COASTAL WETLANDS; CONSERVATION AND MANAGEMENT IN BRAZIL

Prof. Antonio Carlos Diegues
Scientific Director of NUPAUB-University of São Paulo
Research Center on Human Population and Wetlands

INTRODUCTION

Brazil one of the longest coasline in the world - around 7.500 km, presenting a large variety of ecosystems from the tropical to the sub-tropical realms. The coastal ecosystems include mangroves, coral reefs, beaches, cliffs, coastal lagoons, estuaries and salt marshes. There is a great variety of fauna and flora that have been used by local populations using their traditional techology and management schemes. The recent economic development, from the 1970's onwards is threatening this great biological diversity and the livelihood of the traditional communities that include indigenous people, "caiçaras" of the Rio de Janeiro- São Paulo coast, the raftfishermen of the Northeast and the artisanal fishermen descendents of Azorian migrants.

Today, in spite of the continuous threats to coastal ecosystems and their traditional population, there is a growing social awareness of the important of coastal habitats, such as mangroves, coastal lagoons and islands.

This papers aims at presenting an overview of the problems facing human communities and the coastal ecosystems.

1. COASTAL BIO-GEOGRAPHY

The Brazilian coast is located between latitude 4° 52'45"N and 33 ° ,45'10s"S and is approximately 7.408 km long, presenting a variety of coastal and marine ecosystems such as dunes, reefs,bays, estuaries, lagoons,mangroves and cliffs.

There are coastal plains formed by sand deposition of the Quaternary Period and mangrove areas in the north and northeast regions, where the Tertiary formation reaches the sea. In the southeast, Pre-Cambrian structure of the "Serra do Mar" almost reaches the coastline, creating cliffs and small bays.

Brazil's continental platform is the continuation of it continental mass directed towards the ocean and it shows diferents widths, being larger in the north of the country, becoming narrower in the northeast and larger again in the southeast and south regions

There are three oceanic systems affecting the Brazilian coast (**Figure 1**); the Southern Equatorial Current reaches the coast at 5°S going northward. The states of Maranhão, Pará and Amazonas on the northern coast are affected by the Northern Equatorial Current and are also areas with a high tidal range. The Brazilian Current affects most of the Brazilian coastline between 25°S and 5°S. The southern of Brazil's coast is affected by the Malvinas Current which travels from the southern part of the continent up to 30°S. Tidal ranges, become smaller from north to south, with values up to 07 metres in the north (São Luiz, Maranhão) or less than 01 metre in the south (Imbituba, Santa Catarina).(Diegues, A;Oliveira, E; Moreira, A.Marone, E, 1992

The region includes a diverse range of coastal formations ranging from the intertropical realm in the Amazonian region to the tropical realms in the north and northeast of Brazil, to the temperate marine areas of the south.

T'he great size of Brazil allows for considerable diversity of coastal exposure and geomorphologic development. There are three principal portions of the shore. The first is the area in the north that is influenced by the Amazon River and its sediments; the second is the narrow coastal margin fringing the huge Brazilian Shield, creating an escarpment nearly adjacent to the ocean; the third is the southern area where considerable quantities of sediments have accumulated to provide a barrier island formation.

The mouth of the Amazon River is a great estuary stretching for about 1,500 kilometers inland. Large quantities of sand and especially silt and clay are discharged by the river and accumulate along the shore margins. From the border with Surinam east-ward to the Bahía de São Marcos, the finegrained sediments blanket the shoreline and are cloaked with mangrove. East of the Bahía de São Marcos the shoreline begins to be characterized by sandy beaches lyíng before low hills. The sand beaches are interspersed with mangrove stands.

Beginning in Rio Grande do Norte and continuing southward to the coastal margin of Alagoas state, the beach zone is severely attenuated. The dry climate and the short drainage systems limit the transport of sediment to the ocean margin. This portion of Brazil is bordered by fairly extensive coral reef formations.

South of Recife the coast is cliffed. The combination of cliffed coast and the presence of coral reef extends for about 500 kilometers. Sandy beach backed by an escarpment begins near the Alagoas-Sergipe border and continues south to Rio Grande do Sul State. The beach often broadens in large curvilinear embayments, and there may be local mangrove stands, beach ridges, and deltaic buildout. In the state of Paraná there is an extensive area of beach ridge development. The beach ridges attain elevations of 10 meters in their interior location and gradually decrease to elevations of 2-3 meters near the shore.

The coastal margin of the state of Rio Grande do Sul is distinct from the rest of Brazil, consisting of a classic barrier island-lagoon sequence. Broad sandy beaches extend along the coast for 640 kilometers and incorporate wide beach ridge systems and large coastal dunes reaching 25 meters in elevation. The northern margin of this coastal plain comes against a terrace surface with elevations of 15 meters.(Diegues, A & Moreira& Harris G. 1995)

2. ECOSYSTEMS AND SPECIES DIVERSITY

The Brazilian coast presents a variety of ecosystems and habitats. The most relevant are:

Coral Reefs

The distribution of coral reefs in the South Atlantic is limited to tropical areas along the coastline and offshore islands of Brazfl. The Brazilian coral fauna has long been considered of interest on account of its high proportion of endemic species. Some 3,000 kilometers of coast has reefs, although not all of these are true coral reefs. Ten of the 18 hermatypic coral species known from Brazil are endemics.

Two main coral reef formations may be identified on the Brazilian coast. The first is Grupo Recifal do Cabo São Roque that unfolds from Cabo de São Roque until Natal in Rio Grande do Norte State, along which are the Fernando de Noronha archipelago and the Rocas atoll; the second is the assemblage of coral reefs situated in the Bahia State's south coast (the Abrolhos archipelago), which is the richest and most developed coral reef formation in the

region. In addition to these main formations, coral reefs also occur between Natal and the São Francisco river mouth and on the latitude of Salvador Bahia (both usually associated with calcareous reefs).

The northeast coast formations are rocky calcareous outcroppings forming reefs and hence differ from the coral reef formations such as those of the Abrolhos archipelago.

Mangroves

These ecosystems extend almost along the entire coast of Brazil, from Oiapoque (Amapá) to Laguna (Santa Catarina), occupying an area of about 25,000 km^2.The northern limit of mangroves on the American continent is found in Florida (U.S.), at around 29'53'N. Mangrove formations extend to Santa Catarina state in southern Brazil. The most extensive areas of mangrove a associated with the mouth of the Amazon River in the north of Brazil, well-developed communities extend from the northern boundary of the region until the border between Maranhão and Piaui states at around 2'3O'S. Less extensive areas of mangrove a present along the coast until saltmarshes be come dominant in Santa Catarina and Rio Grande do Sul. Low stands of *both Avicennia schaueriana and Rhizophora mangle* terminate at Florianopolis (27'3O'S), but *Laguncularia racemosa ex*tends southward to the poleward limit of mangrove at the mouth of the Araranguá River (29'S) (Chapman 1977).

