice, sugar cane, manioc, watermelon, bean, maize, orange, banana,	01

				coconut	
Bequimão	- 01 not metal mineral production - 01 furnishings	- 01land field	- small restaurants	rice, sugar cane, manioc, watermelon, bean, maize, orange, banana, coconut, avocado	01
Cândido Mendes	- 01 metalworks (gates, bars, grating) - 20 wood factory - 03 food products	- 01 land field - some moorage	- small restaurants	rice, sugar cane, manioc, watermelon, bean, maize, coconut, cashew fruit	01
Carutapera	- 01 wood factory - 03 food production	- 01 land field - some moorage	- small restaurants	pineaple, rice, sugar cane , mango, manioc, watermelon, bean, maize, passion fruit, tangerine, cashew fruit, coconut, papaya	01
Cedral	- 03 food production	- 01 land field - some moorage	- small restaurants	rice, sugar cane, banana, manioc, watermelon, bean, maize, coconut	01
Cururupu	- 06 wood factory - 01 food production - 01 frozen confection	- 01 land field - some moorage	- 01 hotel - many restaurants	rice, sugar cane, manioc, watermelon, bean, maize, orange, banana, coconut, avocado,	01

				mango	
Godofredo Viana	- 06 wood factory - 01 food production	- 01 land field - some moorage	- 01 hotel - many restaurants	rice, sugar cane, manioc, watermelon, bean, maize, orange, banana, coconut, avocado, mango	01
Guimarães	- 01 metalworks - 02 food production	- 01 land field - some moorage	- small restaurants	rice, sugar cane, manioc, bean, maize, orange, tangerine, banana	01
Luís Domingues	- 01 food production	- 01 land field - some moorage	- small restaurants	rice, manioc, bean, maize	any
Mirinzal	- 01 metalworks - 02 food production	- 01 land field	- 02 hotels - small restaurants	rice, manioc, bean, maize	any
Turiaçu	- 01 metalworks - 01 wood factory - 01 food production - 01 variety	- 01 land field - some moorage	- small restaurants	rice, pineaple, broad bean, sugar cane, manioc, bean, coconut, papaya mango, avocado, banana, cashew fruit	01

Source: adaptation from Corrêa; Monteles & Aguiar, 1996

The table above, although is illustrative, is only demonstrating officially registered data at Industries Federation of Maranhão State ("Federação das Indústrias do Estado do Maranhão"- Fiema), State Secretariat of Agriculture and Supply ("Secretaria de Agricultura e Abastecimento"- Sagrima), Maranhão Firm of Turism ("Empresa Maranhense de Turismo"- Maratur), Fisherman Federation of Maranhão State ("Federação dos Pescadores do Estado do Maranhão"- Fepema) and at the Maranhão

Road Map/ 1994. However it's known that almost in every municipalities there are small guest-houses and a bigger amount of fisherman colonies. Gerco/Ma team has already observed the existence of simple guest-houses at Bacuri, Guimarães and Turiaçu municipalities, but a precise update will be only possible from new field activities.

On 'Macrodiagnosis of Maranhão Coast Zone' (Corrêa et all, 1996) can be found observations about the very low number of employeed people at industries, the lack of energetic installations, lack of indian reserves at Gerco/Ma area of actuation (consequently at the Ramsar site too), and some social characteristics such as in Cururupu where there are small albino communities, known as 'children of the moon', that live at Lençóis island preserving some primitive characteristic, and as in Mirinzal where there are rural communities, practising wandering agriculture, with rational exploration of natural resources as "babaçu" coconut at the Extractive Reserve of "Quilombo do frechal", whose people are Black descendant from slaves.

The use of data that correspond with a municipality as a whole can induce to some mistakes, once that many municipalities are covered only in part by this EPA, although usually the centre city with the town hall are at Reentrâncias. Informations such as about the amount of wood factories don't implicate exactly on deforestment at the wet zone, once that their locations are more logical to be next to the areas with a higher extractive power as the amazon forest close to Biological Reserve of Gurupi, region reached by the limits of municipalities as Carutapera, Godofredo Viana and Cândido Mendes but a bit far from Reentrâncias EPA.

In 1994 and 1995 some municipalities were divided up into others, which started their instalation in 1997, after the elections of 1996. Nevertheles, all we got are the creation decree, the identification of new municipalities limits are still being defined by IBGE and respective town hall. Making difficult the delimitation of actual municipalities covered by Reentrâncias EPA. As far as it was possible to observe, in a preliminar way, from the 13 emancipated municipalities, previously linked to this wet site, only 4 (emphasized in the table down) are infact at this Ramsar site, totalizing 16 municipalities covered by this EPA. Its verified, that way, one more failure point at available census data.

Divided municipalities at Reentrâncias EPA

Original Municipality	**Municipality Created**	**Law of Creation**
Bacuri	**Apicum-Açu**	6,179 (1994)
Cândido Mendes	Maranhãozinho	6,137 (1994)
Cândido Mendes	Governador Nunes Freire	6,174 (1994)
Carutapera	Centro Novo do Maranhão	6,160 (1994)
Cedral	**Porto Rico do Maranhão**	6,134 (1994)
Cururupu	**Serrano do Maranhão**	6,192 (1994)
Godofredo Viana	Centro do Guilherme	6,126 (1994)
Godofredo Viana	Maracaçumé	6,163 (1994)
Mirinzal	**Central do Maranhão**	6,175 (1994)

Turiaçu (and Santa Luiza do Paruá *)	Turilândia	6,183 (1994)
Carutapera, Luís Domingues and Godofredo Viana	Junco do Maranhão	6,165 (1994)
Carutapera and Luís Domingues	Boa Vista do Gurupi	6,182 (1994)
Carutapera, Luís Domingues and Godofredo Viana	Amapá do Maranhão	6,433 (1995)

Source: Relation of Municipalities created in 1994 and 1995 at Maranhão State given up by IBGE Fundation (* this municipality is at EPA influence area, but gave up lands for Turilândia). The municipalities newly created emphasized are in Reentrâncias EPA, the others are not.

