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Regulatory Challenges in Realizing Integrated Coastal Management—Lessons from Germany, Costa Rica, Mexico and South Africa

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Received: 24 August 2018; Accepted: 4 October 2018; Published: 18 October 2018



Abstract: Integrated coastal management (ICM) has been considered worldwide to be a suitable approach to realizing comprehensive schemes to protect or develop coastal regions. A complex regulatory system stretching from international to local levels provides a framework for ICM practices. This raises the question whether and to what extent ICM practices have been supported by legal and policy frameworks at the international and national levels in different settings in both developed and developing countries. This paper examines four case studies in Germany, Costa Rica, Mexico and South Africa. Two research methods were used. First, a document-based analysis was conducted in two parts: a literature review of the content of ICM, and a policy and law analysis of the jurisdictions of the four case studies and at the international level (i.e., treaties and declarations). Second, a qualitative analysis was conducted based on in-depth interviews involving 21 decision-makers representing all the case studies. With a view to enhance the effective use of international and national legal and policy instruments and their implementation in a more local site specific context, this study considers four principles currently guiding ICM practices: (i) incorporation of international instruments' principles in national legal and policy frameworks, (ii) participation, (iii) sustainable development and (iv) monitoring. An I-P-S ((I) incorporation of international instruments' principles in national frameworks, (P) participation (S) sustainable development) diagram is used for an integrative assessment of ICM and indicates directions for further improvements at the case study sites. The embeddedness of ICM into national legal and policy frameworks is a success factor for ICM, however, it is often limited due to a lack of implementation. Furthermore, ICM can easily be jeopardized if ICM is allocated a marginalized position.

Keywords: sustainability; participation; implementation; policy; law; comparative study

1. Introduction

All around the globe, fragile coastal environments are undergoing pressure and change. Among the main challenges are: massive tourism, unsustainable fishing, unplanned development, water shortages, deforestation, degradation of the terrestrial and marine ecosystems, pollution, extinction of several marine species, and social inequalities [1–6]. Due to this constant pressure, management actions, policies and legislation need to ensure the protection of this unique environment.

Integrated Coastal Management (ICM) is a recognized science-driven management approach based on participation [7–9], capacity development [10] and sustainability [6,9,11]. For the purpose

of this paper, ICM is understood as ‘a dynamic process by which actions are taken for the use, development and protection of coastal resources and areas to achieve national goals established in cooperation with user groups and regional and local authorities’ [12].

ICM involves a continuous integrated approach to planning and management that takes all sectors, policies, laws and individuals into account [9]. ICM should address various aspects such as economic, social, cultural and environmental issues [13]. Such processes will depend on the particular characteristics of the coastal areas as a multidimensional entity that consists of the physical reality, institutions, knowledge, perceptions, paradigms and economic and cultural values [14,15].

ICM as a management cycle with multiple steps starts by collecting information, after which it focuses on planning, decision-making, implementation, monitoring and evaluation [16], which leads again to planning for optimizing the planned approaches. These steps have to cope with the ambivalent nature of ICM with respect to participative processes and, at the same time, its embeddedness in complex legal settings as part of formal processes.

Although according to the ICM definition coastal zones with nature conservation areas are facilitators of ICM and currently the prime focus of ICM in practice, it is important to understand the different contexts and challenges (e.g., environmental conditions, regulation, policy and institutions) that different countries face [17–20]. For example, in developing countries the decline in ecosystem qualities is much more rapid than in most developed nations [21], and in developing countries a large proportion of the coastal population depend on their immediate environment for their survival and have few options or alternative means of supporting themselves when such local resources fail [9].

This article investigates challenges and opportunities (i) in incorporating ICM principles recognized in international instruments into national policy and legal instruments and (ii) the effective implementation of regulations based on such ICM principles in practice. The main international instruments that will be discussed in this paper are: the Convention of Wetlands of International Importance Especially as Waterfowl Habitats [22]; the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter [23]; the Convention on International Trade in Endangered Species of Wild Fauna and Flora [24]; the Convention on the Law of the Sea [25]; the Convention of Climate Change [26]; the Convention of Biological Diversity [27]; Agenda 21 [28]; and the 2 Paris Agreement [29].

This study explores transposition and implementation challenges and opportunities in four different countries that exhibit diverse socio-economic and environmental conditions and levels of maturity of policies and laws. The featured countries are Germany, Costa Rica, Mexico and South Africa. In particular, this article aims at answering the following research question: To what extent are ICM practices supported by international instruments (i.e., conventions and declarations) and national policy and legal frameworks?

2. Material and Methods

In order to operationalize the investigation of the research question of this study, two research methods were used. First, a document-based analysis was conducted, and subsequently, a qualitative analysis was undertaken. The document-based analysis was divided into two parts: a literature review of the content of ICM, and a policy and law analysis in the jurisdictions of the four case studies and at the international level (i.e., conventions and declarations).

The first part of the analysis was developed through a compilation of scientific documents that elaborates the theoretical framework of coastal zones, their inherent problems and the ICM approach. In this study, the reflection on both context and management was based on elements of four principles currently guiding ICM practices, namely: (i) incorporation of international instruments’ principles in national legal and policy frameworks, (ii) participation, (iii) sustainability and (iv) monitoring. These are explained in Table 1. These key principles provided the focus of the analysis of this research. The principles have a strong relevance for ICM practices in coastal regions that include marine nature conservation areas. Adherence to these principles calls for a comprehensive perspective in

order to cater adequately to a given socio-ecological context and to design and execute inclusive management approaches.

Table 1. Integrated coastal management (ICM) key principles used in the analysis taken from the literature review and the international instruments' analysis.

