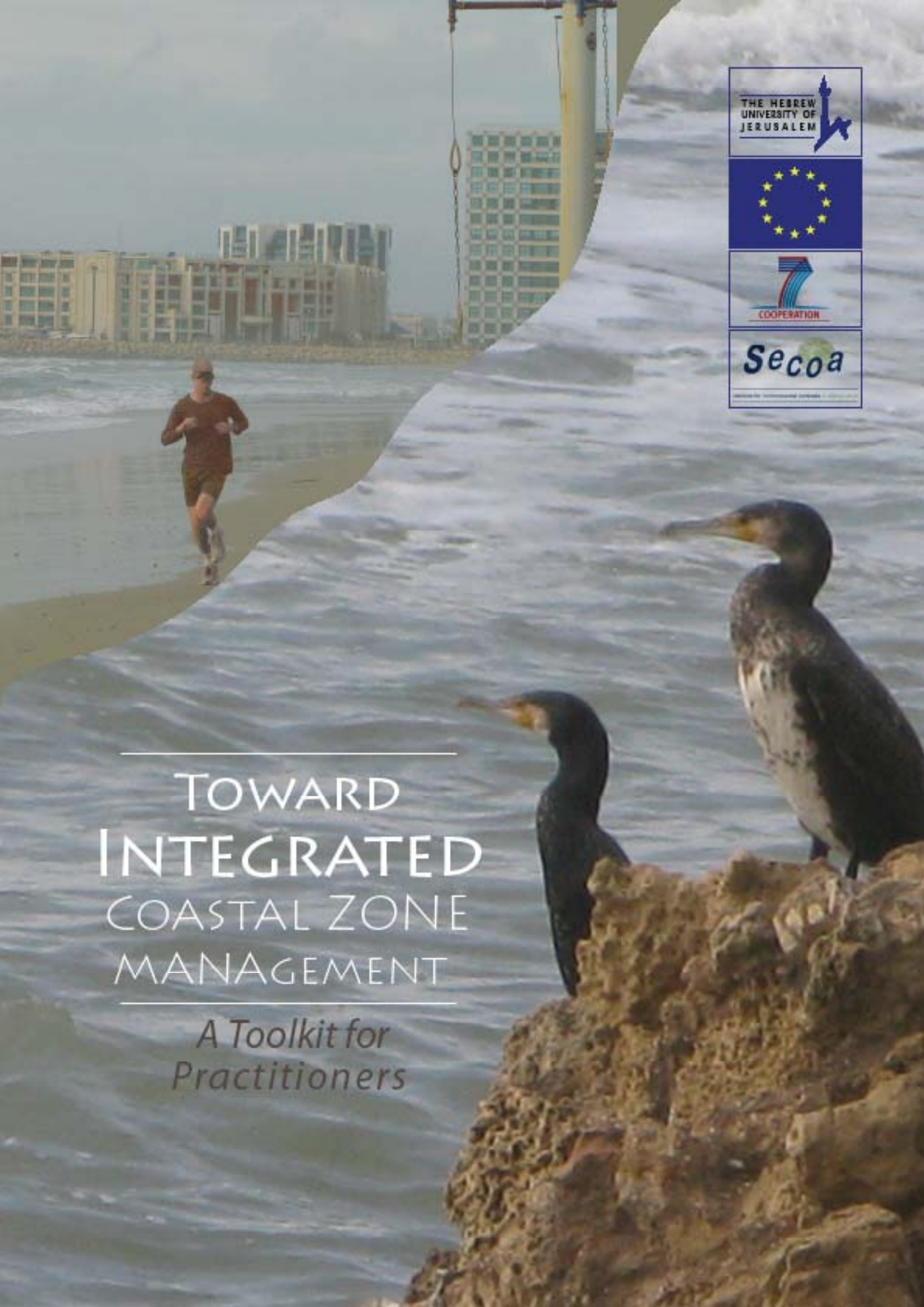

Toward Integrated Coastal Zone Management

A Toolkit for Practitioners

Towards *Integrated* Coastal Zone Management: A Toolkit for Practitioners

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FINAL DRAFT

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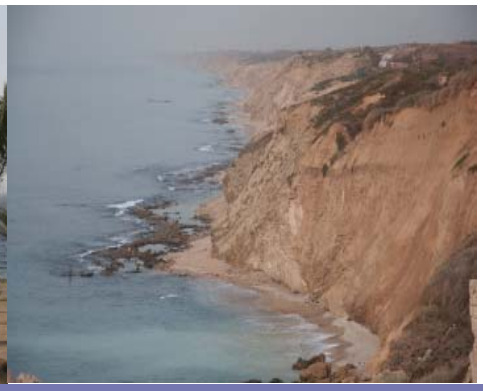

