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Regional public policy for Integrated Coastal Zone Management in Central America

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ABSTRACT

The littoral of the Central American region is shared by seven countries where ecosystems, cultures and activities converge. Usually, impacts on natural heritage and human well-being are not dealt in a common way by the respective administrations. An analysis was carried out to understand the evolution of Integrated Coastal Zone Management in the region. Initiatives implemented in and between the countries on the subject were taken into account, as well as policies and strategies approved within the Central American Integration System. To conclude, a brief analysis is made of the public policies of each nation. The results obtained indicate that these countries are closely linked; however, they currently lack any common supranational public policy for better coastal governance. An integrated approach for its management could help promote and harmonize regional and state responses related to the sustainability of the coastal-marine space.

1. Introduction

The Central American (CA) region is a complex geopolitical space, with high biological and cultural diversity, especially in its coastal and marine area (Yañez-Arancibia, 1999; CCAD, 2014; UCR/IFAC, 2017). The ideas and approaches that underlie public policy for this area are varied and simultaneously materialize as the integration of policies from the Central American Integration System (SICA). The Latin American and Caribbean Initiative for Sustainable Development (ILAC), was one of the first milestones in the process of integrating better responses to the challenges of sustainability of the coasts and seas in CA (UNEP, 2002). The ILAC was formulated and presented by the Forum of Ministers of the Environment of Latin America and the Caribbean at the World Summit on Sustainable Development in Johannesburg in 2002. Due to the increasing degradation of ecosystems and impacts on human well-being, an integrated management approach within the region should be promoted, as ILAC has already pointed out (UNEP, 2010). Even before, specifically for the coastal spaces of CA, different authors (Foer and Olsen, 1992; Rodríguez and Windevoxhel, 1998), highlighted the importance of implementing Integrated Coastal Zone Management (ICZM).

The present study assumes that only with explicit public policies an ICZM approach can provide answers to the complex problems of the littoral. The socio-cultural dimension should be an integrated component of the planning and management of coastal zone, as human pressures generate increasingly major alterations to the support ecosystems (Townend, 2002; Barragán-Muñoz and de Andrés, 2015; Pallero-Flores et al., 2017). Modern ICZM aims to address the precursory elements of human well-being with regard to sustainability. Since 1992, the Rio Summit reaffirmed the need to implement this approach. Yañez-Arancibia (1999) stated that coastal management was given general consideration in Latin America since that year. Several authors recognize how Chapter 17 of Agenda 21 marked an important milestone in the evolution of the approach and its objectives (Yañez-Arancibia, 1999; Barragán-Muñoz, 2005; Arenas-Granados, 2011). Since Rio 92 there have been numerous guides, publications, projects and international and national instruments that have addressed the issue (Barragán-Muñoz, 2003, 2014; Arenas-Granados, 2011; Pérez-Cayeiro, 2013).

Real and effective implementation of ICZM has not been possible to the same level in the countries of CA. In the region there are common problems related to water quality and sanitation, river basin deforestation, solid waste and ecosystem degradation. In addition, there are social problems related to political instability, drug trafficking, poverty, inequality and growing insecurity (UNDP, 2016b; SICA/FAO, 2011). To all this is added the inadequate public management of those spaces that

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Table 1
List of institutions consulted.

Country	Institutions
Belize	Coastal Zone Management Authority and Institute (CZMAI)
	Fisheries department
	Southern Environmental Association (SEA)
Guatemala	National Council of Protected Areas (CONAP)
	Ministry of Environment and Natural Resources (MARN)
	Foundation for Eco-development and Conservation (FUNDAECO)
	University of San Carlos (USAC)
Honduras	Ministry of Energy, Natural Resources, Environment and Mines (MiAmbiente)
	Institute of Forest Conservation, Protected Areas and Wildlife (ICF)
	Ministry of Foreign Affairs
	Conservation of Ecosystems in Omoa (CCO)
Nicaragua	Ministry of Environment and Natural Resources (MARN)
	Private consultants
Costa Rica	Ministry of Environment and Energy (MINAE)
	University of Costa Rica (UCR)
	National System of Protected Areas (SINAP)

may benefit from the effective appropriation of ICZM approach. Since the 1990s, Foer and Olsen (1992) have also reported the growing deterioration of the conditions of coastal resources in the region under study. This situation is generally also common throughout Ibero-America. Despite the ecological, socio-cultural and economic importance of these spaces, in most cases in Latin America the management has been carried out in a sectorial and non-integrated manner (Yañez-Arancibia, 1999; Barragán-Muñoz, 2005, 2009; Arenas--Granados, 2011). This situation is currently evident in CA, as Rodriguez and Windevoxhel (1998) pointed out more than twenty years ago. According to Barragán-Muñoz (2005, 2020), very different levels of coastal management can be observed among the different Latin American countries, which coincide precisely with the situation in CA.

Since 1991, with the constitution of SICA, through the Tegucigalpa Protocol, no formal initiative has emerged to formulate a regional public policy regarding ICZM. Therefore, this study argues that a common policy should be proposed that harmonizes and implements an ICZM approach to provide appropriate responses to coastal problems in the current context of Global Change. The SICA is the ideal instrument to promote this task. Considering that the coastal-marine space does not recognize political borders, it is extremely difficult for a single country to fully and adequately address its problems (Rivera-Arriaga, 2005). This is even more so in countries with a relatively small geographical area.

Notice that the study does not intend to carry out a space-time analysis about the problems on the regional coast. This is because the main focus of this study is a supranational analysis of public policies that influence the coastal-marine space in CA. Policies, plans, programs and projects formulated and implemented in the region, including general national public policies oriented to ICZM, were reviewed. The analysis was oriented according to the Decalogue of coastal management (Barragán-Muñoz, 2003).

2. Materials and methods

Various related methods have been employed considering the spatial and systemic character of the object of study. A deductive methodology was used with a time perspective that covers more than a quarter of a century (from 1992 to 2018). Analysis at the regional level was prioritized over the national level.