20. Land tenure/ ownership of: (a) site (b) surrounding area

Land property, according to Reentrâncias EPA municipalities

Number of order	Municipalities	TOTAL		Establishment and area according the land property			
				Individual		Condominium or people association	
		Establishment	Area (ha)	Establishment	Area (ha)	Establiment	Area (ha)
1	Cândido Mendes	2,531	62,842	1,526	55,165	24	438
2	Carutapera	4,161	485,756	2,371	300,789	47	32,895
3	Godofredo Viana	2,072	95,059	1,376	61,441	-	-
4	Luís Domingues	868	33,873	201	10,541	-	-
5	Turiaçu	17,376	368,169	6,231	197,482	328	22,756
6	Alcântara	3,290	10,458	1,409	8,394	620	781
7	Bacuri	3,434	7,210	1,388	5,383	183	230
8	Bequimão	4,195	11,925	1,729	4,762	893	4,681
9	Cedral	2,479	6,452	1,671	5,536	496	641
10	Cururupu	7,158	48,522	4,645	39,763	1,310	8,184
11	Guimarães	2,676	13,225	1,393	9,317	522	3,323
12	Mirinzal	4,897	40,177	3,985	34,878	669	4,947
	Total Area	55,137	1,183,668	27,925	733,451	5,092	78,876

Source: IBGE, 1985.

Land property, according to Reentrâncias EPA municipalities (continuation)

Establishment and area according to land property									
Limited company or by Cotes of limited responsability		Cooperative		Public Body		Font or Religious Institution		Without declaration	
Establishment	Area (ha)	Establishment	Area (ha)	Establishment	Area (ha)	Establishment	Area (ha)	Establishment	Area (ha)
2	501	-	-	951	6,612	4	2	24	122
13	2,478	1	50	1,628	122,053	10	30	91	27,459
3	19,999	-	-	687	13,292	-	-	6	326
20	119	-	-	644	23,121	-	-	3	90
407	125,681	4	52	9,830	18,848	1	1	575	3,346
1	0	1	1	800	804	439	458	20	17
-	-	-	-	1,832	1,580	1	0	30	14
37	1,336	-	-	1,191	905	275	189	70	49
1	1	-	-	287	254	-	-	24	19
1	0	3	5	1,189	561	3	0	7	6
3	4	-	-	700	547	51	27	7	4
-	-	-	-	235	345	-	-	8	5
488	150,119	9	108	19,974	188,922	784	707	865	31,457

Source: IBGE, 1985.

Lands' Legal Condition, according to Reentrâncias EPA municipalities

Number of order	Municipalities	Establishment and area according to lands' legal condition					
		Unique					
		Total		Ownership		Leased (1)	
		Establishment	Area (ha)	Establishment	Area (ha)	Establishment	Area (ha)
1	Cândido Mendes	2,524	62,108	1,095	53,984	15	166
2	Carutapera	4,139	483,945	1,519	337,112	109	567
3	Godofredo Viana	2,048	93,712	1,005	79,187	14	46
4	Luís Domingues	866	33,776	78	9,956	33	237
5	Turiaçu	17,315	367,045	4,077	338,581	379	941
6	Alcântara	3,279	10,447	191	7,665	638	432
7	Bacuri	3,432	7,185	122	4,536	997	735
8	Bequimão	4,138	11,860	324	8,597	1,593	1,435
9	Cedral	2,471	6,415	66	3,970	1,863	1,952
10	Cururupu	7,155	48,392	361	34,605	3,867	3,812
11	Guimarães	2,657	13,083	97	11,155	1,571	1,188
12	Mirinzal	4,896	40,175	113	25,222	4,146	4,143
	Total Area	54,920	1,178.,43	9,048	914,570	15,225	15,654

Source: IBGE, 1985.

Lands' Legal Condition, according to Reentrâncias EPA municipalities (continuation)

Establishments and areas according to lands' legal conditions											
Unique		Mixt									
Occupied		Total		Ownership and leased (1)		Ownership and occupied		Ownership, leased and occupied (1)		Leased and occupied (1)	
Estab-lishment	Area (ha)	Estab-lishment	Area (ha)	Estab-lishment	Area (ha)	Estab-lishment	Area (ha)	Estab-lishment	Area (ha)	Estab-lishment	Area (há)
1,414	7,958	7	734	-	-	7	734	-	-	-	-
2,511	146,265	22	1,810	3	925	14	819	-	-	5	64
1,029	14,477	24	1,347	3	523	20	817	-	-	1	7
755	23,582	2	96	1	71	1	25	-	-	-	-
12,859	27,522	61	1,123	8	214	52	908	1	0	-	-
2,450	2,349	11	11	1	0	9	9	-	-	1	1
2,313	1,914	2	25	-	-	1	24	-	-	1	1
2,221	1,828	57	64	6	15	5	9	-	-	46	39
542	492	8	37	1	3	3	28	-	-	4	5
2,927	9,974	3	129	2	128	-	-	-	-	1	0
989	738	19	142	10	126	-	-	-	-	9	15
637	10,809	1	1	1	1	-	-	-	-	-	-
30,647	247,908	217	5,519	36	2,006	112	3,373	1	0	68	132

Source: IBGE, 1985.