Coastal lagoons

Coastal lagoons are bodies of water separated from the ocean by sandbars/ Tropical lagoons can have varying degrees of salinity due to rainfall. They have an elongated shape, generally narrow along their principal axis which is parallel to the coast. Sandbars (restingas), reefs, raised terraces formed by fluvial and marine sediment accumulation as well as beaches, contribute to the formation of lagoons. Examples are: Feia, Araruama, Saquarema, Maricá, Sepitiba, Manguaba, Roteiro, Jequiá, Mirim and Tramandaí.(Diegues, A (ed), 1994)

Barrier Islands (restingas)

Barrier Islands are stretches of sand deposited in parallel to the coast and created by the dynamic of ocean waters. These deposits occur when the coast forms a headland or cape, which often borders a series of small lakes. They are common in the southern littoral of the State of Bahia and Rio Grande do Sul. The main Brazilian “restingas”are: Ilha Comprida and Marambaia.

Other Wetlands and Saltmarsh

In Brazil tidal marshes occur as a pioneer community and as a secondary formation disturbed areas within mangrove wood along the coast. Tidal marshes become prevalent on the southern coast of Santa Catarina and Rio Grande do Sul where extensive saltmarsh formations are found, the most important being associated with the Patos, Mirim and Mangueira lagoons in Rio Grande do Sul. Saltmarshes are found in the following locations in Brazil: the bays of Paranaguá and Guaratuba (Pernambuco), the Lagoa de Conceição (Santa Catarina) and principally, the coastal lakes in the southern region such as the Patos, Peixes, Mirim and Mangueira lakes.

Tidal flats

Tidal flats are low littoral tidal flats which are covered by the tides and are of great ecological importance. Examples: Marituba and Marajó

Beaches, Dunes, Cliffs

The best-developed beaches and dunes are found on the coast of Brazil. In the north much of the shoreline is formed by sandy beaches interspersed with mangroves lying before low hills. Sandy beaches continue from Alagoas State to the south where large dunes and barrier island formations occur.

Islands and Submerged Banks

The Brazilian coast has a variety of large islands such as Marajó, at the mouth of the Amazon, São Luís, in Maranhão, Ilha Bela and Cardoso, in São Paulo, Ilha Grande, in Rio de Janeiro, Santa Catarina, in the State of Santa Catarina. There also also some oceanic islands and archipelago.

Atol das Rocas lies about 200 kilometers northeast of the coast of Rio Grande do Norte State. The atoll is an almost circular reef possibly lying on the same submarine shelf (the platform of the Rio Grande do Norte) as Fernando de Noronha. This one is a volcanic

archipelago consisting of a principal island of 17 square kilometers and eighteen islets of varying sizes. The archipelago lies 350 kilometers northeast of Cabo de São Roque and has a similar flora and fauna to the Atol das Rocas. The islands of São Pedro and São Paulo (St. Paul's Rocks) are situated
in the Atlantic about 500 kilometers northeast of Fernando de Noronha

Restingas and coastal lagoons

Restingas are found along the Brazilian coast in Marabaia (Rio de Janeiro), Cardoso Island (São Paulo), Guarapari (Espírito Santo) and São José do Norte (Rio Grande do Sul).

Coastal lagoons are situated close to the shore yet separated from the sea by narrow stretches of land, which make them extremely vulnerable to sea-level rise. Coastal lagoons are important along the Brazilian littoral because they support artisanal fisheries as well as tourism. The most important ones in Brazil are: Mundaú, Manguaba and Roteiro (Alagoas), Feia Lagoon, Araruama, Saquerema, Maricá (Rio Grande do Sul).

Open Ocean, Deep Sea, Upwellings

On the Brazilian coast, areas of upwelling are rare due to stratification of the water masses that prevents the surface layers from receiving nutrients from bottom layers. The -main exception is areas of upwelling in the Cabo Frio region (near Rio de Janeiro). The main areas of higher productivity are the estuarine and mangrove areas, which receive larger amounts of nutrients from continental runoff

These ecosystems and habitats present a large variety of flora and fauna that sustain a variety of economic activities. Birds, fish, crustacea, molluscs, mamals are abundant in these habitats and some of them are already endangered, including(along Belém coast) *Eudocimus ruber* (guará), *Phoenicopterus ruber* (flamingo), *Trichechus inungis* (Amazonian manatee), *Procyon cancrivorous (* crab-eating racoon*) Dermochelys coriacea (trunk turtle)*: Along the Amapá coast : *Dendrocygna autnmnalis(marreca), Chelonia mydas (* green turtle). On Maranhão coast: *Harpia harpya* (harpy eagle), *Aratinga garouba* (golden paroquet), *Porphyrula martinica* (rail), *Alouatta fusca* (howling monkey), *Tricherus Manatus* (manatee); on Mucury estuary: : Falco peregrinus (Peregrine falcon),

Ara ararauna (Canindé macaw); on Linhares grassy marshers: *Crypturellus noctivagus* (zaeble red-footed tinamou), *Myrmecophagus tridactyla* (great anteater), *Lutra enudris* (otter), *Dermocheluys coriacea* (trunk turtle); on Iguape-Paranaguá estuary; *Bubo virginianus* (jacurutu), *Cebus apella* (macaco-prego), *Tapirus terrestris* (anta)

Some fish species are being severely overfished, in particular, shrimps *Penaeus schmitti, brasiliensis, paulensis, Panulirus argus* and *P. laevicauda* (lobsters), *Bachyplatytoma vaillati* (piramutaba), *Sardinella brasiliensis* (sardines) and several species of mangrove crabs. (Diegues,A (ed), 1994)

3. SOCIO-ECONOMIC PROCESSES ON THE COAST

Along the coast, the most important ecosystem is the Atlantic Forest that at the beginning of the Portuguese settlements o cover around 1.000.000 sq.km, from which only 5% remain today. In many parts of the country, this forest reaches the coastal line, and in this sense, mangroves can be considered part of this large forest. The Mata Atlântica (Atlantic Forest) has a biological diversity as high as that of the Amazon Forest showing a large number of endemic species. From the 60's onwards when the urban-industrial development was accelerated this forest started to be destroyed and today only around 5 to 10 percent of this large forested bioma still exist, mainly along the Southern Rio de Janeiro, São Paulo and Paraná States. The Mata Atlantica is also the territory of different human cultures, such as Indians and their descendents, such as the "caiçaras", the "jangadeiros", (raft fishermen) that have developed a deep knowledge and traditional management systems of the forest and their adjacent coastal ecosystems.

During the colonial period the coastal zones where used as trade centres and as the gateway to conquest of the hinterland where the mineral and agricultural resources were abundant. Major cities were usually located on the coastline, thus ensuring communication with the colonial power overseas as well as the hinterland. Marine resources, with the exception of whale hunting, were also exploited at subsistence level. During that period boat construction was one of the few important industries on shore and was responsible for intensive wood cutting in some northeastern provinces.