This study is based on the territorial analysis proposed for a complex system as a coastal zone by Barragán-Muñoz (2003) and it is split into three sections: i.e. physical-natural, socioeconomic and

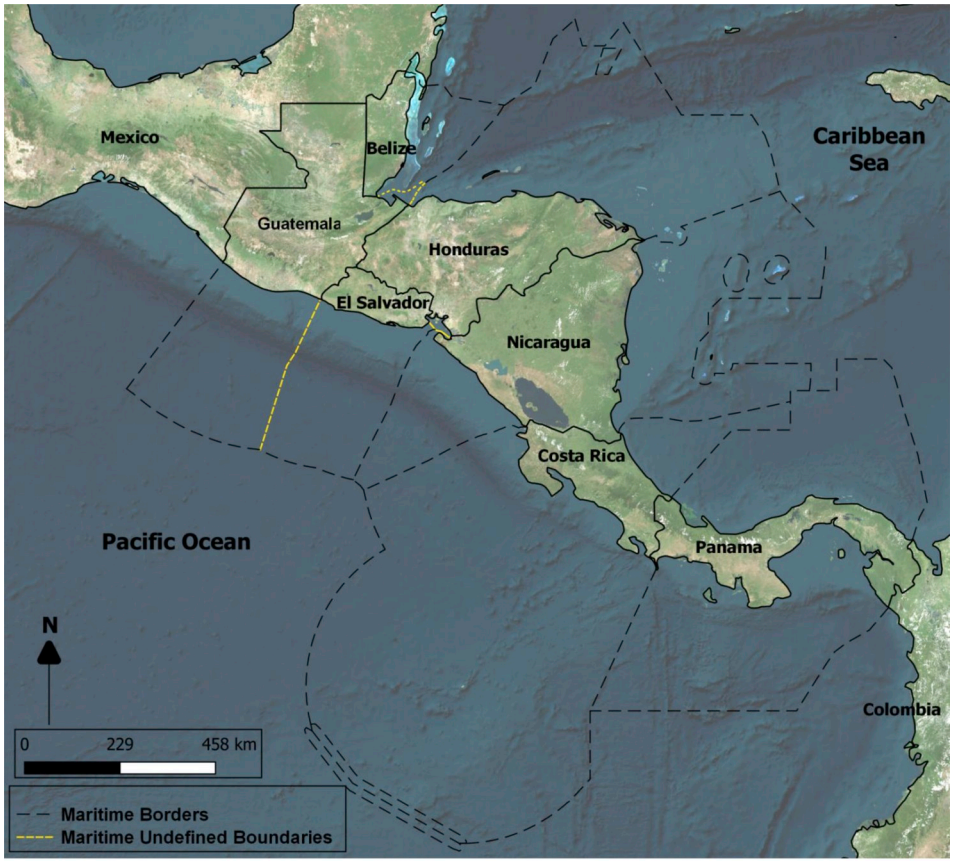

Fig. 1. Central America and its Exclusive Economic Zone (EEZ).
Source: Own elaboration based on shape file from Flanders Marine Institute (2018).

Table 2
Geographical characteristics of coastal and marine area in Central American countries.

Aspect	Panama	Costa Rica	Nicaragua	Honduras	El Salvador	Guatemala	Belize
Total area (km^2)	615,717	664,783	434,933	341,993	121,040	236,504	58,965
Emerged continental surface (km^2)	75,517	51,100	130,373	112,492	21,040	108,889	22,970
Coastal-maritime surface (km^2)	540,200	613,683	223,935	229,501	100,000	127,615	35,995
Maritime space (%)	88	92	51	67	83	54	61
Continental platform (km^2)	25,000	589,163	75,500	58,500	21,000	16,800	9,800
Coastline (km)	2,987 1,700 Pacific 1,287 Caribbean	1,228 1,016 Pacific 212 Caribbean	911 324 Pacific 587 Caribbean	1,189 287 Pacific 902 Caribbean	321	424 254 Pacific 170 Caribbean	386
Continental surface/ coastline (km)	25.28	41.61	143.1	94.6	65.54	256.81	59.5
Watersheds	Pacific: 70% Caribbean: 30%	Pacific: 53.6% Caribbean: 46%	Pacific: 10% Caribbean: 90%	Pacific: 14.4% Caribbean: 85.6%	11	Pacific: 22.3% Caribbean: 31%	16
Islands, islets, keys in coastal-marine zone	1,100 (Caribbean) and 1,000 (Pacific)	27 (Pacific) and 9 (Caribbean)	250	8 islands and 50 keys (Caribbean) 4 islands (Pacific)	10	None	1,000 keys
Coastal-Marine Protected Areas	43 (9,861.3 km^2)	21 (14,830.42 km^2)	8 (1,610.77 km^2)	25 (21,100 km^2)	3 (1,776.87 km^2)	10 (2,236 km^2)	16 (4,545.43 km^2)

Source: FAO, 2012; **Panama:** Suman (1990); Suman (2002); Averza-Colamarco (2010); Arenas-Granados and Garcés (2010); ANAM, 2011; Arenas-Granados (2011); **Costa Rica:** SINAC, 2009; Morales-Ramírez et al. (2009); Alvarado et al. (2011); CONAMAR, 2013; Guzmán-Arias (2013); **Nicaragua:** MARENA, 2001; TNC/MARENA, 2009; MARENA, 2010; Ryan and Christie (2017); **Honduras:** FAO, 2002; SERNA/ICF/SAG, 2011; Carrasco and Caviedes (2014); **El Salvador:** CCAD, 2002; MARN, 2018; **Guatemala:** TNC, 2008; IARNA/URL, 2009; CONAP-MARN, 2009; **Belize:** FAO, 1993; CZMAI, 2014, 2016.

juridical-administrative subsystems. The first two sections are an introduction to understand the complex context of the object of study. In the third and the main section some structural issues related to management were analyzed in detail, which allowed for the understanding of the evolution of ICZM in the region. In turn, this section has three subsections, following the *Decalogue* (Barragán-Muñoz, 2003, 2004; Red IBERMAR, 2008) as methodological basis. Notice that the Decalogue is an instrument composed by 10 structural elements of the juridical-administrative subsystem for the public administration at certain territorial scale (e.g. Public Policy and National Strategies, Normative, Institutions, Competences, Instruments, Economic Resources, Training and Qualification, Research-knowledge and Information, Public Participation and Education for Sustainability). This instrument has been tested and improved in the Iberian Peninsula, North Africa, and in 16 countries of Latin America and the Caribbean (Bello et al., 2006; Barragán-Muñoz, 2009; García-Sanabria et al., 2011; Arenas-Granados, 2011; Diederichsen et al., 2014; Scherer, 2013; Milanés et al., 2014; Caviedes et al., 2014, 2016; Nava-Fuentes et al., 2018; Pazmiño-Manrique et al., 2018).

Table 3
State of definition of maritime borders in Central America.