21. Current land use:

(a) site

The site is a rural area, with antropic use of low intensity with artisanal fishing, subsistence agriculture, predatory hunting, gold mining, with hard access through highway; having this area a natural hydroway (Bittencourt, 1994. Maranhão coast profile)

(b) surrounding area

At continental area at surrounding zone are kept the site characteristics, including only wood exploration of pre-amazon forest.

22. Factors (past, present or potencial) adversely affecting the site's ecological character, including changes in land use and development projects:

(a) site

In accordance with Rebelo-Mochel (1997) the majority impacts observed in the region between Alcântara and Turiaçu is promoted by natural tension such as strong tide current, sand advance over mangrove among others. The impacts of antropic origin at mangrove as tree cut, are restricted, at the most, to town neighbourhood, not constituting, yet into irreversible damage for ecosystem.

Mangrove devastation by riverine populations in order to make use of mangrove wood for building houses, of old mangrove bark to dye boats sails and of tannin to tan leather and hides.

As for not sustainable exploration of this site its observed that mining areas have not been recuperated after work, and although few used, there are mercury contamination in some places. It still happens eggs collect of migaratory birds, predatory hunting and fishing. Exploration of mangrove wood and of "guanandi" to make stake/peg and there are knocked down of "babaçu" palms to take out "palmito" (inside edible part of some palms), used to feed animals. The old salt bed are not recuperated too, once shut down have been simply abandoned.

(b) surrounding area

At continental portion, that is to say at sites' south, is verified a predominium of activities such as agriculture and extensive cattle-raising, mining areas (notability near Gurupi river, around BR-316), forest exploration/ handling at pre-amazon forests areas. Genarally these forests taking off gives origin to secondary formations like fields or "babaçuais", "capoeiras" and secondary forest.

23. Conservation measures taken: (national category and legal status of protected areas - including any boundary changes which have been made: management practices; whether an officially approved management plan exists and whether it has been implemented)

Transformation of the area into a Reetrâncias Maranhenses Environmental Preservation Area and recognition by Hemispherical Network of Reserves for Limicolous Bird, as an internationally important reserve.

Untill this moment this wet zone doesn't has any management plan or emergency action plan, once it's yet an area not well known, for near half of this area there isn't even the cartographyc base of Department of Geographyc Service (DSG) of Ministry of Army.

But, with the conclusion of the Macrozoning of the Coast of Alcântara Municipality it will be possible to elebaorate a management plan to this municipality. Others areas that will be considered for 1998 are the municipalities of Bequimão and bacuri, where we have already started to work in partnership with local town hall.

Since 1992 Sema/Ma, Ministry of Navy through Harbourmasters Office, Vale do Rio Doce company, Alumar company and Maranhão Dock Company (Codomar) are working in partnership, under Gerco/Sema/Ma coordination, to elaborate the Contingency Plan for São Marcos bay. Which is justified because of the intensity of harbour activities practiced in areas related to São Marcos bay.

Although the main harbours are located in São Luís, at the west side of Maranhão island (which are: Complex Harbour of "Ponta da Madeira", Alumar Harbour and Itaqui Harbour), this work has grate importance for the next regions as Reentrâncias EPA, once this region is considered one of the influence areas on the eventuality of an acident, because of the far-reaching and great ship moviment at this bay.

Untill this moment it has reached as results, the Plan of Accident Prevention and Control of the Complex Harbour of "Ponta da Madeira", the Plan of Accident Prevention and Control of Alumar Harbour and the Contingency Plan of Itaqui Harbour, and now its been elaborated the Contigency Plan for São Marcos bay, for that it was made (in 1997) the Chart of Environmental Sensibility of São Marcos bay (scale: 1:100,000) and a preliminary report.

The partnership with whom we can account till this moment, at preliminary studies, at this region are the Federal Universities of Maranhão, of Paraíba and of Pará; local town hall, specially from Alcântara, Bequimão and from Bacuri; the CLA Implenting Group (GICLA) of Ministry of Air Force; the NGO Amavida (Maranhão Association for Wild Life Conservation) that keeps, at Alcântara region, one ecological station which lodges helps at researches.

Some of the documents used, till this moment, on the strategic planning of this EPA is the method adopted by Coast Mangement Programme (documents published originally in portuguese):

OGATA, MARIA GRAVINA. 1995. Macrozoneamento Costeiro: Aspectos Metodológicos (Coast Macrozoning: Method Aspect). Programa Nacional do Meio Ambiente - PNMA, Série Gerenciamento Costeiro, v.5. Brasília - DF. 27 pág.

MORAIS, A C. R. & GENEROSO, L.G. 1995. Configuração de metodologia para o macrozoneamento costeiro do Brasil (Configuration of method for coast macrozoning of Brazil). 2ª edição ver. e aum. Programa Nacional do Meio Ambiente - PNMA, Série Gerenciamento Costeiro, v.8. Brasília - DF. 42 pág..

AGRA FILHO, S.S. & VIÉGAS, O. 1995. Planos de Gestão e Programas de Monitoramento Costeiro: Diretrizes de Elaboração (Management Plans and Coast Monitoring Programmes: Directive for Elaboration). Programa Nacional do Meio Ambiente - PNMA, Série Gerenciamento Costeiro, v.4. Brasília - DF. 85 pág.

MMA. 1994. Treinamento operacional das equipes de gerenciamento costeiro dos estados das Regiões Norte/Nordeste e Sul/Sudeste. coletânea de textos (Operational Training for managemnent coast teams of states of North/Northeast and South/Southeast Regions. Texts collection). Programa Nacional do Meio Ambiente - PNMA, Ministério do Meio Ambiente e da Amazônia Legal. Brasília - DF. 140 pág.

