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Improving integration for integrated coastal zone management: An eight country study

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HIGHLIGHTS

- Qualitative comparative analysis of ICZM progress in eight EU and non-EU countries
- Focus is on five types of ICZM mechanisms and their role in improving integration.
- All countries have shown some progress in implementing ICZM.
- Certain mechanisms are better suited to enhance specific types of integration.
- Poor enforcement of regulations is one of the main barriers limiting integration.

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ABSTRACT

Integrated coastal zone management (ICZM) is a widely accepted approach for sustainable management of the coastal environment. ICZM emphasizes integration across sectors, levels of government, uses, stakeholders, and spatial and temporal scales. While improving integration is central to progress in ICZM, the role of and the achievement of integration remain understudied. To further study these two points, our research analyzes the performance of specific mechanisms used to support ICZM in eight countries (Belgium, India, Israel, Italy, Portugal, Sweden, UK, and Vietnam). The assessment is based on a qualitative comparative analysis conducted through the use of two surveys. It focuses on five ICZM mechanisms (environmental impact assessment; planning hierarchy; setback lines; marine spatial planning, and regulatory commission) and their role in improving integration. Our findings indicate that certain mechanisms enhance specific types of integration more effectively than others. Environmental impact assessment enhances science–policy integration and can be useful to integrate knowledge across sectors. Planning hierarchy and regulatory commissions are effective mechanisms to integrate policies across government levels, with the latter also promoting public–government integration. Setback lines can be applied to enhance integration across landscape units. Marine spatial planning is a multi-faceted mechanism with the potential to promote all types of integration. Policy-makers should adopt the mechanisms that are suited to the type of integration needed. Results of this study also contribute to evidence-based coastal management by identifying the most common impediments related to the mechanisms of integration in the eight studied countries.

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1. Introduction

Coastal zones are spatial units with great importance worldwide. In addition to their economic and social values, coastal zones often possess unique flora and fauna and provide many essential services such as maintenance of habitats for commercial fish spawning and

flood protection. Yet assessments reveal a continuing degradation of littoral environments (e.g., [European Environment Agency, 2006](#)). Over the past several decades, policy-makers have indicated the lack of integration as a stumbling block for successful management of the coast ([Anker, et al., 2004](#); [Miles, 1991](#); [Underdal, 1980](#)).

Integration is a sought-after policy norm in many areas of environmental governance including energy production and distribution, watershed management, forestry, pollution prevention and environmental planning ([Portman and Fishhendler, 2011](#)). Much empirical research, academic literature and many professional publications have described the benefits of integration for resource management including reduced conflict over resource use in the long-term and a better chance for

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sustainable development (Barousseau et al., 1997; Ernsteins, 2010; UNESCO, 2003).

Integrated coastal zone management (ICZM) is a widely-accepted approach to managing resources that has been adopted in response to the well-documented failures in sectoral management of marine fisheries, coastal hazards, mining and land use (Cicin-Sain and Knecht, 1998; Cordah Ltd., 2001). Today, almost all plans and programs for the coast call for the use of ICZM. Yet practitioner evaluations and research on ICZM have found that in many cases it is unclear what ICZM can accomplish and how (Rupprecht Consult, 2006). Past studies suggest that further empirical and comparative analyses are needed to inform how to best use specific mechanisms within particular institutional and organizational contexts (e.g., Anker et al., 2004).

To address some of the gaps identified in previous research (e.g., Anker et al., 2004), this article presents the results of qualitative comparative research on different mechanisms used to support ICZM in eight countries. These countries have highly variable institutional conditions and variable socio-economic contexts (See Portman et al., 2012). The countries are partners working on the EU-funded project “Solutions for Environmental Contrasts in Coastal Areas” (SECOA²) and consist of Belgium, India, Israel, Italy, Portugal, Sweden, United Kingdom, and Vietnam. In this research we address two core questions: (1) which mechanisms are most suited to enhance different types of integration?; and (2) what are the common impediments (including costs) to their implementation?. The comparison of the use of ICZM mechanisms within the different institutional and socio-economic contexts of the eight countries highlights common impediments. Policy-makers can use this information to improve coastal management aimed at enhanced integration.

Section 2 briefly reviews the main tenets of ICZM. Then it summarizes the contributions of past evaluations of its implementation and identifies relevant gaps in knowledge. This section also qualifies mechanisms as our unit of analysis to further understand the concept of integration. Section 3 explains the basis for the methodological approach used. Section 4 reports the results of the qualitative empirical research conducted. The findings also indicate the most common challenges to their implementation. We close with overarching recommendations for achieving greater integration for management of the coastal environment and improved ICZM.