Country/Country	Status of definition	Year of definition, signature or ratification	Regarding the definition of the starting point of the border boundary on the coast
Belize/Guatemala	Not established		Mouth of River Sarstun - Not defined
Guatemala/ Honduras	Not established		Mouth of River Motagua - Defined
Honduras/ Nicaragua	Ratified	October 2007. Treaty Santos-Jimenez.	River Coco-Segovia - Defined
Nicaragua/Costa Rica (Caribbean)	Ratified	2nd of February of 2018. Treaty Gonzalez-Moncada.	Mouth of River San Juan - Defined
Costa Rica/ Panamá (Caribbean)	Ratified	2nd of February of 1980. Treaty Calderón-Ozores.	Mouth of River Sixaola - Defined
Panamá/Costa Rica (Pacific)	Ratified	2nd of February of 1980. Treaty Calderón-Ozores.	Burica Point - Defined
Costa Rica/ Nicaragua (Pacific)	Ratified	2nd of February of 2018. Treaty González-Moncada.	Salinas Bay - Defined
Gulf of Fonseca (El Salvador, Honduras and Nicaragua)	Not established (Shared area)		Honduras and El Salvador: River Goascoran - Defined Honduras and Nicaragua: Ratified. Islands still in litigation
El Salvador/ Guatemala	Not established		La Chapina - Defined

The three subsections were:

a) ICZM initiatives implemented in CA, among several countries and individuals: This allowed identification of those structural elements agreed on the guidelines of the initiatives.
b) Regional Public Policy and Strategies in ICZM: This is a detailed analysis of the first structural element of the *Decalogue.* This allowed analyze of the approach to ICZM of those policies, strategies and regional plans for a better understanding of how certain efforts have been transferred to the administrative system of SICA.
c) National ICZM Public Policies and Strategies. This is a brief review of the existence of ICZM public policies at the national scale and other relevant aspects for their implementation. These correspond to the three key structural elements of the Decalogue: (1) Existence of explicit ICZM public policy or national strategy, (2) Specific laws for the management of coastal zone, (3) Institutions and specific competences for the ICZM.

The analysis of the different parts of the methodology involved the collection, classification and review of scientific publications related to environmental, social, cultural, economic and political-administrative issues in the region. Likewise, standards, programs, projects and other

Table 4
Main national socio-economic data.

Aspect	Panamá	Costa Rica	Nicaragua	Honduras	El Salvador	Guatemala	Belize
Total population	4,037,043	4,947,490	6,169,668	9,012,229	6,643,359	17,302,084	398,050
Population settled on the coast (%)	73*	18*	14^	14^	57*	5^	40
Human Development Index (IDH)	0.788 (60)	0.776 (66)	0.645 (124)	0.625 (130)	0.680 (117)	0.640 (125)	0.706 (103)
Gini coefficient	0.487	0.521	0.33	0.51	0.408	0.63	0.533
Life expectancy at birth	77.8	79.6	75.2	73.3	73.3	72.1	70.1
Years of schooling	9.9	8.7	6.5	6.2	6.5	6.3	10.5
Gross Domestic Product (GDP) per capita	19,470	14,006	4,747	4,463	7,732	7,063	7,375

Source: UNDP, 2016b; **Panamá:** INEC-Panamá, 2018; **Costa Rica:** PEN, 2017; INEC-CR, 2018; **Nicaragua:** INIDE, 2018; **Honduras:** INE-Honduras, 2018; **El Salvador:** Diederichsen et al. (2014); **Guatemala:** INE-Guatemala, 2018; **Belize:** CEPAL, 2015; CZMAI, 2016; SIB, 2018. Note: *Based on census of provinces/departments bordering on the coast, ^Based on census of municipalities bordering on the coast.

documents related to regional coastal management generated by public institutions and non-governmental organizations (institutional reports and official documents) were analyzed. These documents were selected through systematic keywords search and their combination, such us: "gestión", "manejo", "Management", "zona costera", "coastal zone", "costa", "litoral", "mar", "sea", marino/a", "marine", "ecosystems", "política", "policies", "estrategia", "strategy", "programa", "program", "plan", "Central America", "SICA", and the name of the seven countries. Other resources of information included conference proceedings, project reports and digital databases from official state institutions, and research theses. In addition, meetings were held with staff from public institutions, NGOs, specialists and other actors from Belize, Guatemala, Honduras, Costa Rica and Nicaragua (Table 1). Thanks to these open-ended interviews, additional material was made available for research purposes.

3. Results and discussion

3.1. Physical-natural subsystem

CA (Fig. 1) is a region of seven countries located on the isthmus that separates the Greater Caribbean and the Pacific Ocean between latitudes 18°N and 7°S. The continental surface of CA is 552,381 km^2 and the coastal-marine surface is 1,870,929 km^2 with 75% of the region corresponding to marine areas. It has 7,368 linear km of coastline, 3,902 km in the Pacific and 3,466 km in the Atlantic (Suman, 1990; FAO, 2002; MARENA, 2001; CCAD, 2002; TNC, 2008; IARNA/URL, 2009; SINAC, 2009; Alvarado et al., 2011; SERNA/ICF/SAG, 2011; Carrasco and Caviedes, 2014; CZMAI, 2014, 2016; MARN, 2018) (see Table 2). Countries not only share ecosystems, culture and history, but also problems, threats and impacts, which increasingly affect natural systems, and therefore, human welfare. Common ecosystems include mangroves, coral reefs, sea-grass meadows, soft sea-bed, beaches, savannas, coastal lagoons, rocky coasts, islands, keys, etc. According to the IUCN (2013), although the region only represents 2% total surface of the planet, it is home to 12% of biodiversity. CA has 206 ecosystems, 33 eco-regions and 20 life zones (CCAD, 2014). It represents 12% of the coasts of Latin America and the Caribbean, more than 100 marine protected areas, 8% of the world's mangrove area (567,000 ha) and 1,600 linear kilometers of coral reefs (Yañez-Arancibia, 1999). The second largest barrier reef on the planet can be found in CA, in Belize, the heart of the Mesoamerican Reef System (UCR/IFAC, 2017). It is also a region with a very high vulnerability to climate change (IPCC, 2007; Suman, 2015). The recurrence of droughts, floods and extreme weather events place at risk coastal communities and strategic economic sectors such as agriculture, tourism and fishing. Four of the seven CA countries are among the top 15 of 171 countries, with the greatest risk from climate change (CEPREDENAC, 2017): Guatemala in fourth position; Costa Rica, eighth position; El Salvador, eleventh; and Nicaragua, fourteenth position.