24. Conservation measures proposed but not yet implemented: (e.g., managment plan in preparation; officially proposed as a protected area, etc.)

There is a planning involving Reentrâncias EPA that is the future elaboration of a Directing Plan for the Space Base of Alcântara. Due to the strategic localization of Throwing Center of Alcântara ("Centro de Lançamento de Alcântara" - CLA), the Ministry of Air Force and Infraero ("Infra-Estrutura Aeroportuária") are planning to increase the CLA services to air firms, specially on the area of throwing space ships and satellites, having as object the development of the Brazilian Complete Space Mission, through the Space Air Brazilian Commission. To do so it will be necessary to increase the present built up area and to promote some changes in the nowadays land use and occupation, even improving the town infrastructure of Alcântara. That way, representative of the Ministry of Air Force and of Infraero, got in touch with Gerco/ Sema-Ma in order to exchange informations to make easy the planning and ordering of land use of the region destined to CLA.

A Contingency Plan is being elaborated for the São Marcos bay (major harbour area - Itaqui, Vale do Rio Doce, Alumar), including prevention and control plans in case of accidental oil spill for example, which will cover the harbour region of São Luís and fishing and passenger terminals that exist at this bay.

For the development of the management plan for the area, it is necessary the acquisition of satellite images for a updated mapping and diagnosis of the region.

25. Current scientific research and facilities: (e.g., details of current projects; existence of field station, etc.)

The Cemave/ Ibama ("Centro de Pesquisa para Conservação das Aves Silvestres"/ "Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis" - Research Center for Conservation of Wild Birds/ Brazilian Institute of Environment and of Natural Renewable Resources) is monitoring and registering data on migrating birds.

It was gotten support with aimed Ramsar Wetland Consertavion Fund, in 1994, with emergency assistence, ammount Sfr 40,000.00, to the project "Ecological Study of the Mangrove Wetlands in the Western Coast of the State of Maranhão", for the period January to December 1994 (04/27/94). Others scientifc studies observed on this region are listed above.

The research installations that can be taken in account at this site, basically is resumed to the Research Station for Wild Life Conservation - Cajual Island at Alcântara Municipality. This base was built with the Alumar support and under the coordination of the ONG Maranhão Association for Wild life Conservation - Amavida; there is lodge for 10 people (divided into 2 rooms), bathroom, kitchen and study room. At the others regions can be taken in account the support of local town hall, guest houses and restaurants. Through the the research project that Sema is developing with the Acqua Maritima firm on the State Marine Park of Parcel de Manuel Luís and Reentrâncias EPA, it can be taken in account too, one catamaran of 50 feets.

a) Researches already done:

BITTENCOURT, J.B. & REBELO-MOCHEL, F. 1993. Workshop sobre alternativas ao uso dos manguezais (Workshop on alternative uses of mangrove); Relatório Gerco/Sematur - Ma. 14 pág.

BITTENCOURT, J.B.; et all. 1994. Perfil Estadual do Litoral Maranhense (State Profile of Maranhão Coast). Gerco/CPE/Sema-Ma. São Luís. Atualizado em maio/1996. 114 pág.

BRASIL. 1976. Pesquisas dos recursos pesqueiros da plataforma continental maranhense (Research on fishing resources of Maranhão continental shelf). SUDENE, Recife, Divisão de Reprografia. 69 pág.

BRITO, M.C.A . 1997. Qualidade ambiental de corpos das águas superficiais da ilha de São Luís, Alcântara e Rosário (Environmental quality of superficial waters of São Luís island, Alcântara and Rosário). Monografia de bacharelado e licenciatura apresentada ao curso de Ciências Biológicas da UFMa. São Luís/Ma. 63 pág.

LOPES, A T.L. 1993. Distribuição e densidade da macroendofauna bentônica de substratos móveis do mesolitoral da ilha do Cajual (Distribution and density of bentonic macroendofauna of mesocoast movable ground of Cajual island), Alcântara - Ma. Monografia apresentada ao Curso de Ciências Biológicas da UFMA. 66 pág.

MARANHÃO. 1976. Prospecção dos recursos pesqueiros das reentrâncias maranhenses (Prospection of fishing resources of Maranhão reentrâncias) Resultados da Primeira Etapa. Instituto de Recursos Naturais - IRN. São Luís. 85 pág.

MARANHÃO. 1992. Diagnóstico e diretrizes do setor pesqueiro para o município de Bacuri - Ma (Diagnosis and directives of fisshing sector for Bacuri/Ma Municipality). Secr. Est. Da Economia, FINEP, São Luís. 66 pág.

MARTINS, P.R. et all. 1983. Caracterização do pescador artesanal do litoral norte maranhense (Characterization of artisanal fiserman from Maranhão north coast). Sernat/ Sudepe. 68 pág.

PORTELA, J.B.V. et all. 1993. Diagnóstico do setor pesqueiro do município de Alcântara - Ma (Diagnosis of fisshing sector for Alcântara/Ma Municipality). Gerco-Ma/Sematur/Sudam. 55 pág.

REBELO-MOCHEL, F. 1996. Estudo ecológico dos manguezais do litoral ocidental do Estado do Maranhão (Ecological Study of the Mangrove Wetlands in the Western Coast of the State of Maranhão). Projeto Fundo de Conservação Ramsar (SGF). Já disponível relatório parcial, 27 pág., o relatório final está sofrendo pequenas correções de normatização.

RODRIGUÊS, A A F. 1993. Migração, abundância sazonal e alguns aspectos sobre a ecologia de aves limícolas na baía de São Marcos, Maranhão, Brasil. (Migration, seasonal abundance and some aspects on limicolas birds at São Marcos bay, Maranhão, Brazil). Dissertação de mestrado, UFPA/MP Emílio Goeldi. Zoo. 105 pág.