2. Integration and ICZM

To ‘integrate’ means to unify, to put parts together into a whole. An integrated approach to policy-making, then, refers to policy-making in which the constituent elements are brought together and made subject to a single, unifying concept (Underdal, 1980). Underdal (1980) aptly defined integration in relation to marine policy at the time which was largely managed for fisheries and mineral extraction whereas management of the coastal environment was (and is) highly dependent on terrestrial land use planning for tourism, recreation and urban development. Therefore a salient disconnect was common between landscape units and management regimes and these met at the coastal zone (Cicin-Sain and Knecht, 1998; Cordah Ltd., 2001).

Consequently integration became important with regard to coastal management following the adoption of Chapter 17 of Agenda 21 in 1992, the Jakarta Mandate on Marine and Coastal Biodiversity under the Convention on Biological Diversity, and the UN Food and Agriculture Organization's Code of Conduct for Responsible Fisheries. Article 10 of this code is entirely devoted to ICZM (FAO, 1995; Cicin-Sain and Knecht, 1998). Exact definitions of ICZM have evolved over time and they vary somewhat depending on policy makers' specific objectives. For our purposes ICZM is defined as “an adaptive, multi-sectoral

governance approach which strives to balance development, use and protection of coastal environments...” (UNEP, 2009).

In the US, ICZM has been implemented for some time through the US Coastal Zone Management Act, promulgated in 1972. The Act bestows upon individual states responsibilities for the incorporation of federal coastal zone management (CZM) principles in state and local plans for the coast. The European Union (EU) adopted a recommendation for the implementation of ICZM (2002/413/EC) for its member countries in May 2002 (European Parliament, 2002). The recommendation formalizes eight principles of ICZM that should be implemented in member countries (see European Parliament, 2002).

Many countries have been implementing CZM plans using integrated approaches for over three decades. ICZM efforts in different governance, spatial and temporal contexts have met with varying success (Christie et al., 2005; European Commission, 2011; Klinger, 2004) dependent to some extent on what terms of reference are used to assess their success. In any case, the need to improve the implementation of ICZM is clear based on the poor condition of littoral environments the world over despite the widespread adoption of ICZM principles (Klinger, 2004).

2.1. A framework for evaluation based on past studies

Analysis of past studies of ICZM helps identify what it is expected to achieve. This is an important step in determining how to evaluate its implementation. In determining our framework for evaluation of the effectiveness of ICZM we considered what integration seeks to achieve and why it is important for coastal management, the strengths of evaluation methods used in the past, their relevance for our purposes and research gaps.

Mitchell (1982) undertook an early comparative study when the formal concept of ICZM was barely a decade old. Albeit outdated, Mitchell's work confirms the importance of comparative research in the field. In addition to evaluating the systems of ICZM in the US by comparing them to those of Western Europe, he examined the use of ICZM between developed and developing countries. An important finding was that despite intentions, the national programs he evaluated were not highly integrative since the ability to simultaneously manage across landscape units (e.g., marine and terrestrial) and between levels of governance remained largely unchanged. This early study highlighted sectoral governance and environmental (physical) aspects of integration, including integration at various scales (i.e., local, regional, national). Subsequent studies of ICZM and other types of resource management have examined similar aspects of integration (e.g., Cash et al., 2006; Lane, 2008; Biermann et al., 2009).

As concerns for sustainability have grown in importance over the last three decades, temporal scales have also become an important element of *integrated* resource management and environmental policy. Sustainable development calls for the use of resources in ways that serve present generations without affecting the ability of future generations to use the same resources (Brundtland, 1987). This concept is the basis for the temporal dimension of ICZM.

One way to operationalize and evaluate integration is through the use of indicators. Indicators often measure what we are looking for; they also serve for monitoring characteristic phases, elements and outcomes of ICZM. Trumbic et al. (1997) evaluated ICZM programs, plans and projects in the Mediterranean region based on performance, integration and sustainability. These three aspects of programs indicated success “against which the case studies [were] evaluated”. Both the performance and sustainability indicators, respectively referring to program progress and extension (i.e., program continuity) can be thought of as related to measures of “institutional success”. Indicators of integration refer to the level of horizontal or vertical interdependences achieved among sectors, plans or administration levels and it is the only dimension in that study for which the integration of environmental components is addressed (Trumbic et al., 1997; Lindemann, 2007).