After Independence, and particularly during the second half of the 19th century, most of the important economic activities, such as coffee, rubber and sugar-cane plantations shifted from the coastal zone to the hinterland. At the beginning of the 2Oth century, industrialization led to the production of goods for the internal market to replace imported products. Small industrial plants to process cotton and food products were concentrated both in the hinterland and on the coast.

After the 195Os, Brazil pursued an **industrial economic model** oriented towards export. Most of the heavy industries (chemical, petrochemical, fertilizer) were and are still located in estuaries and bays and next to other fragile coastal ecossystems. Such large industrial centers were located in fragile coastal environments as in São Luís Island (for alumina processing) in the Northern State of Maranhão, in the coastal lagoons of Maceió, (Alagoas), in Salvador Bay, in the Vitória Island (for iron export), Rio de Janeiro bay, Santos-Cubatão, in São Paulo, and in the southern lagoon Dos Patos. Huge harbours for export of mining production were established in São Luís (Vale do Rio Doce Cia in São Luís (MA) and Vitória). Examples of these large industries settled on the coast are: Chemical industries in Arrail do Cabo (RJ)- Cia Nacional de Alcalis,Dow Chemical in Salvador,(BA), oil and chemical industries in Cubatão (S.P), Dow Chemical, Petrobrás and Petroflex in Rio de Janeiro; Salgema in Maceió(AL); ferlizers in many cities around the coast; coal mining on the coast of Santa Catarina and Rio Grande do Sul; iron production - Cosipa in Cubatão, CST and Cia de Ferro e Aço in Vitória. Paper pulp production, involving large areas of eucaliptus plantation is important along the coast of Espírito Santo and southern Bahia. (Aracruz Papel e Celulose). Many alcohol distillaries have been established along the coast, particularly in the Northeast. (Egler, C. 1995)

As a result, pollution has been heavily concentrated in this zone and coastal degradation extensive.

The **increasing urbanization** is a crucial process(**figure 2**) that affects the coastal area, as five of the nine metropolitan areas in Brazil are located on the coast: In 1990 Rio de Janeiro had 9.6 million inhabitants; Recife had 2.5 million inhabitants; Salvador had 2.4 million inhabitants; Fortaleza had 2.2 million inhabitants and 1.3 million inhabitants. In addition to that, many capital of States are also on the coast: São Luís (655.000 inh.),Natal (606.000 inh);Maceió (626.000 inh.); Vitória (523.000 inh); JoãoPessoa (695.000 inh), Florianópolis (254.000 inh). (Moraes, A. 1995) Many of these coastal cities have a high

demographic growth, attracting migrants from the hinterland and a high percentage of these migrants live in slum areas (Salvador, Fortaleza, Rio de Janeiro)

At the same time, coastal cities are expanding as poor people migrate from the countryside, where the modernization of Brazilian agriculture has led to an increasing concentration of productive land in the hands of few land owners and groups, both national and multinational. With the expulsion of small land owners and peasants from the countryside, slum areas have been established in large coastal cities, such as Salvador, Recife and Rio de Janeiro. Most sewage systems are inadequate resulting in increasing pollution of coastal rivers, estuaries, lagoons and bays.

As **road transportation** has the highest priority in the country, many highways have been build along the coast. One clear example is the BR-101 built in the 1970's, that links many coastal capitals . During the construction process, many beaches and mangrove areas have been damaged, as it has occurred between Santos and Rio de Janeiro. These coastal roads have also incentivated the construction of villas by tourists, causing also the displacement of many small-scale fishermen villages up-hill and to the mangrove areas, resulting in the destruction of the Atlantic Forest.

Oil drilling is an important economic activity along the Brazilian coast, and oil production started in 1973. The main drilling along the coast are Campos (Rio de Janeiro), Sergipe, Piaui-Rio Grande do Norte, Amazon basin and Recôncavo Baiano. Over 56%of the oil produced in Brazil comes mainly from marine basins.(CIMA, 1991) There are important harbours where oil is landed and the most important is situated in São Sebastião, where regularly there are many accidents. Tourism, fisheries as well as mangroves and other coastal habitats suffer from frequent oil in the area. Coal is also produced in coastal area of Santa Catarina and Rio Grande do Sul. Reefs are also exploited mainly in the Northeastern coast for construction.

Tourism and recreation became one of the most important factor influencing the use of coastal areas and resources.. Around 1.6 million foreign tourists visit the country, in particular the coastal touristic resorts, generating an income of 1.55 billion dolars and around 1.4 million jobs.

In 1992, Embratur (Brazilian Agency for Tourism) has established the Plantur-National Plan for Tourism that has created several touristic development poles in the coastal areas. In 1991, Sudene (Agency for the Development of the Northeast) and

Embratur have created Prodetur (Programme for the Development of tourism). and have requested a US 1.6 billion loan to the Interamerican Development bank.(Becker, B, 1995) This large programme is directed to the Northeastern coast, involving the construction of large hotels, roads, improvement airports and urban infrastructure, such as water and sewage. This programme follows the intensive use of the coastal line today existing in touristic areas such as Cancun, in Mexico. The ecological and social impacts of this programme have not yet been properly assessed, by social and ecologist groups of the area are reacting against it as local communities and the environment will suffer the most.

Fisheries is also an important economic activity along the coastal and marine environments. The total coastal/marine fish catch is (1993) around 565.000 tons, out of which around 60% is caught by the industrial fleet and 40 % by the artisanal fishermen. In the same year Brazil has imported 140.000 tons and the per capita consumption is around 7 kg/year. (Banco Central, 1996)

The Southeast/South region from Rio de Janeiro to Rio Grande do Sul has the largest landing, representing 75% of the national catch. The main species landed are *Sardinella brasiliensis (sardines)* that represent 44.5% of the total catch, *Micropogonias furnieri* (corvina), pescadas foguete and olhuda *Macrodon ancylodon and Cynoscion striatus (* corvina), *Penaeus brasiliensis , P.paulensis* and *P.Schmitti (* shrimp) *Katswonus pelamis (* bonitos), *Thunnus albacares (* tuna).

Industrial fishing is the most important sector in this region, responsible for 75% of the catch and the artisanal sector is responsible for the remaining 25 % (main species being Mugil sp (mullets), *Centropomus sp (* robalos), *Cynoscion sp(* pescadas).The main fishing techniques used by the industrial sector are trawling, encircling nets and long line.

The second most important area in fish landing is the Northeast, from Maranhão to Espírito Santo) representing 18% of the total catch,but in this region the artisanal sector is the most important and responsible for 85% of the total landings in Brazil. The main species are *Panulirus argus and P. laevicauda (* lobsters) , *Penaeus brasiliensis and P. Schmitti*, (shrimps), *Lutjanus purpureus (* pargo), *Epinephelus sp (*garoupa), Thunnus albacares (tuna) and *Hemiramphus sp* (agulha)

The Northern region (from Amapá to Piaui), is responsible for 7 % of the total catch and most of it is caught by the artisanal sector. The main species landed are shrimp, *Bachyplatytoma vaillati* (piramutaba) and *Lutjanus purpureus (* pargo)

In Brazil there are around 550.000 fishermen, most of them artisanal, organized through fishermen guilds. In the Northern region live about 21 % of all artisanal fishermen, organized in 54 guilds; in the Northeast live 45 % of the artisanal fishermen, organized through 157 guilds and in the Southwest/Southern region live 34 % of the Brazilian artisanal fishermen, organized through 88 guilds.