RODRIGUÊS, A A F.; MARTINEZ, C. & CUNHA, A H. F. DA. 1993. Biologia reprodutiva do taquiri, *Nyctanassa violaceae* na ilha do Cajual (Reproducitive biology of “taquiri” *Nyctanassa violaceae* at Cajual island). UFMA/Fapema. 10 pág.

RODRIGUÊS, A A F. & MARTINEZ, C.. 1995. Produtividade de ovos e filhotes do guará, *Eudocimus ruber* - espécie ameaçada de extinção, na ilha

do Cajual (Productivity of eggs and young birds of “guará”, *Eudocimus ruber* - threaten specie, at Cajual island). Fapema. 40 pág.

SOUSA, S. B. 1993. Caracterização climatológica da zona costeira do Maranhão (Climatic characterization of Maranhão coastal zone). Gerco/Sema - Ma. São Luís. 40 pág., 55 mapas climatológicos esc.: 1: 2.000.000

STRIDE, R.K.. 1992. Diagnóstico da pesca artesanal marinha do Estado do Maranhão (Diagnosis of artisanal sea fishing of Maranhão State). CORSUP/ EDUFMA. São Luís - Ma. 205 pág.

b) Projects not yet started

BITTENCOURT, J.B.; PORTELA, J.B.V. & GONDIM, A A DE O . 1994. Estudo sobre o aproveitamento de salinas desativadas em viveiros para maricultura (Sudy on use of desactivated salt beds as nursery for mariculture). Gerco/CPE/Sema - Ma. Projeto encaminhado a SUDAM, sem retorno.

BITTENCOURT, J.B. et all. 1994. Diagnóstico pesqueiro e ambiental das comunidades pesqueiras do litoral maranhense (Fihsing and environmental diagnosis of fishing communities of Maranhão coast). Gerco/CPE/Sema - Ma. Projeto encaminhado a SUDAM, sem retorno.

BITTENCOURT, J.B.; COURA, M.F. & OSCAR JUNIOR, N. 1997. Elaboração de audiovisual da APA das Reentrâncias Maranhenses (Audiovisual elaboration of Reentrâncias EPA). Gerco/CPE/Sema - Ma. Projeto encaminhado ao SGF/Ramsar. 04 pág.

BITTENCOURT, J.B.; COURA, M.F. & EL-ROBRINI, M.. 1997. Aplicação de imagens de satélite na cartografia da planície costeira das Reentrâncias Maranhenses (Application of satellite imagery at cartography of plaincoast of Maranhão Reentrâncias). Gerco/CPE/Sema -Ma. Projeto encaminhado ao SGF/Ramsar. 05 pág.

CASTRO, A C. L. de; PIORSKI, N. M. & ALMEIDA, Z. 1998-99. Biologia e dinâmica populacional da pescada amarela *Cynoscion acoupa*, Lacepéde 1802, no litoral ocidental maranhense (Biology and dynamic population of acoupa weakfish (“pescada amarela”) *Cynoscion acoupa*, Lacepéde 1802, at Maranhão west coast). UFMA/ LABOHIDRO, projeto encaminhado a SUDAM.

COURA, M.F. & REBELO-MOCHEL,F. 1997. Estudo ecológico dos manguezais do litoral ocidental do Estado do Maranhão - Fase 2: Subsídios para o planejamento da zona costeira (Ecological Study of the Mangrove Wetlands in the Western Coast of the State of Maranhão - Phase 2: Subsidies

for planning the coastal zone). Gerco/CPE/Sema - Ma. Projeto encaminhado ao SGF/Ramsar. 05 pág.

COURA, M.F.. 1997. Ações de gestão na área do Parque Estadual Marinho do Parcel de Manuel Luiz - Ma, Brasil (Management actions at State Marine Park of Parcel de Manuel Luiz - Brazil). Gerco-Ma/Sema. Projeto encaminhado ao SGF/Ramsar. 06 pág.

PORTELA, J.B.V. & SANTOS JUNIOR, H dos. 1994. Prospecção do caranguejo-uça, *Ucides cordatus* (Linnaeus, 1763) no município de Turiaçu-Ma (Prospection of crab "caranguejo-uça", *Ucides cordatus* (Linnaeus, 1763) at Turiaçu/Ma Municipality. Gerco/CPE/Sema - Ma. Projeto encaminhado a SUDAM, sem retorno.

PORTELA, J.B.V.; BEZERRIL, M.F.F. & ROCHA, L.E. 1994. Utilização da energia solar na obtenção do pescado salgado/ seco (The use of sun energy to obtain salty/ dry fish). Gerco/CPE/Sema - Ma. Projeto encaminhado a SUDAM, sem retorno.

c) Projects being developped:

BITTENCOURT, J.B. & COURA, M.F. 1994. Programa Estadual de Gerenciamento Costeiro (State Programme of Coastal Management). Convênio 008/94 MMA/PNMA/PNGC e Sema/Ma.

BITTENCOURT, J.B., et all. 1994-97. Subprojeto de Macrozoneamento da Zona Costeira de Municípios do Setor I - ilha do Maranhão, Alcântara, Rosário e Bacabeira (Subproject of Coastal Zone Macrozonning of Sector I Municipalities - Maranhão island, Alcântara, Rosário and Bacabeira). Áreas Temáticas: geologia, geomorfologia, pedologia/cobertura vegetal, hidrogeologia, hidrologia, processo de ocupação espacial/ uso e cobertura da terra, sócio-econômico e cultural; síntese sócio - ambiental, potencialidades e limitações; escala: 1: 100.000. Convênio 008/94 MMA/PNMA/PNGC e Sema/Ma. Em fase final.