² <http://www.projectsecoa.eu/>

Since Trumbic et al's (1997) study much empirical and theoretical work has been conducted on the use of indicators for evaluating ICZM (see Ocean and Coastal Management Journal, 46, 221–390, 2003). One of the problems researchers have identified related to the use of indicators for coastal issues (at least until the mid-years of the past decade), is that they have been used almost exclusively for the assessment of environmental quality (Pickaver et al., 2004) whereas in reality, ICZM is much more complex. For example, indicators have been widely used for monitoring the state of the coast, e.g., the use of nitrate and phosphate loading for measuring eutrophication in near shore waters or for use within the framework of pressure–state–impact–response (PSIR) models originally developed for use by the Organization for Economic Cooperation and Development.

The 2006 report on ICZM in EU member states submitted to the European Environment Agency presents indicators of two distinct groups: those evaluating progress of ICZM adoption and those evaluating sustainable development in the coastal zone (Breton, 2006). These groups of indicators were accepted beginning in 2004 by the European Commission Working Group on Coastal Zone Management (EC Working Group) and then tested and validated in subsequent years. The latter group of indicators, twenty-seven in number, has the advantage of being very specific and providing measurable proxies for ecosystem health, ranging from the quality of coastal water (percent of bathing beach water compliant with the guide value of the European Bathing Water Directive) to the state of the main fish stocks by species and sea area. But similar to those indicators used for PSIR models, they focus on environmental quality.

The former group of indicators, those related to ICZM adoption, addresses institutional matters and therefore relates more closely to the framework we adopt. To develop such indicators, the EC Working Group divided the implementation of ICZM into four phases. The more advanced phases consist of development of: (1) various integrated administrative bodies working on the interface of land and sea and making sectoral decisions within an integrated context (e.g., the building of a coastal authority); (2) the means for integration of data for decision-making (e.g., establishment of a coastal observatory); (3) a system of public participation and governance, including all stakeholders and the public (e.g., establishing a Coastal Forum); and (4) a good financing system for ICZM planning and management organized at different spatial and temporal scales.

Two additional reports focusing on institutional matters are the Rupprecht Consult (2006) and Christie et al. (2005). The former provides an evaluation using indicators of best practices that are based on the eight principles of ICZM recommended by the (European Parliament, 2002). The report summarizes the differences between EU member countries in the progress to introduce and implement ICZM based on government structure. For example, those countries that are currently undergoing major reforms to reorganize government structures have difficulty implementing ICZM. Also, difficulties arise when there is unclear distribution of functions between national and lower levels of government (Rupprecht Consult, 2006). In a broader and more globalized effort, Christie et al. (2005) focused on the ability of ICZM programs in various developing countries to continue over time.

These past studies begin to analyze particular tools, such as coastal authorities or forums for bringing various stakeholder groups into the decision-making process for development in the coastal zone. However, we identified a significant gap in this regard. Most of the studies using indicators evaluate the overall institutional success of various programs or the contribution of mechanisms of ICZM to improve environmental quality and the achievement of sustainable development (Pickaver et al., 2004). Studies emphasized either institutional success or sustainability as it relates to economic, social or environmental well-being (See Table 1). We concluded that there is a need to examine how mechanisms of ICZM contribute specifically to achieving integration.

A model study we identified, addressed both institutional success and sustainable resource management by providing an overview of

Table 1

Existing research on specific mechanisms of ICZM and the corresponding emphasis, indicated by an X in the appropriate column.

Mechanisms	Source	Emphasis on:	
		Institutional success	Sustainable resource management
Public participation	Anker et al., 2004	X	
Co-management task force	Crean, 2000	X	
Consistency/concurrency review	Portman, 2007		X
Capacity building	Garriga and Losada, 2010	X	X
Planning hierarchy	Allmendinger et al., 2002		X
Setback lines	Bernd-Cohen and Gordon, 1999		X
Environmental impact assessment	Budd, 1999		X
Statutory management task force	Enemark, 2005		X
Social impact assessment	Sievanen et al., 2005		X

the current education and training for ICZM in Europe. Garriga and Losada (2010) administered a survey to assess among other aspects of ICZM, how integration is covered in higher education programs that prepare future coastal managers. The following five dimensions of integration were evaluated in the survey: (1) spatial integration; (2) temporal integration (e.g., intergenerational); (3) among different use sectors (called horizontal) and among levels of government (vertical); (4) transdisciplinary (marine and coastal entities); and (5) integration between short- and long-term actions. Results of the survey have contributed to a European database on ICZM capacity building which is among the objectives of many on-going EU-funded research projects such as COREPOINT, COMET2, SPICOSA and ENCORA.

