

ECONOMY, LAW AND SUSTAINABILITY: ROUTES FOR COASTAL MANAGEMENT IN BRAZILIAN NORTHEAST

Economia, direito e sustentabilidade: rumos do gerenciamento costeiro no Nordeste brasileiro

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ABSTRACT

The present work aims at analyzing aspects of Integrated Coastal Zone Management regarding Federal States in the Northeast Region of Brazil from the Economy, Law and Sustainability perspectives. In the context of opinionated analysis, the methodology herein adopted, included the qualitative collection of bibliographic and documental records on a determined set of issues involving coastal management. From this study, it was possible to identify economic activities, directly and indirectly related to Blue Economy, which express the relevance of the sector in the studied Region as well as the existence of an environmental legal framework also relevant to coastal and marine planning and management. However, this legal framework lacks a broad democratic participation, mostly, the participation of traditional communities in the decision making processes with regards to planning the coastal zone sustainable use and occupation.

Keywords: coastal zone, coastal management, socio-environmental planning, blue economy, law of the sea.

RESUMO

O objetivo deste trabalho consiste em analisar os aspectos da gestão integrada da zona costeira nos estados que envolvem a região do Nordeste brasileiro, a partir das perspectivas do Direito, da Economia e da Sustentabilidade. Sob o contexto da análise opinativa, a metodologia adotada envolveu levantamento qualitativo de fontes bibliográficas e documentais acerca das temáticas que envolvem o gerenciamento costeiro. A partir deste estudo, foi possível notar a presença de atividades econômicas, direta e indiretamente relacionadas à economia do mar, que expressam a relevância do

setor na região em estudo, além da existência de um arcabouço jurídico ambiental relevante no campo do planejamento e da gestão marinho e costeiro, mas que carece de ampla participação democrática, sobretudo que envolvam as comunidades tradicionais, de modo que permita planejar o uso e a ocupação da zona costeira de forma sustentável.

Palavras-chave: zona costeira, gerenciamento costeiro, planejamento socioambiental, economia do mar, direito do mar.

INTRODUCTION

The Brazilian Northeast Region (NE) comprises an area of 1,670 km², representing about 20% of the national territory. It is constituted by nine federal States (Alagoas, Bahia, Ceará, Maranhão, Pernambuco, Piauí, Rio Grande do Norte e Sergipe), housing approximately 28% of the Brazilian population; it is characterized by climatic adversities which cause a clear distinction between its sub-regions: Zona da Mata, Agreste, Sertão and Meio-Norte¹ (IBGE, 2019; Matos, 2013).

The NE is the oldest Brazilian Region in terms of historic settlement, nowadays it is strongly integrated to the national economy by means of farming production and in the service sector economic participation, as well as a diversified production in the regional industry, which was intensified by State interventionism practiced from the second half of the 1950s. Despite this integration, the Region presents high rates of social inequality such as low access to treated water and housing, highlighting this way, the current challenge represented by the search for social justice and the rescue of citizenship rights for millions of people.

In an attempt to detail the Northeast coastline, it is possible to highlight its historic importance as the initial milestone for colonizing expeditions towards North, Southeast and Center-West regions of Brazil. Those expeditions resulted in the foundation of several cities after the incursions of cattle raisers who advanced along the São Francisco River and spread out across the fields of Goiás and Mato Grosso States; connecting with new routes, the hydrological basins at inland Brazil. In addition, it is also possible to situate from the coastline, the first substantial economic activity in Brazil, the timber extraction of Pau-brasil (*Paubrasilia echinata*). Among other Countries which disagreed with the Treaty of Tordesillas, France constantly conducted incursions to Brazilian coastlines in order to extract and smuggle timber to Europe.

Although the occupation of the NE has started from the coastline, these areas were not densely populated at first; the initial occupation consisted in cores of settlement with low population density; however, these small cores represented the embryonic stage for port cities such as: São Luís, Fortaleza, Recife and Salvador.

¹ Northeastern regional subdivisions as suggested by Manuel Correia de Andrade (2005). Considering a natural and geographical methodological division focused on the dispersion of economic activities which indicate the temporal density of Brazilian northeast: 1. Zona da Mata: extending from the eastern coastline of Rio Grande do Norte to the south of Bahia with predominance of agriculture destined to international markets (sugar-cane, cotton and cocoa); 2. Sertão: State of Ceará and the interior of Rio Grande do Norte, Paraíba, Pernambuco, Alagoas, Bahia and Sergipe which developed ultra-extensive cattle raising; 3. Agreste: transition area between Zona da Mata and Sertão, characterized by extensive ranching and agriculture in small scale destined to internal markets; 4. Meio-Norte: area of transition between northern Amazon and northeastern Sertão comprising the States of Piauí and Maranhão.

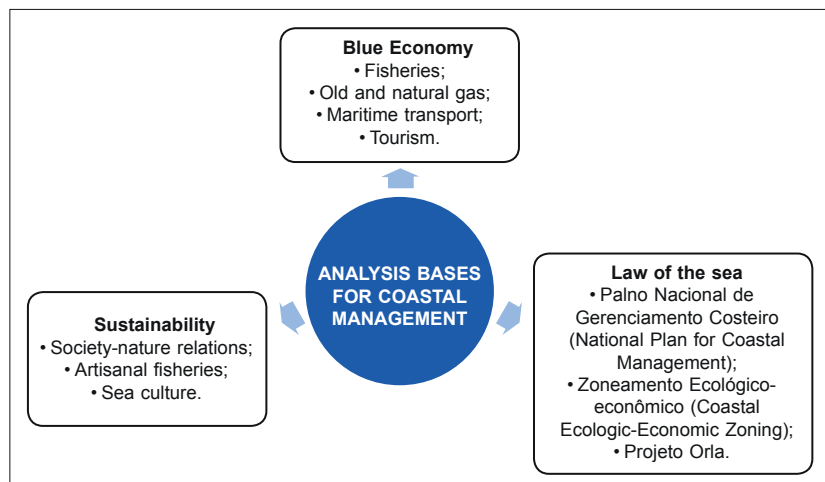
The NE coast, with 3,338 km², is the largest of the five Brazilian Regions, encompassing the States with the largest and the smallest coastal space; respectively, Bahia with 923 km and Piauí with 60 km. In the natural environment perspective, the NE coastal zone is characterized by calciferous and sandstone reefs, vast sand dunes areas, mangroves, sandbanks, lagoons and forests, representing one of the most complex environmental systems of Brazil.

Along with the development of new villages and cities in the NE coast, it also emerged a new pattern of space organization related to the configuration of territorial structure and the appropriation of natural environment as well as to the use of natural resources and, in the relationships between places. In the present days, the marine and coastal spaces play out an important role in the context of economic activities. The Blue Economy in the Brazilian northeast plays out a unique role, intensively mobilizing income and employment; particularly to fisheries, shipbuilding market, water transport, oil exploration and drilling, wind energy and activities related to sun-sand tourism.

Regarding the multiple uses and forms of occupation of this part of the northeast territory, conflicts involving traditional communities (fishermen, shellfish collectors, quilombolas² and Indigenous peoples) with land speculators and the State itself, have become the trend at coastal and marine spaces. This context has raised concerns and proposals for planning and management of those spaces, including the legal framework and other tools to ensure the sustainability of the Brazilian NE coastal space.

Grounded in this premise, the present study aims at analyzing coastal zone management aspects of Brazilian NE Region under the perspectives of Law, Economy and sustainability (Figure 1). To support this study, the methodological path chosen, included a qualitative analysis of data and information from Instituto de Brasileiro de Geografia e Estatística - IBGE (Brazilian Institute of Geography and Statistics), Banco do Nordeste do Brasil (BNB) and Instituto de Pesquisa Econômica Aplicada (IPEA) besides databases and repositories of institutional publications.

Figure 1 - Analysis bases for Coastal Management at Brazilian Northeast Region
Source: authors (2021).



² Descendants of runaway African slaves who escaped the plantations in Brazil and gathered in small, isolated communities known as “Quilombos” (authors’ note).

1 Northeast coastline: challenges to integrated management

Droughts, the sertanejo³ and the caatinga⁴, this is the imaginary that prevailed in the institutionalization of the Brazilian NE at the first half of the twentieth century. Although these constituent elements actually expressed the reality perceived at the Region, there is also another dimension interconnected with the sea and the maritime. The artisanal fisheries represented by the jangadeiros⁵ and seashell collectors in constant disputes with touristic activities, large urban areas, port complexes and industrial poles which, in turn, have established diversified dynamics at the coastal zone during the past decades, transforming urban and socio-environmental aspects.

In respect with landscape features and environmental attributes, the NE shoreline is characterized mostly by sand beaches and heterogeneous geomorphologic forms, also presenting coral reefs, mangroves, vast sand dunes formations, coastal cliffs and estuarine plains which provide important ecological services to a large variety of biological communities (Prates; Gonçalves & Rosa, 2012). Besides, it also houses the Atlantic Forest biome, which presents one of the richest vegetal biodiversity of the planet; however, it is being devastated by the over exploitation of its natural resources since the colonial times.

According to IBGE projections from 2020, the NE Region has a population of over 57 million inhabitants nowadays. It is the Region with the longest coastline in Brazil with 156 municipalities bordering with the Atlantic Ocean, representing 55.7% of all municipalities in Brazil (IBGE, 2019).

The coastal municipalities were subject to intense industrialization processes of different sectors starting at the second half of the twentieth century. Such processes contributed to a high concentration of people originating metropolization processes (Nakano *et al.*, 2006). However, environmental and urban public policies did not keep the pace with cities growth; as a result, socio-environmental issues have become more and more evident at urban centers (Aguilar, 2016).

The availability of natural resources and the strategic location of the coastal zone have turned it in a potentially and promising space for the development and concentration of human activities and population settlements (Brasil, 2015). This fact becomes more evident when one realizes that despite the coastal cities correspond to only 8.7% of all the cities in the NE, 1/3 of its population resides in these areas (Table I). In that scenario, The State of Bahia accounts for the largest number of inhabitants in coastal municipalities; however, Rio Grande do Norte proportionally responds for 43.31% of its population in coastal areas, while the State of Piauí, with the lesser extension of the coast, presents the smallest quantity of municipalities and inhabitants at coastal areas.

³ Those who are originally from, or live in, the Sertão (authors' note).

⁴ Typical semi-arid vegetation from Northeast of Brazil (authors' note).

⁵ Raftsmen (authors' note).

Table I – Representation of inhabitants and municipalities facing the sea of the Brazilian Northeastern

Northeast States	Number of municipalities facing the sea	Total number of municipalities	% of municipalities facing the sea	Number of inhabitants of the municipalities facing the sea	Total number of inhabitants	% of inhabitants of the municipalities facing the sea
Alagoas (AL)	15	102	14,71	1.286.031	3.351.543	38,37
Bahia (BA)	30	417	7,19	4.465.565	14.930.634	29,91
Ceará (CE)	20	184	10,87	3.939.141	9.187.103	42,88
Maranhão (MA)	33	217	15,21	2.114.393	7.114.598	29,72
Paraíba (PB)	10	223	4,48	1.131.632	4.039.277	28,02
Pernambuco (PE)	14	184	7,61	3.756.964	9.616.621	39,07
Piauí (PI)	4	224	1,79	201.051	3.281.480	6,13
Rio Grande do Norte (RN)	23	167	13,77	1.530.800	3.534.165	43,31
Sergipe (SE)	7	75	9,33	832.355	2.318.822	35,90
Total Northeastern	156	1.793	8,70%	19.257.932	57.374.243	33,57

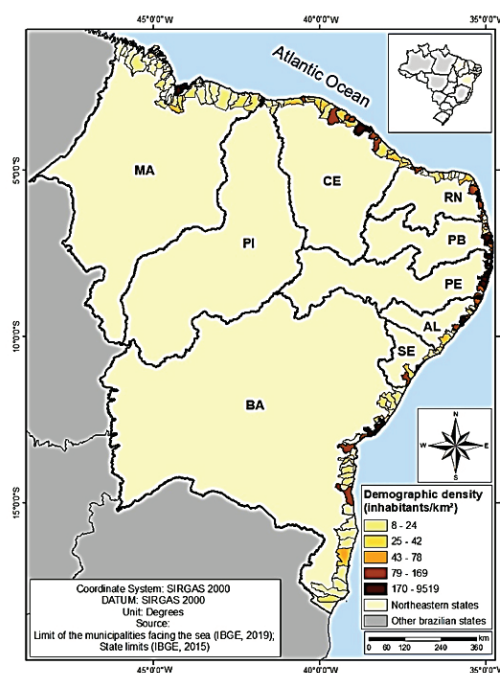
Source: authors, based on IBGE (2019).