CA is composed of seven relatively small countries separated by 10 boundaries and 13 bordering rivers, which according to Funpadem (2000), is a highly fragmented territory in the political-territorial sense. The 48.06% of the continental border length of CA runs along the margin of an international river (1,893.64 km), with all CA borders incorporating this type of boundary in some of its segments (López and Hernández, 2009). These rivers are not exempt from socio-environmental problems shared among several countries. In terms of maritime fragmentation, this is much greater, especially because CA is still immersed in several cases of international litigation regarding definition of coastal and maritime borders (Table 3). There are a total of 24 maritime borders among the States, 14 in the Caribbean and 10 in the Pacific (López and Hernández, 2009).

Source: Own elaboration based on CIJ, 2018.

3.2. Socio-economic subsystem

CA represents one of the greatest cultural diversities in the world with around 62 indigenous peoples with different languages and their own cultural traits; several of these cultures reside on the coast and have adapted their socio-economic activities linked this reality, like Garifunas (Salazar, 2004; UNDP, 2016a; Herrera-Paz, 2017). The region continues, however, to be one of the poorest in the Americas with profound inequalities among countries and within their own societies. According to SICA/FAO (2011), the percentage of people living in poverty in CA is 50.9% compared to 33.1% in all of Latin America. Historically, there has been a strong economic dependence on countries outside CA, mainly United States of America. The "outward" style of development, centered on neoliberal commercial openness, has created few social benefits, resulting in an urgent need to cover the demand for education, health, employment and food services (CONARE, 2016). In the case of education, nearly 60% of young people between ages of 15–24 (5.4 million) fall outside the education system (CONARE, 2016). In many coastal areas there is less coverage and more abandonment of basic education. In terms of environment and health, two thirds of Central American population lacks basic sanitation services (IUCN, 2013), causing numerous socio-environmental problems. Added to this are other issues: the lack of an effective presence of public institutions due to the centralization, pollution, diseases, disappearance of coastal ecosystems, overexploitation of natural resources, deforestation of watersheds, violence, social injustice and emigration. These problems all directly affect the main economic activities: fishing (both industrial and artisanal), aquaculture, tourism, agriculture and industry. Table 4 show a summary about the main socio-economic data of each country.

3.3. Political-administrative subsystem

3.3.1. ICZM initiatives in Central America

According to Sorensen (1993), as of 1992, CA already had four countries immersed in initiatives of "Coastal Zone Management" or "Coastal Resources": some national such as in Costa Rica, Belize and El Salvador and others in specific areas, such as the Department of Bay Islands (Honduras). These initiatives are shown in the Table 5, where the structural element of the Decalogue, detected in each of the initiatives,

Table 5
Countries of Central America that already had ICZM initiatives in 1992 and the related structural elements of the Decalogue.

Country	Initiative	Structural element of the Decalogue	Detail	Implementing instances	Year
Costa Rica	Maritime Terrestrial Zone Act	Normative		Costa Rican Tourism Institute -ICT-	1977
El Salvador	Environmental Protection Project (PROMESA)	Instruments	Emphasis on protection and regeneration of the Coastal Area	Ministry of Agriculture and Livestock and the Secretary of State for the Environment.	1991
Honduras	Bay Islands Environmental Management Project (PMAIB)	Instruments Research-knowledge and information	Drafting of the PMAIB initiated in 1994	Secretary of Tourism	1988
Belize	Coastal Zone Management Project: Coastal Zone Management Unit is created (CZMU) and the Coastal Zone Management Technical Committee	Policy and strategies	Workshop in 1989 for a Coastal Zone Management Strategy	Fisheries Department	1990

Source: Own elaboration based on Serrano and McCaffrey (1992); Sorensen (1993); Olsen and Ngoile (1998); Gibson et al. (1998); SAFEGE/SOGREAH/MONCADA&MONCADA, 2002.

has been incorporated. On the other hand, with the exception of Costa Rica and Belize, none of the Central American countries (CA) had established national priorities for the management of these spaces before 1992 (Lemay, 1998; Rodríguez and Windevoxhel, 1998).

The Regional Environmental Program for Central America (PROARCA/COSTAS) operated from 1998 to 2002 in some transboundary areas that had been classified as priority for coastal management: Gulf of Honduras, Gulf of Fonseca, Gandoca-Bocas del Toro and the mouth of the Coco-Segovia River. According to Ochoa et al. (2001), this prioritization was based on the ecological importance and common problems that had to be addressed in a coordinated manner among nations. Considering the intense dynamics of coastal-marine space, a cross-border perspective is necessary. According to Barragán-Muñoz (2005), the effectiveness of the ICZM initiatives implemented, including those by advanced countries, may be reduced if common initiatives are not undertaken. Rodríguez and Windevoxhel (1998) point out relationships among sectors in cross-border coastal-marine systems in CA are particularly complex, requiring coordination among governments. PROARCA/COSTAS was followed by the PROARCA/SIGMA Project, within the framework of Central American Commission of Environment and Development (SICA/CCAD) and the United States Agency for International Development (USAID) between 2002 and 2007 (Miranda, 2002). This final project did not focus on ICZM, but it emphasized necessary components for better coastal management, such as harmonization of norms and management of protected areas. Subsequently in the region, the Project for the Management of Coastal Marine Resources and Alternative Economic Activities (USAID/MAREA) operated between 2010 and 2014. Its core objective was the improvement of fisheries management with an integrated perspective, but not about ICZM. The main projects related to ICZM in the region are shown in Table 6.

In 2011, with the support of French cooperation, the Cousteau Observatory for the Seas and Coasts of Central America was created. Government agencies and universities in Belize, Costa Rica, Guatemala, Honduras, El Salvador, Nicaragua and Panama are participating members of this initiative, conceived as a regional marine-coastal information research and exchange platform. It was stored and analyzed in five areas of interest: biodiversity, climate change, oceanography, governance and integrated environmental management, and the design of management instruments for knowledge management (UCR/IFAC, 2017).

