

The establishment of municipal boundaries in São Paulo's territorial sea and its impact on the distribution of natural resources and on environmental and social rights and co-responsibilities



<https://doi.org/10.56238/Connexpemultidisdevolpfut-110>

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ABSTRACT

The creation of three Marine Environmental Protection Areas by the Secretary of the Environment of São Paulo, in 2008, totaling 1,138,067.68 hectares, extending from Ubatuba to Cananéia, in the coastal marine zone of São Paulo, raised the issue of formalizing the Waters Courts in 15 municipalities in the State and the respective rights and responsibilities. We present a proposal for this division of interests and duties at Sea, with a map establishing preliminary boundaries for future deliberations in society. We describe the process and bases for proposing Marine Environmental Protection Areas and present their main data.

Keywords: Coastline, Municipal Territorial Sea and Natural Resources.

1 INTRODUCTION

The design process of the Marine Environmental Protection Areas (APAMs) emerged in the Secretariat of the Environment of São Paulo (SMA) at a time when the creation of Mosaics of Nature Conservation Units was discussed, from the mid-2000s, such as Juréia-Itatins and Jacupiranga and the Set of Nature Conservation Units (CUs) of Cantareira. The moment brought broader and more consistent ecological concerns, encompassing areas of sustainable development. The Mosaic figure established in the National System of Nature Conservation Units (SNUC), Chapter IV Art. 26, and in its Regulation, Chapter III, favored decisions for a more integrated, regional and social vision. The SMA hypothesized a "Mosaic of the Marine Islands".

The Sea was not effectively and historically contemplated in Protected Areas. Ilhabela, the largest archipelago on the coast of São Paulo, with 85% of the terrestrial island environment of the



municipality inserted in the State Park, created in 1977, did not have a single cubic meter of aquatic environment covered in its limits. The same happened with the state parks (PE) of Anchieta Island of 1977 in Ubatuba and of Ilha do Cardoso of 1962 in Cananéia.

Figure 1: Laje de Santos Marine State Park in APAM LC, Santos



The Forest Institute that secularly created and administered the Specially Protected Areas of the State and that continued to create and implement Nature Conservation Units (CUs) after the advent of the SNUC, created two Units with marine aquatic environments only in 1993, the Marine State Park (PEM) of Laje de Santos and PE Xixová-Japuí (Figure 1). The Special Secretariat for the Environment (SEMA) at the federal level had created the Tupinambás and Tupiniquins ecological stations (ESECs) in 1986 and 1987, covering the marine environment within a radius of one kilometer from the burst in each island form (Table 1).

Table 1. State and federal coastal and marine UCs of São Paulo

Conservation Unit	Year of Creation	Forms Island	Municipality and Headquarters	Area ha Insular	Area ha Navy	Area ha Total
PEI Cardoso	1962	01	Cananéia	13.60	-	13.600
PE Ilhabela	1977	15	Ilhabela	27.03	-	27.025
PEI Anchieta	1977	02	Ubatuba	828,00	-	828
EE Tupiniquins	1986	05	Iguape	44,00	1736	1.780
EE Tupinambás	1987	09	S. Sebastião	30,00	2.415	2.445
PE Xixová-Japuí	1993	01	S. Vicente	-	300,00	901
PEML Santos	1993	01	Santos	10,00	4.990,00	5.000
RVS Abrigo-G.	2013	03	Peruíbe	10,00	470,00	480
RVS Alcatrazes	2016	03	S. Sebastião	179,97	67.229,10	67.409,10
SUM		40	-	41.547	21.869	157.111