The industrial fishermen (around 1.600)live mostly in the main fishing harbours, in Santos (São Paulo), Rio de Janeiro, Belém,(Pará) Fortaleza (Ceará) and Itajai (Santa Catarina)

Until 1967, when an ambitious programme of support to industrial fisheries, artisanal fishing was responsible for more than 50% of the fish landings. High subsidies were given for the creation of an industrial fleet and processing plants but artisanal fishing received only marginal funding. The result of his policy was catastrophic. Most of the commercially valuable fish species have been overexploited by large boats from firms which have received important subsidies for export (lobster, shrimp, catfish).Today most of the boats of these firms lay idle, processing plants are closed, fish production is stagnant, and fish imports are responsible today for more than 50 % of the consumption. (Diegues, A, 1995)

3.1. Levels of Degradation of the Brazilian Coast

A relative ranking of environmental degradation of Brazilian coastal ecosystems can be seen in **Figure 3**

a)Critically degraded areas

Critically-degraded ecosystems are those affectect by the existence of petrochemical and chemical industries and high degree of urbanization These areas are mainly concentrated in the southeastern and southern region of the country with the exception of the Bay of Todos os Santos which is the only critical area in the northern/north-eastern regions. It is noteworthy that the planned development of new chemical industrial centers Belém (Pará) and in Suape (Pernambuco) will shortly render these regions subject to the same level of degradation unless measures are immediately taken to minimize the risks of environmental damage

The areas with critical levels of degradation are as follows:

- *Bay of Todos os Santos*

The main centres of pollution are the Industrial Center of Aratú that contains more than 140 industries, employing 20.000 people and the Petrochemical Complex of Camaçari that produces petrochemical goods, synthetic fibres, thermoplastics, etc.. These industries account for emissions of NH_3, SO_2, petrochemical resins and organic and inorganic liquid effluents. As far as sea-level rise is concerned, this region has a value of 25 cm/century which is within the range of global mean values. High environmental degradation occurs in Aratu, where chemical companies dump industrial residues with high mercury content. This mainly affects the Tainheiros Bay, location of the Alagados shantytown, which was constructed on and around the city's garbage dump. The population lived by gathering crustacea and molluscs. Due to the high mercury content the catching was forbidden, causing additional impoverishment to local fishermen.

The principal ecosystems in this area are: mangrove swamps, swamps, many small estuaries, river mouths, beaches and lagoons, which are distributed along the bay, covering 180,000 ha

Estuarine Region of Vitória (Espírito Santo)

The principal ecosystems of this region are mangrove swamps which are degraded by urban waste coming from the metropolitan region and industrial centres (producing detergents, phosphates, caustic soda and iron products) as well as from large harbour facilities. The Vitoria Bay there are two major industrial complexes, including Cia Siderúrgica Nacional de Tubarão (CST) and Cia Vale do Rio Doce producing pellets.

The main degraded ecosystems are mangrove, islands and estuaries.

-*Bay of Guanabara* (Rio de Janeiro)

The main sources of pollution are the over populated urban areas responsible for the dumping of 2 million m^3 of sewage and industrial waste such as ashes, harmful industrial residues (acidic and caustic), oil, soda, sulfides, heavy metals, agrochemical waste and ordinary industrial waste. There are around 2.300 industries, its main sectros being oil sub-products, metallurgy, plastics, synthetic rubber

The main degraded ecosystems are mangrove, estuaries and , beaches

-*Baixada Santista- Cubatão* (São Paulo)

This estuarine area is formed by various islands, extensive channels and river mouths, large areas of mangroves, many of which are degraded by a dense urban and industrial development.

Around 23 giant industries, including Petrobrás, Cosipa and Ultrafertil are located there, contributing with 2.6 % of the Brazilian G.N.P. These industries generate there 1.5 million tons/year of solid residues, of which a great proportion is dumped into the estuary. In addition, several mangrove stands have been cleared for real estate development.

The main degraded ecosystems are mangrove, estuaries , river mouths and the slopes of the Atlantic Forest.

-*Coastal Region of Santa Catarina State*

This 60,000 ha area encompasses many brackish lagoons and some mangroves in the southern part. The principal environmental problems are linked to intensive coal mining performed by the coal producing industries of Santa Catarina, principally affecting artisanal fisheries. This region, together with most of the southern littoral of Brazil, has a fairly unstable sea-level rise index varying between 40 and 150 cm/century.

The main degraded ecosystems are mangrove, beaches and coast lagoons.

-*Coastal Lagoons of Rio Grande do Sul*

This area includes fauna and flora of great economic and ecological importance, which are being degraded by urban - industrial residues from the Porto Alegre (from leather metallurgical and chemical industries as well as by the Petrochemical Complex of the south, responsible for the emission of 33,000 tons/year of gases and 19,000 tons/year of SO_2 in addition to heavy metals and phenols.

The main degraded ecosystems are coastal lagoons and salt-marhses.

b)Highly degraded ecosystems are those which are subjected to recent industrialization exacerbating existing degradation. These areas are:

- *Maranhão Gulf*

This Gulf harbors an extensive estuarine system where important rivers drain. It covers 1,000,000 ha of numerous channels, as well as extensive mangrove swamps, estuaries and islands.. The principal environmental problems began in the 1980s with the establishment of mining and metal processing industries on São do Luis Island, causing chemical contamination of water sources and the water table. In addition, mangrove swamps are being degraded by real estate development.

The main threatened habitats are mangrove, estuaries and islands.

Estuarine Region of Recife and Suape Estuary (Pernambuco)

One of the major problems of urban expansion in this area is the fact that only 22 per cent is serviced by a sewage system. Most sewage is thus dumped untreated in rivers, causing various health problems among riverine populations. The construction of the industrial port complex of Suape caused many detrimental impacts and it is predicted that this will continue unless appropriate measures are taken to curtail chemical pollution. In the area a missile basis was built in 1988 and around 8.000 families were expelled from their land.

-*Mundaú and Manguaba lagoons* (Alagoas)

A great diversity of ecosystems, including mangrove swamps, small estuaries, sandy beaches and lagoons are found in this area. The city is serviced by a deficient sewer system, causing environmental degradation due to high concentrations of faecal coliforms and silting of the lake banks and bottoms. The increasing real estate speculation on the northern and southern beaches is also a cause for concern. There are also industrial impacts from the Chlorochemical Complex of Alagoas (PCA) and the Salgema Complex that cause negative impacts on the livelihood of thousands of artisanal fishermen.

The main threatened ecosystems are coastal lagoons and mangrove.