Key Principles of an ICM Practice	References	Main International and Regional Legal and Policy Frameworks
Incorporation of International Instrument's Principles into National Policy and Legal Frameworks	[2,9]	International <ul style="list-style-type: none"> • Paris Agreement • Law of the Sea Convention • CITES Convention • Biological Diversity Convention • Agenda 21 Regional Treaties (European Union Conventions) <ul style="list-style-type: none"> • Water Framework Directive • Marine Strategy Framework Directive
Participation	[7–9]	International <ul style="list-style-type: none"> • Paris Agreement • Agenda 21 Regional Treaties (European Union Conventions) <ul style="list-style-type: none"> • Water Framework Directive
Sustainable development	[6,9,11,26]	International <ul style="list-style-type: none"> • Paris Agreement • Ramsar Convention • CITES Convention • Climate Change Convention • Biological Diversity Convention • Agenda 21 Regional Treaties (European Union Conventions) <ul style="list-style-type: none"> • Water Framework Directive • Fauna Flora Habitat Directive • Marine Strategy Framework Directive • Maritime Spatial Planning Directive
Monitoring	[9,16]	International <ul style="list-style-type: none"> • Paris Agreement • Agenda 21 Regional Treaties (European Union Conventions) <ul style="list-style-type: none"> • Water Framework Directive • Fauna Flora Habitat Directive • Marine Strategy Framework Directive

The second part of the analysis consisted of a policy and legal analysis, which was conducted first at the international level and then at the national level in the countries of the selected case studies. The analysis of the international instruments covered the four guiding principles previously identified in the literature review as drivers of ICM practices. The analysis of the legal and policy instruments conducted at the national level and the international instruments' principles were linked to socio-economic and environmental conditions (discussed in detail in Section 4).

The qualitative analysis was completed by using four case studies in Germany, Costa Rica, Mexico and South Africa. The four selected countries represent comparable and contrasting situations. Comparable conditions included the ratification of international conventions, such as the Convention on the Law of the Sea, together with the design and implementation of domestic policy and legal frameworks. Contrasting elements included factors such as developed versus developing countries and problems relating to institutions in different multi-layered administrative systems. Germany, Costa Rica, Mexico and South Africa were the focus of this research, since they illustrate an important development of regulatory frameworks with respect to ICM; at the same time, they offer an overview of remaining challenges and opportunities (discussed in detail in Section 4). Consequently, this research used multiple case studies in order to promote the generalizability of the findings in comparable contexts. Furthermore, using multiple case studies enriches the contribution to the literature and can explore the effects that different features and variables have on ICM. Results from multiple case studies were considered more powerful than those derived from a single case study [30].

During this research, 21 in-depth interviews were conducted. Those involved were identified and selected on the basis of specific predetermined selection criteria (e.g., decision-makers at governmental and non-governmental organizations (NGOs)). Appendix A shows the interview protocol crafted for this research. The interviews were analyzed using the Adaptive Theory, which facilitates the adaption and development of concepts and insights of ICM literature to evidence gathered from the analysis of interviews [31]. The following steps were taken to analyze the interviews of this research: (i) transcribing the interviews and storing them in an electronic format; (ii) coding and data reduction, done by selecting, abstracting and transforming data in order to extract the main topics; (iii) data display by presenting the information in a form suitable for conclusions to be drawn (interview matrix); and (iv) determining what explanations emerge from the data analysis and how they can be verified.

An I-P-S-triangle diagram was developed for an interview-based assessment of the current status of ICM and to indicate directions for further improvements at the pilot sites. The triangle considers three dimensions of assessment based on the four ICM principles highlighted/featured in this study, i.e., (I) incorporation of international principles in national legal and policy frameworks, including regional regulations and an implementation of effective schemes, (P) participation and (S) sustainable development, which was considered in combination with monitoring of ICM processes in the diagram. Relevant information was taken from the interview matrix and classified into four categories. Each category was given a weight. Categories and weights are as follows: 'no relation or impact': 0; 'minor relation or impact': 1; 'significant relation or impact': 2; and 'major relation or impact': 3. In order to calculate values for the I-P-S diagram, all weights per diagram dimension were totalized for every pilot separately. The total numbers were aggregated based on the number of interviewees. The relative proportion of the resulting numbers per dimension was plotted in the I-P-S diagram.

It is important to acknowledge that there were other methodological approaches used in the analysis and diagnosis of socio-ecological systems, which have looked at the implementation of policies and regulation. In this sense, it is important to mention Ostrom's general framework for analyzing sustainability of socio-ecological systems [32], and more recently, the integrated territorial investment (ITI) of the Mar Menor [33]. However, the discussion of such methodologies is outside the scope of this paper.

3. The Case Studies

This research is based on four case studies summarized in Table 2. Marine-coastal regions with nature conservation areas were selected in Germany, Costa Rica, Mexico and South Africa to allow for an evaluation of ICM practices under comparable, as well as contrasting situations with respect to environmental and societal conditions. Key management and protection instruments used in the selected case studies are mentioned in Table 3. These case studies provide a basis for analyzing

whether and to what extent ICM practices are supported by international and national legal and policy frameworks:

The coastal region studied in Germany is Langeoog Island, which is located in the central part of the Wadden Sea National Park. The Wadden Sea stretches from the Netherlands to Denmark along the barrier islands of the Dutch, German and the Danish coasts. It is the largest unbroken system of intertidal sand and mud flats in the world, with natural processes undisturbed throughout most of the area. It is also a hot spot of human activities as it is one of world's most frequented shipping lanes and one of the prime tourist destinations in Germany. Shipping, oil and natural gas exploration, off-shore wind energy, maritime tourism and flood and nature protection infrastructure together form a complex and overlapping pattern of uses in this coastal region [34–36], which makes it an ideal case study for analyzing ICM practices both in Germany and Europe.

In Costa Rica, the coastal area under examination is the Marino Ballena National Park, which is located in Osa Peninsula in the South Pacific, at the foot of the communities of Uvita and Bahía Ballena. It was one of the first national marine parks declared in Latin America in 1989. Marino Ballena National Park, as most of the marine-coastal zones in Costa Rica, is of great economic, recreational, ecological and physical importance. Among the marine species protected in the park are coral reefs, crabs, worms, lobsters, algae, fishes, sponges and molluscs. However, pollution and degradation persist as key problems [37,38]. Such characteristics make the case study highly relevant for the examination of ICM practices in Costa Rica and Latin America.