Note. PE Xixová-Japuí with 601 ha of continental medium

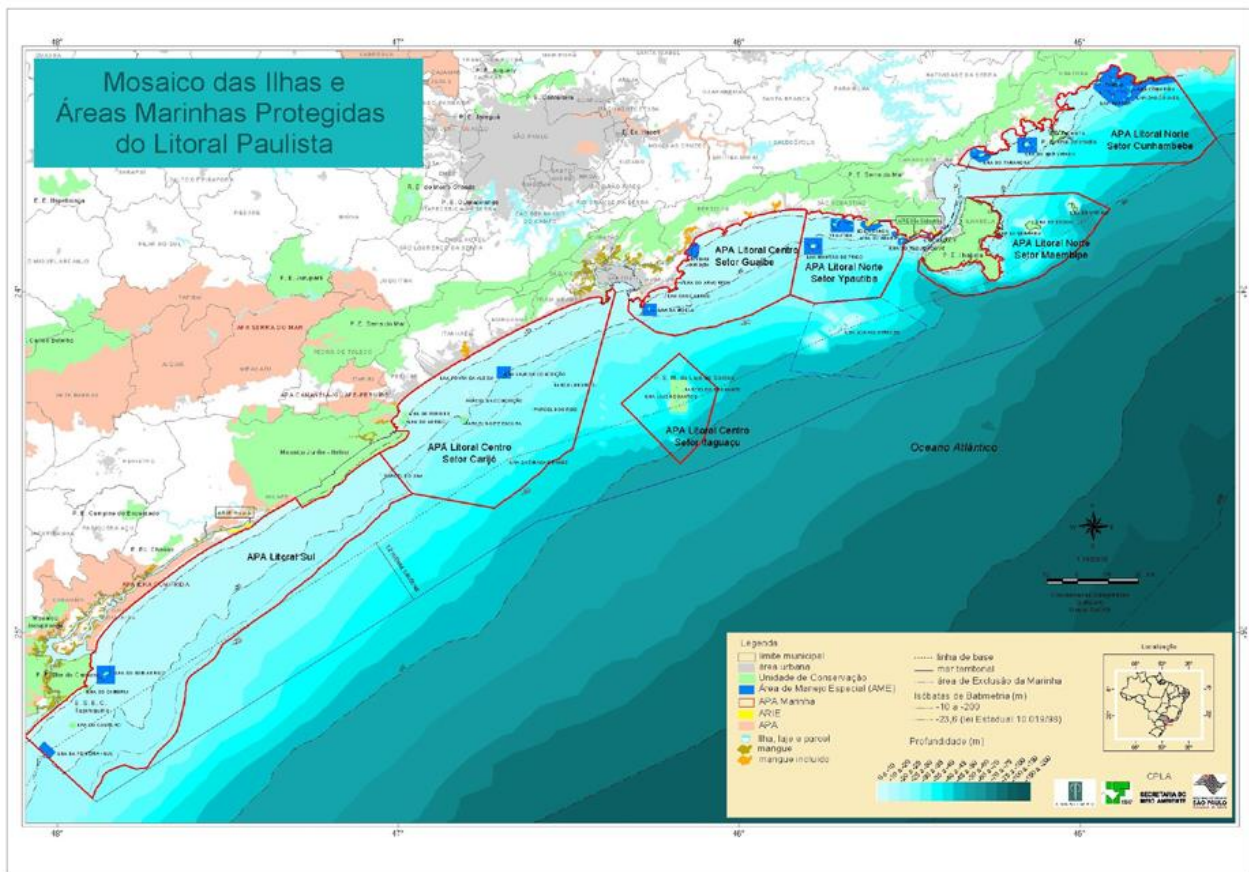
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The administrative and protection activities of these first Marine Specially Protected Areas (AEPs) in São Paulo were precarious and omitted for more than 10 years. The ecological knowledge of the coastal and marine environments resulted from the research of the Oceanographic Institute of USP (IO-USP) and the Institute of Fisheries belonging to the Secretariat of Agriculture and Supply (SAA).

Figure 2: Marine Environmental Protection Areas in São Paulo



Despite the efforts of technicians in the field, the authorities began to pay attention to these Marine AEPs only in 1999 in the federal ones and in 2004 in the state ones, appointing directors, allocating resources and vessels. In 2003, the general board of the Forestry Institute (IF), which was responsible for the Marine PE of Laje de Santos, and the executive board of the Forestry Foundation (FF), without being able to define guidelines, agreed on denial and irresponsibility towards coastal and marine ecosystems. APAMs came to repair the chronic abandonment and neglect of the biodiversity of these ecosystems in 2008 (Figure 2). There was a way to dedicate himself to organizing the protection of beaches, sandbanks, mangroves, estuaries, rocky shores, coves, island forms and marine habitats.

The implementation of the APAMs began soon after the decrees of creation, with the appointment of managers and coordination. There was the creation of a Maritime Platoon of the



Environmental Military Police (PMA), formation of Management Councils and prohibition of pair fishing (Resolution SMA No. 69/2009). The beginning of the "Program for the Socio-Environmental Recovery of Serra do Mar and the Mosaics of the Atlantic Forest" from 2011, with resources for the APAMs was a preponderant factor. However, the admission of candidates in the period 2011/2012 was decisive for consolidation. Receiving human resources it was possible to plan the administration, act in the field and begin the elaboration of management plans. Measures in the area of exclusion from fishing or restriction of modalities were taken, but the SMA's performance has always sought good dialogue and broadening partnerships, strengthening the socio-environmental relationship with all actors. The management plans of the three APAMs are ready and approved by the State Council of the Environment (CONSEMA). Still, after almost 15 years, municipal rights and duties have not been defined spatially in the Paulista Sea.