-*Estuary of Sergipe/Aracaju*

This region is characterized by a series of estuaries which include many marshy areas, with mangroves as well as other ecosystems rich in fish. Environmental degradation in this area is due to urban expansion and the disposal of untreated sewage into the estuary of the Sergipe River, as well as by the three industrial centres producing fertilizers, cement and chemical products.

The main affected habitats are estuaries and mangrove

- *Northern coast of Espírito Santo- Southern coast of Bahia*

This area is severely affected by eucaliptus plantation and paper pulp production by Aracruz Celulose company The plants of this industry produces around 420.000 tons/year of short-fibre sulphate-bleached cellulose, produced from eucaliptus. The plant installation covers and area of 1.100 ha, with a further 97.000 ha earmarked for nine munipalities between the north of Espirito Santo and the south of Bahia. The plant's operation brought indiscriminate tree cutting , decreased fishing activity and impoverishment of fishermen.

c)Moderately degraded littoral ecosystems are affected by urbanization, tourist and secondary industry often being situated in expanding metropolitan areas. They are:

-*Marajó Bay–Belém* (Pará)

This region comprises marshes, mangrove swamps and floodplains which harbour an extremely rich fauna and flora. The principal factors causing degradation are industrial wastes coming from an expanding industrial complex, real estate speculation and inefficient handling of products in the port of Belém.

-Estuary of Rio Grande do Norte – Natal

This area of 35,000 ha is covered with estuaries, marshes and nearly 10,000 ha of lagoons, which are being degraded by tourism and a deficient sewage system.

-Estuary of Paraíba

This region covers nearly all of the littoral of this state and is composed of mangrove swamps, sandy beaches, brackish water ponds and several islands.

Coast of Santa Catarina

It is a very diversified coast presenting bays, estuaries and islands. The main sources of degradation are urban expansion , unplanned tourism and overfishing

East coast of Ceará

This area has large dune formations, estuaries and mangrove. The main source of degradation are urban expansion and tourism. This degradation will be higher with the establishment of the Prodetur tourism programme.

Slightlydegraded littoral ecosystems

are those located away from urban and industrial centres and often include reserve areas protected by state and national agencies.

Eastern part of the Amazonian Gulf

This region is formed by a vast complex of canal and river channels, low islands, mangrove swamps and estuaries and flooded forests. The main causes of degradation are overfishing and urban expansion

-Coast of Pará and Maranhão

This region covers 450 km of fairly irregular terrain with more than 35 coves, estuaries, mangrove swamps, sandy beaches and dunes. The principal source of degradation is overfishing of shrimp.

-Delta of the Parnaíba River (Piauí)

This is a lagoon area with extensive areas of brackish and freshwater, sandy beaches, coastal dunes and mangrove swamps. Principal impacts are the felling of mangroves for timber, the destruction of dune-fixing vegetation, overfishing and deforestation of riverine forests.

-Estuarine Lagoon Complex of Iguape/Cananéia/ Paranaguá (São Paulo, Paraná)

This is an extensive lagoon region between the states of Paraná and São Paulo, composed of many islands, barrier island and river deltas, thus forming the most important ecological system of Brazil's southern littoral. Factors causing degradation include the inefficient handling of chemical products in the harbour of Paranaguá,the third most important in the country), real pollution from commercial agriculture and unplanned tourism.

3.2.Traditional Communities and Coastal Ecosystems degradation.

Several littoral communities such as *caiçaras* (traditional seashore communities of the southwest of Brazil), *açorianos* (traditional communities of the state of Santa Catarina) and *jangadeiros* (raft fishermen) in addition to other indigenous communities living along the coast, are suffering from uncontrolled urban and industrial expansion.

Local populations were severely affected by the occupation of their land by industries and also by impacts on primary activities such as extraction (crustaceans and wood), fishing and agriculture in general, which suffered losses of production because of pollution from industrial waste. The pollution of coastal ecosystems greatly affects human communities along the shore which are used to live in harmony with these environments.

Diegues (1987) has described the relation of certain littoral communities with mangrove swamps on the coast of Brazil, naming these communities "mangrove civilizations". These communities that have developed a specific way of life where economic, social and cultural activities fundamentally depend on the existence of coastal flora and fauna and related biological cycles (rhythms of tides, fisheries, etc.). The growing impoverishment of these communities as well as the disruption of their culture is a consequence and at the same time an additional cause of coastal degradation. This disruption of the traditional way of live, based on the direct use of living resources forces many coastal communities to migrate to coastal towns, forming additional slum areas.

Paradoxically, the top-down model of creating protected areas, from where traditional communities are displaced or in which their fishing and agricultural activities are severely limited is becoming and additional cause of the impoverishment of local people.

4. SOCIAL MOVEMENTS AND INSTITUTIONAL ARRANGEMENTS FOR COASTAL MANAGEMENT

Since the middle of the 197O's public concern for coastal conservation has gathered momentum in Brazil. Some of the factors that explain this rising concern are:

(a) *The growing awareness of the Brazilian society* on the ecological importance of the coastal area and on the increasing degradation of its ecosystems. The position of the Brazilian Government at the Stockholm Conference in 1972 was "Brazil welcomes polluting industries" has changed since then, because of the pressure of Non-governmental organizations, International Institutions and mainly because of the growing awareness of the population concerning environmental issues.In the 1970',s despite the presence of an authoritarian military regime favouring industrialization at any social or ecological cost, many environmental groups were created. In the last years of the military regime (until 1984) national campaigns were organized by environmental movements on issues such as the destruction of the Amazon and Atlantic Forest, the Pantanal, pollution in urban centres (such as São Paulo and Rio de Janeiro), and the establishment of nuclear plants along the coast. Hundreds of small groups blossomed to oppose whale hunting, tree cutting in urban areas and destruction of national parks. Although many of these groups,formed by the middle class, were urban biased , they were instrumental in raising the level of environmental succeeded in electing a few representatives in the Provincial Parliaments of the more urbanized states such as São Paulo, Rio de Janeiro and Rio Grande do Sul. in 1986, some candidates with strong environmental concern were elected to the National Congress that elaborated the 1988 Constitution.. And for the first time, specific considerations of the conservation of coastal ecosystems were included in the Constitution.

In the " Cadastro Nacional de Instituições Ambientalistas - Ecolista - a roster published by WWF/Mater Natura (1996) there are 1.400 Environmental NGO's registered, from which 296 were created in 1991-1992. From those which answered the research undertaken by the Cadastro, around 6O of them, or 14.7 % deal exclusively with coastal/marine ecosystems. If 504 ENGO's dealing with the Atlantic Forest are added, one could say that around 61 % of the Brazilian ENGO's are, in one way or another concerned with the conservation of the various marine ecosystems.. A large group of them are located in the Northeast (30.0%)

From the ENGO's dealing exclusively with coastal/marine ecosystems there are those which deal with species or ecosystems conservation, such as SOS Mata Atlântica(SP) Tamar,(BA) that protects turtles, and Peixe-Boi (Manatee) (PB), Projeto Mamíferos Marinhos da Bahia, Clube de Observadores de Aves (RN). There are also socially oriented ENGO's, dealing specifically with traditional populations and their environment, such as Terramar, Sociedade Civil Mamirauá, Sociedade civil São Sebastião Tem Alma, Fundação Josué de Castro, etc.