BITTENCOURT, J.B.; COURA, M.F. & THOMAS, W.M. 1997. Projeto integrado de arqueologia submarina no P.E.M. Manuel Luiz e pesquisa na APA das Reentrâncias (Integrated project of submarine archaeology at State Marine Park of Manuel Luiz and research at Reentrâncias EPA). Convênio 003/97 MMA/SCA e Sema/Ma.

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RODRIGUES, A A F. & CUNHA, A H. F. da. 1991-97. Migração de *Callidris pusila* em direção ao hemisfério Norte a partir da costa Norte do Estado do Maranhão, Brasil (Migration of *Calidris pusila* towards North hemisphere from North coast of Maranhão State, Brazil). UFMA.

26. Current conservation education: (e.g., visitors centre, hides, information booklet, facilities for school visits, etc.)

We got 2 large folders, distributed with the newspaper "O Imparcial", called "VIVA - Série Especial de Ecologia" (Alive- Special Ecology Series), Year I nº 1 and 2. And 1 folder about Gerco/ Ma.

The Amavida has one folder and a poster about the Station for Research and Wild Life Conservation - Cajual island.

Its been elaborated one video tape (VHS) from the field activities that are been realized during 1997 through the agreement between MMA/ SCA and Sema/Ma.

A Sema/ Ma and the Secretariat of Education of Maranhão State (Seeduc) signed an agreement, in december/1997, for the implementation of a Programme of Education and Environmental Information which have the aim of given in informations produced at Special Programmes/ Sema, specilly on coastal zone (through Gerco/ Ma), to the state teaching net. The municipalities of Mirinzal and Bacuri are among the municipalities selected for the inicial phase of programme implementation, expected to act on the fundamental teaching in 1998.

With the aim of sustainable turism recognised and implemented as economic alternative suitable for improving life quality at this Maranhão ecoturistic pole, Maratur (Maranhão Turism Firm) through Prodetur (National Turism Programme with supports from BIRD) is predicting the following actions: 1 - revise educacional system; 2 - recycle teachers; 3 - implement/ include regional knowledge at educational programme contents; and 4 - create a model school of sustainable ecoturism.

27. Current recreation and tourism: (state if wetlands is used for recreation / tourism; indicate type and frequency/ intensity)

This is predominantly a rural site, offering simple lodges or lodge at families houses. cookery is based on sea food (fishes and crustaceans) and fowl.

The the Municipality of Alcântara attract a grate number of turists. There is historical site protected by a Federal Decree, which has goods of urban nature, architectural, archaeological and of natural property.

As attractive landscape can be cotted beaches, islands, rivers and channels, emphasizing 'sheet' of large dunes of very fine white sand, that are extended throug all the coast of Cedral Municipality, and reaching Guimarães and Cururupu.

Among cultural attractive beyond historical property with its colonial architecture, mainly farm houses and churchs, its observed the local craft:

- straw: baskets, big baskets, hammock, belt, bag, mat;
- clay: jug, bowl, pot, vase;
- wood: tables, canoe, ox cart, carving;
- leather: shorts, cowboy waistcoat, slipper, hats, balls;
- coconut: rings, portrait frame, cups, sacer, bracelets;
- horn: rings, bracelets and bags;
- line: napkin, bedspread, clothes, etc

And there are even the folks and religious parties from which can be stand out "bumba-meu-boi", coconut dance, Pastorals, Epiphany, creole drum, "mina" drum, quadrille, "Divino Espirito Santo" (Divine Holy Spirit) and Divine Party.

Field activities realized in august/ 1997 by Gerco/Ma team, registered the presence of foreign boats at Lençóis bay, by that time a north american yacht. When talking about that with local residents we got to know that is very common the presence of boats from others countries, mainly form Africa and EUA, being possible to observe 8 boats at the same time. However its to regret that these visiting are promoting the sexual turism too.

The cultural equipments that can be visited in Alcântara are the Historical Museum of Alcântara and the Culture House of Alcântara, kept by the State Secretariat of Culture; and the Museum "Casa do Divino" (Holy Spirit House) kept by Maranhão Firm of Turism - Maratur (Sema, 1997).

In accordance to Sema (1997), the turism is already incorporated to economic activities although there is still a lack of services and support infrastructure of good quality.

Its on planning phase the PRO-ECOTUR, under coordination of Maratur, this project will act at the municipalities of Mirinzal, Apicun-Açu, Bacuri, Central, Cedral, Guimarães, Cururupu, Porto Rico do Ma e Pinheiro (this last one out of Reentrâncias EPA).

Alcântara Municipality will be benefited by PRODETUR with BIRD support, this project predict improving at local infrastructure.

28. Jurisdiction: (territorial e.g., state / region and functional e.g., Dept. of Agriculture/ Dept. of Environment, etc.)

At this Reentrâncias EPA there are lands owned by Union (Brazilian Government), State, Municipalities and privaties, however, the administration of this site is under the State Governemnt management through the State Secretariat of Enviornment and Water Resources - Sema.

29. Mangement authority: (name and address of local body directly responsible for managing the wetland)

Secretaria de Estado do Meio Ambiente e Recursos Hídricos - Sema
State Secretariat for the Environment and Waters Resources
Coordenadoria de Programas Especiais - CPE
Special Progammes Coordination
Address: Rua da Palma, 53, Centro, São Luís/Ma, Brasil CEP. 65.010-440
Tel/fax: 0055 (098) 232 1957
E-mail: sec.meioambiente.ma.3@greenmail.net

30. Bibliographical references: (scientific/ technical only)

See item 25 above and:

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See Annexe I - Charts that cover ‘Reentrâncias Maranhenses’ EPA.