The concentration of people living in coastal cities in the NE is better understood by means of the cartographic analysis of the demographic density data (Figure 2). The occupation rates vary along the coast, presenting a concentration of municipalities more densely populated in the States of Pernambuco, Rio Grande do Norte and Paraíba. The city of Olinda, Pernambuco, presents the highest demographic density in Brazil, 9.519 inhabitants per km². Concerning the ten State capitals with the highest demographic density; it is observed that half of the coastal cities are in the NE and, Fortaleza, Ceará, presents the highest demographic density with 8.601,29 inhabitants per km² (Table II).

Federal government actions at regional level were relevant for the NE development with investments in different economic sectors. Thus, and mostly from the Estado Novo period of the Getúlio Vargas’ dictatorial government from 1937 to 1945, there were incentives in areas such as:

- I. Construction of industrial centers;
- II. Expansion of railways and of roads infrastructure aimed at the development of inter and intra-regional connections;
- III. Creation of autarchies, companies and government agencies for planning and financing, such as: Superintendência do Desenvolvimento do Nordeste (Sudene), Departamento Nacional de Obras Contra a Seca (Dnocs), Banco do Nordeste do Brasil (BNB), Companhia Hidrelétrica do São Francisco (Chesf).

Figure 2 – Demographic density of the municipalities facing the sea of the Brazilian Northeastern



Source: authors (2021).

The Programa de Desenvolvimento Econômico e Social (PAC) and financing from Banco Nacional de Desenvolvimento Econômico e Social – BNDES (Economic and Social Development National Bank) brought more investments in housing, infrastructure and sanitation in the NE. Overall, these investments impacted the Region as a whole; however, with certain privileges to the States of Bahia, Ceará and Pernambuco (Guimero, 2017). In face of the potentialities observed along the coastline, it is noted, in this context, the development of public policies oriented to the Blue Economy, specifically to the sectors of fisheries, oil and natural gas, navigation and tourism

Table II - Ten Brazilian capital cities with the highest demographic density

Position	Capital city	Number of inhabitants	Area (km ²)	Demographic density (in inhabitants/km ²)
1st	Fortaleza	2.686.612	312,35	8.601,29
2nd	São Paulo	12.325.232	1.521,11	8.102,79
3rd	Belo Horizonte	2.521.564	331,35	7.609,88
4th	Recife	1.653.461	218,84	7.555,47
5th	Rio de Janeiro	6.747.815	1.200,33	5.621,64
6th	Natal	890.480	167,4	5.319,44
7th	Curitiba	1.948.626	434,89	4.480,71
8th	Salvador	2.886.698	693,45	4.162,79
9th	João Pessoa	817.511	210,04	3.892,09
10th	Vitória	365.855	97,12	3.766,92

Source: authors, based on IBGE (2020).

Blue Economy in Brazilian Northeast

The blue economy is fundamental to the society’s welfare regarding its capacity to provide food, energy, minerals, health, leisure and transportation. Nevertheless, coastal ecosystems are subject to a crescent pressure generated from human activities.

Considering the oceans importance, the 2015 United Nations (UN) program for ocean protection reads in its objective 14: “to conserve and sustainably use the oceans, seas and marine resources for sustainable development” (ONU, 2015). In November, 2018, took place the first global conference directed to economic aspects related to the seas – Sustainable Blue Economy Conference – in Nairobi, Kenya in order to elaborate and suggest priorities for sustainable and inclusive economic growth related to the oceans (SBEC, 2018).

To highlight the UN Decade for Ocean Sciences to Sustainable Development 2021-2030, the Unesco presented in March, 2021, the International Day of the Water consisting on educational content to alert on the fundamental role of scientific research regarding the oceans (ONU, 2021).

The economy of the sea, or oceanic economy, or yet, blue economy includes activities directly or indirectly connected to the oceans considering a specific geographical area. According to Keen, Schwarz and Wine-Simeon (2018), the concept involves “resilience of the ecosystems”, “economical sustainability”, “participation of communities” “institutional integration” and “technical capacity”. Colgan (2013) understands that the term regards to economical activities related to the oceans measured from data related to companies,

employment, income generation and the gross domestic product (GDP). Therefore, when economical activities related to the oceans are considered, they imply the relevance of coastal natural resources to the economy; therefore, it also becomes relevant the need for coastal management policies.

In Brazil, it is not possible, so far, to identify specific methodologies to collect data and statistics in order to systematically accompany the contribution of sea natural resources to the national economy. For instance, the Brazilian system of National Accounts, do not distinguish between marine and non-marine sectors.

Due to these limitations, the present study intends to assess the blue economy in Brazilian NE based on economic activities directly influenced by the sea, also including others conducted in proximity with the sea or which are part of its productive chain and do not depend directly on the sea for raw material. By doing so, it is possible to consider different opportunities generated by ocean resources, as well as to assess benefits and identify specific challenges and how to possibly overcome them by building up a general scenario starting from the 2000s.

1 Indicators related to blue economy in Brazilian northeast

Economic activities related to the oceans are rapidly expanding in connection with population growth in coastal cities. In that sense, The Organization for Economic Cooperation and Development (OECD, 2016) estimates that the ocean global economy will grow from US\$ 1.5 trillion in 2010 to US\$ 3 trillion in 2030.

Although approximately 26.6% of the population occupies the coastal zone (IBGE, 2011a) in Brazil, there is a significant lack of equivalent aggregated data, and, the attempt to disaggregate the data by regions reveals even larger statistics restrictions; fact that demands the adoption of indirect measures, as done in the present study concerning the Brazilian NE, as presented in Table III, which displays data on resident population according to gender, domicile and demographic density.

Table III - Population, gender and domicile

Geographic unit	Estimated resident population/2015 (person)	% Total				Demographic density/2015 (in habitants/km ²)
		Male	Female	Urban	Rural	
Brazil	204.860.100	48,5	51,5	84,7	15,3	24,05
Northeast	56.640.710	48,4	51,6	73,1	26,9	36,4
Alagoas (AL)	3.355.054	47,2	52,8	73,7	26,3	120,5
Bahia (BA)	14.394.167	48,4	51,6	73,9	26,1	25,5
Ceará (CE)	8.912.944	49,1	50,9	72,5	27,5	59,9
Maranhão (MA)	6.570.818	49,2	50,8	59,9	40,1	19,8
Paraíba (PB)	3.969.176	47,4	52,6	79,4	20,6	70,3
Pernambuco (PE)	9.291.857	47,8	52,2	79,5	20,5	94,7
Piauí (PI)	3.194.632	49,1	50,9	65,7	34,3	12,7
Rio Grande do Norte (RN)	3.222.471	47,7	52,3	76,8	23,2	61,0
Sergipe (SE)	2.185.749	48,7	51,3	69,3	30,7	99,7

Source: IBGE, PNAD (2015) and IBGE (2021).

In 2015, the nine States of the NE Region comprised a population of approximately 57 million people, mostly composed by women (51.6%) and by residents of urban areas (71.3%), many of these are engaged in activities directly related to the sea, for instance; tourism, fisheries and maritime transportation among others, as well as a varied range of services indirectly related to economic activities in the coastal zone.

The NE presents a particular natural, historic and cultural patrimony, consisting on a variety of artistic, gastronomic and folk attributes which determines a consistent touristic potential. Its shoreline, with 3,338 km, provides different forms of leisure activities supported by a diversified infrastructure interconnecting urban and coastal areas. Among the activities related to tourism, it is possible to highlight: transportation, vehicle-rental, accommodation, property-rental, gastronomy, travel agencies, and cultural services.

An indicator of tourism in Brazil is provided by the movement at the airports. In 2018, the total number of passengers registered in international flights was 206,880.245; the NE accounted for 16.9% (34,938.746) of that total, corresponding to 93.1% growth in the period comprising 2006-2018 (BNB, 2019).

Tourism is relevant to income generation and to the creation of new companies, and consequently, to the production of goods and services. In 2015, 3,712 travel agencies were registered as service suppliers in the NE States (Portal Brasileiro de Dados Abertos, 2021).

In order to meet the increasing demands of the sector, it is necessary to invest in infrastructure, for example, accommodation for tourists. In 2016, there were 2,194 accommodation establishments in Brazil, each, with five or more employees, approximately 50.5% (1,109) located in the NE (Table IV).

Table IV - Number of accommodation establishments with 5 or more employees (2016)

Federative Units	Number of establishments for accommodation				
	Total	Urban areas/ downtown	Urban areas/ outside downtown	Shoreline/ beach/island	Rural area/ environ- mental reserve/ ecopark
Brazil	17 033	7 272	6 085	2 194	1 482
Northeast	3791	1237	1205	1109	240
Alagoas (AL)	256	50	83	102	21
Bahia (BA)	1 266	523	326	355	62
Ceará (CE)	544	139	168	194	43
Maranhão (MA)	246	111	99	26	10
Paraíba (PB)	191	56	53	69	13
Pernambuco (PB)	609	177	234	156	42
Piauí (PI)	161	52	91	7	11
Rio Grande do Norte (RN)	361	90	95	153	23
Sergipe (SE)	157	39	56	47	15

Source: IBGE, Diretoria de Pesquisas, Coordenação de Serviços e Comércio, Pesquisa de Serviços de Hospedagem (2016).

According to a study conducted by IPEA (2015), approximately 1,938 people were engaged in activities related to tourism in Brazil, 51% in formal labor and 49% in informal jobs in December, 2013. The sector was responsible for 2.2% of the total jobs in all national territory, the NE accounts for 23% of those occupations, with 17% constituting formal jobs,

representing 23% of all occupations related to tourism in Brazil which demonstrates the potential of the NE Region.

Proceeding with the search for indicators of economic activities related to the oceans, the fisheries represent considerable economic and social influence on food production and generation of jobs and income. It constitutes important source of food and income, strategic for many communities in the NE.

Nevertheless, Ximenes and Vidal (2018) point out that in Brazil, the marine fisheries are impaired by structural and conjunctural factors, such as: overfishing, infrastructure scrapping as well as issues related to techniques and safety equipments, storage logistics, commercialization and high costs involving the production chain.

According to Ximenes (2021), from 2010 to 2018, aquaculture grew 4.94% annually, while the fisheries presented a negative result (-1.18% per year). From 2014 to 2019, the aquaculture production in the NE had a negative outcome (-0.27% per year) due to a severe drought which persisted from 2012 to 2017. However, the study notes that the NE Region accounted for 25% of the national aquaculture production in 2019, approximately 150 thousand tons.

In relation to fish foreign trade, Ximenes and Vidal (2018) report that Brazil imported approximately 3 million tons of fish, ± US\$ 3 billion in the period 2008-2017. However, the trade balance presented in the referred period an average deficit of US\$ 1 billion per year due to the lack of investment at the sector. In the NE, the average costs of imports were higher than the export costs. The products of the segment “whole fish, fresh fish, cooled fish, frozen fish and similar fishing products” represented 92.77% of exports and 73% of imports. This is consistent with the national profile of 88.92% of exports and 68.48% of imports of the same products.

Concerning the employment at fishing sector in the NE, the Region presented approximately 29% of employment contracts in the Country (Table V).

Table V - Numbers of employment contracts (2011)

Activity	Brazil	Northeast
Fisheries in saltwater	8.310	679
Aquaculture in saltwater and brackish water	5.757	5.173
Catches preservation and fish products manufacturing	14.834	2.623
Total	28.901	8.475

Source: based on BNB (2012).