Various reviews and analysis of the CA littoral and its management have given us insight into the progress of public policies since the 90s. Foer and Olsen (1992), in *The Coasts of Central America*: *Diagnoses and Agenda for Action*, presented for the first time diagnosis and proposals for the formulation of a strategic program of coastal resource management. Hinrichsen (1994), in *Coastal Waters of the World: Trends, Threats, and Strategies*, includes analysis of social, economic and biophysical aspects oriented towards ICZM in the region. Rodríguez and Windevoxhel (1998), in their regional analysis of the situation of the Central American coastal-marine zone, developed technical data sheets on the advances in ICZM for each Central American country. This study enabled us to do a preliminary comparative analysis on the organization and public institutional functioning, a fundamental issue for ICZM. Furthermore, it was noted that until 1998, no CA country had any explicit public policy on coastal zone management and that only Costa Rica had specific legislation for its coastal-marine zone since 1977. Until 1998, ICZM in CA was primarily a collection of projects that attempted to harmonize the priorities of economic development, with little political will to achieve the goals of Agenda 21 and Chapter 17 (Lemay, 1998; Yañez-Arancibia, 1999). According to Ochoa et al. (2001), the initial effort in ICZM could not count on the corresponding legal and institutional framework as it did not yet exist: "ICZM has so far only been developed within Protected Areas and under the protection of its legal framework, or it has been based on local agreements that have not required the approval of central governments or regional mechanisms".

There are initiatives in Latin America and the Caribbean based on

Table 6
Some ICZM initiatives implemented in Central America (1992–2019) and the related structural elements of the Decalogue.

Initiatives between several countries	Structural element of the Decalogue	Year	Countries involved	Detail
Conservation of the Coastal Ecosystems of the Gulf of Fonseca (PROGOLFO)	Instruments	1997–2000	Nicaragua, Honduras and El Salvador	Funded with Danish Cooperation (DANIDA), International Union for Conservation of Nature (IUCN) and Central American Commission of Environmental and Development (CCAD).
Central America Environmental Regional Program -PROARCA/COSTAS-.	Instruments	1998–2002	Central America	Funded by USAID. Consortium: Coastal Resource Center/ University of Rhode Island, The Nature Conservancy -TNC-, World Wildlife Found y CCAD.
Management of Coastal Marine Resources and Alternative Economic Activities (MAREA)	Policy and strategies	2010–2014	Central America	Funded by USAID
Conservation of the Coastal Ecosystems of the Gulf of Fonseca (PROGOLFO)	Instruments Research-knowledge and information	1997–2000	Nicaragua, Honduras and El Salvador	Funded by Danish Cooperation (DANIDA), IUCN and CCAD.
Integrated Management of Coastal Zones and Sustainable Management of the Mangroves of Guatemala, Honduras and Nicaragua (Mangrove Project)	Instruments Research-knowledge and information	2011–2013	Guatemala, Honduras and Nicaragua	Funded by the Government of Spain through the United Nations Environment Program (UNEP) and Ministry of Environment and Natural Resources (MARENA), Secretary for Natural Resources and Environment (SERNA) and the Ministry of Environment and Natural Resources (MARN).
Environmental Protection and Pollution Control established by Maritime Transport in the Gulf of Honduras (Gulf of Honduras Project)	Instruments Research-knowledge and information	2004–2008	Belize, Guatemala and Honduras	Funded by the IDB and implemented by the Central American Commission of Maritime Transport and the CCAD.
Mesoamerican Reef System Fund	Instruments Economic resources	2012–2016	Region of the SAM	Sponsored by Kreditanstalt für Wiederaufbau (Kfw). Focused on specific Marine Protected Areas of the MBRS.
Leadership Program of the SAM	Training and qualifications Education for sustainability	Since 2010	Region of the SAM	Initiative of the Mexican Fund for the Conservation of Nature with support from the Summit Foundation.
The Cousteau Observatory for the Seas and Coasts of Central America	Research-knowledge and information	2011–2018	Central America	Consortium: French Institute of Central America (IFAC), Research Institute for Development, University of Western Brittany of France, University of Costa Rica (UCR), National University of Costa Rica, Ministry of Energy, Environment and Seas of Costa Rica and Cousteau Observatory of Mexico.
Individual initiatives of each country		**Year**	**Country**	**Detail**
Conservation and Management of Coastal Marine Resources in the Panama Pacific	Instruments Research-knowledge and information	2009	Panama	Consortium: TNC, Smithsonian Tropical Research Institute and the Aquatic Resources Authority of Panama (ARAP).
Program for the Sustainable Development of Darien (PDSD)	Institutions Instruments Research-knowledge and information	2002–2007	Panama	Funded by IDB and implemented by Marine and Coastal Resources Directorate of the Panamanian Maritime Authority (AMP/DGRMC)
Coastal Management Project in Bocas del Toro Province	Instruments Research-knowledge and information	2007–2010	Panama	Funded by IDB and implemented by ARAP.
Integrated Management of Coastal Marine Resources in the province of Puntarenas	Instruments	November 2011 to November 2016	Costa Rica	Funded by the Global Environmental Facility (GEF) and implemented by the Mar Viva Foundation. Beneficiary: National System of Conservation Areas.
Comprehensive Management Program of the Coastal Zones of Nicaragua (MAIZCo).	Policy and strategies	1996–2000	Nicaragua	Funded through Cooperation of the Netherlands and Denmark. Beneficiary: MARENA General Directorate of the Environment.
Strengthening of the Subsystem of Protected Areas of the North Coast of Honduras - Coastal Marine Project.	Instruments	2015–2019	Honduras	Funded by the GEF through the United Nations Development Program (UNDP). Implemented by the Ministry of Natural Resources, Environment and Mines.
Conservation and Sustainable Use of Biodiversity in Marine-Coastal Protected Areas.	Instruments	January 2014 to December 2018	Guatemala	Funded by the GEF through the UNDP. Implemented by MARN.
Municipal Strengthening for the Management and Treatment of sewage water in the Caribbean area of Guatemala.	Instruments	March to October 2016	Guatemala	Funded by UNEP. Implementation area: Municipalities of Puerto Barrios, Rio Dulce, Livingston and Morales.
Project Sustainable Exploitation of Resources Associated with the Mangroves of the Pacific of Guatemala.	Instruments Research-knowledge and information	1997–2000	Guatemala	Implemented by IUCN and the National Forestry Institute of Guatemala, with funds from European Cooperation.
Coastal Zone Management Project	Normative Institutions	1993–1997	Belize	Funded by the GEF through UNDP.

Source: Own elaboration based on MARENA, 1997; Vanegas-Zuñiga (1999); Ochoa et al. (2001); Suman (2007), 2018; SINAC, 2012.

Table 7
Some of the policies and strategies from SICA and relationship with the coastal-marine environment.