2 MATERIAL AND METHODS

During the development of this work, secondary data of bibliographic review were obtained from the consultation of legislation related to the theme, academic works, technical reports and government databases. To establish the municipal geopolitical limits in the Territorial Sea of São Paulo, the bases of the work developed in the creation of the three Marine Environmental Protection Areas, APAMs North Coast, Central Coast and South Coast were used, which resulted in their creation decrees in 2008 (OLIVEIRA *et al.* 2014). The state decrees creating the three APAMs (DE nº 53.525/2008-LN; OF nº 53.526/2008-LC; and DE nº 53.527/2008-LS), with their annexes, present letters, justifications and descriptive memorials.

For this study it was necessary to add in the APAMs LC and LS two marine areas arising from the recreation of the Mosaic of Conservation Units of Juréia - Itatins (LE 14.982/2013). These portions correspond to 3,823.00 ha in APAM LC (Peruíbe) and 11,137.00 ha in APAM LS (Iguape), which were suppressed from the sea of the Juréia-Itatins Ecological Station included in the previous proposal of Mosaico. The drawings of the APAMs contained in the decrees of creation circumvented the previous Mosaic, which was annulled by means of an ADI - Direct Action of Unconstitutionality. The two areas total 14,960.00 ha, subtracted from the category of Integral Protection to that of Sustainable Development, which loosened the defense of the coast of Juréia-Itatins.

For this study of the Municipal Currencies, we used the original database that generated the digital mapping and descriptive memorials of the APAMs, carried out by the Forest Inventory Project of the Forest Institute (SMA), using the Global Positioning System (GPS), which had launched a survey of the Natural Vegetation of the State of São Paulo (KRONKA *et al.* 2005).

To approach the marine territories with their insular forms, the publication "Ilhas do Litoral Paulista" (ÂNGELO *et al.*, 1989) was initially used. In updating the data, we resorted to studies of



island seabirds during which the environments were recorded, whose images illustrate this article (CAMPOS *et al.* 2004) as shown in Table 2. Studies in Alcatrazes and other seabird maternity islands have allowed diagnoses and a more comprehensive view of the Territorial Sea (OLIVEIRA *et al.* 2007).

Table 2. Marine island forms of São Paulo

Municipality	Island	Islet	Slab	Parcel
Ubatuba	16	7	8	1
Caraguatatuba	02	1	-	-
Ilhabela	13	1	2	-
São Sebastião	14	4	6	2
Bertioga	1	-	-	-
Guarujá	14	1	2	-
Santos	2	1	-	3
São Vicente	2	-	1	-
Praia Grande	-	-	-	-
Mongaguá	-	-	-	-
Itanhaém	5	-	-	2
Peruíbe	4	2	1	1
Iguape	-	-	-	1
Ilha Comprida	1	-	-	-
Cananéia	6	1	2	-
SUM	80	18	22	10

The definition of Straight Baselines (DF nº 4.983/2004) to characterize the Brazilian Territorial Sea naturally contributed to the tracing of the polygonal APAMs

3 MUNICIPAL GEOPOLITICAL CURRENCIES IN THE TERRITORIAL SEA OF SÃO PAULO

To define a Marine Mosaic, the idea of establishing three APAMs was used, one for each stretch of the coast: North, Center and South. It was necessary to use studies from the Alcatrazes Project, an entity that questioned the bombings carried out by the Brazilian Navy in the Alcatrazes Archipelago, in São Sebastião, causing a situation of disturbance and environmental risk with ESEC Tupinambás and the rich biodiversity of Alcatrazes Island. The Alcatrazes Project made complaints, promoted scientific expeditions and related to other institutions and entities that studied the island environments, such as the Butantã Institute, the Museum of Zoology (MZUSP), the Institute of Botany (IBt/SMA), the TAMAR Foundation (<https://www.tamar.org.br/>) (GALLO *et al.* 2002), among others. General field contribution came with the Islands Project of the Forest Foundation (FF) acting since 1997/1998 and another related to ringing of island seabirds (CAMPOS *et al.* 2004), bringing the vision and knowledge to propose, design and ecologically justify the three APAMs and their two Areas of Relevant Ecological Interest (ARIEs).