To summarize, integration is clearly the cornerstone of the desired coastal management approach. It is what distinguishes the ICZM approach from other traditional (sectoral) approaches. Past studies have shown that practitioners are often at a loss about what constitutes integration on the ground and how it can be achieved by particular mechanisms (Rupprecht Consult, 2006). For purposes of our analysis, we adapt the dimensions of integration used by Garriga and Losada (2010) combined with a review of literature and concepts of ICZM from earlier studies mentioned above (e.g., Mitchell, 1982; Trumbic et al., 1997) and also published as part of project SECOA (see explanation below and Fig. 1).

Finally, evaluation of ICZM implemented in varying country contexts may lead to highly variable outcomes that are hard to compare. There is already great variation among countries subjected to the same or similar international directives. As an example, the Netherlands national “stocktake” has concluded that no new system for ICZM is needed but that it will form part of a national spatial planning strategy (Shipman and Stojanovic, 2007). At the same time, the French stocktake highlights the importance of intensifying the implementation of ICZM at the local level, including local capacity building, and the establishment of a national council for implementing ICZM (Shipman and Stojanovic, 2007). We therefore conduct a qualitative comparative study of progress in ICZM focusing on integration achieved by the same mechanisms of ICZM implemented by different countries. By using specific tools as the unit of analysis we are in a good position to obtain comparable, meaningful results.

2.2. Integration mechanisms (as a framework)

The role of mechanisms as a unit of analysis is central to developing a framework for analyzing, assessing, and thereby, improving integration of ICZM. In this regard, the previous sub-section highlighted the

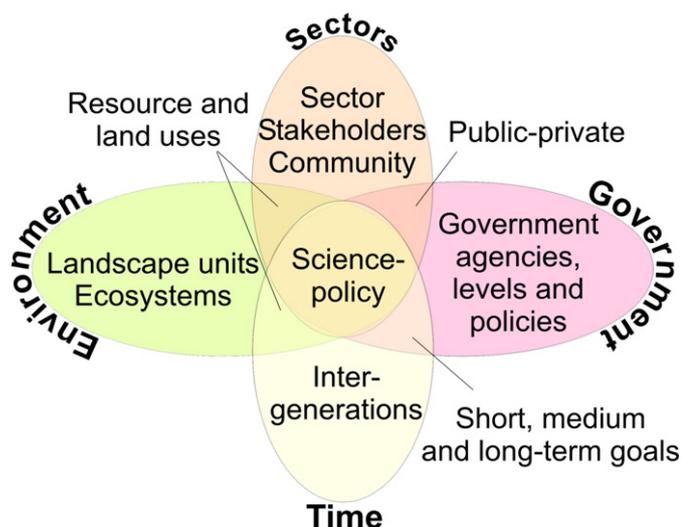


Fig. 1. Four dimensions of integration and resulting types of integration (identified inside the ellipses).

role of mechanisms as a point that remains understudied in the ICZM discourse. The choice of specific mechanisms frames the link between the implementation of ICZM and assessment of their performance; it provides a crucial analytical lens for understanding and improving integration. Based on past studies and our on-going research within the SECOA project (Portman and Fishhendler, 2011; Portman et al., 2012), we separate mechanisms into two major hierarchical levels: overarching mechanisms and operational tools. The former are broad approaches mandated by regulatory frameworks and policy declarations that drive coastal management programs. They are conceptual in nature and generally aim to solve problems that arise due to natural system interdependencies, multiple uses and multiple overlapping jurisdictions and authorities, all of which are the rationales identified for ICZM. Operative tools are the means by which the overarching mechanisms are implemented.

Overarching mechanisms commonly associated with ICZM are consistency, concurrency, cooperation and capacity building. Consistency embodies the notion that policies at various hierarchical levels of government should be in harmony. Concurrency refers to coordination between similar authorities either at the same governance

level or same spatial unit level. It also implies simultaneous or synchronized actions of a defined temporal scale. Simply stated cooperation is a mechanism that brings together various authorities for coordinated management. It usually involves distinct parties working together over time and addressing the same space (Enemark, 2005). Capacity building refers to efforts to improve the environmental capacity of a country understood as a function of the strength, competence and configuration of the governmental and non-governmental proponents of environmental protection and the specific cognitive-information, political-institutional and economic-technological conditions. The degree of resource system knowledge, empowered environmental organizations and public awareness are measures of capacity. Any operative tool for ICZM that improves these conditions will fall into the overarching category of capacity-building (Jänicke, 2002; Jacob and Volker, 2007).

Operational tools that aim to bring about integration in CZM are described below (Table 2). We included adaptations of these in our initial survey (see Methods below) because they further integration, serve one or several of the four overarching mechanisms and because they are commonly applied for management of resources and uses occurring at the marine-terrestrial interface; in other words, they occur within those areas that make up the coastal zone.