Policies and Strategies	Subject treated and relevance to ICZM
Central American Policy of Disaster Risk Management 2015–2030 and its Regional Plan for Disaster Risk Reduction	It does not include coastal risks or vulnerability
Central American Agricultural Policy 2008 - 2017	Contains a commercial emphasis. There is a lack of consideration of the problems of pollution and coastal modification caused by agriculture, including social and ecological problems in coastal areas caused by intensive cultivation of African palm. The principle of sustainability is mentioned, but guiding measures are not included.
Fisheries and Aquaculture Integration Policy in the Central American Isthmus 2015 - 2025	Sectorial policy focused on decision making agreed by the countries of the region.
American Policy on the Conservation and Wise Use of Wetlands	Its strategies and actions reflect the importance of supranational coordination, without considering an integrated approach to coastal management.
Regional Climate Change Strategy	Objectives proposed were as follows: (a) Develop a research/action agenda on climate change and climate variability; its relationship with coastal-marine ecosystems and resources and integrate the results of science into the coastal-marine policies of the region. (b) Improve knowledge on the effects of climate change and climate variability in these spaces. (c) It integrates the results of scientific research into ICZM policies. To this end, it proposes the development of policies for the use of coastal space to address aspects related to: tourism infrastructure, urban centres, logistics infrastructure, the strengthening of early warning systems on the coast and specific training. It also suggests the implementation of the regional policy of non-pollution of the oceans, coasts and adjacent lands, and the Code of Conduct for companies based on the coast. (d) Strengthen the Organization of Fisheries and Aquaculture Sector of the Central American Isthmus (OSPESCA)* design and implement an integrated coastal-marine management plan, including spatial management to reduce the risk and vulnerability of both populations and critical infrastructures.
Regional Environmental Strategy Framework 2015 - 2020	Strategic Action: "Forests, Seas and Biodiversity": Contribute to marine spatial planning processes and promote sustainable fishing.
Sustainable Agriculture Strategy Adapted to Climate for the SICA Region 2018 - 2030	Framed within the Objectives of Sustainable Development, but without a vision that relates agricultural activities with impacts and risks in coastal areas.
Central American Sustainable Energy Strategy 2020	Concerns only with the application of energy systems located on the mainland, when it could extend to exploration of renewable marine-type energy.

Source: Own elaboration based on CCAD, 2002; UN/SICA, 2007; CAC, 2008; CCAD, 2010b; CCAD, 2014; OSPESCA, 2015; CEPREDENAC, 2017; CAC/SICA, 2018. Note: *In the framework of OSPESCA is developed PRADEPESCA (Regional Program of Support for the Development of Fishing in the Central American Isthmus).

comparative analyses of public policies related to ICZM, and some on which Central American countries have been involved. Notable examples are the Ibero-American Network for Integrated Coastal Management (Red IBERMAR), which started in 2008 as a thematic network of the Ibero-American Program of Science and Technology for Development (CYTED). It is made up of researchers and managers from 16 Ibero-American countries, creating an important space for analysis and exchange of experiences for better management in terms of sustainability of the littoral. Honduras, Costa Rica and Panama have institutions within the initiative, with national diagnoses and proposals in the methodological framework promoted by IBERMAR (Morales-Ramírez et al., 2009; Arenas-Granados and Garcés, 2010, Arenas-Granados, 2011; Caviedes, 2011; Caviedes et al., 2014, 2016).

As can be seen, in most projects the initiatives have been aimed at the formulation of strategic instruments and the generation of knowledge and information. In general, the development of ICZM initiatives in the region has been dependent on support from international cooperation. When projects have not generated substantial changes in public institutions, the continuity of such initiatives has been lost. This trend has not changed significantly since international cooperation was introduced in these countries. According to Rivera-Arriaga (2005) and Arenas-Granados (2011), in most developing countries, successful ICZM efforts have been financed by international cooperation programs or loans from multilateral banks, where maintenance of finance for a full cycle has been critical.

3.3.2. Regional ICZM Public Policies and Strategies

Within the SICA framework, different public policies have been approved as responses to various problems. These include some secondary issues that ought to be involved in an ICZM policy. However, no reference has been found regarding management implementation, institutional coordination or other relevant issues (Table 7). This is mainly explained by the fact that within the SICA there is no advocacy or coordination mechanism for integrated management of the Central American coastal-marine space. In this system, the sectorization of activities is well documented. Rodríguez and Windevoxhel (1998) suggested that the CCAD, a body within SICA made up of environmental ministers, is best placed to establish the necessary coordination to implement a regional ICZM initiative. However, 20 years later there are no concrete actions (Table 7), such as the formulation and implementation of a policy or strategy for better coastal governance, which should be of particular importance to address the challenges of Global Change. The role of SICA to respond appropriately to a matter of such importance cannot be over stressed.

In 2010, the *Relaunch for Central American Integration* (SICA, 2010), included a Joint Declaration and an Action Plan, which brought together the five pillars of Regional Integration: Democratic Security, Climate Change and Disaster Prevention, Social Integration, Economic Integration and Institutional Strengthening. This was a step forward taking into consideration the bases that an ICZM Public Policy should have for CA. However, the Action Plan did not include any reference for the better management of coastal-marine spaces. A non-integrated political vision for integrated coastal management is evident in the region, but emphasis is only placed on "Fisheries Resources Management". After the Central American Summit on Climate Change and Environment in 2008, the project *Economics of Climate Change in CA* (CCAD, 2010a) was implemented. Climatic studies and trend scenarios were carried out on macroeconomic and demographic issues, changes in land use, water resources, agriculture, biodiversity, extreme events and energy. Among the policy proposals, none are directed towards ICZM. The project only indicates aspects related to the protection and conservation of coastal ecosystems. This leads us to suppose that the application of ICZM is only aimed at the protection and conservation of the natural environment for the development of the tourism sector.

Similarly, the *Environmental Plan of the Central American Region PARCA 2010–2014* (CCAD, 2009) recognizes the importance of

Table 8
Synthetic analysis of the state of progress of ICZM in the supranational scale of SICA.