The digital mapping was derived from works of the Forest Institute (KRONKA *et al.* 2005). Other sectors of the SMA collaborated with technical and legal information, holding Public Hearings and in political action, to enable the creation. It was important the participation of the Head and ESEC



team of the Tupiniquins of ICMBio (MMA), whose process of elaboration of the Management Plan contributed with significant information from the central and southern coasts.

The geopolitical boundaries were drawn encompassing the inland waters corresponding to sets of municipalities. The Baseline, which characterizes the Territorial Sea in São Paulo, with extremes in Ubatuba to the NE and Cananéia to SO, defined points south of the islands farthest from the coast, Vitória, Ilhabela, Alcatrazes, Laje de Santos, Queimada Grande and Figueira Sul. In this drawing a perpendicular line from Ponta da Trindade (Latitude 23°22'3", Longitude 44°43'25") penetrates 12 miles to a point in the sea (Lat. 23°30'14", Long. 44°37'48"), from where it deflects to the points of the islands, at the limit of the inland waters, to a point in the sea (Lat. 25°25'47", Long. 47°57'33"), from where it flexes to the middle of Barra de Ararapira (Lat. 25°18'23", Long. 48°5'40"), bordering the State of Paraná, resulting in the Territorial Sea of São Paulo with 2,119,000.00 hectares (Figure 2).

The design of the sectors of the APAMs (Cunhambebe, Maembipe and Ypautiba - LN; Guaibe, Itaguaçu and Carijó - LC) follows the coastline and heads to the Sea starting at boundaries between municipalities when possible. Maembipe involves part of the Ilhabela and Itaguaçu Archipelago to Laje de Santos Island. The LN and LC APAMs extend the distance of ten nautical miles towards the Baseline, sea to sea. In the most distant islands there are about five miles, still within the Territorial Sea of São Paulo, in which are inserted approximately 1,280,000.00 ha of inland waters, which comprise in its calculation the terrestrial surface of the exclusively marine islands. In this environment there are coastal ecosystems along the preamar line to those of the open sea, where the oceanic region itself begins (Table 3).

In the construction of the APAMs, the maritime itineraries of the ships to the ports of São Sebastião and Santos were not covered. All marine islands are in the APAMs, with the exception of Ilhabela and the Alcatrazes Archipelago. where at the time there was conflict between the Brazilian Navy and organized civil society in defense of island biodiversity. A number of mangroves were protected in the APAMs, 24 in the LN and 7 in the LC. The mangroves of Cubatão and Santos, which bring together an extraordinary diversity of birds, were not contemplated, due to political pressure for port expansion. The municipality of Cubatão without the proper protection of its mangroves, which strictly are ecologically connected with the Sea, because it does not have a marine front line is no longer contemplated in the proposal of the APAMs. It is observed that in the APAM South Coast did not include the mangrove swamp at the mouth of the Ribeira de Iguape River.



Table 3 APAMs – Protected Marine Coastal Territory in São Paulo

MARINE COASTAL TERRITORY ROUTED		
APA NAVY	MUNICIPALITIES	AREA APAM ha
North Coast – Sectors Cunhambebe, Maembipe and Ypautiba	Ubatuba, Caraguatatuba, Ilhabela e São Sebastião	316.242,45
Litoral Centro – Sectors Guaibe, Itaguaçu and Carijó	Bertioga, Guarujá, Santos, São Vicente, Praia Grande, Mongaguá, Itanhaém, Peruíbe	453.082,70
South Coast	Iguape, Ilha Comprida e Cananéia	368.742,53
TOTAL		1.138.067,68
Territorial Sea of São Paulo 2,119,000.00 ha		

Names of the APAMs and sectors were inspired by Professor Paulo Nogueira-Neto, who created Marine Ecological Stations adopting indigenous names of the Tupi-Guarani, still in the former Special Secretariat of the Federal Environment (Nogueira-Neto 1991). For the indication of names was used dictionary of toponyms "Tupi-Guarani Vocabulary Portuguese" of Prof. Dr. Francisco da Silveira Bueno (1998).

In addition to the large marine territory protected with the three APAMs, we have two Areas of Relevant Ecological Interest (ARIEs): São Sebastião, which contains three sectors (Cebimar, Costa do Navio and Boiçucanga), corresponding to 607.93 ha (Figure 3) and Guará with about 455.27 ha, located on Ilha Comprida, sheltering nests of waterfowl.