In formulating our analysis framework, we establish the link between the mechanisms (overarching and operational) and the three rationales for ICZM as follows: Understanding of natural system interdependencies is commonly served by the monitoring of ecosystem health, environmental impact assessment (EIA) and cooperative research. Such operational tools foster cooperation and concurrency and build capacity among stakeholders and coastal zone managers. The monitoring of ecosystem health promotes temporal or spatial integration by informing about effects of actions and development in the coastal zone over time and between landscape units. Although dependent on specific local or national regulations, EIA will generate information about externalities expected from activities and development in the coastal zone. Finally, cooperative research has the potential to inform stakeholders about each others' goals and positions and to create mutual understanding and the likelihood of long-lasting partnerships that support integration (Hartley and Robertson, 2006).

Of significance with regard to the use of certain mechanisms is the fact that policy-makers frequently choose to implement any number of operational tools together in a regulatory program or in an ICZM plan. Normatively speaking, policy-makers should choose (appropriate

Table 2
Integration mechanisms commonly associated with ICZM (used in the initial survey).

Mechanisms	Description
Social impact assessment	A way to assess and identify the possible socio-economic and cultural impacts that a proposed project may have on surrounding coastal populations and communities. SIAs provide information and generate new data that help in managing the marine-terrestrial interface and in reviewing projects (Pollnac et al., 2006).
Consistency review	Reviews and evaluations conducted of an administrative regulation, policy document or planning order to determine whether it is consistent with other plans, policies, laws and regulations administered at different levels of government or between spatially adjacent authorities at the same level of government.
Management forums	A forum consisting of representatives of user-groups, government agencies and research institutions working together in a collaborative and participatory process for influencing regulatory decision-making. In most cases this will be a non-statutory forum (i.e., not mandated by law).
Setback lines	A prescribed boundary set at a distance from a landscape or physical feature such as a cliff top, water course, shoreline or line of permanent vegetation, within which all or certain types of development or uses are prohibited. Setback lines are boundaries set on the landward side of the coast (Cambers, 1997).
Marine spatial planning	A process of analyzing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic, and social objectives that usually have been specified through a political process (Ehler and Douvere, 2009).
Regulatory commissions	A forum mandated by law or regulation consisting of representatives of government agencies including local and regional authorities, and other experts working together in a collaborative and participatory process for the purpose of regulatory decision-making about development, or the management of activities along the coast.
Planning hierarchy	A hierarchical system for regional planning and resource management driven usually using a top-down approach. Statutory or non-statutory (master) plans at the top level will direct actions or development to be taken at lower levels. Often at the top level will be plans of national importance that will then be further detailed by plans at lower levels that address regions or local areas more specifically.
Environmental impact assessment	A report (delivered as a statement) that identifies and evaluates the impacts that a proposed project may have on the surrounding environment including those on the quality of the environment and health of ecosystems. In some contexts, EIA is the principal medium through which governmental systems incorporate the environmental sciences into political decision-making (Dimento and Ingram, 2005).

Table 3
Mechanisms used in each country and types of integration supported by the studied ICZM mechanisms.

Mechanism	SECOA countries ^a	Main type(s) of integration supported
EIA	BE, IN, IL, IT, PT, SW, VN, UK	Cross use sectors; landscape units; science-policy
Planning hierarchy	BE, IL, IT, PT, SW, VN, UK	Landscape units; cross-government levels
Setback lines	IN, IL, IT, PT, SW	Landscape units; ecosystems; science-policy
Marine spatial planning	PT, SW, UK	All types
Regulatory commission	IN, IL, UK	Cross-government levels and agencies; use-sectors; public-private

^a BE = Belgium, IN = India, IL = Israel, IT = Italy, PT = Portugal, SW = Sweden, UK = United Kingdom and VN = Vietnam.

and effective) operational tools that serve overarching goals and alleviate particular problems in specific contexts. However, such choice-making suffers a lack of empirical and evidence-based insights about what mechanisms enhance specific types of integration more effectively than others (e.g., Anker et al., 2004; Rupprecht Consult, 2006). It is this lack that underlies the choice of mechanisms as our unit of analysis.

3. Methods

This study presents results from qualitative analysis of questionnaires developed to collect information on the implementation of ICZM under the national contexts of the eight SECOA countries. Our work within the framework of a large study on development of metropolitan coastal cities allowed exploration of the use of mechanisms for ICZM in areas of concentrated and intensive development (Portman et al., 2012). It is perhaps in these areas where integration could have the largest impact, as coastal changes here are frequent and extensive due to population and development pressures, such as port construction, tourism infrastructure, protection from hazards to built environments and more. The 17 SECOA case study areas are both metropolitan coastal areas in Belgium, India, Israel, Italy, Portugal, Sweden, Vietnam and the UK (see www.projectsecoa.eu).