Foreword

This toolkit is the product of work accomplished as part of a larger, four-year project funded by the European Union's Seventh Framework Program (FP7). The research project called Solutions for Environmental Contrasts in Coastal Areas (SECOA), investigates eight metropolitan areas of international/global importance and eight metropolitan areas of regional/national importance in European and Asian countries. The participating countries are: Belgium, India, Israel, Italy, Portugal, Sweden, United Kingdom and Vietnam. The project also involves end users from the areas considered. The varied composition of each of the country research teams guarantees a multidisciplinary approach and capacity building such as that promoted by this toolkit.

Just as the coastal zone is an ever changing entity, perspectives on management change as well. Although integrated coastal zone management is a well-known approach for managing and planning resources in the land/sea interface, we believe this document can make a significant contribution as a current and comprehensive publication that considers the most pressing issues of our time. These issues include the increased competition for coastal resources juxtapositioned with global climate change, human mobility and urban growth.

It is our hope that this publication will encourage the development and implementation of appropriate policies, plans and programs for management of the coastal zone. We also envision it as an opportunity to disseminate step-by-step results of the work being done within the overall framework of the larger project. Through this report and information yet to be produced, we hope to foster improved technical and institutional capacity to achieve best practices for management, preparedness and science in partner countries and beyond.

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About This Booklet: An Introduction

During recent years, integrated coastal zone management (ICZM) has been the focus of considerable interest throughout the world, particularly in countries with heavily used coastal areas. ICZM offers policy makers and resource managers an operational framework for maintaining the value of coasts while supporting their sustainable use. Essentially, ICZM is an approach that can make key components of good planning and wise-use of coastal areas a reality. While numerous attempts have been made to define both the scope and nature of ICZM, relatively few have discussed or evaluated how it is put into practice.

This toolkit is primarily intended for professionals responsible for the planning and management of coasts and their resources. It is targeted to situations in which economic, environmental and social concerns must be balanced. This introduction briefly answers some questions readers may have regarding the focus and purpose of this toolkit, who should use it, and what it can contribute to ICZM. The rest of the toolkit provides a comprehensive overview of ICZM starting with a focus on understanding what is meant by integration. It includes a discussion of why integration is important and how it relates to avoidance of or increases in conflict and controversy.

Although this toolkit describes ICZM mechanisms, it does not focus on the details of any one of them in particular. It is not intended to be a technical guide about the step-by-step implementation of an exact approach to ICZM. When available, references to sources of information are referenced in the text. Ultimately, this document can guide professionals who want to know more about the promise and potential of ICZM as a way to achieve multiple goals and objectives, including sustainable economic development, conservation and improved environmental quality along the coastal zone. However, its main purpose is to provide basic information that will be used in the future for evaluation of specific ICZM mechanisms under particular country contexts.

We begin this toolkit by dealing with the meaning of integration and attempts at achieving integration for natural resource and environmental protection policy in general and then for marine and coastal policy in particular. In the next section we present a brief survey of various types of integration and how they have been promoted. The following sections lay the foundation for a typology of integrated policy for coastal zone management.

Once we understand the importance of integration and identify its forms, we can deal more explicitly with conflicts, their management and resolution as they manifest themselves in the coastal zone. The booklet is infused throughout with supplemental and case study materials that can improve basic understanding of the many contributions and challenges of ICZM.

Fishing boat near Cat Bá, Vietnam.