Figure 3: AME Island Touch-touch; Sector Serra do Navio ARIE São Sebastião; APAM LN, San Sebastian



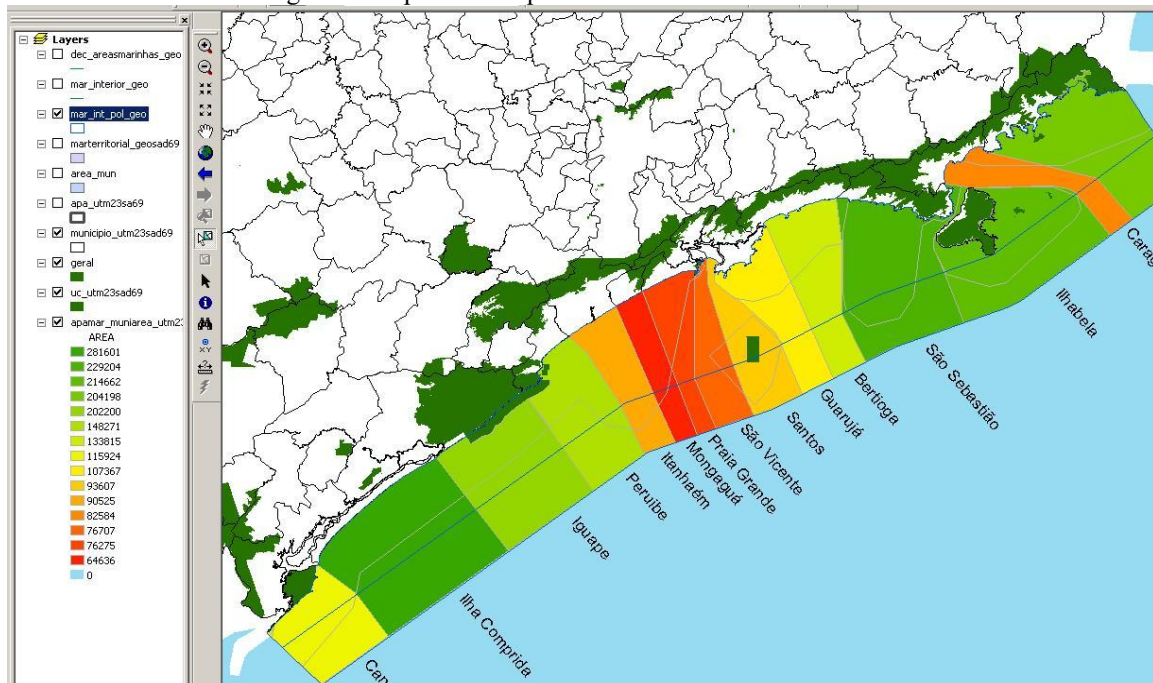
The São Paulo state decrees that created three extensive marine environmental protection areas raise the issue of municipal borders at sea. In addition to these APAMs, the Mosaic of Islands in Marine



Protected Areas of the São Paulo Coast was created (DE nº 53.528/2008). There are fifteen municipalities with coastline at sea and that would benefit from the transfer of financial resources from state tax (ICMS Ecológico - Law No. 8,510/93; complemented by Law No. 12,810/2008); in the case of characterization of its currencies, as happens with Santos, because it houses the Laje de Santos Marine State Park with 5,000.00 ha (Figure 1).

The Municipal Geopolitical Limits, embodied in the APAMs, were drawn from the points of the borders on the coast line, preferably following perpendicular to the Baseline and the limit of the Territorial Sea (Figure 4). All 15 municipalities correspond to marine areas relative to their coastline. For Caraguatuba and Santos we have inclined lines due to the geographical position.

Figure 4: Map of municipal areas in the Territorial Sea - SP



The APAMs were established in the São Paulo Territorial Sea, almost entirely in the inland waters, between the coast line and the Straight Baselines. It is, therefore, a matter of defining what will correspond to the area in the Territorial Sea to each coastal municipality and, equally, of the Marine APA and its percentage of the Ecological ICMS. Many of the insular forms are not included in the laws of creation and municipal currencies, which should be studied and consolidated in the records of the Geographic and Cartographic Institute of the State. In Figure 5, an example of "marine territory" of Ubatuba.