Two rounds of questionnaires were completed by researchers of the SECOA project with expertise in the management of coastal resources in their study areas. When the necessary expertise was not found among SECOA researchers, external assistance was requested to adequately complete the questionnaires. Practitioners from the advocacy, public or consultancy sectors identified based on their work and knowledge about ICZM in their country provided external expertise, if needed. For a complete list of internal and external contributors see Portman et al. (2012).

The initial survey was a general questionnaire made up of open-ended questions that addressed each country's regulatory context including its governance framework, environmental regulation and institutional aspects of coastal management nationwide and in the case study localities. More specifically, we asked about legal aspects and key players of land and sea management, national and sub-national ICZM plans and programs, international initiatives related to ICZM, the current status of ICZM for the case studies in each country and the mechanisms used. The information obtained served as background for the comparative analysis.

The second survey (hereafter: the supplemental questionnaire, SQ) specifically addressed ICZM mechanisms and focused on the five ICZM mechanisms most often cited in the initial survey responses. The eight mechanisms included in the initial survey were: social impact assessment; consistency review; non-statutory management forums; setback lines; marine spatial planning; regulatory commissions; planning hierarchy; and EIA (see Table 2). The last five, described in detail in the Glossary in Supplemental material I of this article, were the subject of the SQ because these were the mechanisms most commonly chosen in the first survey. Questions in the SQ were multiple choice or short answer questions to allow a systematic comparison. The main results relate to the identification of the mechanisms used, the level and type of integration achieved by each, and the challenges to their implementation.

The comparative analysis then focused on two core questions: (1) what mechanisms are most suited to each type of integration; and (2) what are common impediments (including costs) to their implementation. Paradigms of institutional and sustainability success were used to assess ICZM mechanisms. Examples of the questions we asked include those that focus on institutional success:

- Does the mechanism facilitate integration between sectors?
- Does the mechanism facilitate integration between levels of government?
- Does the mechanism facilitate horizontal³ integration (across administrative boundaries)?

Those focusing on sustainability success are, for example:

- Does the mechanism help realize economic development?
- Does the mechanism involve public input?
- Does it promote fairness?
- Does it consider future generations?
- Do boundaries determined by the mechanism cross-landscape units?
- Does it incorporate best available knowledge, current science?
- Does it cross field/discipline boundaries?

There is some overlap between categories but by breaking them down, our evaluation is comprehensive and results can be compared with those of other studies. Here sustainability refers to sustainable resource management as in Table 1, and not sustainability of the program, policy or use of a particular mechanism.

4. Results and discussion

Based on the responses we received from the two-tiered questionnaire system, we were able to determine which mechanisms are employed in each country and how these mechanisms are perceived in terms of their efficacy and particularly their contributions to integration (see Appendix II). We were also able to identify barriers to implementation. In this section we first explain results of the research based on the questionnaire responses, then discuss and interpret results, and finally address limitations of our methodology.

Table 3 shows which of the five mechanisms have been implemented in the different countries. Only EIAs have been implemented in all countries and planning hierarchies are used in all except India. Setbacks are applied in five countries and only three report using marine spatial planning (MSP) or statutory regulatory commissions. In regards to the less common mechanisms, MSP is a relatively new tool (e.g., officially recommended by the EU only since 2008); which may account for the fact that only three countries show evidence of planning for or starting its implementation. Also surprising is the minimal use of regulatory commissions (in only three countries out of eight) dedicated to decision-making on coastal issues (e.g., development) despite their

³ Lindemann (2007) uses a vertical/horizontal distinction in describing management of water related conflicts in catchment areas. 'Vertical' water law is hierarchical, consisting of international water law through which victims of water conflicts might seek remedy. Horizontal initiatives for international river management occur between two or more riparian states at the river basin level.

Table 4
Main barriers identified to the implementation of ICZM mechanisms.