At the society level, a socially oriented environmentalism gained importance vis-a-vis the traditional enviromentalism that was interested mainly in species protection. This new environmentalism was able to establish alliances with other social movements, political parties and local movements.

(b)The increasing number of public institutions dealing with environment conservation By the end of the military regime, a public space had been opened for environmental issues. Secretariats for Environment were established in many Brazilian States. At the Federal level, SEMA - Special Secretariat for the Environment (created in 1973) and later (1992) the Ministry of the Environment have been designated as core agencies for environmental protection.

c) The importance of the environment was also higlighted by a growing number of *University and Government research centers*. Well known Oceanographic institutions, such as the Oceonographic Institute of the University of São Paulo, the Undergraduate Course on Oceanography in Rio Grande, Labomar, in Fortaleza, Labohidro in São Luís, the Schools of Fisheries Engineering in Recife and Fortaleza have contributed to increase the knowledge on coastal/marine ecosystems. Some other research institutions linked to

Universities, such as Nupaub- Research Center on Human Populations and Wetlands of the University of São Paulo have also cooperated in increasing the knowledge about the relationships between local communities and coastal ecosystems. The Nupaub has produced the first inventory on the Brazilian Wetlands,(1994) disseminating the knowledge about coastal habitats and their human population.

4.1.The role of the State, of Non-Governmental Organizations and Local Institutions in Coastal Management.

Coastal conservation and management became an important issue in Brazil in the late Seventies and in the Eighties when the impacts of the industrialization and urbanization resulted in a rapid degradation of the coastal environment. Artisanal fishermen started a movement in the Northeast against the pollution of estuaries and rivers caused by the acid waste of the alcohol producing distillaries. It was the starting point for a stronger organization of small-scale fishermen, supported by the Catholic Church and some Non-Government Organizations.. This social process indicated the rising of new identities and social awareness among coastal communities and artisanal fishermen communities. These identity building processes often occurred during conflicts that opposed these communities to urban expansion that often resulted in the expulsion of artisanal fishermen from their beaches and adjacent coastal waters. In tropical countries, where warm, sandy and sunny beaches became valuable assets to national and international tourists, artisanal fishermen and their activities are seen as obstacle to a free development of the market forces. Artisanal fishermen and local dwellers are put apart at the corner of their own beaches transformed in to touristic resorts. In some other cases, the establishment of large industrialization projects resulted in unbearable level of marine pollution, destruction of valuable habitats, such as mangrove and ultimately led to the social disorganization of artisanal fishermen communities. In many cases, the social reaction against these processes led to the establishment of new and polically orientated social movements of artisanal movements, such as the National Movement of Fishermen - Monape, in Brazil-

4.2 Coastal area Management Programme

In the late 1970's, Government institutions have been created at federal, state and municipal level to deal with enviroment conservation. The first federal institution

was SEMA , Secretariat for the Environment, was created in 1973 and was incorporated by the Ministry of the Environment and Legal Amazonia, created in 1992. In 1989 the IBAMA, Brazilian Institute for the Environment was created and incorporated to the Ministry of Environment and Legal Amazonia. After the 1970's most of the States have created their own Secretariat for the Environment, and more recently many municipalities are creating their own environmental institutions. In 1981 the first encompassing national law on the environment was promulgated although the first legislation on environmental issues in Brazil was established in the 1930's. CONAMA, the National Council on the Enviroment was created, with the participation of Governmental agencies and NGO's and it is responsible for the main policies concerning the environment. In 1986, CONAMA approved the first legislation requesting environmental impact analysis for large projects.

Today (1996) there are around 310 Government institutions at all levels dealing with environmental issues. (Mater Natura/WWF, 1996)

The 1988 Constitution has declared the Atlantic Forest and its coastal zone as one of the five crucial areas for management and sustainable development.

The Brazilian Government and Non -Government Organizations have actively participated in the UNCED-92, in Rio during the various discussions on the issues of coastal/marine environment that have originated the Chapter 17 of Agenda 21. The text of the Agenda 21 was published in Portuguese in 1995 by the Parlamentarian Commission on Consumer's Protection, Environment and Minorities of the National Congress. According to the text of chapter 17, the Governments have agreed on a series of measures that should lead to a sustainable development of the world coastal/marine areas.

Also the ENGO's, such the National Forum and Monape- the National Movement Fishermen of have participated in the drawing of a Fisheries Treaty, signed by Non-Government Organizations during the Unced 92

Brazil also signed the Unclos Law of the Sea in November 1982 and ratified it in December 1988. In January 1993, the Brazilian Congress has decreed the Law 8.617 in which Brazil defines the 12 miles territorial sea and the 200 miles Economic Exclusive Zone. Since 1988, the Interministerial Commission for Marine Resources has established the Project Leplac, collecting geophysical data to define the limits of Brazilian EEZ. Through the Revizee Project-(1994-1988) - Assessment of the sustainable potential of sea resources-, the same Interministerial Commission is surveying the existing biomass and the

allowable catch for each species in the framework of the Law of the Sea. In this process, this Comission has established research agreements with the main Oceanographic Institutes and other marine institutions to collect and evaluate the necessary information.

In order to coordinate the various research on marine resources, the Government has established in 1974 the Interministerial Commission for Marine Resources (CIRM). CIRM's main responsibilities are the promotion of research and the rational management of marine resources. The Commision was formed by representatives of eight ministries (Navy, Foreign Relations, Agriculture, Transport, Education, Industry and Commerce, Mines and Energy, and Interior) and the Planing Office and the National Council for Scientific and Technological Development. In 1979, a Secretariat was established (SECIRM) and was chaired by the Navy.

This Commission developed three main programmes:

(i) *PSRM-Sectoral plan for marine resources*

In 1980 a National Ocean Resources Policy, designed to promote rational utilization of marine resources, was approved by the Government. This stated the exclusive right of the Brazilian Government to guide, coordinate, and control scientific and commercial research and the management of living resources, minerals and energy in the Brazilian territorial sea and the continental shelf (Diegues, A 1988).

The first Sectoral Plan for Marine Resources covered the period 1982-1985. The main objectives were to increase seafood production, mineral extraction and energy production. Brazilian Universities were called on to cooperate in these efforts through the improvement of scientific knowledge. Special attention was given to training and to improving institutional support for marine research.

For the second Marine Resources Sectoral Plan, a study analysed trends in resource use up until the year 2000. The main objectives of this second plan (l986-1989) are an increase in output from marine resources, a better understanding of coastal and marine ecosystems and improvement of fish landing facilities and fish processing.

Special emphasis was given to integrated research in important coastal ecosystems, in particular the estuarine area of Maranhão, and Lagoa dos Patos lagoon and the coastal ecosystems of the southeast coast (Ubatuba). Considerable funds were allocated to

Universities for studies that ought to improve scientific knowledge of the biotic, abiotic and socio-economic factors affecting these ecosystems.