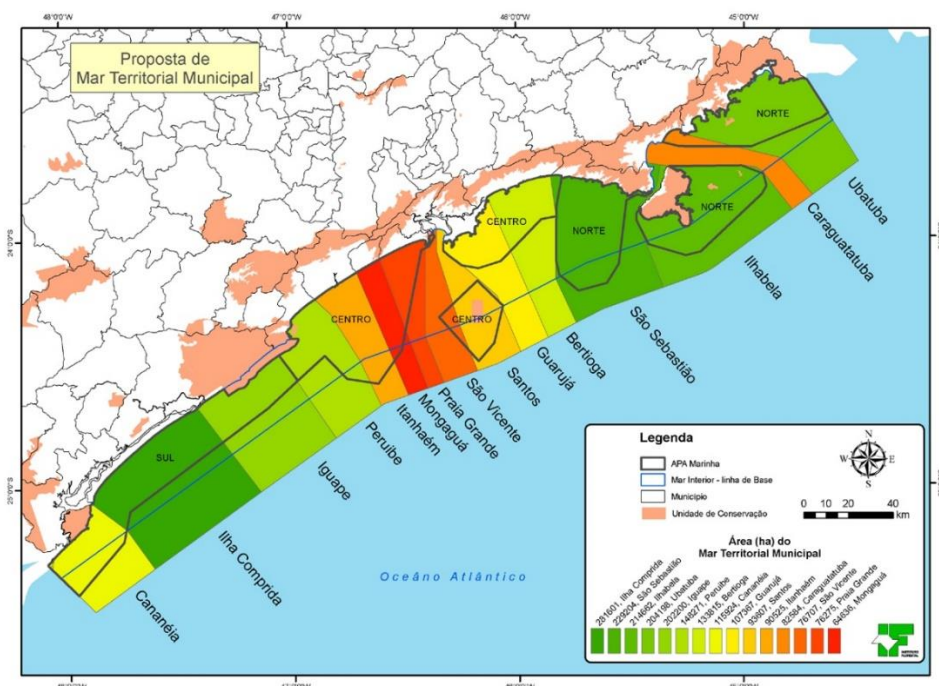


Figure 5: APA Marinha Litoral Norte, Ubatuba



Coastal municipalities will be interested in establishing their jurisdictional waters. All marine coastal municipalities are at least related to fishing or tourism at sea, which implies economic, environmental and social development interests. From a draft, with an initial proposal of defined currencies, the Prefectures and Municipal Councils will be able to discuss among themselves their geopolitical limits in the sea and their respective island territory. For this preliminary design a basic criterion is to draw boundaries from the known landmarks on the coastline and follow in a perpendicular direction to the Straight Baselines, extending to the limit of the Territorial Sea (Figure 6).

Figure 6: Map of municipal areas in APAMs - SP



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This demarcation of currencies at sea, between coastal states and municipalities, will favor the participation in the results or financial compensation for the exploitation of natural resources in the territorial sea, continental shelf or in the exclusive economic zone (CF Art.20 §1º), according to Table 4.

Table 4. Municipal Territorial Sea in São Paulo

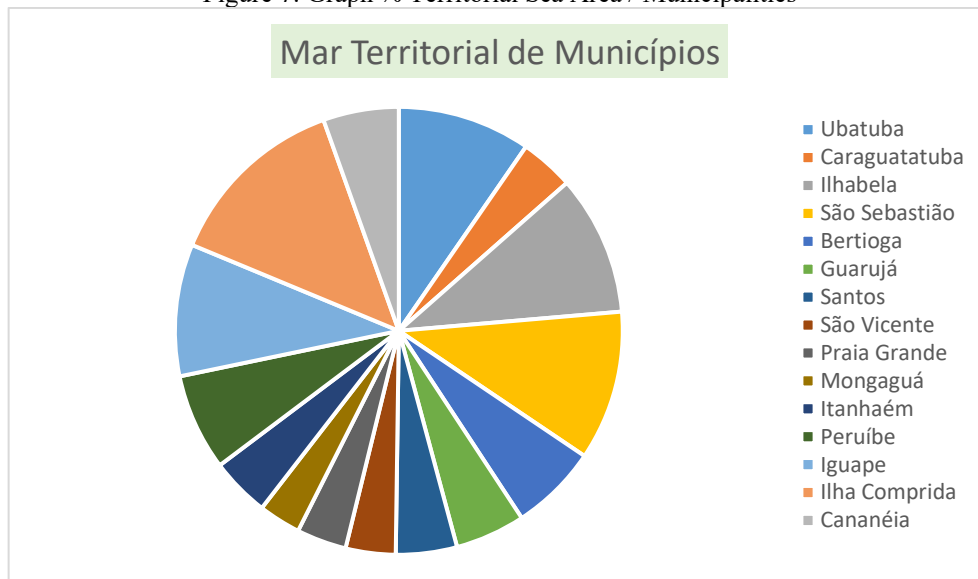
Municipality Coastal - SP - Brazil	Area ha Territorial Sea	Area % Sea Territorial
Ubatuba	204.198	9,62
Caraguatatuba	82.585	3,89
Ilhabela	214.662	10,12
São Sebastião	229.205	10,81
Bertioga	133.816	6,31
Guarujá	107.368	5,06
Santos	93.608	4,41
São Vicente	76.708	3,61
Praia Grande	76.276	3,60
Mongaguá	64.637	3,05
Itanhaém	90.526	4,27
Peruíbe	148.272	6,99
Iguape	202.201	9,53
Ilha Comprida	281.601	13,27
Cananéia	115.925	5,46
TOTAL	2.119.000,00	100