Annexe I - Charts that cover 'Reentrâncias Maranhenses' EPA

Item	Chart/ Map Name	Scale	Year	Base	Type	Covered area	Contents
01	SÃO LUÍS	1:1000.000	1973 (published)	RADAM	THEMATIC	Maranhão Coast, part of Ceará and Pará coast.	Geomorfologic and Geographic.
02	CURURUPU	1:250.000	1973 (published)	RADAM	PLANIMETRIC	Part of Cururupu Municipality.	Towns, main drainage, highway and railway.
03	TURIAÇÚ	1:250.000	1973 (published)	RADAM	PLANIMETRIC	Municipalities of Godofredo Viana, Luís Domingues, Candido Mendes, Carutapera and Bacuri.	Towns, main drainage, highway and railway
04	ALCÂNTARA	1:100.000	1980 (published)	DSG - MI 495	TOPOGRAPHIC/ THEMATIC	Part of Alcântara Municipality.	Highways (Federals, State, secondary, paths) administrative division, declivity scale, vegetation elements, hidrography elements, planialtimetric isolines and altimetrics elements.
05	GUIMARÃES	1:100.000	1980 (published)	DSG - MI 494	TOPOGRAPHIC/ THEMATIC	Municipalities of Guimarães, Bequimão and Mirizal.	Highways (Federals, State, secondary, paths) administrative division, declivity scale, vegetation elements, hidrography elements, planialtimetric isolines and altimetrics elements.
06	BEQUIMÃO	1:100.000	1980 (published)	DSG - MI 484	TOPOGRAPHIC /THEMATIC	Municipalities of Bequimão, Palmeirandia, Peri-Mirim, São Bento and São João Batista.	Highways (Federals, State, secondary, paths) administrative division, declivity scale, vegetation elements, hidrography elements, planialtimetric isolines and altimetrics elements.
07	MAPA DE VEGETAÇÃO	1:5000.000	1988	IBGE	THEMATIC	Whole National Territory	Vegetal cover /Types.

	DO BRASIL (Brazil vegetation map)						

08	CARTA NAÚTICA 400 (Nautical Chart 400)	1:317.010	1970	DHN	PLANIALTIME-TRIC	Gurupi river mouth till Santana island.	Navegation guidding points (navegation buoy and lighthouses) access channels, harbour and moorage, sea costa details and informations on logistic support.
09	LEVANTAMENTOS PLANIALTIMÉTRICO ELABORADO SOBRE IMAGENS DE RADAR DO PROJETO RADAM * (Planialtimetric raising elaborated over radar imagery of Radam Project)	1:250.000	1985	RADAM	THEMATIC	Gurupi river mouth (sheet SA23-V-D-I)	Distinguish mangrove areas and drainage elements
10	LEVANTAMENTOS PLANIALTIMÉTRICO ELABORADO SOBRE IMAGENS DE RADAR DO PROJETO RADAM * (Planialtimetric raising elaborated over radar imagery of Radam Project)	1:250.000	1985	RADAM	THEMATIC	Carará bay (sheet SA23-V-D-II)	Distinguish mangrove areas and drainage elements
11	LEVANTAMENTOS PLANIALTIMÉTRICO ELABORADO SOBRE IMAGENS DE RADAR DO PROJETO RADAM* (Planialtimetric raising elaborated over radar imagery of Radam Project)	1:250.000	1985	RADAM	THEMATIC	Turiaçu bay (sheet SA23-V-D-III)	Distinguish mangrove areas and drainage elements

12	LEVANTAMENTOS PLANIALTIMÉTRICO ELABORADO SOBRE IMAGENS DE RADAR DO PROJETO RADAM * (Planialtimetric raising elaborated over radar imagery of Radam Project)	1:250.000	1985	RADAM	THEMATIC	Turiaçú river (sheet SA23-V-D-VI)	Distinguish mangrove areas and drainage elements
13	LEVANTAMENTOS PLANIALTIMÉTRICO ELABORADO SOBRE IMAGENS DE RADAR DO PROJETO RADAM * (Planialtimetric raising elaborated over radar imagery of Radam Project)	1:250.000	1985	RADAM	THEMATIC	Lençóis bay (sheet SA23-X-C-IV)	Distinguish mangrove areas and drainage elements
14	LEVANTAMENTOS PLANIALTIMÉTRICO ELABORADO SOBRE IMAGENS DE RADAR DO PROJETO RADAM * (Planialtimetric raising elaborated over radar imagery of Radam Project)	1:250.000	1985	RADAM	THEMATIC	Capim bay (sheet SA23-X-C-IV)	Distinguish mangrove areas and drainage elements
15	LEVANTAMENTOS PLANIALTIMÉTRICO ELABORADO SOBRE IMAGENS DE RADAR DO PROJETO RADAM * (Planialtimetric raising elaborated over radar imagery of Radam Project)	1:250.000	1985	RADAM	THEMATIC	Cumã bay (sheet SA23-Z-A-I)	Distinguish mangrove areas and drainage elements