In relation to the production in the period 2007-2010, the NE Region presented a growth of the extractive fisheries and marine aquaculture (Table VI).

Table VI - Northeast fishery production (tons)

Type	2007	2008	2009	2010
Extrative marine fisheries	155.625,50	182.444,50	210.965,90	195.842,10
Marine aquaculture	63.500,50	67.740,40	62.859,10	67.327,90
Total	219.126,00	250.184,90	273.825,00	263.170,00

Source: based on BNB (2012).

Another important activity for blue economy is the productive chain of oil and natural gas, which comprises exploitation, refining and transportation of the products as well as distribution and commercialization of its oil derivatives.

The oil and natural gas industry plays an important role at the extractive industry sector in Brazil, both at employment and GDP. According to Viana (2020) the oil production increased 14.4% and the natural gas production increased 27.3%, the liquefied gas responded for 15.4% in the period 2015-2019. In 2019, the Brazilian refineries processed 62.8% of the oil produced locally, 20% of that processing occurred in the NE region.

Considering the same period (2015-2019) the sales exceeded the production of oil derivatives in Brazil, demonstrating the negative impact in the trade balance. The NE region accounted for 17.2% of the oil derivatives consumption in 2019. This result is related to the GDP performance in accordance with the equivalence logic inherent to the Region and States economies' size (Viana, 2020).

Also according to Viana (2020) the supporting activities and jobs related to oil and gas sectors accounted for 63,394 employments in 2012; however, due to the falling prices of oil and the economic crisis in the Country, the following years presented a decrease in the referred sectors. The NE Region presented a smaller number of employments in 2019 when compared to 2015, with 21.7% and 22.7% respectively.

The maritime transport is another relevant activity to blue economy; due to the low costs, it is of intense use for trading among nations. Therefore, the ports structure destined to loading and unloading of goods is of strategic importance to a Country's growth. In 2019, Brazil had 36 harbor complexes which dealt with 1.1 billion tons of goods. The NE Region, in the same period, had 10 harbor complexes capable of deal with 327.4 million tons (Portal Aquaviário, 2021).

Besides the activities directly included on the assessment of the blue economy, there are those considered subsidiary in terms of aggregated value, but of extreme importance as a sustainable component for a country's growth. The Nature Conservation Units are a relevant example; Brazil, with its vast biota faces challenges in the field of marine conservation and, one of the mechanisms to protect the biodiversity is by means of the Conservation Units System. Besides conserving the ecosystems and biodiversity, this strategy may generate income, jobs, sustainable development and promote the improvement of life quality of local populations in the proximity of these protected areas (Brasil, 2011).

The benefits from the Conservation Units are shared by all civil society and involve issues related to different economic sectors, among others: quality and quantity of water in reservoirs of hydro-electrical power plants, tourism, pharmaceuticals, cosmetics and the protection of strategic resources for the Country's development as a whole due to the mitigation of greenhouse gases (Medeiros *et al.*, 2011). In Brazil, approximately 37.8% of the total protected areas correspond to marine and coastal biome (Table VII).

The indicators regarding the blue economy affect multiple aspects of the coastal zone, among others: social, ecological and urban dynamics. Thus, it raises questionings on the implication of transformations in coastal environments and in society-nature interactions.

The disorganized forms of use and occupation of the coastal space may result in environmental degradation, overexploitation of natural resources and increase of socio-environmental vulnerability (Silva & Modesto, 2011). In this context, the integrated management emerges as a possible way to safeguard the coastal and marine spaces.

Table VII – Areas of Conservation Units – by biome (2020)

Biome	Full protection (ha)	Sustainable use (ha)	Total area (ha)	%
Amazônia	42.883.300	77.559.700	120.443.000	47,2
Caatinga	2.036.500	5.717.300	7.753.800	3
Cerrado	5.845.900	11.508.900	17.354.800	6,8
Pantanal	440.100	258.400	698.500	0,3
Mata Atlântica	2.909.100	9.103.100	12.012.200	4,7
Pampa	121.800	465.900	587.600	0,2
Marinho Costeiro	12.110.800	84.259.100	96.369.900	37,8
Total	66.347.500	188.872.400	255.219.800	100

Source: SNIF (2021).

Integrated Management as a Tool for Sustainability in Marine Seashore

The socio-environmental characteristics of the seashore spaces have been modified over time in the NE territory, in which, traditional communities of artisanal fishers ‘share’ the coastal space with large cities and/or metropolitan areas in latent processes of expansion (Moraes, 2007). Thus, it becomes a challenge to scale related issues of a spatiality which is fragmented considering the political – administrative, occupation and forms of use perspectives.

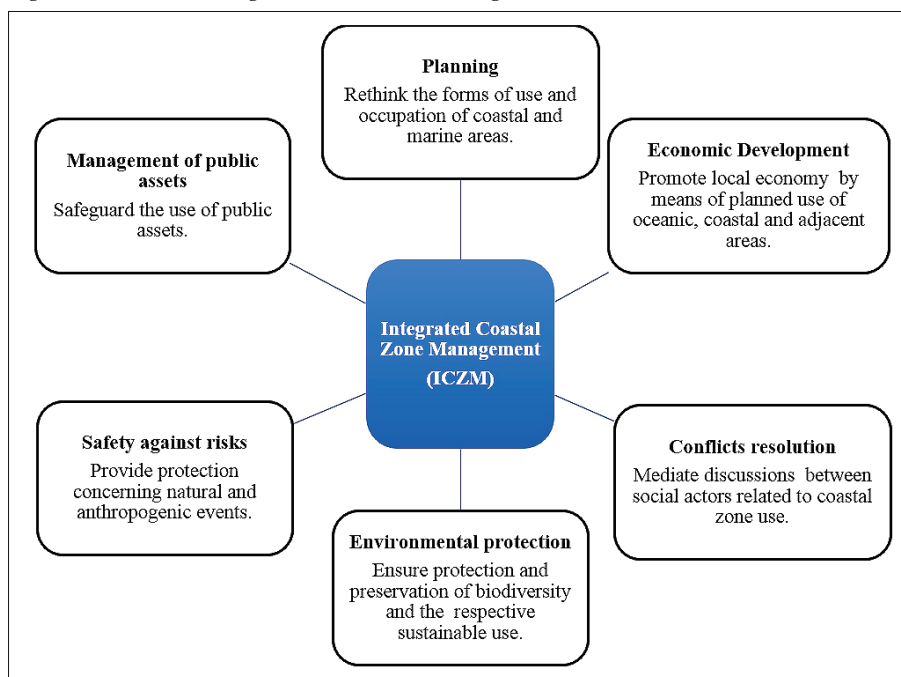
Overall, the concerns on coastal and marine protection rise from broad debates regarding the dynamics of use and occupation taking into account anthropogenic pressures on these environments. Therefore, Brazil participated, together with the rest of the world, in the debates on the urgency for coastal zones conservation (Brasil, 1992; ONU, 2015).

In this context, there have been considerable improvements to support coastal management in Brazilian territory, such as: the inclusion of the coastal zone as a national patrimony in the Federal Constitution of 1988, attributing a special attention and incentives to create policies oriented to coastal zones (Brasil, 1988a); the creation of Política Nacional de Gerenciamento Costeiro⁶ (PNGC) which is of extreme relevance to generate and carry out coastal and marine planning and monitoring (Polette & Silva, 2004); The Projeto Orla, which focus on planning the land use, aimed at territorial organization as well as patrimonial and environmental conservation from a participatory and integrated perspective (Nakano *et al.*, 2006).

According to Kitzmann, Asmus and Laydner (2004, p. 4) the search for Integrated Coastal Zone Management (ICZM) consists of “a dynamic, continuous process, by which, decisions are made and actions are taken towards the sustainable use, development and protection of coastal areas and marine resources”. This proposal overall objective is to improve the life quality of communities dependent on coastal resources, concomitantly with the preservation of ecosystems’ diversity and productivity (Gesamp, 1996). Concerning coastal management systems, six pillars are of fundamental interest according to FAO (1998), as synthesized in Figure 3.

⁶ National Policy for Coastal Management (authors’ note).

Figure 3 – Pillars for integrated coastal zone management



Source: authors, based on FAO (1998).

In that context, legal precepts, laws and decrees dealing with coastal zone management were elaborated at federal level along the past decades. These legal standards consist of basic rules defining directives to be followed by the States to elaborate their own regulations on integrated coastal management (Table VIII).

Table VIII – Principais normas federais de gestão da zona costeira

Federal Standards	Subject
Legislative Decree nº 5/1987	Endorses the UN Convention on Law of the Sea
Constitution of Federative Republic of Brazil (1988)	Enacts the Federal Constitution
Law nº 7.661/1988	Plano Nacional de Gerenciamento Costeiro – PNGC (National Plan for Coastal Management)
Law nº 9.985/2000	Sistema Nacional de Unidades de Conservação da Natureza – SNUC (National System of Nature Conservation Units)
Decree nº 4.297/2002	Regulates the Zoneamento Ecológico Econômico – ZEE (Ecological-Economic Zoning)
Decree nº 5.300/2004	Regulates the Plano Nacional de Gerenciamento Costeiro
Decree nº 5.377/2005	Approval of Política Nacional de Recursos do Mar – PNRM (Sea Resources National Policy)
Complementary Law nº 140/2011	Endorsement of federal entities concerning environmental matters
Law nº 12.651/2012	Novo Código Florestal (New Forestry Code)

Source: authors (2021).

1 The 1988 Federal Constitution and the coastal zone as a national patrimony

The Brazilian Magna Charta promulgated on October 5th, 1988 was pioneer on environmental issues; it brought a specific chapter inserted in the Title “Social Order” (Chapter VI of Title VIII); however, the environmental issues permeate its whole text, correlated with the fundamental themes of the constitutional rule (Silva, 2002).

The 1988 Federal Constitution (FC) contemplates the objectives of sustainable development, as introduced in the international scenario in 1987 by the UN Brundtland report entitled *Our Common Future*. The FC Caput of the article 225 reads:

All have the right to an ecologically balanced environment, which is an asset of common use and essential to a healthy quality of life, and both the Government and the community shall have the duty to defend and preserve it for present and future generations (Brasil, 1988a).

It is highlighted in the same article, § 4th, that: the Brazilian Amazon Forest, the Atlantic Forest, Serra do Mar⁷, Pantanal Mato-Grossense⁸ and the Coastal Zone are part of the national patrimony, and shall be used as provided by the law, under conditions which enable environmental preservation, including the use of mineral resources (Brasil, 1988a). It is relevant to note that the legislator did not include in the text, two important biomes, the caatinga and the cerrado⁹.

The coastal zone is highlighted in the FC, which imposes that its occupation and exploitation is conducted in an ecologically sustainable way considering the special protection of these spaces; thus, the constitution's declared objective is to highlight the need for conditions that ensure the environmental conservation of those biomes in Brazilian territory. In that sense, it is mandatory to acknowledge the fragility and the expressive biological diversity of those areas (Machado, 2012).

By deciding to designate the coastal zone as a national patrimony, the legislator's choice was aimed at dealing with environmental problems in general. Nevertheless, the term 'patrimony' should not be understood as public property, but, as an asset of public interest, with the declared purpose of contributing to an ecologically balanced environment, essential to a healthy quality of life (Milaré, 2014).

The management model adopted in the 1988 FC is fundamentally a Federal responsibility when it concerns to coordination and supervision at the implementation of plans and programs, with the activities involving direct execution delegated to related partners. Therefore, besides States and municipalities governments, the universities and research centers, academic community, entities of the productive sectors; NGOs and local communities affected by the plans and programs may also be a part of these processes. This way, the decentralization is a result of the current constitutional law (Moraes, 2007).

The federal law 7.661 from May, 16, 1988 created the Plano Nacional de Gerenciamento Costeiro (PNGC) as a response to the acknowledgement of the coastal zone as a national patrimony which will be further approached in this study. The regulation also occurred at states and municipalities jurisdictions, which, by means of their own laws, were allowed to institute their coastal management plans, respecting the prevalence of the national constitutional law. The regulation directed at the plans and tools to coastal management in the NE states will be subsequently addressed in this study.