The Mexican case study features the Cozumel Reefs Marine National Park, located in the Caribbean Sea. Its waters are the home of an important number of marine species, such as coral reefs, algae, echinoderms, fishes, crustaceans, worms, molluscs and turtles. Inaugurated in 1996, it is also one of the pioneering marine national parks in Latin America. In the past decades the island of Cozumel has seen a large increase in tourism, and nowadays, it hosts the most important cruise harbor in the Mexican Caribbean. The island of Cozumel, like many other marine-coastal zones in Mexico, faces increasing problems with pollution and pressure on the environment due to economic activities such as tourism, oil extraction, fisheries, maritime routes and harbors [39–41]. All these features make it extremely pertinent to analyze ICM practices at this site, both in Mexico and Latin America.

In South Africa, the case study under examination is the Sundays Estuary, which is located 30 km north-east of the city of Port Elizabeth, Eastern Cape. The Sundays Estuary represents a core site for conservation of estuary biodiversity. It is also an important nursery habitat for line fish, including overexploited species. It plays an important role as a roosting and feeding area for marine-coastal birds and it is an important source of nutrients and sediment to the nearshore marine environment [6,42–44]. Overall, the Sundays Estuary is a large and biologically diverse estuary which, even though it faces a number of environmental threats such as pollution, is in an environmentally healthy condition. It represents an important focal point of South Africa's conservation efforts, which makes it a pertinent example to examine ICM practices.

Table 2. Key issues, number of interviewees and locations of the 4 case studies.

Case Studies	Langeoog Island, Wadden Sea National Park—Germany	Marino Ballena National Park—Costa Rica	Sundays Estuary—Republic of South Africa	Cozumel Reef National Park—Mexico
Key issues	Tourism and marine-coastal protection of the island. Small-scale communities.	Tourism and important conservation efforts (mainly inside the limits of the park). Small-scale communities.	Traditional uses, such as subsistence harvesting of shellfish and religious ceremonies. Tourism. Small-scale communities.	Tourism is the main economic activity on the island. Important conservation efforts inside Cozumel Reef National Park. Small-scale communities.
Interviewees	5—public employees (4) and NGOs (1).	4—public employees (3) and NGOs (1).	5—public employees (4) and NGOs (1).	7—public employees (5) and NGOs (2).
Location	Located in the central part of the Wadden Sea National Park in the German State of Lower Saxony. The Wadden Sea is an extended tidal marine-coastal system of the North Sea/NE Atlantic.	Located in the South Pacific of Costa Rica, in the province of Puntarenas. It belongs to the Conservation Area of the Osa Peninsula.	Located 30 km north-east of the city of Port Elizabeth, in the Eastern Cape. The estuary discharges into Algoa Bay/Indian Ocean.	Located in the state of Quintana Roo in the Caribbean of Mexico.

Table 3. Synopsis of the management and protection instruments of the four case studies.

	Langeoog Island, Wadden Sea National Park	Marino Ballena National Park	Sundays Estuary	Cozumel Reefs National Park
Management	<p>Key instrument of the Wadden Sea management are state laws on the establishment of national parks. No German law for integrated coastal management exist. European Union Integrated Coastal Zone Management (ICZM) National Strategy. In addition, several EU-driven regulations complement ICM Management lies with three Federal States (Länder) in line with the hierarchically designed German subsidiary administrative system. Trilateral Wadden Sea Secretariat set up to implement the Danish-Dutch-German Trilateral Wadden Sea Plan.</p>	<p>Main instrument is the Maritime Terrestrial Zone Law. In addition, there are several environmental laws (i.e., Forestry Law, National Parks Law and Conservation of Wildlife Law). The management of the Marino Ballena National Park involves multiple stakeholders, such as public institutions, communities and NGOs. The National Strategy for Integrated Management of Marine and Coastal Resources is of additional relevance. Coastal Regulatory Plans in the maritime terrestrial zone.</p>	<p>The most important instrument is the Sundays Estuary Management Plan. The Integrated Coastal Management Act (ICMA) is of additional relevance. The management of the Sundays Estuary involves a network of institutions representing different sectors and levels. Various institutions are involved in ICM on national, provincial, regional and local levels.</p>	<p>A key management instrument of the Marine National Park Cozumel Reef is the national law on the Establishment of Marine National Parks. The Mexican government and environmental NGOs aim to channel their input into an international context of environmental and climate protection, as well as sustainable development.</p>
Protection	<p>In 1986, the Wadden Sea Area was declared a National Park. In 1993 the park became a UNESCO biosphere reserve. In June 2009, the Dutch and German Wadden Sea Conservation Areas were listed as a World Nature Heritage by UNESCO. The Danish part was added to the site in 2014.</p>	<p>Marino Ballena National Park was inaugurated in 1989. Strategic purpose is to protect important natural marine habitats. Main provisions of the Maritime Terrestrial Zone Law (No. 6043 of 1977), which covers two hundred meters (50 m public zone and 150 m restricted zone).</p>	<p>In 2000, South Africa drafted its National Policy on Integrated Coastal Zone Management (White Paper). The Integrated Coastal Management Act (ICMA) was designed in 2009 to operationalize the White Paper. In addition, Estuary Management Plans are in place.</p>	<p>In Mexico, there are several laws to protect marine biodiversity; in particular, there is the Wildlife General Law. Related laws are: the Official Mexican Norm on the Protection of Endangered and Vulnerable Species, the Ecological Equilibrium and Environment Protection Law and the Climate Change Law.</p>

4. Results

This section turns to the results of the four case studies and explains to what extent ICM practices are supported by international instruments (i.e., conventions and declarations) and national legal and policy frameworks. The analysis involved (i) examining the principles identified in the literature as enablers of ICM, (ii) assessing the implementation of the principles in the case studies and (iii) identifying their effectiveness through the analysis of available laws, policies, by-laws, plans and other existing regulatory frameworks. This process was extended by qualitative research, conducted via in-depth interviews with decision-makers.