Although the Federal Constitution defines that the Territorial Sea is part of the "assets of the Union" (Article 20, Item VI), the establishment of the Municipal Territorial Sea will define environmental and social rights and co-responsibilities, which are important and strategic for the management, protection and development of coastal environments and jurisdictional waters. It is necessary, simultaneously, that the Government of São Paulo discuss its currencies at sea with Rio de Janeiro, Paraná and the Union (Figure 4).

The responsibility for the conservation and development of coastal and marine environments already occurs as something that can be affirmed as shared between state, municipal and federal governments. With the division of geopolitical boundaries in the sea, it will be better defined what belongs to each instance and what needs to be integrated to favor better results (Figure 7). Municipalities face extremely serious environmental problems, such as solid waste disposal, excessive demographic growth, irregular occupations in PPAs (Permanent Preservation Areas) or areas of imminent risk, impact of major works, disorderly and predatory tourism, improvident port expansion and, exclusively at sea, overfishing.



Figure 7: Graph % Territorial Sea Area / Municipalities



Governments and entities have to prevent and combat frequent environmental impacts in the marine coastal region, such as contamination and pollution with domestic sewage and industrial dumps that reach streams and beaches, real estate speculation and land grabbing, degradation of environments and landscape, destruction of mangroves and siltation of rivers and estuaries, invasion of Guarani villages, deforestation and, in the beautiful sea of São Paulo, theft and trampling of eggs and chicks of island seabirds, capture and death of turtles, petrels, albatrosses and dolphins and, among these, the porpoise (*Pontoporia blainville*) which is the most threatened, trophy submarine hunting, theft and trafficking for aquariums, spillage and contamination with oil, tank wash of ships and shots of the Brazilian Navy that persist on the Island of Friends (Sapata) in Alcatrazes.

The problems listed above bring threats and cause loss of marine biodiversity. There are serious consequences. Habitats are reduced or disappear. The contamination and pollution for tourism of these cities – seaside resorts are disastrous, cause diseases and fall in the quality of sea water. Another worrying situation is the decline in fish stocks. All these issues above and others not mentioned need to be addressed in cooperation of the three spheres of power with the support of each and every entity, so that the municipalities achieve sustainable development.

The proportion of jurisdictional waters to each municipality varies according to the length of its coastline and the design that can be traced according to geography and the concave cutout, in a State whose direction of this coast line is Northeast - Southwest. In the pie chart, the differences in areas are also due to the fact that the Baseline makes an inflection to the south, approaching the coast (Figure 6).

Depending on the length of the coastline, there are variations from 64,636 ha of Mongaguá to 281,601 ha of Ilha Comprida in the estimates for areas of jurisdictional waters to be an integral part of



the municipalities (Figure 7). At the end there will be proportional distribution of resources and effective social and environmental responsibility (Table 4).

In the three APAMs, Special Management Areas were considered and determined for the protection of biodiversity, the fight against predatory activities, the control of pollution and the support of fishing productivity (AMEs). There are a total of 14 AMEs, which require studies since their creation in 2008 for the eventual creation of UC of full protection or sustainable use. After 15 years, none of them has been included in the SNUC model, although three of them constitute reproductive colonies of endangered island seabirds (Sternidae). Two AMEs, Ponta da Armação, figure 8, and Ilha Laje da Conceição, were contemplated with studies derived from environmental compensation. However, these works sleep in some drawer of the SMA (SEMIL).

Figure 8: AME Ponta da Armação APAM LC, Guarujá



SMA were created instead of SNUC categories, because at the time it was not desired figures of greater restriction. The IF's technical team even proposed wildlife refuges and state parks and more ARIEs than the two accepted. AMEs, however, serve as a roadmap of what needs to be researched and better protected. The AME Ponta da Armação, for example, contains the ruins of the Fort of Hans Staden, where he was captured by the Tupinambá nation, as well as a whale and hermitage frame and a nature with rich biodiversity (Figure 8).