The FC emphasizes the need for preventive actions by demanding a previous assessment of human activities potentially capable of resulting in environmental damages,

⁷ Mountain range extending for ±1,500 km east/south along the coast. It houses the largest protected Atlantic Forest area in Brazil (authors' note).

⁸ Steep Savannah with 124,457 km² in central Brazil. The world's largest seasonal flood plain (Branco, 2014).

⁹ Second largest biome in Brazil. Savannah vegetation, occupying more than 2 million km² (ISPN, 2021).

the FC also makes it mandatory a prior environmental impacts study (art. 225, IV). Thus, it becomes irrefutable the obligation to act preventively in relation to existing damages as well to prevent potential environmental damages whenever they can be anticipated; important rule for coastal zone protection.

As delimited in the FC, the competence on the environmental protection, anti-pollution measures, and preservation of forests, fauna and flora is common to all federal entities: the Union itself, States, Municipalities and the Federal District (Brasil, 1988a). Accordingly, administrative measures, such as: environmental licensing, creation of conservation units, monitoring activities and/or construction works potentially harmful to the environment is a shared responsibility of all federal entities.

The sole paragraph of the article establishes the need of a complementary law which will determine “regulations for mutual cooperation involving the Union and the States, the Federal District and the Municipalities, considering the balance between development and welfare in a national level” (Brasil, 1988a). Due to the absence of a regulatory norm, there were frequent conflicts of competence involving the Union and the States, specially, on activities and construction works potentially harmful to coastal zones. The competence issue was finally regulated in 2011 by means of the complementary law nº 140, which designated the respective administrative actions to the federal entities.

With respect to the Union actions delimited by the complementary law 140, it is been designated, among others: to promote actions related to the Environment National Policy at national and international level; to engage in environmental zoning at national and regional levels; to define territorial spaces and its components to be specially protected; and, to promote environmental licensing of activities and ventures located or developed in the territorial sea, continental shelf or at the Exclusive Economic Zone (Brasil, 2011b).

2 The National Plan for Coastal Management and its stewardship tools

The constitutional protection of the coastal zone does not prevent its use; however, it is necessary to observe its resources protective and preservationist norms. The infra-constitutional law determines the overall parameters and defines the criteria for natural resources exploitation and land occupation at these spaces (Sirvinskis, 2018).

The PNGC is part of the Política Nacional para os Recursos do Mar (PNRM) and subordinated to the principles and objectives of the Política Nacional do Meio Ambiente (PNMA); The PNGC, was instituted by the federal law 7.661 on May, 16, 1988. It aims specifically to guide the rational use of resources at the coastal zone in order to contribute to the improvement of the population’s life quality as well to protect the natural, historic, ethnic and cultural patrimony. Besides, it defines principles, objectives and tools oriented to meet the demands for actions oriented to land planning and occupation. Based on the PNGC, the Brazilian juridical system can count on norms responsible for the general directives for coastal management in a national scenario (Melo, 2013).

In order to operationalize the PNGC, Brazil developed the Programa Nacional de Gerenciamento Costeiro¹⁰ (Gerco) aimed at planning and managing, in an integrated, decentralized and participatory way, the socio-economic activities at the coastal zone in

¹⁰ Coastal Management National Program (authors’ note).

order to guarantee the sustainable use by means of controlling, protecting, preserving and recovering natural resources and coastal ecosystems.

The PNGC main objective is the seashore zoning of uses and activities as well as to prioritize conservation and protection, among others, of the following assets: renewable and non-renewable natural resources; coral reefs, seaweed beds, coastal and oceanic islands; river, estuary and lagoon systems, coves and bays; beaches; rocky coasts and marine caves, sandbanks and sand dunes, seashore forests, mangroves and seagrass beds; ecological sites with cultural relevance and other permanent preservation natural units as well as monuments integrating the natural, historical, paleontological, speleological, archaeological, ethnical, cultural and scenic patrimony (Brasil, 1988b).

On Dec. 7, 2004, the PNGC Law was regulated by the federal Decree 5.300. The text included several concepts and establishes that the Brazilian coastal zone, considered national patrimony corresponds to the geographic space of air, sea and land interactions, including its resources, renewable or not, covering a determined maritime and terrestrial strip.

The essential integrated coastal management instruments, instituted by the decree 5.300, which make possible the appropriate use and occupation of the coastal zone are displayed in Table IX.

Table IX - PNGC instruments and purposes

PNGC instruments	Purposes
Plano de Ação Federal da Zona Costeira ¹ (PAF)	Federal competence, synthesizes conceptions and responsibilities for planning and managing the coastal zone and the assessment of material, strategic and legal aspects of this competence as well as obligations determined by international treaties, which Brazil has adhered.
Plano Estadual de Gerenciamento Costeiro ² (PEGC)	Legally established, explicit the PNGC developments towards the implementation of the Coastal Management State Policy, includes the definition of responsibilities and institutional procedures for its completion.
Sistema de Informações do Gerenciamento Costeiro ³ (Sigerco)	A component of the Environmental National System of Information (SINIMA) constitutes itself as a PNGC integrated system of information on the environment; it derives from a data base as well as from geographic information systems and remote-sensing. It shall provide support and capillarity to the sub-systems structured - managed by the States and Municipalities.
Sistema de Monitoramento Ambiental da Zona Costeira ⁴ (SMA)	It is the operational structure of data and information collection designed to accompany, continually, the coastal zone indicators of socio-environmental quality and to propitiate a permanent support to the management plans.
Relatório de Qualidade Ambiental da Zona Costeira ⁵ (RQA-ZC)	Procedure of periodic consolidation of the results obtained by means of the environmental monitoring and, particularly, the efficiency of the measures and actions developed. This report will be periodically elaborated by the National Coordination of Coastal Management from the reports developed by the States Coordinators.
Macrodiagnóstico da Zona Costeira ⁶	Territorial management apparatus predicted by the Brazilian legislation which gathers information in a national level on the physical-structural and socio-economic coastal characteristics.
Zoneamento Ecológico-Econômico Costeiro ⁷ (ZEEC)	Territorial planning guidance instrument necessary to obtain the coastal zone environmental sustainability conditions in consonance with the national territory ZEE directives.

Source: authors, based on Brasil (2004).

Among the instruments mentioned above, the ZEEC is an important PNGC tool. Initially, it consisted in a PNMA instrument instituted by the federal law nº 6.938/81 firsts

denominated as environmental zoning, this management tool, comes with the objective of reconciling economic development with areas to be protected, always considering the life quality of present and future generations (Melo, 2019). However the environmental regulation, took place only in 2002 by means of the federal decree no. 4.297 with the new denomination of ecologic-economic zoning.

There are disagreements related to environmental zoning and ecologic-economic zoning as being synonyms. Both terms have the same meaning regarding the PNMA purpose, which objective is the preservation, improvement and recovery of environmental quality conducive to life; aimed at, in Brazil, to ensure conditions to socio-economic development, the interests of national security and protection of human life dignity (Melo, 2019). Therefore, the PNMA predicts in its scope, preservation and socio-economic development, which consists of economic growth with social improvements (Sampaio & Vital, 2015). The federal decree n° 5.300/2004 establishes that the ZEEC shall guide the territorial planning processes, required to obtain sustainability conditions to the development of these spaces.

The territorial planning must be in accordance with the ZEEC national territory directives, consisting as a mechanism to support the monitoring, licensing and management actions. In order to use the ZEEC as criteria for environmental licensing, rigorous parameters shall be established concerning the bid processes and technical staff involved, considering the invaluable future relevance of the ZEEC (Bastos & Silva, 2010).

Thus, the ZEEC is an important space planning tool for coastal zone and, for this reason, subsidize the environmental licensing, monitoring and management of activities conducted at the territorial sea, continental shelf and economic-exclusive zone by means of the segmentation of these spaces and the delimitation of their allowed and not allowed uses.

The decree does not determine that the States shall elaborate the ZEEC, the sole paragraph of art. 15 reads that the State entities which do not have the ZEEC will seek guidance on other tools for territorial regulation, such as regional zoning, conservation units zoning and socio-environmental diagnosis which allow assessing the socio-economic and natural conditions related to the implementation of new ventures (Brasil, 2004a).

3 The Northeast and the coastal zone rules

In this section, we approach the laws and decrees which deal with coastal management at the nine States of the Brazilian NE Region. It will be analyzed the existence of PEGC and ZEEC in each State, both considered fundamental tools for coastal management predicted in the PNGC.

The PNGC establishes that the States may develop; based on the law, the respective PEGC according to rules and directives of the National Plan as well as the related law, besides designating the competent bodies to conduct the referred plans (Brasil, 1988b). By means of planning, each Federal State shall guide the present tendencies towards sustainable use patterns. By means of management, the State agencies aim at mediating the conflicts of use, supporting possible consensus or interceding for one of the parts via creation of forums, legitimacy of plans and projects or even making exceptions, respecting the established limits of the regulations (Moraes, 2007).

The law which institutionalized the PNGC reads in its article 5, paragraph 1, that the States may create their own PEGC based on the creation of specific legislation (Brasil,

1988b). Therefore, the table 10 displays only the NE States PEGC created by means of law. However, the Ministério do Meio Ambiente¹¹ (MMA) argues that the “PEGC also known as GERCO” has been an important ally in the formulation of specific legislation referring to the coastal zone as well as at the implementation of the Projeto Orla in the Municipalities (Pereira & Oliveira, 2015, p. 170).

Considering the perspective of analyzing, on States scale in the NE, the State of Alagoas has a State Program of Coastal Management, which main objective consists in “ensure the sustainable use through measures of control, protection, preservation and recovery of natural resources and coastal and marine ecosystems” (IMA, 2015, p. 1). However, there is no Law institutionalizing the PEGC. The State Decree no. 4.098 of Jan. 14, 2009, establishes the Projeto Orla for the State, also creating the State Coordination and the Technical Commission responsible for accompanying the seashore integrated management project (Alagoas, 2009).

It was developed a proposal of ZEE to the State coastal zone (Northern Coastline, Central Coastline and Southern Coastline) coordinated by the Universidade Federal de Alagoas (UFAL) in partnership with State and Federal governments, which will consist in the basis for the development of a territorial zoning and planning of all coastal zone in Alagoas.

The Bahia State Decree n° 10.969 of March 14, 2008 creates the Coordination of the PEGC and the Bahia State Technical Commission to accompany the Projeto Orla - CTE/ Bahia. However, the State does not have the PNGC as well as the ZEEC. However, it has a ZEE which comprises all its territory. The State Decree n° 14.530 of Jun. 4, 2013, regulates its implementation. According to information of the MMA, it has been finished the planning, diagnosis and prognostics, and the management proposal is in progress (Bahia, 2021).

In 2006, the State of Ceará created its PEGC through the State Law n° 13.796 of Jun. 30. This law establishes the policy which comprises a “set of definitions, principles, objectives, directives, instruments and activities oriented to guide the governmental action and the civil society on the sustainable use of the environmental resources of the State’s coastal zone” (Ceará, 2006). On the text of the Law, it were delimited the areas referring to the ZEEC, but the instrument has not been regulated so far. The ZEEC review process was resumed in 2013, taking as a premise the “restructured an updated mapping of the ZEE of the State Coastal Zones as well as of its Conservation Units.

The State of Maranhão, by means of the Decree n° 28.729 of Dec. 4, 2012, creates the State Technical Commission for Projeto Orla; however did not implemented its PEGC. Despite the absence of the ZEEC, there is the Maranhão State Macro-ZEE, regulated by State law n° 10.316 of Sept. 17, 2015. In the referred law, the coastal zone corresponds to zone 3, which consists in areas under coastal influence, predominantly, characterized by the lowland coast, deflation plains, sand dunes, flat-topped coastal areas, estuary complexes, sandbanks, mangroves, beaches, bays, islands, stationary dunes, delta systems and lake basins (Maranhão, 2015).