The overall methodology used for this study is illustrated in Figure 1. The flow-chart is followed in this booklet through to the stage of the description of operational mechanims. These are presented as a topology of coastal zone management mechanisms in the section of this document on overarching mechanisms and operative tools

Once we have identified mechanisms they will be evaluated through case studies in further initiatives, namely in the ICZM handbook currently under preparation within the framework of the SECOA project. While the last two sections of this toolkit identify some impediments and supports to integration the handbook of SECOA case studies will include full analysis and empirical evaluation of the mechanisms based on reported on-the-ground experience. It will also point out supports and impediments to their implementation. This toolkit, by contrast, serves as a «menu» of possible tools as these are collected from the literature, existing case studies, and various professional and country reports on ICZM.

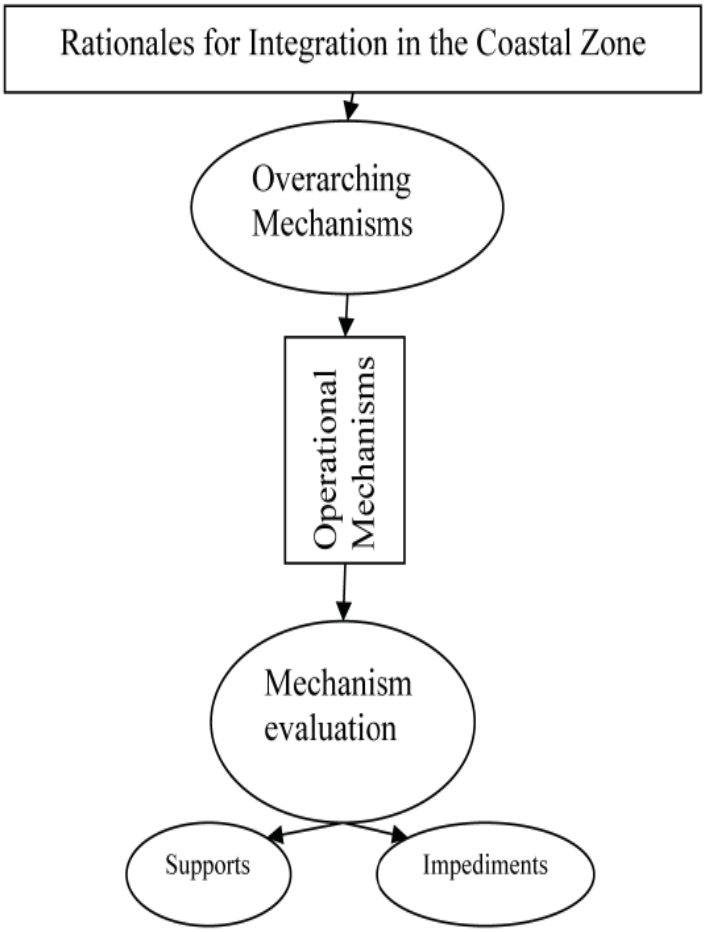


Figure 1: Scheme for constructing a typology of ICZM mechanisms and case study evaluation.

Integration in Resource Management and Policy

Over the past three decades a number of seminal environmental declarations have called for integration. One of the earliest articulations of integrated environmental and resource management is found in the report of the Brundtland Commission, published in 1987. This report described the chief institutional challenge of the 1990s to be the integration of ecological dimensions of policy with those of economics, trade, energy, agriculture and industry. It called for all these dimensions to be dealt with on the same agendas and in the same national, and international institutions (Brundtland 1987).

Another important reference to integration is in Agenda 21, the blueprint of action to be taken by organizations of the United Nations (UN), national governments, agencies and NGOs for sustainable development and for addressing global climate change. The text of Agenda 21 adopted in 1992 at the UN's summit in Rio de Janiero points out that "Prevailing systems for decision-making in many countries tend to separate economic, social and environmental factors at the policy, planning and management levels" (UN Department of Economic and Social Affairs 1992).

A more recent example of ubiquitous efforts for integration is the implementation plan of the parties to the 2002 World Summit on Sustainable Development. It has 81 references to "at all [governance] levels" in just 50 pages (Cash et al. 2006). Such recurrence likely signifies an acknowledgement that many problems have causes and solutions that span multiple administrative levels. This and other calls for integration set the stage for a discussion of the types of integration that have developed over the past several decades and have no doubt influenced management of the coastal zone.