(ii) Antarctic programme

In 1975 Brazil joined the Antartic Treaty and in 1982 a first research programme was elaborated by CIRM. In December of the same year a research expedition was organized and a site was chosen to set up physical research facilities (King George Island). Since then CIRM has maintained a special secretariat for this programme (ProAntar) and has organized several scientific expeditions in cooperation with several Brazilian Universities.

(iii) *Programme of coastal management*

In 1985 CIRM created an official programme on coastal management (GERCO) and a especial Sub-Secretariat to implement the programme. Six coastal States were selected to starts management plans: Rio de Janeiro, Rio Grande do Norte, Rio Grande do Sul, Bahia and Santa Catarina. This choice was based upon the need for urgent coastal management measures in highly urbanized and industrialized coastal areas, political willingness to join the programme, and the existence of multi-disciplinar teams and institutions capable of producing zoning plans.

The programme has four major components:

- Preparation of preliminary coastal zoning plans for the six selected states. These plans would be discussed, at provincial level, with a coastal committee where representatives from the Community and the Government would be represented.
- Setting up of a computerized data system at Provincial level.. This will serve as the basis for a monitoring system.

- Training programmes. In order to train multi-disciplinar teams at Provincial level, a series of training courses and workshops have been organized.

- Infrastructure support. This programme is designed to provide logistic support to the planning teams.

4.3 **Coastal zone management legislation**

A first Coastal Zone Management Bill was drafted in 1984 by CIRM and sent to Congress. Whilst it was being analyzed by Congress, the Bill was withdrawn by the Navy, the reason given being that a new Ministry of Urban Development and Environment was being created and should assess the terms of the proposed Bill. In 1987 the Bill was sent again to Congress which made several amendments. Members of the Conservative Party (PDS) made a proposal that changed the previous text and would have made the Bill totally ineffective. Members of the Congress linked to the Environmentalist movement reacted to this proposal and finally by the end of April 1988 Congress approved the text presented by CIRM. (Diegues, 1988)

The Bill states that a National Coastal Management Plan will be established aiming at proposing rational uses of coastal resources for the benefit of local population and the conservation of coastal ecosystems.

In the first draft the 'coastal zone' was defined as "the area where the ocean interacts with the land, including marine, and terrestrial resources within a twelve mite maritime belt in width and two mile wide land belt to be measured from the average high water mark of 1831".This coastal belt could be widened by subsequent zoning. In the recently approved Bill the limits of the coastal zone were not determined and would be defined by the zoning plans. This change most probably weakens the Bill because it will become more difficult to define the management of coastal zones in some states, in the North and Northeast where local lobbies and interest groups are powerful. The Bill defines areas and ecosystems that should be priorities for protection, such as mangroves, reefs, coastal and oceanic islands, barrier systems, deltas, lagoons, estuaries, dunes, bays, beaches, coastal forests and wildlife sanctuaries, as well as monuments that constitute the Brazilian historical, archaeologic, artistic and cultural heritage (Pires Filho and Cycon, 1987).

There are also general guidelines that will help orientate the coastal zone management plan. This should contain criteria for coastal use, land tenure, energy and transportation systems, sewage and criteria for the conservation of national heritage.

State and municipal plans would complement the National CZM Plan and would contain more detailed guidelines. CIRM would verify the consistency of these plans with

the general guidelines. Permits for coastal activities will be issued by the States and must take into consideration existing federal laws on environmental protection. An important provision is that access to sea and beaches is free and open to all. In 1990, responsibility for the elaboration of the management plan passed from the Navy to the Ministry of the Evironment. However, little progress has been made so far.

The little success in the implementation of the Coastal Management Law is caused by several factors:

l. The academic characteristic of the management process which has put high priority in the production of maps, using GIS, by Universities and Research Institutions. More information was made available but few concrete plans were generated and implemented. In 1995 (Morais, 1995) the National Programme of Coastal Management (GERCO) has proposed a more versatile methodology, taking into account the diversity of situation in the various States and Municipalities. A more descentralized programme was proposed, giving more initiative to States and Municipalities, as it is stated in the 1988 Constitution.

2.The weak support this planning exercise got from the society, as little discussion and negotiations among the different users groups with vested interests occurred.

3. The continuous changes in the Government institutions responsible for the planning and implementation of the plans. Although the 1988 Constitution has defined a de-centralization of decisions in this kind of planning exercise, favouring the Provincial and municipal levels, most of the decisions are still taken at the Federal level.

4. Conflicts of jurisdiction among institutions such as CIRM and IBAMA at the Federal Level and different institutions at State and Municipal levels. The establishment of protected areas, for instance, is the responsability of IBAMA at the federal level and of the Secretariats for Environment at State and municipal level. Such protected areas are established at the federal level without a previous consultation with the Municipalities . In many of them, large tracts of coastal land are set apart for national parks from where, according to the existing legislation, traditional communities of fishermen should be expelled. In this process growing conflicts occur between local fishermen, municipalities and park administrations.

5. Lack of coordination between policies concerning issues and problems related to the coastal environment, such as urban-industrial development, tourism, harbour and

transportation, fisheries and aquaculture policies. According to the Brazilian legislation, environmental impact analysis should be developed for any major project in coastal areas. Very frequently, however, the interests of local groups, such as small-scale fishermen are not taken into consideration, and as result, coastal environment and local communities are the loosers when a large project is established.

5. Lack of coordination between Government agencies at the Federal, State and Municipal agencies which have specific roles as far as zoning and environmental issues are concerned. Municipalities in Brazil enjoy now significant zoning and planning autonomy in the administration of their territory. However, at municipal level the lobbies of tourism, land speculation, and construction are very strong. Historically, local authorities are influenced strongly by economic and financial interst groups, that have very little concern with environmental matters. São Paulo, for instance, the State Government which is frequently more concerned with environmental issues has to block decisions taken by municipal authorities that have autorized private constructions or public works that would have strong negative impact on the coastal environment.

The main problem however, is the lack of effective social mobilization of local communities in support of coastal management measures. Coastal communities are politically weak and their concerns on conservation of marine resources and on their well-being are not taken into account in most of the Goverment plans. Some of these communities, however, started their own organizations aiming at improving their livelihood and their access to coastal resources and to their land, threatened by land speculators. In fact, there is an increasing level of conflicts among artisanal fishermen/ fisher folk and urban speculative interests that threw away many local dwellers from their beaches in order to build touristic infrastructure..

4.4. **Coastal Marine Protected Areas**

The establishment of protected is one of the main Government policies concerning coastal ecosystem conservation. The creation of protected area is under the responsability of IBAMA (Brazilian Institute for the Environment) and the State Secretariats for the Environment. There are 28 these protected areas, covering several coastal and marine ecosystems such as coastal and oceanic islands/archipelagoes, dunes, mangroves, lagoons and salt marsh habitats. A recent study on coastal/marine protected areas (Diegues,A and

Moreira, A, 1992) has shown that there is a low level of management due to lack of management plans, of legislation enforcement, technical and financial means and research.