The Paraíba State Decree n° 12.254 of Dec. 3, 1987, created the State Commission for Coastal Management; however, it did not implement its PEGC and ZEEC. The State Decree n° 15.149/1993 created the Ecologic-Economic Zoning Project of Paraíba and the State Commission

¹¹ Ministry of Environment (authors' note).

for the ZEE. In this sense, it was initiated a process of zoning in the Borborema mesoregion focusing on the desertification expanding process; the project is in the diagnosis stage.

The State law nº 14.258 of Dec. 23, 2010 accounts for the Pernambuco State PEGC and defines the coastal ZEE as one of the PEGC instruments (Pernambuco, 2010). The State elaborated two ZEECs, one for the southern coastline regulated by the Decree nº 21.972 of Dec. 29, 1999 and another one for the Northern coastline – Decree nº 24.017 of Feb. 07, 2002. The development of the ZEE for the Metropolitan Core of Recife is being elaborated.

The State of Piauí did not create its PEGC. However, it established the Inter-institutional Coordinating Commission for the ZEE, instituted by the State Decree nº 14.504/2011. The State developed and concluded the Macro-ZEE, but did not regulate it so far.

It has not been found in the legislation, a specific law regarding the Rio Grande do Norte State PEGC. Yet, the State law nº 7.871/2000 provisions the Western coastline ZEEC. The ZEEC was compartmentalized in two zones, the Interior Coastal Zone and the Special Coastal Zone comprising a total of 17 Municipalities (Rio Grande do Norte, 2000). The Northern Coastline ZEE is being elaborated.

The State law nº 8.634/2019 instituted the Sergipe's Plan and the Coastal Zone Management System as well as the Coastal Zone Management State Council and correlated measures (Sergipe, 2019). The Sergipe State ZEE is being elaborated, the diagnosis stage has already been concluded.

By analyzing the NE States regulations on Coastal Zone, it is possible to observe the delay concerning the provision of the management coastal plans and coastal zoning. Of the nine States of the Region, only Ceará, Pernambuco and Sergipe developed the PEGC, instituted by law.

The ZEEC current situation is of more concern, since only the States of Pernambuco and Rio Grande do Norte provisioned their coastal zoning according to the law. Although the State of Ceará designed its ZEEC in 2006, it has never been regulated. The ZEEC regulation is essential for its applicability, since the spatial distribution of economic activities is directly related to ecosystem-based limitations and fragility, demanding prohibitions, restrictions and alternatives to territorial exploitation; the due regulation may also indicate the possible relocation of activities considered incompatible with the general directives of the ZEEC (Brasil, 2002).

It becomes clear the ZEEC regulation by means of a State Decree constitutes an important tool to sustainable territorial planning. The ZEEC is fundamental for environmental licensing; it provides a compartmentalization of the coastal zone, resulting in the possibility to designate the permitted and prohibited forms of use. Nevertheless, the ZEE itself must be accompanied by the enforcement of the environmental legislation, specially, those related to the coastal zone (Melo, 2013).

After thirty three years of the PNGC creation, the Pernambuco is the only State in the NE Region to institute two essential instruments to coastal zone management, the PEPG and the ZEEC. Though the objective here is to point out the existence, or not, of the referred instruments; it is relevant to highlight the importance of the qualitative analysis to assess the results of both instruments (Andrade & Santiago, 2020). The Table X presents a synthesis of PEGC and ZECC in the NE States.

Table X - PEGCs and ZEECs in Brazilian Northeast

State	PEGC	ZEEC	Observations
Alagoas (AL)	No	No	- Instituted Projeto Orla for the State coastline (Dec. 4.098/2009). - ZEEC under development.
Bahia (BA)	No	No	- State Decree 14.530/2013, regulates the implementation of Bahia ZEE. - State Decree 277/1991, instituted the ZEE State Commission. - State Decree 10.969/2008 created the Program GERCO/BA.
Ceará (CE)	Yes (State Law 13.796/06)	Yes (not regulated)	- PEGC Law instituted the ZEE and established the zones. - Mapping and diagnosis of ZEEC are currently being updated.
Maranhão (MA)	No	No	- State Decree 28.729/2012 creates the State Technical Commission for Projeto Orla.
Paraíba (PB)	No	No	- State Decree 12.254/1987 created the Management State Commission. - State Decree 15.149/1993 created the Ecologic-Economic Zoning Project and instituted the ZEE State Commission.
Pernambuco (PE)	Yes (State Law 14.258/ 2010)	Yes (State Decrees 21.972/1999 and 24.017/ 2002)	- Pernambuco Southern Coastline ZEE regulated by State Decree 21.972/1999. - Pernambuco Northern Coastline ZEE regulated by State Decree 24.017/2002.
Piauí (PI)	No	No	- State Decree 14.504/2011 created the ZEE Inter-institutional coordinating Commission. - Macro-ZEE developed but not regulated.
Rio Grande do Norte (RN)	Yes	Yes (State Law 7.871/ 2000)	- Northern coastline ZEE under development.
Sergipe (SE)	Yes (State Law 8.634/ 2019)	No	- State ZEE under development; diagnosis already concluded.

Source: authors (2021).

3.1 The Projeto Orla and the coastal participatory planning in the NE

In the context of coastal planning and management tools, the Projeto Orla, a tool for participatory management of the coastal zone, was provisioned by the Federal Decree 5.300/2004 which regulates the Federal Law 7.661/1988 establishing the Coastal Management National Policy. It consists in a management strategy in local scale, of optional adhesion for Municipalities which intend to deal, in an environmental perspective, with multiple uses and human activities considering potential pressures on sandbanks, mangroves and estuaries among other ecosystems (Brasil, 1988b, 2004b).

The main product of the Projeto Orla is the Plano de Gestão Integrada¹² (PGI), which consists in a document articulated by Institutions responsible for historic, environmental and cultural patrimony in Federal, State and Municipal level with the participation of social actors (Brasil, 2004b). The participatory aspect, meet a current demand originated from the fundamentals of integrated coastal management as well as the directives recommended at the

¹² Integrated Management Plan (authors' note).

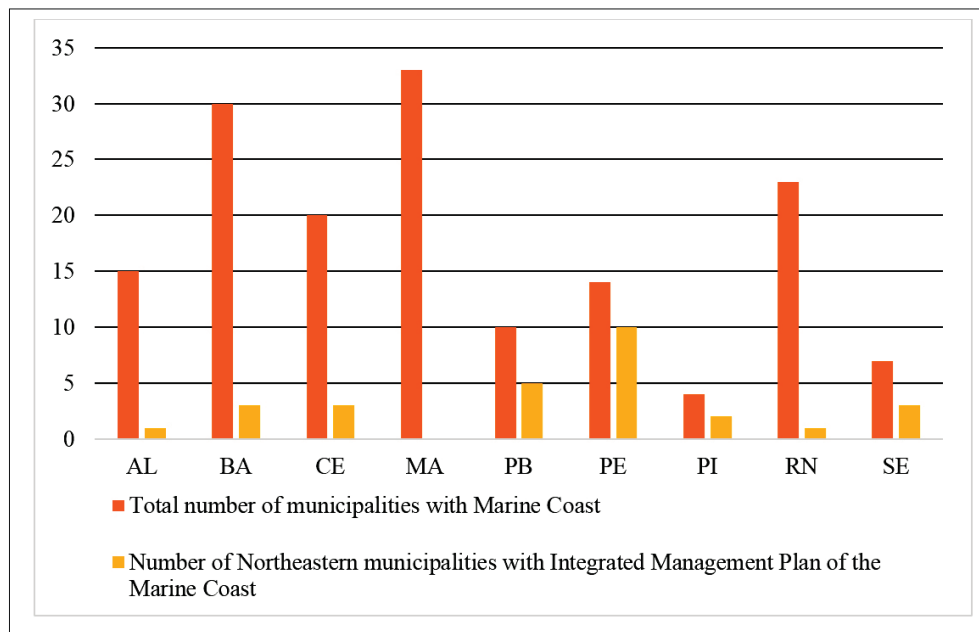
national coastal zone management plans, that is, the spatiality discussions and debates processes occur in a democratic and decentralized way (Brasil, 2006).

The participation of all civil society sectors in a certain coastal area is, therefore, essential; for instance: for conflicts mediation, definition of conservation areas, the suitability of irregular occupations, economic activities and sport practices zoning. Actually, there are many possibilities; what determinates which actions will be approached is the local reality as well as the local population engagement to Projeto Orla.

In the past recent years, the Projeto Orla has become a mandatory instrument for some Municipalities. The Federal Law 13.240/2015 allows the Municipalities to manage federal properties, for instance, the naval coastal lands, when specifically request by the Municipality; one of the conditions for the concession is the elaboration of a management plan in no longer than three years (Brasil, 2004b, 2015a).

The adhesion to Projeto Orla in the NE Region is not high (Figure 4). Considering the total coastal Municipalities, only 18% finalized all the stages of Projeto Orla and elaborated the PGI. The State of Pernambuco presents the highest proportion of Municipalities which elaborated the PGI (71%) followed by Alagoas and Piauí (50% both) and Sergipe (43%); these 4 States present the most expressive percentages (Table XI).

Figure 4 - Northeastern municipalities with the Integrated Management Plan of the Marine Coast



Source: Municípios (2021).

The State of Maranhão, with the largest number of cities bordering the sea, does not account for any final product of Projeto Orla. The Other States have presented significant rates of adhesion in the past 16 years, since the Projeto Orla was created, raising questionings on the reasons for such low adhesion.

Despite the significant improvement on the legislation and on the support to coastal management, there are still challenges, such as, raising the awareness of public managers about the importance of Projeto Orla. However, the possibility of transferring the administration of naval coastal land may be an incentive for other Municipalities adhesion to Projeto Orla.

Table XI – Number of Northeastern municipalities with Integrated Management Plan of the Marine Coast vs Number of municipalities with Marine Coast (%)

States	Number of Northeastern municipalities with Integrated Management Plan of the Marine Coast	Total number of municipalities with Marine Coast	Percentage %
Alagoas (AL)	1	15	7
Bahia (BA)	3	30	10
Ceará (CE)	3	20	15
Maranhão (MA)	0	33	0
Paraíba (PB)	5	10	50
Pernambuco (PE)	10	14	71
Piauí (PI)	2	4	50
Rio Grande do Norte (RN)	1	23	4
Sergipe (SE)	3	7	43
Total	28	156	18

Source: Municípios (2021).

Considering the current scenario of coastal areas in Brazil, and, more specifically in the NE, it is urgent to develop efforts to adopt coastal planning measures. The management of conflicts and coastal ecosystems conservation shall be prioritized, since human interference has negatively affected the ecological services, fishery resources and coastal protection among others as well as coastal communities' identity.

Therefore, the strengthening of Projeto Orla shall be priority for all institutions responsible for its coordination, considering the popular protagonist characteristic and the possible articulation with different public and private sectors, essential for an efficient and sustainable management. In this sense, communities involved in traditional activities, such as the artisanal fishery, present along the entire Brazilian coast, will have the opportunity to participate in the decision making processes concerning marina coastal planning.

The multiple roles of fisheries and artisanal fishers in the coastal socio-environmental sustainability in the Ne

Traditional communities are intrinsically inserted in the core of the debates regarding sustainable societies and activities. In that context, it becomes relevant to better understand the historical roots and developments, as well as the current status and perspectives to the future of artisanal fishers as perpetrators of sustainable fisheries. As a starting point, it is necessary to envision the varied socio-cultural, economic and ecologic interconnections involving the artisanal fisheries in the face of pressures which permeate the very continuity of the activity and of artisanal fishers as a traditional society.

The Brazilian national policy for sustainable development of fisheries defines artisanal fishery as: "Directly performed by professional fishers, autonomously or under family economy regime, with their own means of production or through partnership contracts, landed or using vessels with gross tonnage under 20 tons." (Brasil, 2009, p. 15).

It is common knowledge that, in the scope of socio-environmental sustainability, the current model of industrial marine fishing exploitation has caused the depletion of fish

stocks, raising questionings on sustainable alternatives, among others, the artisanal fisheries. According to Diegues (2000, p. 91), artisanal fishers communities are characterized by their respect to natural resources conservation and use of techniques that allow the renovation of stocks while generates low impacts on ecosystems and ecological processes.