Mechanism	Barriers to implementation (country reported)
Setback lines	Poor enforcement and compliance (IT); exceptions are easily obtained (IL, IT, PT); a rigid, top-down approach that does not sufficiently consider local conditions (PT)
Planning hierarchy	Lack of integration between local plans (VN); delays due to incomplete higher-level plans (IL, IT, PT); delays for completion of higher-level planning, result in implementation of outdated policies/plans (IL, SV)
Marine spatial planning	Integration of land-coastal-marine plans are not guaranteed (SE); long time-frame needed (PT)
Environmental impact assessment	Results not understandable to the public (BE, IL) and to decision-makers (VN, IN); quality of assessments greatly variable (UK); often not science-based (UK, IL); does not consider 'no-development' option (VN, SW, UK); recommendations not adopted or implemented (PT, VN); does not consider a wide geographic area or a wide spectrum of impacts (SW).
Regulatory commission	Long time-frame needed for deliberation (IL); compliance and enforcement is lacking of decisions made (IN)

being effective means to promote integration with relatively few impediments to their implementation.

Interpretation of the responses led to the relating of the use of certain mechanisms to certain types or dimensions of integration (for this categorization see Section 2.1 and Fig. 1). These are perhaps the most important findings of the study. By acknowledging this relationship, policy-makers and practitioners can promote and enhance particular types of integration by focusing their efforts on the use, or improvement, of certain mechanisms.

For example, EIA enhances integration between science and policy, whereas regulatory commissions generally bring about cross-sectoral and public–government (decision-maker) integration. Setbacks address cross-landscape unit integration almost exclusively but need to be supported by knowledge of coastal processes (i.e., science–policy integration). As a further example, Indian Coastal Zone Management Authorities are commissions responsible for regulating and enforcing matters concerning the Coastal Zone Regulation Notification of 2011, such as the use of setback lines and EIA. These regulatory commissions improve integration across government levels, sectors and public and private interests by bringing together different government levels, government departments (e.g. Urban Development, Industry, Agriculture and Fisheries), NGOs, traditional communities and independent experts.

Other results of the study are derived from our interpretation of responses indicating impediments and barriers to the implementation of mechanisms. Table 4 summarizes the most general problems that must be addressed to improve the use of each tool for integration in the coastal zone. However, responses indicate that coastal managers perceive integration mechanisms to generally be costly in the short-term but able to reduce conflicts in the long-term.

Most respondents reported that the follow-through of mechanisms has been neglected or deficient. This undoubtedly influences their ability to bring about true integration. For the implementation of setbacks, this is a direct issue as the compliance and enforcement of development regulations call for the observance of setback lines seem to be neglected in all case studies. For other mechanisms, potential contributions to enhancing ICZM are limited as decisions are not fully adopted or acted upon, such as decisions of regulatory commissions or compliance of the lower levels of the planning hierarchy. Another example is the mechanism of EIA. Environmental impact statements are often of variable quality (e.g. Israel, India, and UK) and presented in complex technical jargon incomprehensible to decision-makers and the public (e.g. Israel, India, Vietnam, Belgium, Portugal).

Another point we discovered regarding integration is that to achieve it, different mechanisms need to be implemented at varying spatial scales. Despite calls for integrated management within the land and sea interface (Cicin-Sain and Knecht, 1998; European Commission, 2011) in most countries different government levels manage these realms. Land management is the responsibility of regional, district or local authorities (and these themselves may be integrating various sectors), while sea management is almost always decided at the national level (e.g., Belgium, Sweden, and the UK). In practice, some of the

mechanisms of integration do not counter this segregation. For example, setbacks pertain to the intertidal zone and a relatively narrow adjacent inland area; MSP usually addresses only marine areas at a larger scale, although it could potentially encompass terrestrial parts of the coastal zone.

We looked at whether integration is occurring across levels of government. Regional government levels are not present in all eight SECOA countries (e.g. Sweden and the UK). In the UK, regional agencies have been abolished by the current government and substituted by a localism agenda (i.e., empowerment of local government and communities). By contrast in Sweden, the lack of regional government has led to more centralization. As observed in both Sweden and the UK, the lack of a regional level of government does not seem to limit the integration of national policy goals and local coastal management initiatives.

All SECOA countries participate in some form of international program directly or indirectly aiming to promote ICZM and some countries are more dependent on such programs than others. The implementation of EU Directives into the national legislation of EU member states represents a 'top-down' multilateral agreement, which has contributed to ICZM by obligating member countries to develop and implement ICZM national plans and programs. The various tiers of government within countries are then responsible for implementation.

Other types of international involvement were identified in addition to EU-national government directives. We observed: (1) bilateral collaborations, where a foreign entity/agent actively helps initiate a program in another country (e.g., the Netherlands involvement in a Vietnamese ICZM program, the VNICZM Project 2000–2004)⁴; and (2) a multi-lateral, regional or cross-regional initiative, such as the Barcelona Convention, Regional Seas etc. Further research is needed to measure the contribution of such programs to ICZM based on country contexts.