A major reason for the low conservation achievement however lies in the way these protected areas area established, without previous consultation with users groups, in particular with traditional populations. These groups, by the existing legislation should be transfered from the places where these protected areas are established. It is known, however, (Diegues, 1996) that these traditional communities have used these ecosystems with a low level of impact on flora and fauna and should be considered as important allies in the conservation process. As these areas are created mainly by federal and state agencies, local municipalities are excluded from the decision and therefore give little support to these important conservation areas.

In the 1990's, some extractivist reserves have been created, ensuring the presence and participation of the local population such as Pirajubaé extractivist reserve in Santa Catarina and Arraial do Cabo(RJ)

4.5.International Agreements

In 1974, the the Brazilian Commission for the Programme of Man and Biosphere from Unesco was established in Brazil. In 1987 Brazil ratified the Convention on the Preservation of the Cultural World Patrimony, promoted by Unesco was also signed. Important historical coastal cities, such as Salvador, Paraty and São Luís do Maranhão were appointed as patrimony of mankind. In 1977, Brazil ratified the International Convention on civil responsability on damages caused by pollution and oil.

A large Unesco Biosphere Reserve has been created in 1992, covering the whole remainings of the Atlantic Forest and its coastal/marine habitats. Brazil has also recently signed the Ramsar Convention (1994) and has indicated two coastal protected areas as Ramsar Sites (Lagoa do Peixe and Reentrâncias Maranheses).

Brazil has also signed important conventions that are relevant to marine ecosystems such as the one on biodiversity and climatic change. It is also member of large ecological International Organizations such as IUCN- The International Union for Nature Conservation. The Nupaub-USP represents, in Brazil, the international programme on wetlands conservation.

5. LOCAL INITIATIVES FOR COASTAL MANAGEMENT

While coastal management planning and implementation has, in general, remained a technocratic exercise without a major impact, in some areas coastal communities are doing their own coastal management. In Ceará, for instance, local communities are suffering from the invasion of their beaches by land speculatation, tourism and from overfishing of lobster, mainly by the industrial fleet and by divers coming from a neighbouring state. Assisted by local Ngos and research institutions, they have proposed a Coastal Forum, where the various problems are discussed by representatives of local communities, of the touristic sector, of the industrial fisheries sector and of the Federal, State and Municipal Government. Within this forum they have proposed a management plan for lobster fishing, also in coordination with the industrial fisheries sector. When IBAMA announced that no funds and boats were available for surveillance of lobster fishing, they equipped one of their boats in order to ensure the compliance with the rules that regulate that fishery. The fishermen that disobey the regulations are firstly reprimanded and when they do not comply again with the agreed legislation, they are taken to a court.

In some beaches, the selling of a plot of land for tourists and for hostal building by a dweller must be approved by the community council

In some other coastal communities, such as Pirajubaé in Santa Catarina, Mandira-Cananéia in São Paulo and Arraial do Cabo, in Rio de Janeiro,extractivist reserves are being build in order to ensure access to fisheries resources for the members, and limit the access to outsiders, mainly to sport fishermen. In most of their initiatives, there is a strong resource conservation component, and as result they frequenly suceed in getting the support of Government and Non-Government environmental organizations.

6.Conclusions

Coastal zone management issues have become a concern for a part of Brazilian public opinion, many local communities and several Government agencies. The existence of an Interministerial Comission can be considered an asset for coastal management and the approval by Congress of a Coastal Management Bill has laid the legal foundation for the implementation of coastal zoning plans that are being elaborated by State agencies. However, major constraints exist in the actual implementation of the plans in view of the lack of negotiation procedures among different user groups, of the resistence from strong

lobbies (public work contractors, construction and industrial interest groups), the lack of support of local communities. In many ways, the coastal management exercise remained an academic and technocratic exercise, although in the process, the level of scientific knowledge about coastal ecosystem has improved. In some regions, however, local communities, with the support of Ngos and research institutions are proposing and implementing their own coastal management plans in order to protect themselves from the occupation of their land by speculators and from the over use of their renewable resources.. The success of the plans will depend on ability of the Government and from Non-Goverment institutions to raise overall consciousness of Brazilian society of the need to harmonize different uses of the coastal zone and their resources and to protect them against rapid degradation. Environmental education, surveillance and control are urgently needed in view of the rapid destruction of many important coastal wetlands in Brazil.

Bibliography

Banco Central. Estatísticas- coleta direta na fonte, Brasília, 1996

Becker, B, 1995 Levantamento e avaliação da Política Federal de Turismo e seu impacto na Região Costeira, Ministério do Meio-Ambiente e da Amazônia Legal, Brasília, 1995

Chapman,V (ed) Ecosystems of the Cold Wet Coastal Ecosystems, Amsterdam, Elsevier, 1977

CIMA Subsídios Técnicos para elaboração do Relatório Nacional do Brasil para a CNUMAD. Brasília, 1991

Diegues, A Ecosistemas marinos y su degradación en Sur y Centroamerica, Mexico y el Caribe, in Gallopin,G (ed) *El futuro ecológico de un continente: una visión prospectiva de la America Latina,* Editorial de la Universidad de las Naciones Unidos and Fondo de Cultura Económica, Tokyo-Mexico, 1995

Diegues, A Os pescadores artesanais e a questão ambientais, in Diegues, A- *Povos e Mares*, Nupaub-USp, São Paulo, 1995

Diegues, A (ed) An Inventory of Brazilian Wetlands, IUCN, Gland, 1994

Diegues, A& Moreira, A & Harris G Marine Region 9: South Atlantic, in Kelleher,G & Bleakley & Wells S. A Global Representative System of Marine Protected Areas,

vol II The Great Barrier Reef Marine Park Authority/WB and IUCN, Washington, 1995

Diegues, A. - Managing Brazil's Wetlands: The Contribution of Research Amid the Realities of politics. *Paper presented at the 3rd International Seminar on Wetlands Conservation* - Rennes, Sept. 1988

Diegues, A. O mito moderno da natureza intocada, Huicitec, SãoPaulo, 1996

Diegues,A et alii The Environmental implications of Global Change,in *18th IUCN General Assembly, Perth,* 1992

Egler, C. Os impactos da política industrial sobre a Zona Costeira, Ministério do Meio-Ambiente, dos Recursos Naturais e da Amazônia Legal, Brasília, 1995

Mater Natura/WWF Cadastro Nacional de Instituições Ambientalistas, Curitiba, 1996

Moraes,A. Os impactos da Política Urbana sobre a Zona Costeira. Ministério do Meio-Ambiente, dos Recursos Naturais e da Amazônia Legal, Brasília, 1995

.

Pires Filho, I. and D. Cycon. 1987. Planning and Managing Brazil's Coastal. Resources. In: *Coastal Management* . 15: 61-74.

SEMA. 1984. Relatório da Qualidade do Meio-Ambiente. ROMA, Brasília. 1984.