Within this context, Diegues (2006, p. 9) reinforces that among other traditional fishing societies in Brazil, the artisanal coastal fishermen depend almost entirely on fishing to survive, possessing deep knowledge concerning marine habitats as well as on navigation and catching techniques well adapted to different ecosystems and biological species along the coastal zone in Brazil; however, the artisanal fishery is characterized by a reduced scale of production, which is destined to livelihood and local trading.

Therefore, one may infer that the selective catching techniques in accordance with fish stocks renovation and environmental conservation, the respect to biological species reproductive cycles as well as the reduced scale of production, configure the artisanal fisheries as a sustainable activity.

The Code of Conduct for Responsible Fisheries (FAO, 2011), connects the concept of artisanal fisheries to responsible fishing, thus, to the sustainability of artisanal fisheries; meanwhile, it also suggests that National States should grant artisanal fishers the preferential access to areas traditionally associated with artisanal fisheries under their jurisdiction.

Considering the authority to legislate in coastal areas, is for Brazilian State to adopt measures concerning the planning of coastal spaces in order to guarantee not only the access, but also the ecologic and social-cultural preservation of artisanal fishers' territory, which origins are, in turn, intertwined with Brazil's history.

The artisanal coastal fisheries communities' constituent elements, the way we know it in Brazil nowadays, have actually emerged from the combined influence of Brazilian indigenous, European and African peoples. In colonial Brazil, small groups dedicated to coastal fishing and agriculture, established themselves nearby the most expressive cities at the time, in which they traded their small surplus production, including fishes and other seafood (Mussoline, 1953, p. 82).

In the historic panorama, those small groups represent the early stages of coastal artisanal fishers' traditional communities, which persevere in present days by means of a social organization model intrinsically dependent on the sea. The Brazilian legislation (Brasil, 2007) defines traditional communities as:

Culturally differentiated groups, with self-recognition as a group possessing a distinct traditional culture, with their own ways of social organization, occupying and using territories and natural resources as a condition to their cultural, social, religious, ancestral and economic reproduction; also using knowledge, innovations and practices both generated and traditionally transmitted.

The acknowledgement of territorial occupation as a condition for the reproduction of the traditional communities' way of life, as delineated in Brazilian legislation, admits the interpretation of the coastal spaces occupied by artisanal fishers as their traditional territory.

According to Haesbaert (2004, p. 4), the category territory aggregates cultural identity to function - with a view to natural resources use; thus, the territory acquires such representativeness that losing it, may result in the disappearance of the group as a traditional community. Therefore, it is reasonable to infer that the continuity of the

traditional way of life, that is, the socio-cultural, economic and sustainable use of natural resources is inherent to the very existence of the artisanal fishers' territory.

With that regard, socio-economic phenomena and processes such as the growth of cities, tourism and maritime vilegeiature among other vectors of conflicts, may inflict a foreign functionality in substitution to the native previous one, constitutive of the fishers' territory, presenting a potential scenario which may result in the exclusion from their traditional territory (Andrade, 2020, p. 57).

The coastal space occupation, in the case of artisanal fishers, demands environmental public policies specifically oriented to contemplate territorial management. In this regard, Siqueira (2008, p. 426) points out the efficiency of such policies, whenever public participation is included in their planning. From that perspective, the artisanal fishers' knowledge entitles their participation on the decision making processes concerning the planning of coastal areas on a local scale.

Regarding the connections involving traditional knowledge and environmental perception (EP), Diegues (2000, p. 87) reports that traditional communities of artisanal fishers perceive and interpret the structures of nature by means of, and based on traditionally transmitted knowledge which strongly influence the sustainable use and management of natural resources, also influencing the sense of belonging in a traditional territory.

In a convergent view, Albuquerque and Alves (2014, p. 20) reflect that traditional knowledge "includes perceptions and explanations on the landscapes, geomorphology and relationships between living organisms and natural environment". Thus, it is possible to identify a complex and varied repertoire of constitutive elements as part of the artisanal fishers' knowledge, built upon traditional knowledge combined with day-to-day new experiences originated from a rapidly changing world, making it possible to include new facts to their perceptions.

In that sense, the EP of artisanal fishers may expand itself due to the cognitive interpretation of new elements added to traditional knowledge. In this sense, the expanded knowledge regarding the local environmental reality, may represent an important source of information to the Integrated Coastal Zone Management (ICZM) aimed at conciliating ecological, social and economic aspects of coastal areas, in addition, it promotes the insertion of artisanal fishers in the marine environmental debates.

A possible consequence generated by conflicting relationships related to coastal space production resides in the possible migration of artisanal fishers to other occupations, in detriment of the artisanal fisheries. Generally, ICZM involving artisanal fishers' territories deals with conflicting relationships with touristic activities, industrialized and/or densely populated areas. In that sense, Gianella and Torres (2020, p. 359-360) elucidate that socio-economic space production may disaggregate fishers communities from their traditional ways of being and behaving in the world.

As an example, the case of artisanal fishers in the municipality of São Miguel dos Milagres, State of Alagoas, Northeast of Brazil, well illustrates the massive migration of artisanal fishers to activities related to tourism, such as the transportation of tourists to the natural swimming pools at the coastal coral reefs, followed by the potential threat to this ecosystem; in this case, the abandonment or/and migration are also related to the low profitability of the local artisanal fishery (Andrade, 2020, p. 75-76).

However, also in the Northeast Region of Brazil, many coastal fishers persist in artisanal fisheries disregarding the adversities. For instance, in the State of Ceará, artisanal

fisheries are responsible for the livelihood of several fishing communities while also supplies for local and regional markets. Braga (2021, p. 18) highlights that marine artisanal fishery accounts for more than 60% of all fisheries production in Ceará, while registers 5.733 artisanal fishing vessels in the State (Braga, 2021, p. 106).

In Fortaleza, the capital city of Ceará, there are 2.500 fishers affiliated to Fishers' Colony Z-8; the fisherwomen represent 10% of the total, and dedicate themselves, mostly, to fishing at mangroves and beaches; the fishermen constitute 80% and are engaged in marine fishing; while 20% act in continental fisheries (Menezes *et al.*, 2019, p. 282). So, considering the quantitative of Fortaleza's artisanal fishers and artisanal fisheries production in Ceará makes it possible to project the potential relevance of the socio-economic role of artisanal fishers to other coastal States in Brazil.

In light of the Bases for Integrated Coastal Management already mentioned in this study, that is: Economy of the Sea, Sustainability and the Law of the Sea, it is possible to briefly envision the intertwinement of artisanal fishery with the multiple dimensions which compose the large spectrum of Brazilian coastal environment features. Therefore, it becomes evident the connections of artisanal fisheries regarding fisheries sustainability, environmental conservation, socio-cultural relevance, importance of fisher's knowledge for management and economic development as well as the rights of traditional coastal communities among other features. In that sense, it is highlighted the potential role of artisanal fishers for socio-environmental coastal sustainability in Brazil.

CONCLUSIONS

As presented throughout this study; economy, law and sustainability are important aspects for the NE coastal zone integrated management. These aspects are organically interconnected, explaining how the coastal spaces are intertwined and how the management should be conducted. The fishery and touristic potential stand out in the NE economic scenario, significantly contributing to national fishing prospects and the scenic beauties along the NE coast clearly indicate its touristic vocation.

The advances in federal legislation are indispensable to guide coastal management. However, the effectiveness of management does not materialize itself satisfactorily due to the NE States incipient adhesion to management instruments such as ZEEC and Projeto Orla, as well as the low representativeness concerning the creation of State Management Plans.

The sustainability balance comprising economy, law and society is one the challenges for 21st century. Planning and management of natural resources shall be anchored in practices which ensure the social welfare nowadays as well as for future generations. Concerning the regional context discussed in this study, the artisanal fishermen representativeness in the coastal zones matches the iconic character of the sertanejo in semi-arid central areas of the NE. Thus, we emphasize the need for engagement in public policies which advocate the decentralization and participation of social actors in the decision making processes and in the search for solutions concerning potential and existing conflicts.

With regards to Sea Economy, the Brazilian NE presents environmental features well-suited for its sustainable development. The economic activities described herein, directly and indirectly related to sea economy well express the relevance of the economic

related sectors. Nevertheless, there are challenges to overcome in order to make possible the best use and appropriation of natural resources in terms of sustainability, efficient and fair allocation.

In order to overcome challenges, we highlight the need for a long term planning to accomplish the development of sectors dependent on public investments, for instance: to foster specific scientific studies conducted by educational and research institutions; the international cooperation in order to stimulate innovation and accompany world trends; the strengthening of oceans integrated management and the provision of statistics data base with consistent information oriented to support the elaboration of public policies as well as to guide specific actions to be developed by coastal States.

It is of fundamental importance to consider the juridical-administrative approach comprising the regulation of natural and social systems whenever the coastal zone planning and management are in evidence. The Brazilian environmental legal framework is of great relevance for coastal management. The 1988 Federal Constitution indicates in its text the coastal biomes as national patrimony; in that same year, it was created the PNGC, its regulation occurred in 2004 and detailed important instruments such as State Policies and ZEEC. However, concerning the States, more specifically the NE States, it is possible to observe the slow construction of coastal management tools, indispensable to build up State and Municipal public policies, for instance, the Projeto Orla.

The territorial planning of the coastal zone, encompassing marine and continental portions is fundamental for economic and socio-environmental policies; it is clear, considering the concept of sustainable development, the need for harmonic coexistence between economic growth and environmental preservation.

The management tools shall be elaborated in consensus from a broad democratic participation, towards planning the use and occupation of the coastal zone in a sustainable way by means of actions and responsibilities shared by public administration and civil society. However, it is primordial to highlight that, despite the existence of a solid juridical system encompassing socio-environmental and economic aspects of the coastal zone; its effectiveness may not be accomplished if the decision makers do not cooperate among themselves in order to reach a consensus towards two indispensable requisites: environmental protection and improvement of local population life quality.

REFERENCES

Aguiar, T.C. *Planejamento ambiental: o desafio da interação sociedade/natureza*. Rio de Janeiro: Consequência Editora, 2016.

Alagoas. Decreto nº 4.098, de 14 de janeiro de 2009 [...]. *Diário Oficial do Estado*, 15 de janeiro de 2009. Available in: <http://www.semarh.al.gov.br/meio-ambiente/projeto-orla>. Accessed on: 2 May 2021.

Albuquerque, U.P. & Alves, G.C.A. O que é etnobiologia?, in Albuquerque, U.P. (org.). *Introdução à etnobiologia*. Recife: NUPPEA, 2014.

Andrade, J.A.P. *Pesca artesanal, turismo e impactos socioambientais: a percepção ambiental dos pescadores na APA Costa dos Corais (Alagoas/Brasil)*. 2020. 127 f. Dissertação (mestrado em Ciências Marinhas Tropicais), Programa de Pós-Graduação em Ciências Marinhas

Tropicais, Instituto de Ciências do Mar (Labomar), Universidade Federal do Ceará, Fortaleza, 2020.

Andrade, J. & Santiago, A.G. O zoneamento ecológico econômico costeiro e os desafios da gestão costeira integrada. *Revista Gestão e Planejamento*, Salvador, v. 21, p. 438-455, jan./dez. 2020. Available in: <https://revistas.unifacs.br/index.php/rgb/article/view/6575>. Accessed on: 2 May 2021.

Bahia. Secretaria de Meio Ambiente (Sema). *GERCO: estrutura e funcionamento na Bahia*. 2021. Available in: <http://www.meioambiente.ba.gov.br/modules/conteudo/conteudo.php?conteudo=141>. Accessed on: 12 Mar. 2021.

Bastos, F.H. & Silva, E.V. O zoneamento ecológico econômico como subsídio aos procedimentos de licenciamento ambiental na zona costeira do estado do Ceará-Brasil, in *Anais do Seminário Latino-Americano em Geografia Física, 6.*, Coimbra, Universidade de Coimbra. Coimbra, 2010. Available in: <http://www.uc.pt/fluc/cegot/VISLAGF/actas/tema4/frederico>. Accessed on: 20 Apr. 2019.