Structural element of the Decalogue	Description
1. Public Policy and National Strategies	There is no explicit public policy or regional strategy in ICZM.
2. Normative	There are no rules in the SICA with guidelines for countries to review, sort, and integrate the multiple existing regulations related to the coasts and the sea.
3. Institutions	There is no specific institution or inter-institutional body.
4. Competences	It is not yet clear what the responsibilities of SICA are regarding providing guidance for better government of these spaces.
5. Instruments	There is no regional plan or strategy about ICZM.
6. Economic Resources	As there is no policy or strategy, there are no budget resources allocated.
7.Training and Qualifications	In general, higher education on ICZM is not offered. The postgraduate degree in Integrated Management of Tropical Coastal Areas of the University of Costa Rica and the two postgraduate degrees of the University of Panama and the International Maritime University of Panama, both with emphasis on the management of coastal and marine resources, are exceptions.
8. Research-knowledge and Information	There is a need for greater generation and dissemination of knowledge with respect to these areas, as well as disclosure of their public management.
9. Public Participation	The population of the coastal areas is often oblivious to the political decisions that affect them.
10. Education for Sustainability	There is no regional initiative of non-formal education oriented towards coastal sustainability.

continuing with the economic activities, such as fishing, tourism and ports, but leaves out many other matters with implications in ICZM. So, issues related to the coastal-marine space are viewed from the unique perspective of the physical-natural subsystem. The socio-economic and legal-administrative subsystems are not integrated, meaning that "coastal-marine" remains under the exclusive connotation of natural space and a source of extraction resources.

The CCAD is made up of five technical committees: Forests, Climate Change and Risks, Integrated Management of Water Resources, Trade and Environment, and Environmental Quality. Although all these issues should be considered in the implementation of coastal management programs, coordination among them is also important. There is an urgent need for an inter-sectorial commission within SICA that aims for better management from an integrated perspective. However, there is progress: the Regional Climate Change Strategy (CCAD, 2010b), is in the process of being updated and clearly sets forth guidelines related to ICZM (Table 7).

SICA is the vehicle for implementation of ICZM in CA. Several reasons support this statement. This is a political sphere of coordination among countries, through which other policies and strategies that influence the formulation of national policies. In other cases, they have also influenced issues at the regional level. An example is the implementation of the simultaneous closure of spiny lobster extraction in CA. Besides, SICA is a supranational political entity from which to implement regional ICZM projects. However, certain limitations must be taken into account. There are differences in institutional capacity among countries for the ICZM. On the other hand, SICA's policies, strategies and plans are not binding; an aspect that this political entity could consider in the future. In addition, in most cases the ICZM has been understood as a tool to address the coastal-marine physical-natural subsystem. This ends up turning this integrated management into a properly sectorial theme within the ministries of the environment and, in the case of SICA, within the CCAD, as mentioned above. This causes the ICZM to lose the integrated approach.

Table 8 shows the synthetic and current diagnosis of the ten key issues for ICZM within the SICA framework. It can be observed how a lack of public policy to address these issues clearly results in gaps in the other key aspects analyzed. Among these gaps is the lack, for instance, of an inter-institutional and interdisciplinary regional commission for the coordination of policies and strategies related to ICZM.

3.3.3. National ICZM Public Policies and Strategies

So far only Guatemala, Costa Rica and Belize have formulated explicit ICZM public policies. In Belize, the policy for coastal-marine management has been framed within its Integrated Coastal Zone Management Plan. Since the early 1990s, this country has developed policy initiatives for ICZM. The Coastal Zone Management Unit (CZMU) was established in 1990 within the Fisheries Department. Beginning in 1993, the GEF/UNDP Coastal Zone Management Project promoted the separation of the CZMU from the fishing authority (Gibson et al., 1998). Coastal Zone Management Act of 1998 established the Coastal Zone Management Authority and Institute (CZMAI).

A similar case is that of Costa Rica, which approved the National Sea Policy 2013–2028 (CONAMAR, 2013). However, the country has an extensive experience in the management of coastal-marine spaces. In 1977 it approved the Maritime Terrestrial Zone Act; which is part of a set of similar laws that other countries throughout the world began to develop in the 70s. Additionally, in 2010 the National Strategy for the Integrated Management of Sea and Coastal Resources was approved, which should also be considered as a first ICZM explicit policy to the nation.

In 2009 Guatemala approved its Policy for the Integrated Management of Coastal Marine Areas (MARN, 2009). However, this policy has not been implemented by the competent government agency. It is true that, for some officials and non-governmental organizations, the policy has served as a guide for its activities; however, it has not developed any strategy, operative plan or, the most important, secured funds for its implementation. Guatemala has the State Territorial Reserve Areas Regulatory Law of 1997 and the State Reserve Area Control Office (OCRET), within the Ministry of Agriculture, Livestock and Food -MAGA-. This law regulates concessions in the coastal space, which is defined between the high tide line and three km inland. Notice that this concession regulation is not made from the ICZM approach or under the 2009 Policy determinations. There is also no effective coordination with the MARN or with the National Council of Protected Areas (CONAP).

Honduras, Nicaragua, El Salvador and Panama do not have ICZM policies. Despite efforts, especially from Panama, with the creation of Directorate of Seas and Coasts of the Ministry of the Environment (DICOMAR) in 2015, these countries have had only some sub-national plans and isolated actions that have not achieved substantial changes in the face of coastal problems. Most of these actions were not part of an integrated approach, focused on the management of coastal resources, artisanal fisheries, fishing communities, etc. Notice also that the Development of Coastal Zones Act-2009 of Nicaragua is not related to the ICZM, but economical coast development policies. In Honduras, an initiative to formulate an explicit policy of ICZM of the Secretariat of Natural Resources and Environment (SERNA) begins in 2012. It has resulted in a series of publications and works that facilitated the continuation of the process in 2016 within the framework of the Coastal Marine Project of the Ministry of Energy, Natural Resources, Environment and Mines (MiAmbiente) (Caviedes et al., 2016). Finally, in 2017 the participatory process began, with different sub-regional actors, which generated a policy proposal. The document is currently in its draft phase in MiAmbiente, pending approval.

In conclusion, it has been possible to verify that the countries of CA progress at a different pace in the formulation and implementation of public policies for the integrated management of their coastal-marine spaces. The brief analysis in Table 9 also shows the effort in Central American countries related with public institutions and laws. Only Costa Rica, Nicaragua and Belize have a specific norm oriented towards ICZM and so far only Belize has a public institution specifically dedicated to it.

Table 10 shows the main responses obtained in the interviews

Table 9
Summary of national efforts of ICZM in Central America.