4.1. Incorporation of International Instrument's Principles into National Legal and Policy Frameworks

Germany, Costa Rica, Mexico and South Africa have signed and ratified key international conventions related to ICM. Table 4 summarizes the main features of these instruments.

In general, the main environmental principles and goals of these treaties have been incorporated into the legal frameworks of Germany, Costa Rica, Mexico and South Africa.

There is a visible relationship between the international instruments and the domestic legislation. Therefore, it could be argued that the countries featured here have ensured that they meet the treaties' objectives and obligations. Policies, laws and management plans are undoubtedly a significant first step to promote ICM practices and awareness. However, Costa Rica does not have a comprehensive ICM law; ICM is governed mainly by the Maritime Terrestrial Zone Law, which does not refer to the principles and goals recognized in Agenda 21, such as participation and sustainability. Therefore, there is a need to design an ICM law that incorporates those principles. Even though there is a policy on ICM, it has never been implemented [29]. As one participant put it: 'There has been no proper development of specific mechanisms to facilitate the implementation of regulations on ICM in Costa Rica' [45].

Mexico is similar to Costa Rica, in that despite of the existence of several laws to protect and preserve natural resources and biodiversity, there is no ICM law or policy. Among the most important laws that regulate the marine-coastal zones are the Wildlife General Law [46], the Official Mexican Norm on Protection of Endangered and Vulnerable Species [47], the Ecological Equilibrium and Environment Protection Law [48] and the Climate Change Law [49]. Additionally, the General Law of National Goods [50] offers a definition of the coastal zone. According to this law, the littoral is the patrimony of national citizens, and private owners cannot obstruct free access to the first twenty meters of the coastline. The findings of this case study show that despite the existence of these legal frameworks, effective implementation is still limited. As one interviewee explicated, 'ICM is desired and some steps have been taken to implement it . . . However, up until today the implementation of the regulations to move from an indiscriminate exploitation to a regulated and planned use of natural resources in the coastal zones is still in its infancy' [51].

Similarly to Costa Rica and Mexico, Germany does not have an ICM law; nonetheless, it has a well-defined ICM policy. Germany has designed and adopted specific regulations in order to implement its ICM policy and to fulfill the goals and compromises declared in international treaties and European Union Directives. As mentioned by an interviewee: 'I don't think Germany needs a law to improve ICM; what it needs is to conduct more monitoring and improve the coordination among governmental institutions' [52]. Additionally, all of the interviewees mentioned that the national ICM policy is considered a weak instrument for framing and legitimizing informal initiatives with a view to either managing local problem-driven processes or to embedding the National Park into the even larger Biosphere Reserve. The latter assignment is progressing only slowly.

Table 4. Key features of international instruments that need to be considered in national policy and legal frameworks.

Instrument	Topic	Approach	Management Fields
Agenda 21	Integrated coastal zone management and sustainable development	New path of action	Participation and integration
Law of the Sea Convention	Management of living resources in the sea	Specific jurisdictional limits (12 mile territorial sea and the 200 mile exclusive economic zone)	Prevention, reduction and control
Ramsar Convention	Creation of wetlands	Preservation of ecological equilibrium	Conservation and protection
London Convention	Protection of the marine environment	Prohibition of dumping of certain hazardous materials at the sea	Control and prevention
CITES Convention	Protection of endangered species of plants and animals	Regulation of the trade of species and prohibition of trade of endangered species	Cooperation and protection
Climate Change Convention	Stabilization of greenhouse gas concentrations in the atmosphere and adaptation measures	Prevention of dangerous anthropogenic interference with the climate system	Conservation and adaptation
Biological Diversity Convention	Sustainable development	The sustainable use of biological resources and the fair and equitable sharing of the benefits	Precautionary, common concern of humankind
Paris Agreement	Sustainable development, holding the increase in the global average temperature to below 2 °C, above pre-industrial levels	Strengthening the global response to the threat of climate change	Equity and common but differentiated responsibility

South Africa illustrates a successful example of designing legal and policy frameworks based on international principles and commitments. There is an evident correlation between the vision and principles stated in the international instrument and the ones incorporated in the South African legal and policy frameworks, such as the White Paper [53] and the Integrated Coastal Management Act. In South Africa [54], the development of regulations to protect the marine and terrestrial ecosystems has been steadily improving and consolidated (e.g., through the creation of national parks and marine reserves). However, there is still scope for a more comprehensive policy alignment and the integration of coastal management and uses. At a management and operational level, coastal management remains fragmented, unsustainable and less prioritized. Additionally, some remaining challenges in South Africa in the development of laws and policies are evident, such as the lack of involvement of new users (i.e., local subsistence and small-scale fishermen) and the lack of conflict management mechanisms. As stated by a participant, 'The responsible authorities are not adaptive enough to respond to challenges, and the shift of responsibilities within departments has increased these challenges' [55]. Some scholars recently identified a general lack of coastal management knowledge among officials and the need for capacity-building in the provincial governments [6]. The political will to deploy and dedicate duties and resources to effective implementation also remains an uncertain but critical factor [44].

4.2. Participation

The requirement of participation in environmental issues—of which ICM forms one key aspect—has long been recognized in international instruments. As stated in Principle 10 of the Rio Declaration on Environment and Development: 'Environmental issues are best handled with the participation of all concerned citizens, at all the relevant levels' [28]. For the purpose of this article, participation is understood broadly as the active involvement of interested parties in ICM.

Participation, as defined in Rio Principle 10, have been incorporated into and developed by a number of subsequent binding international instruments [56], as well as in a number of domestic jurisdictions, including those of Germany, Costa Rica, Mexico and South Africa. The importance of having participative processes is to build a good foundation for an effective implementation of policies, laws and management plans. It has been shown that governments that involve the public in making decisions regarding natural resources use and management will be in a better position to take adequate measures and that decisions taken will gain greater support [38].