BNB. Banco do Nordeste do Brasil. *Conjuntura econômica: Edição especial 2019*. Fortaleza: BNB, 2019. Available in: <https://www.bnb.gov.br/etene/conjuntura-economica>. Accessed on: 2 May 2021.

BNB. Banco do Nordeste do Brasil. *Pesca e aquicultura no Nordeste*. Fortaleza: Banco do Nordeste do Brasil, 2012. Available in: https://www.bnb.gov.br/documents/88765/89729/pesca_aquicultura_2012.pdf/3647942b-9548-4c3f-9bc9-e469d654a1d6. Accessed on: 3 May 2021.

Brasil. Lei nº 6.938, de 31 de agosto de 1981. *Diário Oficial da União*, 2 de setembro de 1981. Available in: http://www.planalto.gov.br/ccivil_03/leis/L6938.htm. Accessed on: 20 Apr. 2021.

Brasil. Decreto Legislativo nº 5, de 9 de novembro de 1987. Aprova o texto da Convenção das Nações Unidas sobre Direito do Mar, concluído em Montego Bay, Jamaica, em 10 de dezembro de 1982. *Diário Oficial da União*, de 9 de novembro de 1987. Available in: <https://www2.camara.leg.br/legin/fed/decleg/1980-1987/decretolegislativo-5-9-novembro-1987-367281-publicacaooriginal-1-pl.html>. Accessed on: 29 Apr. 2021.

Brasil. Constituição da República Federativa do Brasil de 1988. *Diário Oficial da União*, 5 de outubro de 1988a. Available in: http://www.planalto.gov.br/ccivil_03/constituicao/ConstituicaoCompilado.htm. Accessed on: 12 Mar. 2021.

Brasil. Lei nº 7.661, de 16 de maio de 1988. Institui o Plano Nacional de Gerenciamento Costeiro e dá outras providências. *Diário Oficial da União*, 18 de maio de 1988b. Available in: http://www.planalto.gov.br/ccivil_03/leis/17661.htm. Accessed on: 17 Apr. 2021.

Brasil. Ministério do Meio Ambiente. *Agenda 21 Global*. Rio de Janeiro: MMA, 1992. Available in: <http://www.mma.gov.br/responsabilidade-socioambiental/agenda-21/agenda-21-global>. Accessed on: 17 Apr. 2021.

Brasil. Lei nº 8.617, de 4 de janeiro de 1993. Dispõe sobre o mar territorial, a zona contígua, a zona econômica exclusiva e a plataforma continental brasileiros, e dá outras providências. *Diário Oficial da União*, 5 de janeiro de 1993. Available in: http://www.planalto.gov.br/ccivil_03/leis/l8617.htm. Accessed on: 17 Apr. 2021.

Brasil. Decreto nº 4.297, de 10 de julho de 2002 [...]. *Diário Oficial da União*, 11 de julho de 2002. Available in: http://www.planalto.gov.br/Ccivil_03/decreto/2002/D4297.htm. Accessed on: 31 May 2021.

Brasil. Decreto nº 5.300, de 7 de dezembro de 2004 [...]. *Diário Oficial da União*, 24 de fevereiro de 2004a. Available in: http://www.planalto.gov.br/ccivil_03/_ato2004-2006/2004/decreto/d5300.htm. Accessed on: 15 Apr. 2021.

Brasil. Ministério do Meio Ambiente e Ministério do Planejamento, Orçamento e Gestão. **Subsídios para um projeto de gestão**. Brasília: MMA e MPO, 2004b. Available in: <https://www.sema.ce.gov.br/manuais-do-projeto-orka/>. Accessed on: 21 Apr. 2021.

Brasil. Decreto nº 5.377, de 23 de fevereiro de 2005. Aprova a Política Nacional para os Recursos do Mar - PNRM. *Diário Oficial da União*, 24 de fevereiro de 2005. Available in: http://www.planalto.gov.br/ccivil_03/_Ato2004-2006/2005/Decreto/D5377.htm. Accessed on: 14 Apr. 2021.

Brasil. Ministério do Meio Ambiente. *Projeto Orka: fundamentos para gestão integrada*. Brasília: MMA, 2006. Available in: <https://www.sema.ce.gov.br/manuais-do-projeto-orka/>. Accessed on: 23 Apr. 2021.

Brasil. Decreto nº 6.040, de 7 de fevereiro de 2007. Institui a Política Nacional de Desenvolvimento Sustentável dos Povos e Comunidades Tradicionais. *Diário Oficial da União*, 8 de fevereiro de 2007. Available in: https://www.planalto.gov.br/ccivil_03/_ato2007-2010/2007/decreto/d6040.htm. Accessed on: 12 Apr. 2021.

Brasil. Lei nº 11.959, de 29 de junho de 2009. Dispõe sobre a Política Nacional de Desenvolvimento Sustentável da Aquicultura e da Pesca [...]. *Diário Oficial da União*, 9 de julho de 2009. Available in: http://www.planalto.gov.br/ccivil_03/_ato2007-2010/2009/lei/11959.htm. Accessed on: 31 May 2021.

Brasil. Ministério do Meio Ambiente. *SNUC – Sistema Nacional de Unidades de Conservação da Natureza*: Lei nº 9.985, de 18 de julho de 2000; Decreto nº 4.340, de 22 de agosto de 2002; Decreto nº 5.746, de 5 de abril de 2006. Plano Estratégico Nacional de Áreas Protegidas: Decreto nº 5.758, de 13 de abril de 2006/Ministério do Meio Ambiente. Brasília: MMA/SBF, 2011a. Available in: https://antigo.mma.gov.br/images/arquivos/areas_protegidas/snuc/Livro%20SNUC%20PNAP.pdf. Accessed on: 6 May 2021.

Brasil. Lei Complementar nº 140, de 8 de dezembro de 2011 [...]. *Diário Oficial da União*, 9 de dezembro de 2011b. Available in: http://www.planalto.gov.br/ccivil_03/leis/lcp/lcp140.htm. Accessed on: 15 Apr. 2021.

Brasil. Lei nº 13.240, de 30 de dezembro de 2015 [...]. *Diário Oficial da União*, 31 de dezembro de 2015a. Available in: https://www.planalto.gov.br/ccivil_03/_Ato2015-2018/2015/Lei/L13240.htm. Accessed on: 21 Apr. 2021.

Brasil. Ministério do Meio Ambiente. *Plano nacional de gerenciamento costeiro: 25 anos do gerenciamento costeiro no Brasil*. Brasília: MMA, 2015b. Available in: <https://www.marinha.mil.br/secirm/sites/www.marinha.mil.br/secirm/files/gerco.pdf>. Accessed on: 18 Apr. 2021.

Ceará. Lei nº 13.796, de 30 de junho de 2006. Institui a Política Estadual de Gerenciamento Costeiro e o Plano Estadual de Gerenciamento Costeiro e dá outras providências. *Diário*

Oficial do Estado, 30 de junho de 2006. Available in: <https://www.al.ce.gov.br/legislativo/legislacao5/leis2006/13796.htm>. Accessed on: 30 Apr. 2021.

Colgan, C.S. The ocean economy of the United States: measurement, distribution and trends. *Ocean Coast Manag.*, v. 71, 2013. Available in: <https://www.sciencedirect.com/science/article/pii/S0964569112002359>. Accessed on: 9 May 2021.

Diegues, A.C. *Artisanal fisheries in Brazil*. São Paulo: International Collective in Support of Fishworkers (ICSF), 2006. Available in: <http://www.fao.org/family-farming/detail/en/c/1025974/>. Accessed on: 31 May 2021.

Diegues, A.C. *et al. Os saberes tradicionais e a biodiversidade no Brasil*. São Paulo: MMA/COBIO/NUPAUB/USP, 2000.

FAO. Food and Agriculture Organization of the United Nations. *Integrated coastal area management and agriculture, forestry and fisheries*. Roma: FAO, 1998. Available in: <http://www.fao.org/3/w8440e/W8440e00.htm>. Accessed on: 20 Apr. 2021.

FAO. Food and Agriculture Organization of the United Nations. *Code of conduct for responsible fisheries*. Rome: FAO, 2011. Available in: <http://www.fao.org/3/i1900e/i1900e.pdf>. Accessed on: 17 May 2021.

Fortaleza. Secretaria Municipal de Urbanismo e Meio Ambiente. *Plano de Gestão Integrada da Orla Marítima – Projeto Orla*. Fortaleza, 2018. Available in: www.sema.ce.gov.br/wp-content/uploads/sites/36/2020/12/PGI_FORTALEZA_Entrega-02_05_2019.pdf. Accessed on: 3 June 2021.

Gesamp. Group of Experts on the Scientific Aspects of Marine Environmental Protection. *The contributions of science to coastal zone management*. Roma: FAO, 1996. Available in: <http://www.gesamp.org/publications/the-contributions-of-science-to-integrated-coastal-management>. Accessed on: 20 Apr. 2021.

Gianella, L.C. & Torres, R.B. Produção do espaço urbano e populações tradicionais: um olhar sobre os pescadores artesanais na zona costeira brasileira. *Revista de Geografia*, v. 37, n. 2, Recife, 2020. Available in: <https://periodicos.ufpe.br/revistas/revistageografia/article/view/244199>. Accessed on: 31 May 2021.

Gumiero, R.G. A trajetória das políticas de desenvolvimento regional do Nordeste: balanço entre a Operação Nordeste e a PNDR. *Revista Política e Planejamento Regional*, Rio de Janeiro, v. 4, n. 2, p. 189-210, jul./dez. 2017. Available in: <http://www.revistappr.com.br/artigos/publicados/A-trajetoria-das-politicas-de-desenvolvimento-regional-do-Nordeste-balanco-entre-a-Operacao-Nordeste-e-a-PNDR.pdf>. Accessed on: 19 Apr. 2021.

Haesbaert, R. *O mito da desterritorialização: do “fim dos territórios” à multiterritorialidade*. Rio de Janeiro: Bertrand Brasil, 2004.

IBGE. Instituto Brasileiro de Geografia e Estatística. *Atlas geográfico das zonas costeiras e oceânicas do Brasil*. Rio de Janeiro: IBGE, 2011. Available in: <https://biblioteca.ibge.gov.br/visualizacao/livros/liv55263.pdf>. Accessed on: 24 Apr. 2021.

IBGE. Instituto Brasileiro de Geografia e Estatística. *Pesquisa nacional por amostra de domicílios - PNAD 2015*. Available in: <https://www.ibge.gov.br/estatisticas/sociais/populacao/19897-sintese-de-indicadores-pnad2.html?edicao=9129&t=o-que-e>. Accessed on: 27 Apr. 2021.

IBGE. Instituto Brasileiro de Geografia e Estatística. *Pesquisa de serviços de hospedagem – PSH*. 2016. Available in: <https://www.ibge.gov.br/estatisticas/multidominio/turismo/9040-pesquisa-de-servicos-de-hospedagem-municipios-das-capitais-regioes-metropolitanas-das-capitais-e-regioes-integradas-de-desenvolvimento.html?=&t=resultados>. Accessed on: 30 Apr. 2021.

IBGE. Instituto Brasileiro de Geografia e Estatística. *IBGE atualiza a lista dos municípios com o mar*. 2019. Available in: <https://agenciadenoticias.ibge.gov.br/agencia-sala-de-imprensa/2013-agencia-de-noticias/releases/24074-ibge-atualiza-lista-dos-municipios-defrontantes-com-o-mar>. Accessed on: 18 Apr. 2021.

IBGE. Instituto Brasileiro de Geografia e Estatística. *Municípios*. 2020. Available in: <https://cidades.ibge.gov.br/>. Accessed on: 18 Apr. 2021.

IBGE. Instituto Brasileiro de Geografia e Estatística. *Áreas territoriais*. 2021. Available in: <https://www.ibge.gov.br/geociencias/organizacao-do-territorio/estrutura-territorial/15761-areas-dos-municipios.html?=&t=downloads>. Accessed on: 29 Apr. 2021.