16	LEVANTAMENTOS PLANIALTIMÉTRICO ELABORADO SOBRE IMAGENS DE RADAR DO PROJETO RADAM * (Planialtimetric raising elaborated over radar imagery of Radam Project)	1:250.000	1985	RADAM	THEMATIC	Alcântara (sheet SA23-Z-A-II)	Distinguish mangrove areas and drainage elements
17	SETORIZAÇÃO DO LITORAL MARANHENSE P/ ESTUDO DO GERCO/MA (Sector divisions of Maranhão coast for Gerco/Ma studies)	1:1.250.000	1997	Mapa Rod. do DER do Ma.	THEMATIC	Gurupi river mouth to Parnaíba river mouth.	Sector divisions of Maranhão coast
18	UNIDADES DE CONSERVAÇÃO DA ZONA COSTEIRA DO MARANHÃO (Conservation units of Maranhão coast zone	1:1.250.000	1997	Mapa Rod. do DER do Ma.	THEMATIC	Gurupi river mouth to Parnaíba river mouth.	Conservation units of Maranhão coast zone
19	MAPA FITOECOLÓGICO (Fitoecological Map - computerized at Gerco/Ma)	1:1.250.000		RADAM	THEMATIC	Gurupi river mouth to Parnaíba river mouth.	Vegetal cover of Maranhão coast
20	CARACTERIZAÇÃO CLIMÁ-TICA – DIFERENCIAÇÃO CLIMÁTICA ** (Climatic Characterization - Climatic Differentiation)	1:2.000.000	1995	Sudene	THEMATIC	Gurupi river mouth to Parnaíba river mouth.	Climatic Differentiation
21	CARACTERIZAÇÃO CLIMÁ-TICA - NEBULOSIDADE ** (Climatic Characterization - Cloudiness)	1:2.000.000	1995	Sudene	THEMATIC	Gurupi river mouth to Parnaíba river mouth.	Cloudiness
22	CARACTERIZAÇÃO CLIMÁ-TICA - PRECIPITAÇÃO	1:2.000.000	1995	Sudene	THEMATIC	Gurupi river mouth to Parnaíba river mouth.	Maxim Precipitation

	MÁXIMA** (Climatic Characterization - Maxim Precipitation)						
23	CARACTERIZAÇÃO CLIMÁ-TICA - PRECIPITAÇÃO MINIMA** (Climatic Characterization - Minim Precipitation)	1:2.000.000	1995	Sudene	THEMATIC	Gurupi river mouth to Parnaíba river mouth.	Minim Precipitation
24	CARACTERIZAÇÃO CLIMÁ-TICA - PRECIPITAÇÃO MÉDIA ** (Climatic Characterization - Avarage Precipitation)	1:2.000.000	1995	Sudene	THEMATIC	Gurupi river mouth to Parnaíba river mouth.	Avarage Precipitation
25	CARTA DE GEOLOGIA DO MUNICÍPIO DE ALCÂNTARA** (Geologic Chart of Alcântara Municipality)	1:100.000	1997	DSG	THEMATIC	Alcântara Municipality	Geology of the area
26	CARTA DE GEOMORFO-LOGIA DO MUNICÍPIO DE ALCÂNTARA** (Geomorphologic Chart of Alcântara Municipality)	1:100.000	1997	DSG	THEMATIC	Alcântara Municipality	Geomorphology of the area
27	CARTA DE HIDROGEO-LOGIA DO MUNICÍPIO DE ALCÂNTARA** (Hydrogeologic Chart of Alcântara Municipality)	1:100.000	1997	DSG	THEMATIC	Alcântara Municipality	Hydrogeology of Alcântara Municipality
28	CARTA DE USO E COBERTURA DA TERRA DO MUNICÍPIO DE ALCÂNTARA** (Chart of Land use and cover of Alcântara Municipality)	1:100.000	1997	DSG	THEMATIC	Alcântara Municipality	Actual land use
29	CARTA DE HIDROLOGIA DO MUNICÍPIO DE ALCÂNTARA**	1:100.000	1997	DSG	THEMATIC	Alcântara Municipality	Hydrology of Alcântara Municipality.

	(Hidrologic Chart of Alcântara Municipality)						
30	CARTA SÓCIO-ECONÔMICO E CULTURAL DO MUNICÍPIO DE ALCÂNTARA** (Socio-eonomic and Cultural Chart of Alcântara Municipality)	1:100.000	1997	DSG	THEMATIC	Alcântara Municipality	Socio-economic and cultural data of Alcântara Municipality; informations are divided in 3 charts.
31	CARTA DE LIMITAÇÕES AO USO DO TERRITÓRIO** (Chart of Land Use Limitations)	1:100.000	1997	DSG	THEMATIC	Alcântara Municipality	Limitations due to: legal base, fragile ecosystems, morpho-genetics process, water use for supplying, water quality and agriculture use.
32	CARTA DE POTENCIALIDADES DOS RECURSOS NATURAIS/ AMBIENTAIS ** (Chart of Potentiality of Natural/ Environmental Resources)	1:100.000	1997	DSG	THEMATIC	Alcântara Municipality	Pontencialities based on: biotic and abiotic resources (edaphic, hydric, mineral and irrigation elements), and landscape (natural and cultural beauty)
33	DIAGNÓSTICO SÓCIO AMBIENTAL (Socio-Environmental Diagnosis)	1:100.000	1997	DSG	THEMATIC	Alcântara Municipality	Integration of synthesis charts (potenciality, limitations and socio-economic and cultural situation)
34	CARTA DE SENSIBILIDADE AMBIENTAL DA BAÍA DE SÃO MARCOS** (Chart of São Marcos Bay Environmental Sensility)	1:100.000	1977	DSG	THEMATIC	Municipalities of São Luís and Alcântara	Environmental synthesis

* HERZ, RENATO. 1991. Manguezais do Brasil. Lab. de Sensoriamento Remoto. Inst. Oceanográfico/ USP/ CIRM. São Paulo. 252 pág.

** Charts elaborated and computerized by Gerco/Ma team, with consultants support at interpretation of thematic areas, at Geoprocessing Laboratory of Gerco/Sema/Ma.