In Costa Rica, the institutions responsible for ICM have, to date, failed to develop participative processes. However, this approach has started to change, and recently there has been a growing tendency to develop and implement more participation in decision-making [37]. The findings of this research show that in Costa Rica, government agencies continue to be the most powerful actors in decision-making in ICM. This continues to be a challenge for other stakeholders to correct the current power imbalance.

However, in the case study of the Marino Ballena National Park, efforts were found to develop and implement more participative processes. An example of such efforts is the work done by the Interinstitutional Coastal Marine Commission of the Conservation Area of Osa Peninsula (ACOSA). This work has been the result of the coordination of actions of different government institutions, NGOs, small private businesses and community associations interested in marine-coastal management in the Osa Peninsula. Respondents suggested the government organization and distribution of information about ICM had been transparent. Respondents also suggested the meetings were open and that the government was willing to engage in discussion and to aim for a rough balance of interests when defining how to develop the coastal zone.

An example of a close to effective implementation of participation is provided by the German case study. Here, there were many interested stakeholders involved in the decision-making processes. These include, in particular, the Lower Saxony State Agency for Water Management, the Marine-Coastal Defence and Nature Conservation (NLWKN) and the National Park Authority of Lower Saxony at state

level, as well as the municipality level, represented by the Major and formal and informal interactions with individuals and local institutions. Respondents affirmed that their interests were included in the decision-making, and that they were satisfied with the outcomes of the meetings and discussions on how to better implement marine-coastal management in the area.

The case study in South Africa revealed a clear inclusion of the participation criterion in laws, policies and management plans related to marine-coastal management. For example, the Sundays Estuary Management Plan establishes the need to implement participative processes in decision-making. The findings of this case study also revealed that the plan itself was created through a participative process; considerable time was dedicated to stakeholders, and thus, created an environment of trust. This factor has helped implement the Sundays Estuary Management Plan. Nevertheless, government agencies continue to be the most influential actors in decision-making in an ICM, with the participation of other stakeholders (e.g., fishermen) still limited.

The Mexican case study appears to have achieved only a limited level of participation with regard to ICM. The fact that Mexico has a top-down approach to ICM affects participation on the part of other relevant stakeholders, such as communities. Additionally, the case study discloses diverse factors that hinder the achievement of participation in ICM, including a lack of inclusiveness of non-governmental stakeholders. However, participation in ICM in Mexico seems to be increasing. As highlighted by an interviewee: 'Participation has increased in the past years . . . it has been shown that participation has become a necessary foundation for an effective implementation of ICM' [57]. Another participant added that: 'With respect to participation, it is important that people understand that we all have a role and responsibility in environmental issues . . . and the only way to have people participating is through awareness and education' [58].

4.3. Sustainable Development

In 1987, the World Commission on Environment and Development (WCED) report, also known as 'Our Common Future', concisely articulated the concept of sustainable development as 'Development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs' [59]. The United Nations Conference on Environment and Development (UNCED), held in Rio de Janeiro in Brazil back in 1992, recognized, by general consensus, the concept of sustainable development as an essential goal of the international community. Since that time, the term has been used with great regularity in international instruments of an environmental, economic and social nature and has been invoked by various international courts and tribunals [60]. Consequently, it has been introduced into a number of national legal instruments related to coastal management including in the jurisdictions of Germany, Costa Rica, Mexico and South Africa.

The inclusion of the overarching goals of sustainable development in European Directives, as well as corresponding aims and regulations in current German law-making, are documented in local management plans such as that of Langeoog. The Langeoog case study showed the most elaborated example of the implementation of a sustainable approach in management practice. Germany and the specific case study of Langeoog display an effective approach to achieving sustainable development in marine-coastal zones. The case study identified initiatives to protect marine ecosystems such as salt marshes and wetlands, and terrestrial ecosystem of the national park such as coastal dunes. Additionally, Langeoog has a particular regulation that protects urban areas and provides benefits to the people who live there. Additionally, the case study revealed that clear efforts were being made to implement sustainable tourism. As one participant affirmed, 'Buildings (e.g., houses and hotels) in Langeoog have a maximum of two floors and cars are not allowed on the island . . . most of the accommodation facilities consist of small and locally owned bed and breakfast houses, which supports sustainable tourism and at the same time improves the welfare of the people who live on the island' [61].

In Costa Rica, even though there is a clear inclusion of the concept of sustainable use of natural resources in a number of environmental laws such as the Organic Environmental Law [62],

the Conservation of Wildlife Law [63] and the Forestry Law [64], this does not apply to the Maritime Terrestrial Zone Law [65]. Unfortunately, the Maritime Terrestrial Zone Law is the key instrument regulating activities in the coastal zones in Costa Rica. As mentioned by an interviewee: 'Even though Costa Rica has done a remarkable job in protecting marine-coastal areas inside national parks such as Marino Ballena ... Costa Rica is failing to use its overall marine-coastal areas in a sustainable manner ...' [66]. All the interviewees in Costa Rica agree that Costa Rica has made important achievements in protecting natural resources in marine-coastal zones inside national parks and other protected wildlife areas such as Marino Ballena National Park. However, marine-coastal zones in the rest of the country have consistently failed in achieving sustainable development. A lot of work still needs to be done, starting with updating the Maritime Terrestrial Zone Law and applying pressure on the government to implement a more integrated approach to the sustainable use of natural resources in marine-coastal zones.

In the case of South Africa, it can be argued that the goals and compromises declared in international treaties on sustainable development have exercised an important influence in shaping laws and policies. South Africa seems to have made important achievements in recognizing and incorporating the value of sustainable development in its laws and management plans. Nevertheless, South Africa lags behind on the enforcement of such laws and plans. The enforcement of Estuary Management Plans, such as that of the Sundays Estuary, has been instrumental in tackling the huge task posed by the sustainable development agenda. As stated by a participant: 'We are on the right track ... with the development of policy and regulatory frameworks to implement sustainable development ... but we are not quite there yet' [67].