IMA. Instituto do Meio Ambiente do Estado de Alagoas. *Gerenciamento costeiro*. 2015. Available in: <http://www.ima.al.gov.br/gerco/>. Accessed on: 31 May 2021.

Ipea. Instituto de Pesquisa Econômica Aplicada. *Relatório com as estimativas da caracterização da ocupação formal e informal do turismo, com base nos dados da RAIS e da PNAD 2013, para o Brasil e regiões*. Ministério do Turismo/IPEA: março, 2015. Available in: https://www.ipea.gov.br/portal/images/stories/PDFs/150317_estimativas_ocupacao-2015.pdf. Accessed on: 2 May 2021.

Keen, M.R.; Schwarz, A.M. & Wini-Simeon, L. Towards defining the blue economy: practical lessons from Pacific Ocean governance. *Marine Policy*, v. 88, 2018. Available in: <https://www.sciencedirect.com/science/article/pii/S0308597X16308235>. Accessed on: 9 May 2021.

Kitzmann, D.I.S.; Asmus, M.L. & Laydner, C. *Gestão costeira no Brasil: estado atual e perspectivas*. Rio Grande: Fundação Universidade Federal Rio Grande, 2004. Available in: <http://repositorio.furg.br/handle/1/2174>. Accessed on: 19 Apr. 2021.

Machado, P.A.L. *Direito ambiental brasileiro*. 21. ed., São Paulo: Malheiros Editores, 2012.

Maranhão. Lei nº 10.316, de 17 de setembro de 2015. Institui o macrozoneamento ecológico-econômico do estado do Maranhão e dá outras providências. *Diário Oficial do Estado*, 19 de setembro de 2015. Available in: <http://www.zee.ma.gov.br/src/upload/docs/LEI-N%C2%BA-10.316-DE-17-DE-SETEMBRO-DE-2015-MACROZEE.pdf>. Accessed on: 30 Apr. 2021.

Matos, F.O. *Formação e limitações regionais do plano de desenvolvimento sustentável da região turística do meio-norte (Brasil)*. 2013. 250 f. Tese (doutorado em Geografia), Centro de Ciências, Universidade Federal do Ceará, Fortaleza, 2013. Available in: <http://www.repositorio.ufc.br/handle/riufc/21134>. Accessed on: 31 May 2021.

Medeiros, R.; Young, C.E.F.; Pavese, H.B. & Araújo, F.F.S. *Contribuição das unidades de conservação brasileiras para a economia nacional: sumário executivo*. Brasília: UNEP-WCMC, 2011, 44 p. Available in: https://www.icmbio.gov.br/portal/images/stories/comunicacao/estudo_contribuicao.pdf. Accessed on: 6 May 2021.

Melo, J.B. *O zoneamento ecológico-econômico costeiro como instrumento de planejamento sustentável do uso e ocupação do litoral: análise de complexos hoteleiros no estado do Ceará (Brasil)*.

Barcelona: UB, 2013. 359 f. Tese (doutorado em Planejamento Territorial e Gestão Ambiental), Universidade de Barcelona. Available in: <http://diposit.ub.edu/dspace/handle/2445/49264?mode=full>. Accessed on: 21 Apr. 2021.

Melo, J.B. O zoneamento ambiental aplicado ao mar territorial, à plataforma continental e à zona econômica exclusiva: proposta de gestão ambiental dos recursos marinhos, in Mont'Alverne, T.F. et al. (org.). *Meio Ambiente Marinho, Sustentabilidade e Direito*. Rio de Janeiro: Lumen Juris, v. 1, p. 67-98, 2019.

Menezes, C.R. et al. Diagnóstico da pesca artesanal na área de influência do Porto do Mucuripe, em Fortaleza (CE): subsídios à gestão pesqueira regional. *Sistemas & Gestão*, v. 14, n. 3, p. 279-290, 2019. Available in: <https://doi.org/10.20985/1980-5160.2019.v14n3.1586>. Accessed on: 31 May 2021.

Milaré, É. *Direito do ambiente*. 9. ed., São Paulo: Revista dos Tribunais, 2014.

Moraes, A.C.R. *Contribuições para a gestão da zona costeira do Brasil: elementos para uma geografia do litoral brasileiro*. São Paulo: Annablume, 2007.

Municípios. *PGI elaborados*. Ministério do Meio Ambiente. 2021. Available in: <https://antigo.mma.gov.br/component/k2/item/945.html?Itemid=887>. Accessed on: 31 May 2021.

Mussoline, G. Aspectos da cultura e da vida social no litoral brasileiro. *Revista de Antropologia*, Universidade de São Paulo, São Paulo, 1953. Available in: www.revistas.usp.br/ra/article/view/131254/127646. Accessed on: 14 Apr. 2021.

Nakano, K. et al. (coord.). *Projeto orla: implementação em territórios com urbanização consolidada*. São Paulo: Instituto Polis; Brasília: Ministério do Planejamento, Orçamento e Gestão, 2006.

OECD. Organisation for Economic Co-operation and Development. *The ocean economy in 2030*. Paris: OECD Publishing, 2016. Available in: <https://www.oecd-ilibrary.org/docserver/9789264251724-en.pdf?expires=1620412587&id=id&accname=ocid54025470&checksum=E7D405ABA30D4BF4AF703EA67342BC18>. Accessed on: 7 May 2021.

ONU. Organização das Nações Unidas. *Objetivo 14. Conservação e uso sustentável dos oceanos, dos mares e dos recursos marinhos para o desenvolvimento sustentável*. 2015 Available in: <https://nacoesunidas.org/pos2015/ods14/>. Accessed on: 19 Apr. 2021.

ONU. Organização das Nações Unidas. *UNESCO lança publicação sobre oceanos*. 2021. Available in: <https://brasil.un.org/pt-br/113101-unesco-lanca-publicacao-sobre-oceanos>. Accessed on: 9 May 2021.

Pereira, F.C. & Oliveira, M.R.L. (org.). *Plano nacional de gerenciamento costeiro: 25 anos do gerenciamento costeiro no Brasil*. Brasília: MMA, 2015. Available in: <https://www.marinha.mil.br/secirm/sites/www.marinha.mil.br/secirm/files/gerco.pdf>. Accessed on: 27 Apr. 2021.

Pernambuco. Lei nº 14.258, de 23 de dezembro de 2010. Institui a Política Estadual de Gerenciamento Costeiro e dá outras providências. *Diário oficial do Estado*, 24 de dezembro de 2010. Available in: <https://legis.alepe.pe.gov.br/texto.aspx?id=3219&tipo=TEXTTOORIGIN AL>. Accessed on: 25 Apr. 2021.

Polette, M. & Silva, L.P. GESAMP, ICAM e PNGC: análise comparativa entre as metodologias de gerenciamento costeiro integrado. *Ciência e Cultura*, São Paulo, v. 55, n. 4, p. 27-31, dez.

2004. Available in: <http://cienciaecultura.bvs.br/pdf/cic/v55n4/a17v55n4.pdf>. Accessed on: 15 Apr. 2021.

Portal Aquaviário. Empresa de Planejamento e Logística (EPL). *Portal Aquaviário*, 2021. Available in: <https://geo.epl.gov.br/portal/apps/sites/#!/geo-ontl/pages/aquaviario>. Accessed on: 6 May 2021.

Portal Brasileiro de Dados Abertos. *Prestadores de serviços turísticos: agências de turismo*, 2021. Available in: <https://dados.gov.br/dataset/cadastur-03>. Accessed on: 30 Apr. 2021.

Prates, A.P.L.; Gonçalves, M.A. & Rosa, M.R. *Panorama da conservação dos ecossistemas costeiros e marinhos no Brasil*. 2. ed., Brasília: MMA, 2012.

Rio Grande do Norte. Lei nº 7.871, de 20 de julho de 2000. Dispõe sobre o zoneamento ecológico-econômico do litoral oriental do Rio Grande do Norte e dá outras providências. *Diário Oficial do Estado*, 20 de julho de 2000. Available in: <http://adcon.rn.gov.br/ACERVO/gac/DOC/DOC00000000054747.PDF>. Accessed on: 27 Apr. 2021

Sampaio, Y.S.B. & Vital, T.W. Desenvolvimento sócio-econômico-ambiental: conceito e problemas para mensuração. *Reflexões Econômicas*, v. 1, n. 1, p. 249-274, abr./set. 2015. Santa Cruz. 2015. Available in: <http://periodicos.uesc.br/index.php/reflexoeseconomicas/article/view/830/782>. Accessed on: 20 Apr. 2021.

SBEC. SBEC Technical documentation review committee report on the global sustainable blue economy conference. *Sustainable blue economy conference*, Nairobi, Kenya, 2018. Available in: <http://www.blueeconomyconference.go.ke/wp-content/uploads/2018/12/SBEC-FINAL-REPORT-8-DECEMBER-2018-rev-2-1-2-PDF2-3-compressed.pdf>. Accessed on: 9 May 2021.

Sergipe. Lei nº 8.634, de 27 de dezembro de 2019. Institui o plano e o sistema estadual de gerenciamento costeiro, cria o Conselho Estadual de Gerenciamento Costeiro – CEGC e dá providências correlatas. *Diário Oficial do Estado*, 30 de dezembro de 2019. Available in: <https://al.se.leg.br/Legislacao/Ordinaria/2019/O86342019.pdf>. Accessed on: 27 Apr. 2021.

Silva, C.A.M. & Modesto, F. Cidades em zonas costeiras brasileiras: rumo à resiliência?, in Encontro nacional da Anppas, 6., 2011, Belém. *Anais...* Belém: UFPA, 2006. Available in: <http://www.anppas.org.br/encontro6/anais/ARQUIVOS/GT11-837-555-20120630163056.pdf>. Accessed on: 21 Apr. 2021.

Silva, J. A. *Direito ambiental constitucional*. 4 ed. São Paulo: Malheiros, 2002.

Siqueira, L.C. Política ambiental para quem? *Ambiente & Sociedade* [on-line], v. 11, n. 2, p. 425-437, 2008. Available in: <https://doi.org/10.1590/S1414-753X2008000200014>. Accessed on: 31 May 2021.

Sirvinskas, L.P. *Manual de direito ambiental*. 16. ed., São Paulo: Saraiva, 2018.

SNIF. Sistema nacional de informações florestais. *Unidades de conservação: tabelas e gráficos*. Available in: <https://snif.florestal.gov.br/pt-br/dados-complementares/131-florestas-e-recursos-florestais/dados-complementares-conservacao-das-florestas/225-unidades-de-conservacao-tabelas-e-graficos>. Accessed on: 7 May 2021.

Unesco Courier. *Time to Turn the Tide*. Paris, 2021. Available in: www.unesdoc.unesco.org/ark/48223/pf0000375277_eng. Accessed on: 4 June 2021.

Viana, F.L.E. Petróleo e gás natural. *Caderno Setorial ETENE*. Fortaleza: Banco do Nordeste do Brasil, ano 5, n. 145, dez. 2020. Available in: https://www.bnb.gov.br/s482-dspace/bitstream/123456789/496/1/2020_CDS_145.pdf. Accessed on: 5 May 2021.

Ximenes, L.F. & Vidal, M.F. Pescado no Brasil: produzir bem e vender melhor. *Caderno Setorial ETENE*. Fortaleza: Banco do Nordeste do Brasil, ano 3, n. 49, nov. 2018. Available in: https://www.bnb.gov.br/documents/80223/4141162/49_aquipesca.pdf/12f1d694-e694-21ac-7085-40cc571bf95c. Accessed on: 30 Apr. 2021.

Ximenes, L.F. Produção de pescado no Brasil e no Nordeste brasileiro. *Caderno Setorial ETENE*. Fortaleza: Banco do Nordeste do Brasil, ano 5, n. 150, jan. 2021. Available in: https://www.bnb.gov.br/s482-dspace/bitstream/123456789/649/1/2021_CDS_150.pdf. Accessed on: 30 Apr. 2021.