The AME Ilha do Bom Abrigo takes us back to 1531 when Martim Afonso de Souza took shelter for a long time in his backwater and from there sent an expedition to the interior of the continent for the purpose of exploration. On this Island also functioned a whale frame (Figure 9). The Brazilian Navy maintains an important lighthouse, which prevents accidents in the difficult access bar to Cananéia. In particular, there is Sambaqui on Bom Abrigo Island, which makes it an archaeological site.



Figure 9: AME Ilha do Bom Abrigo APAM LS, Cananéia



All other AMEs have uniqueness and ecological value. On the Island of Mar Virado there is also Sambaqui. All the islands consist of landing site of migratory birds and some are maternity islands. New or rare species of herpetofauna inhabit some of them. Studies in the AMEs will reveal surprises in their benthic bottom or exceptional attractions for underwater tourism. In the end, certainly other SMAs will be created or, according to the attributes and the political moment, we will directly have Nature Conservation Units.

4 FINAL CONSIDERATIONS

The Union and the State are not able to act fully, although they have many organs, in the 15 coastal municipalities of São Paulo bathed by the Sea aiming at the protection and perpetuation of coastal and marine environments. There is an inherent complexity to each and every action. Legislation is not always enforced or effective. At the federal level, we have the Secretariat of the Union Heritage (SPU / ME), the Brazilian Navy (MB / MD), the ICMBio (MMA) and the Ministry of Fisheries and Aquaculture (MPA). Alongside them, Ibama (MMA), Federal Police (MJ) and Federal Public Ministry (MPF). The primary state action takes place with the current Secretariat of the Environment, Infrastructure and Logistics (SEMIL), which comprises the Forest Foundation, CETESB and the Institute of Environmental Research (IPA) which, in turn, encompassed the environmental research institutes of Botany, Forestry and Geological.

We also have the State Attorney General's Office (PGE-SP), the Environmental Military Police (PMA) and the Fire Department (CBMESP), the Fisheries Institute (SAA) and, from USP, the Oceanographic Institute (IO) and the Geographic and Cartographic Institute (IGC). All these bodies will be assigned to the establishment of municipal boundaries in the Sea, defining these jurisdictional



waters and the rights and responsibilities of each prefecture. In addition, civil society should be represented in fishing colonies, watershed committees, marinas, yacht clubs, universities, colleges, among other actors, various non-governmental organizations.

However, the dialogue to establish the municipal marine boundaries should take place with the states of Rio de Janeiro and Paraná, between each prefecture and with all the municipal councils. Public hearings will take the issue to coastal society. The result should be substantiated in the Legislative Assembly of the State of São Paulo (Alesp) in line with the Geographic and Cartographic Institute of the State of São Paulo (IGC). In the official documents many updates needed to be made.

For example, the document "Municipalities of the State of São Paulo - Creation and Currencies", available in http://www.igc.sp.gov.br/produtos/arquivos/municipios_sp_divisas.pdf, lists 54 islands as an integral part of the 15 municipalities studied. However, in our studies we found at least 80 islands, as well as 18 islets, 22 slabs and 10 slabs (Table 2).

The planet faces serious events and the same impact also affects São Paulo. Invasive species, such as sun coral and lionfish, unbalance our seas and consist of a serious threat that expands and endures. The Climate Emergency has become an unquestionable event. Cataclysms devastate huge regions in every quadrant of the Earth. Powerful winds destroy frigate nests on Alcatrazes. The torrential rains with more than 680 mm of precipitation that caused human dramas with deaths and destruction of neighborhoods in São Sebastião force us to rethink the ways to occupy the coast and deal with the sea. The APAMs have functioned exactly as a special forum to enlighten and guide the population in the search for balanced and sustainable solutions.

Marine coastal environments are subject to contumacious and serious dangers: facing the Climate Emergency, the avian influenza setting in and the entrenched and constant aggressors of the environment. The continuous implementation of the APAMs, the Forestry Foundation (SEMIL) that has signed commitments in defense of the Sea, the international "Blue Park" award given to ICMBio in São Sebastião for the excellent work it does in Alcatrazes, the encouraging increase of humpbacks on the coast of São Paulo, NGOs in the environmental field that emerge combative on the coast and other successful initiatives, They bring great winds.

FINANCIAL SUPPORT

Instituto Florestal/SMA-SP, Fundação Floresta/SMA-SP and Projeto Alcatrazes da Sociedade de Defesa do Litoral Brasileiro-SDLB.

ACKNOWLEDGE

To the technical and legal teams (SMA and external collaborators) that prepared the proposals for Marine APAs in São Paulo.



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