Country	(1) Existence of explicit ICZM public policy	(2) Specific law for the management of coastal zones	(3) Institutions and specific competences for the ICZM
Panama	No	No	DICOMAR within the Ministry of Environment National Marine Commission (COMAR).
Costa Rica	National Policy of the Sea 2013–2028	Maritime-Terrestrial Zone Act 1977	Ministry of Environment and Energy (MINAE), ICT and municipalities. National Council of the Sea (CONAMAR)
Nicaragua	No	Development of Coastal Zones Act, 2009	Nicaraguan Institute of Tourism and coastal municipalities. National Commission for the Development of Coastal Areas
Honduras	Policy proposal pending approval	No	Several institutions with only sectorial competences. There are no clear competences between the state and municipalities
El Salvador	No	No	Ministry of Environment and Natural Resources is the institution with more responsibilities in the field
Guatemala	Policy for the Comprehensive Management of Coastal Marine Areas 2009	State Territorial Reserve Areas Regulatory Law of 1997	The Ministry of Environment and Natural Resources centralizes competences for coastal management. State Reserve Area Control Office (OCRET). Municipalities have some skills such as beach cleaning and waste management
Belize	ICZMPlan-2016 and Nine Regional Guidelines	Coastal Zone Management Act, 1998	The CZMAI and its Advisory Council

Table 10
Issues discussed and main qualitative responses obtained from the experts consulted about ICZM in CA.

Issues discussed	Diagnosis	
	National-scale	SICA
Institutional coordination	Lack of coordination among institutions with competences in the coastal-marine space	Lack of coordination between the SICA Commissions Absence of a commission for the ICZM
National and local institutional competences	Lack of decentralization of competencies in coastal-marine areas accompanied by integrated coastal regulation	Not applicable
Public participation	Lack of integration of the coastal population in decisions taken from public institutions	Absence of public participation in the scope of SICA
Policies and strategies	National sectorial policies. In countries with coastal-marine management policies their implementation is slow	There is no ICZM in the political sphere of SICA SICA's policies and strategies are sectorial in nature.
Understanding ICZM for inclusion in public policies	Lack of staff trained in ICZM in the institutions present in the coastal zone	Lack of staff trained in ICZM in the SICA units. The only coastal issues that appear in the explicit policies of SICA are those related to tourism, fishing and commercial ports, but not the ICZM
Economic resources for ICZM	Lack of funds to implement the management policies of coastal-marine areas	Most of SICA's initiatives are carried out with external funds. When a project finishes most of the initiatives are stopped

conducted in the institutions of different countries in CA during the fieldwork. These responses are the outcome of the non-inclusion of ICZM in the public policies of SICA, and in some cases, already discussed above, also in national-scale policies. These results are consistent with diagnoses of the progress of ICZM carried out in some countries of the region such as Panama, Costa Rica, Honduras and Belize (Suman, 1990, 2007; Christie, 2006; Morales-Ramírez et al., 2009; Arenas-Granados and Garcés, 2010; Arenas-Granados, 2011; Caviedes, 2011; Caviedes et al., 2014, 2016).

4. Conclusions

In the first part of this article, it is demonstrated the need for CA to establish and operate a research and information system which collects, updates and disseminates physical-natural, socio-economic and legal-administrative related to the coastal-marine area. The strategic nature of these zones for the lasting well-being of society, as well as its complexity and fragility demand it. This dynamic tool answers to the eighth element of the Decalogue and should provide adequate support for decision making and implementation of ICZM programs, both at the regional and national scales.

Most ICZM initiatives in CA have focused on the generation and strengthening of management instruments followed by the gathering of information for decision making. In general, the development of ICZM initiatives has depended on support from international cooperation. If these actions do not also generate substantial changes in the public institutions themselves, any progress made and their continuity become lost. Notice that it is important those lessons learned from coastal management projects transcend the framework of political-territorial administrations.

Regarding the analysis of public policies at the regional level, ICZM is not on the CA political agenda and has not been considered a priority in the short, medium or long term. The importance of better resolution and prevention of the complex coastal-marine problems has not yet been recognized by governments. Until this happens, the degradation of ecosystems and associated poverty, food insecurity, diminishing resources, water pollution and the effects of climate change and variability will increase. Despite not being mentioned the ICZM in the different explicit policies and strategies of the SICA, some useful elements are observed in the Regional Climate Change Strategy 2010 for the design of a public policy for CA.

In the supranational framework of SICA, the formulation and implementation of the regional policy for the integrated management of coastal-marine areas must be clearly addressed. As for the other elements of the Decalogue, at present the different dependencies of the SICA are not coordinated under an inter-institutional or interdisciplinary commission that will truly promote an ICZM approach in the region. Effective coordination must be given between the different commissions/units of the SICA related to this area. SICA should also propose guidelines for the elaboration of adequate regulations for the ICZM in the countries. Its purpose is to facilitate the coordination of those aspects, where possible, in binding legislative, as it has been for example the case of the lobster ban. In addition, a priority should be the establishment of postgraduate research and training programs (masters and at least one doctorate) in Integrated Management of Coastal and Marine Areas. In addition, it is necessary to facilitate the growth of

professionals, both scientists and managers to generate substantial changes in public institutions and in decision making, both regionally and nationally. Furthermore, in order to achieve greater participation of the population, it is necessary to improve the mechanisms of public participation. Also, take into account the dissemination of information, as well as education and awareness on the coastal-marine environment.

On the other hand, the lack of ICZM driven by SICA helps to understand the disparity and lack of integration of countries to firmly address solutions to common coastal-marine problems. Despite efforts to formulate policies and strategies related to biodiversity, climate change or better fisheries management, there is no integrated response to coastal-marine problems. The sectorial perspective continues to be dominant. This insufficient approach increasingly contributes to coastal-marine unsustainability in CA, and hence makes physical-natural and social problems more critical. Therefore, it is desirable that ICZM regional public policy is promoted in coordination with national policies. In addition, it should emphasize the implementation of common instruments for supranational coastal areas such as the Gulf of Fonseca and the Gulf of Honduras. These alliances between different actors, also promoted by the 2030 Agenda and its Development Sustainable Goal number 17, increase the necessary cooperation to properly address regional issues.

It is urgent that governments assume an integrated perspective to provide appropriate responses to the unsustainability found in Central American coasts and seas. For this reason, they must abandon a system that leaves management competencies for such a complex space, with a sectorial entity, whether it is “environmental” or “resource management”. This is fundamental in CA, where society, expressed in different cultures and economies, is strongly linked to the sea. The sustainability of human well-being in the region therefore depends on the recognition of this reality by policy makers. This is particularly relevant to the challenges imposed by Global Change.

Declaration of competing interest

None.

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