In the Mexican case study, even though there has been an important influence of international instruments on the development of domestic legislation on sustainable development, it is not possible to conclude that an effective implementation has been achieved. The case study of Mexico showed a myriad of problems, such as limited implementation of legal frameworks to protect and conserve marine-coastal zones. Therefore, it is common for marine-coastal zones to have a high level of pollution alongside many economic activities such as tourism, oil extraction, fisheries, maritime routes and harbors, which have put substantial pressure on the environment [68,69]. Cozumel is only one example of this and unfortunately such scenarios are common in many other marine-coastal zones in Mexico and in many other countries in Latin America. As highlighted by an interviewee: 'More enforcement and compliance are needed in Mexico in order to improve the natural conditions of the marine-coastal areas' [70].

4.4. Monitoring

An essential element of the ICM approach is obtaining feedback on the successes and failures of current management, and using that information to improve future management endeavors [9]. Hence, responsibility for monitoring would need to be explicitly assigned and appropriate resources allocated. The overall monitoring includes the status and changes in the respective marine-coastal socio-ecological system from a sustainable development perspective.

The findings of the Costa Rica case study showed that Costa Rica has made important efforts to measure success in protecting marine-coastal zones. Nonetheless, most of these efforts have been concentrated only inside national parks and protected wildlife areas, leaving the rest of the marine-coastal zones unmonitored. An example of such efforts is the Marino Ballena National Park, where the Interinstitutional Coastal Marine Commission of ACOSA has implemented a monitoring system through different strategies, such as the deployment of marine rangers who have worked on controlling illegal tourism activities and illegal fishing. However, in Costa Rica overall, the fragmented approach to monitoring coastal management is in need of reform; every involved institution has worked on its own and focused its attention solely on a single aspect of ICM (e.g., tourism development in the coast) without any alignment with the work of other institutions [37]. Moreover, without taking into consideration the marine part of the coastal zones, one source of conflict is to be found in the main

coastal planning tool the Coastal Regulatory Plan controlled by the Costa Rica Institute of Tourism (ICT): the coast is seen primarily as an opportunity for tourism. This leads to the exclusion of other uses and key players in the development and coastal management, and fails to address the key problems facing the coastal zone. As stated by an interviewee: 'The main lessons learned are that we have to strengthen and consolidate inclusive planning processes . . . , allocate appropriate budgets . . . , include real participation of stakeholders, improve inter-agency coordination and enable informed decision-making based on technical studies' [71].

Germany represents an example for significant progress regarding the monitoring of successes but also failures of ICM strategies and schemes. In Germany, the Integrated Coastal Zone Management National Strategy comprises a synergy between European Directives and Federal Laws. The latter in particular call for significant efforts to monitor the status and the ongoing processes of National Parks and marine-coastal areas and to constantly reflect on improvements. Besides the implementation of legal and policy frameworks, these include the participation of community stakeholders, as shown in the case study of Langeoog. Additionally, practitioners report positively on the inclusion of the whole marine-coastal area: 'To include territorial waters into State Planning has been acknowledged in the region as a step towards managing the integration of the new off-shore renewable energies sector. The stakeholders have established some procedures and forums to exchange views on goals and problems of marine-coastal management' [72].

Mexican practitioners reflect on difficulties in ICM processes encountered from a variety of perspectives, ranging from monitoring exercises to the still prevailing need for better participation and adaptation to site-specific needs. As one participant pointed out: 'The main problem is the existence of many different laws that do not consider the Mexican context . . . and the different actors involved' [73]. It seems that a major challenge for Mexico is to incorporate the rationale of 'context matters' when designing laws and policies to regulate and manage coastal areas. Until this first step is properly resolved, the success of ICM will continue to be limited. The Cozumel case study provided some proposals to improve the management of the island. Interviewees repeatedly called for a shift from focusing solely on tourism to paying attention to nature protection, especially through the development of Natural Protected Areas (NPAs). Despite this, there is still a need to work on implementing local regulations in order to preserve and conserve NPAs.

Finally, in South Africa, there has been little monitoring regarding ICM. In an interviewee's words: 'The main lesson learned is the importance of developing robust policies and laws in order to promote more sustainable ICM practices... however, there is a lack of monitoring of strategies and schemes' [74]. Although the development of a robust national legal framework that recognizes the importance of international ICM principles was the first step taken by South Africa to initiate ICM practices, monitoring is still lacking. Nevertheless, some limited efforts have been made on monitoring the implementation of such frameworks. In the case study of the Sundays Estuary, the little monitoring done showed that the Sundays Estuary Management Plan was being implemented by many stakeholders. These stakeholders have played a role in protecting this unique place (i.e., maintaining estuary health, supporting the sustainable livelihoods and creating a powerful institutional governance structures).

Additionally, the little monitoring done in South Africa, Mexico and in Costa Rica showed that there is still a need to improve enforcement of current laws, policies and management plans and that there is also a lack of leadership by government agencies. The most relevant challenges relate to a lack of a clear strategy or coordinated approach on the part of central government and at local managing authority level to embrace the livelihoods of the users in a fair manner and protect marine living resources. Coastal management continues to lack the resources (human, financial and technical) needed to develop, support and manage the marine-coastal system in a sustainable manner. Continuous monitoring is a success factor of ICM if applied within a framework of participatory engagement of local/regional communities and in a setting capable of adapting to changes. This factor leads to the more positive situation in Germany than in the other countries.