We found that the most neglected dimension of integration is that crossing science and policy. There seem to be very few opportunities, other than the EIA mechanism, to enhance or achieve it. Although the EIA has the potential to bring scientific study and evidence into the decision-making process, regulations or directives mandating such a course of action are lacking. Perspectives articulated in survey responses coincide with past research findings in the field of EIA (e.g., Barker and Wood, 1999; Mandelik et al., 2005).

4.1. Study limitations

The approach we adopted to conduct this study engenders acknowledged limitations. First, while for many of our survey questions (see Supplemental material II) answers indicate facts, some answers are based on the respondents' perspectives or opinions. These responses were then subject to qualitative interpretation and analysis which also have their limitations and constraints. The second limitation has to do

⁴ <http://www.invemar.org.co/coastman/english/noticias.jsp?idart=838&idcat=97>

with the difficulty of comparing case studies among countries where mechanisms are used in varied contexts.

Comparative case study analysis is a familiar treatment of global phenomena and has been widely applied to various aspects of environmental policies including those related to climate change, urban development (Yin, 1994; Jänicke and Weidner, 1997; Barker and Wood, 1999; Vig and Faure, 2004; Denters and Mossberger, 2006), or as in our case, degradation of littoral environments (Mitchell, 1982; Cicin-Sain and Knecht, 1998). In contrast to the rich or “thick” case study, the comparative study is at risk of a “thin” and one-dimensional description of what are obviously complexities with plural non-universal causations (Pickvance, 2001).

We found evidence that the implementation of specific mechanisms is conditioned by each context (institutional, environmental, cultural, socio-economic, political) in different ways. In this sense, SECOA is an ambitious project that seeks to develop theoretical grounds for comparative analysis in the field of ICZM across not only European boundaries and systems from the north and south, but also in non-European global-south states, and those developed and developing. Another constraint is that not all the eight SECOA countries implement the chosen five mechanisms, e.g. RC and MSP are implemented only in three countries. This limits our qualitative assessment i.e. for some mechanisms there is a smaller evidence-base of contexts.

Even within Europe planning systems, governance, cultures and historical trajectories differ and these differences are multiplied by each state with their unique and varied coastal environments and eco-systems. So that while convergence and transference may be evident and localized models of policy responses and intervention appear similar, conditions and variations (such as the historic, social and cultural identities, governance, geographies/scales) should be considered in order to avoid falling into a reductive trap of universality at the cost of understanding the particular (Wallerstein, 1991; Yin, 1994).

In order to minimize these differences within the comparative framework we focused on a specific aspect of ICZM – that of integration – using specific mechanisms and thus building theory to be used as part of macro-level study. Some of the ways that the macro-level context influences the results have been pointed out in the previous section. For example, regional government levels are not present in all eight SECOA countries. A further step would be to relate macro-level data about political (social and institutional) imperatives that speak to the rationale for integration in each country context. Researchers should also seek opportunity to empirically test our conclusions about the ability of certain mechanisms to achieve certain types of integration using a larger number of countries of similar political and socio-economic, and institutional make-up.

5. Summary and conclusions

All SECOA countries have succeeded in making some progress in ICZM since its inception despite their differences in country context, geographic region, level of development and size. Two main results from this study are: (1) the evidence that certain mechanisms lead to specific types of integration and (2) the identification of the main barriers limiting the implementation of the studied mechanisms. The information presented from this study can inform policy-makers as to what tools are best suited to contribute to certain dimensions of integration. If policy-makers are able to identify the types of integration needed to improve ICZM in their area of responsibility chances are they could either implement one of the common mechanisms analyzed or they could enhance existing ones. This research has also highlighted expected impediments likely to be encountered with the use of certain mechanisms.

For example, the implementation of EIA to guide licensing for activities and development in the coastal zone is an opportunity to enhance science-policy integration (provided EIAs follow best practices). Coastal authorities constitute another good example. If the cross-dimensional

aspect of integration needs enhancing, the establishment of a coastal authority composed of representatives of various government agencies could bring about improvement.

It is expected that these key findings and the information provided on the SECOA case studies are widely applicable and can contribute to improved implementation of ICZM through the use of specific mechanisms and awareness of the most commonly found impediments. Perhaps, the most striking barrier to the improvement of integration in coastal management is the lack of compliance and enforcement. While good methods and practices are intended they are not necessarily fully followed through with. Also, countries engaged in regional and international programs can advance integration for coastal management as efforts are combined with neighboring countries and as lessons are learned from countries with more experience in particular ICZM tools.

Supplementary data to this article can be found online at <http://dx.doi.org/10.1016/j.scitotenv.2012.09.016>.

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