5. Discussion

The key ICM principles have been considered and assessed at the local level to examine whether and to what extent international instruments and national legal and policy frameworks are supporting ICM practices. The integrative view on ICM in the four cases reveals a differentiated situation in the assessments of the interviewees (Figure 1). The positive view on the current status of ICM in Germany is confirmed in the I-P-S diagram. For the case studies in the other countries it is evident that the legal and policy frameworks are not considered to constitute a major barrier for further improvement in ICM. The lack of participation of relevant stakeholders and lack of coordination/cooperation between public institutions have been identified as the major challenges. Locally adapted improvements in that field of action are likely to also benefit an even better enforcement of regulations and more sustainable development.

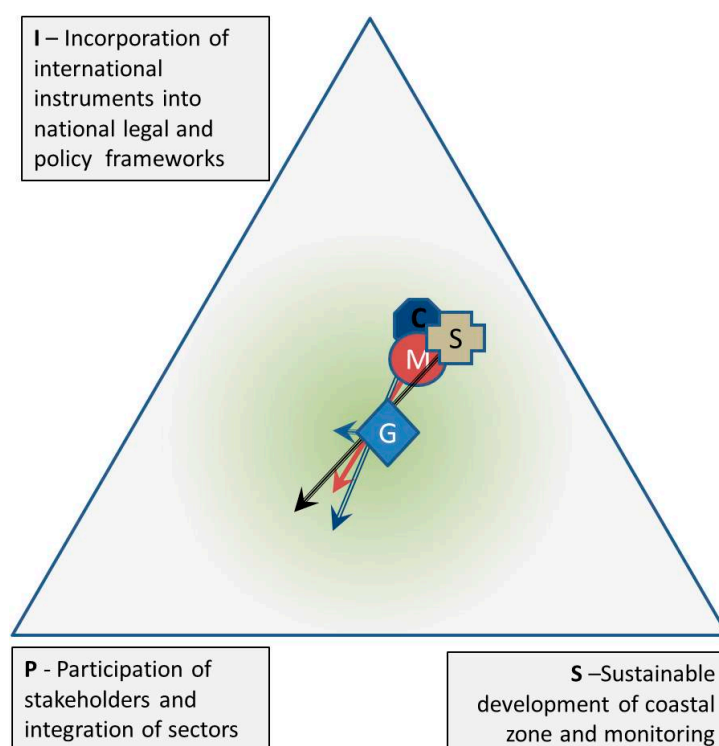


Figure 1. I-P-S triangle diagram of the current status of ICM and directions for improvements at the four case study sites. Mapping of the achieved realization of ICM, according to the dimensions I, P and S, based on the assessments of the interviewees at the four case studies in Costa Rica (C), Germany (G), Mexico (M) and South Africa (S). A harmonized implementation of ICM with an equal balance of three dimensions would appear at the center of the green zone (optimum). The situation in Germany is represented close to the optimum. To balance ICM more equally, ICM practitioners should prioritize actions to adjust the local ICM portfolio at the other case sites as indicated by the arrows. The length of an arrow is double the distance from the plotted value to the optimum and indicates the efforts needed in future ICM practice. The direction of the arrow also points to the fields where the interviewees have identified the most urgent deficits.

In general, the four case studies analyzed in this article demonstrated to some extent that international instruments have supported the implementation of ICM in line with the four ICM key principles. However, all of the case studies show different levels of implementation and effectiveness (Table 5).

Table 5. Design and implementation of ICM legal and policy frameworks in Germany, Costa Rica, Mexico and South Africa.

Country	Design of Integrated Coastal Zone Management Law According to International Treaties	Design of Integrated Coastal Zone Management Policy According to International Treaties	Design of Protection and Conservation Laws According to International Treaties	Implementation of the Law and Policy as Practices	Main Achievements	Major Challenges
Germany	No	Yes	Yes	Significant progress	Implementation	Integration/coordination
Costa Rica	No	No	Yes	Limited but showing progress within protected areas	Protection and conservation through protected areas	Participation, implementation, integration/coordination
Mexico	No	No	Yes	Limited	Awareness	Participation, implementation, integration/coordination
South Africa	Yes	Yes	Yes	Limited	Development of policy and legal frameworks	Participation, implementation, integration/coordination

Germany witnessed significant progress in implementing national policy and legal frameworks. For example, in the case study of Langeoog the implementation of some of the key principles of the ICM (e.g., participation) was demonstrated convincingly. This is mainly due to the extent of committed funding and multi-level collaboration among stakeholders, including governmental institutions dealing with coastal management such as the Lower Saxony State Agency for Water Management, the Coastal Defence and Nature Conservation Agency (NLWKN), the National Park Authority and Langeoog Municipality, as well as non-governmental organizations and individuals. However, an ongoing struggle was detected among government institutions with respect to integration and coordination, which reflects challenges in adapting management to changing societal conditions.

In Costa Rica, there is still a need to change the fragmented way in which ICM practices have been developed, whereby each government institution has worked on its own without attempting to engage other relevant institutions and also without involving non-governmental stakeholders (e.g., communities, fishermen, etc.) in the decision-making process. According to the findings of this research, the support of ICM practices gained from international and national legal and policy frameworks has been limited. Costa Rica needs to review and update the Maritime Terrestrial Zone Law and review the role of the ICT in the overall development of coastal zones. Nevertheless, the findings also showed that the international and national legal and policy frameworks have facilitated the consolidation of marine-coastal protected areas, such as the Marino Ballena National Park.

South Africa is taking significant measures to facilitate ICM practices. However, it is confronted with enormous challenges, which include the legacy of the dismal history of colonialism and apartheid, in which all 'non-white' South Africans were deliberately and systematically denied access to political power, justice and law enforcement mechanisms, and actively dispossessed of their land (including the coastal zones) [43]. In the past few decades, South Africa has started to address most of these problems. Regarding ICM, South Africa has developed a robust ICM policy and legal frameworks based on international principles, which have been a first step forward, recognizing, for example, the principle of non-discrimination. Additionally, some efforts have been made to implement concrete ICM practices, for example the development and implementation of the Sundays Estuary Management Plan.

Similarly, in Mexico, a number of challenges were detected that relate to implementing ICM practices. First, Mexico lacks adequate legal and policy frameworks for ICM and struggles with the enforcement of existing polices and laws intended to promote ICM practices [69,70,75]. Thus, in Mexico, designing and implementing a robust policy and legal framework for ICM must be a priority. The findings of the Cozumel case study reaffirmed those of scholars who have demonstrated that the Mexican ICM policy is at an early stage of execution and of low priority on the political agenda, if included at all [20].

Both the presented results and scientific concepts relevant in modern ICM (Table 1) suggest that ICM practices are supported by international instruments and national legal and policy frameworks. The manifestation differs in the local ICM frameworks, despite the presence of the three general components that some scholars call for in any successful legislative framework for ICM, namely: policy goals, legislative provision and decision-making bodies [76].

Transnational agreements can be supportive but are likely to have mostly limited impacts on domestic coastal law development [77]. European law exerts a unifying influence on aspects of coastal management although being limited by the legal principles of subsidiarity and proportionality [78]. This entails a more effective ICM implementation in local site-specific contexts. This has been mentioned as a decisive field of future ICM action by the interviewees and is a result of the integrative evaluation (Figure 1).

It has been proposed that quality in ICM practices would benefit from the establishment of formal directives [19], and that the lack of consistent political foresight is the primary reason regulations fail [75]. Improvement of the implementation of regulations, therefore, needs careful consideration and resolute action. The embeddedness in formal and informal management settings is an additional success factor. ICM depends on powerful settings and can easily be jeopardized if ICM is allocated

a marginalized role. Most of the examples have shown ICM to be fragmented and lacking in the promotion of participation, integration and sustainability. Poor cooperation between different government institutions and the absence of monitoring programs hinder proper implementation of sectoral strategies and political priorities that comply with ICM [20]. Harmonized amendments of regulatory action and management practice depend on continuous reflection on the specific socio-ecological framework. Actors in ICM have to acknowledge this framework better in order to identify crucial processes or results that indicate positive or negative management activities.

6. Conclusions

This research allows the following generalizable conclusions and legal and policy recommendations: (i) it is a pressing issue for governments in developed and developing countries to reflect on how to merge policy and law regimes and related regulation rooted in either the marine or the terrestrial realm to meet the needs of an amphibic and ambivalent coastal zone where land-sea interactions have to be managed; (ii) governments in developed and developing countries need to allocate adequate financial resources and other relevant means to support the task at hand, which is vital to tackling coastal zones problems and ensuring effective organization and implementation process. This greater support includes a review of the budgets of government agencies dedicated to coastal zone management, as well as adequate capacity building and training of personnel working in such agencies; (iii) it is essential to promote participation and inclusion of local stakeholders in ICM issues because this leads to better outcomes. In order to promote this, there is a need to provide capacities to non-governmental stakeholders in ICM, such as what is done by the Interinstitutional Coastal Marine Commission of ACOSA in the Marino Ballena case study. Local stakeholders also need support to understand legal stipulations, policies and plans that give people the right to participate and to demand accountability in order to control and supervise government decision-making in ICM; (iv) recognizing and managing the interfaces between coastal zones, marine zones, national parks and infrastructure such as tourism development. Here, there is the need for practical approaches to implementing ICM into existing regulatory planning, pollution control, natural resource management and biodiversity conservation frameworks. Recognizing such interconnections is a prerequisite for the (successful) blending of all relevant components of ICM; (v) finally, the findings suggest that acknowledgment of the vulnerability and potential risks in coastal zones tends to ultimately enhance sustainable development in these areas.

In conclusion, this article looked at different parts of the world to provide further insights and a better understanding of ICM in practice and the role of international and national legal and policy frameworks in supporting such practices. Evidently, the support of such instruments is still limited, though continues to grow around the world.

Author Contributions: Conceptualization, Methodology, Software, Writing—Review & Editing, Visualization, G.C.-Q. and T.K. Validation, Formal Analysis and Investigation: G.C.-Q., T.K. and L.M.M.-O. Writing—Original Draft Preparation and Funding Acquisition G.C.-Q.

Funding: Parts of this study were co-funded both by the German DAAD project ‘Developing Sustainability—DevSus’ and The Netherlands Fellowship Program (NFP). The work of Gabriela Cuadrado-Quesada is also funded by the IHE Delft COFUND EWFPF, a fellowship of Marie Curie Actions (FP7-PEOPLE-2013-COFUND).

Acknowledgments: The authors would like to gratefully acknowledge the support of the regional experts who took part in this study.

Conflicts of Interest: The authors declare no conflicts of interest.

Appendix

Interview Protocol

General Questions

1. Do you think there has been an influence of International Conventions like the United Nations Framework Convention on Climate Change (UNFCCC) or United Nations Convention on the Law of the Sea (UNCLOS), or any other, in the development of coastal zone management laws and policies in your country?
2. In your opinion, what are the most important laws and policies that have influenced coastal zone management in your country?
3. In the development of the laws and policies that regulate coastal management, which have been the most relevant conflicts, challenges and lessons learned?
4. Concerning the implementation of coastal management which are the most relevant conflicts, challenges and lessons learned?
5. Could you mention and explain some remarkable examples of implementation of integrated coastal management?
6. What do you think are the further steps needed in order to improve what has been done related to the development of laws and policies that regulate coastal management?
7. What do you think are the further steps needed to have actual implementation of integrated coastal management?

Specific Questionnaire

1. What are the most important regulatory and policy instruments that have influenced coastal management in this specific case study? Are they the same than those at the national level?
2. Concerning the implementation of coastal management in this case study, which are the most relevant conflicts, challenges and lessons learned?
3. Could you mention and explain if you consider that in this case study there has been an integrated coastal management approach?
4. What are the most relevant actors and institutions involved in coastal management in this case study?
5. What do you think are the further steps needed in order to improve integrated coastal management in this case study? Are they the same than those at the national level?

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