To integrate means to unify, to put distinct parts together into a whole (Merriam-Webster 2003). In a policy context, integration describes situation in which constituent elements working in parallel or hierarchically are brought together and made subject to a single, unifying concept (Underdal 1980).

Blatter and Ingram (2000) attribute a related two-fold meaning to integration: it implies both an integrated framework for regulating and managing different environmental resources, as well as the bringing together of fragmented centers of institutional power. The key motivations for this are the better control of interdependent relationships between environmental medium, and the increase of regulatory efficiency and effectiveness by reducing administrative burden. As regulation targets specific resource interdependencies, the roles of various agencies that have jurisdiction over those resources can be consolidated.

Recent interest in the types of environmental policy integration that target laws, regulatory programs and the authorities that implement them has been common at the national and European Union (EU) levels of governance and cover a wide range of topics and disciplines within the environmental policy realm (Weiner 2004; Nilsson et al. 2009). On a global level, the failings of international environmental agencies and authorities have also focused attention on improving capacities for policy integration we discuss further on (Biermann et al. 2009; Oberthür 2009). Even at the local level common pool resource theory has shown that integrative approaches that consider multiple aspects of the environment at multi-levels of governance and involve many resource users or appropriators can internalize externalities and support collective action to avoid overexploitation (Schlager 2004).

In a resource management or environmental context integration will lead to the crossing of boundaries both figuratively and literally; these can be professional (i.e., field/discipline), physical, institutional or administrative boundaries (Ernsteins 2010). The simultaneous treatment of different landscape units represents the crossing of physical boundaries. The crossing of professional boundaries is well illustrated by integrated assessment projects. Although highly context dependent, an integrated assessment assembles, and makes coherent, information from a broader set of domains than would typically be provide by research from a single discipline (Parson 1995). Institutional boundaries are crossed by multi-level interactions between organizational entities.

In Table1, we distinguish between integration that strives to address different elements of the environment (medium) and paradigms which are standards or prototypes that include integrated approaches to resource management or environmental policy development. In the former, integration is necessary to prevent the shifting of pollution/externalities from one medium to another. For example, when addressing waste treatment, although incineration saves open space and avoids endangerment of ground water sources it degrades air quality and impacts surface water sources. Integrated waste management incorporates various perspectives simultaneously for the comprehensive treatment of waste. It incorporates life-cycle assessment, the different sources of waste (i.e., domestic, commercial, industrial and agriculture), and the management process itself (i.e., regulations and laws, institutions, financial mechanisms, technology and infrastructure, and the role of various stakeholders in the solid waste management chain).

	Term	Common application	Seminal sources
Integration Paradigms	Integrated resource planning	Energy system management	World Energy Assessment– Energy and the Challenge of Sustainability, UNDP 2000
	Integrated assessment	Climate change modeling	Integrative Assessment of Mitigation, Impacts and Adaptation to Climate Change 1994
	Integrated policy development	Sustainable development	Our Common Future, Brundtland Commission 1987
	Integrated maritime policy	Marine policy	EU Maritime Policy Directive 2007
	Environmental policy integration	International global governance	Agenda 21, 1992
	Integrated ecosystem assessment	Marine ecosystem-based management	Millenium Ecosystem Assessment 2005
Medium	waste	Waste planning	UNEP Developing Integrated Waste Management Plan Training Manual 2009
	transportation	Infrastructure planning	White paper on EU Transportation Policy 2001
	pollution control	Environmental protection	EU Directive on Integrated Pollution Prevention and Control 1996
	watershed	Urban & regional planning	The Dublin Statement on Water & Sustainable Development 1992
	water	Environmental protection	2000 EU Water Framework Directive
	coastal area	Urban & regional planning	U.S. Coastal Zone Management Act 1972
	energy	Infrastructure planning	US Dept of Energy, Comprehensive Electricity Competition Plan 1998
	tourism (coastal)	Urban and regional planning	Sustainable Coastal Tourism, UNEP 2009

Table 1: Common types of integration for resource management and environmental policy. Types are organized as paradigms and by the various medium addressed.

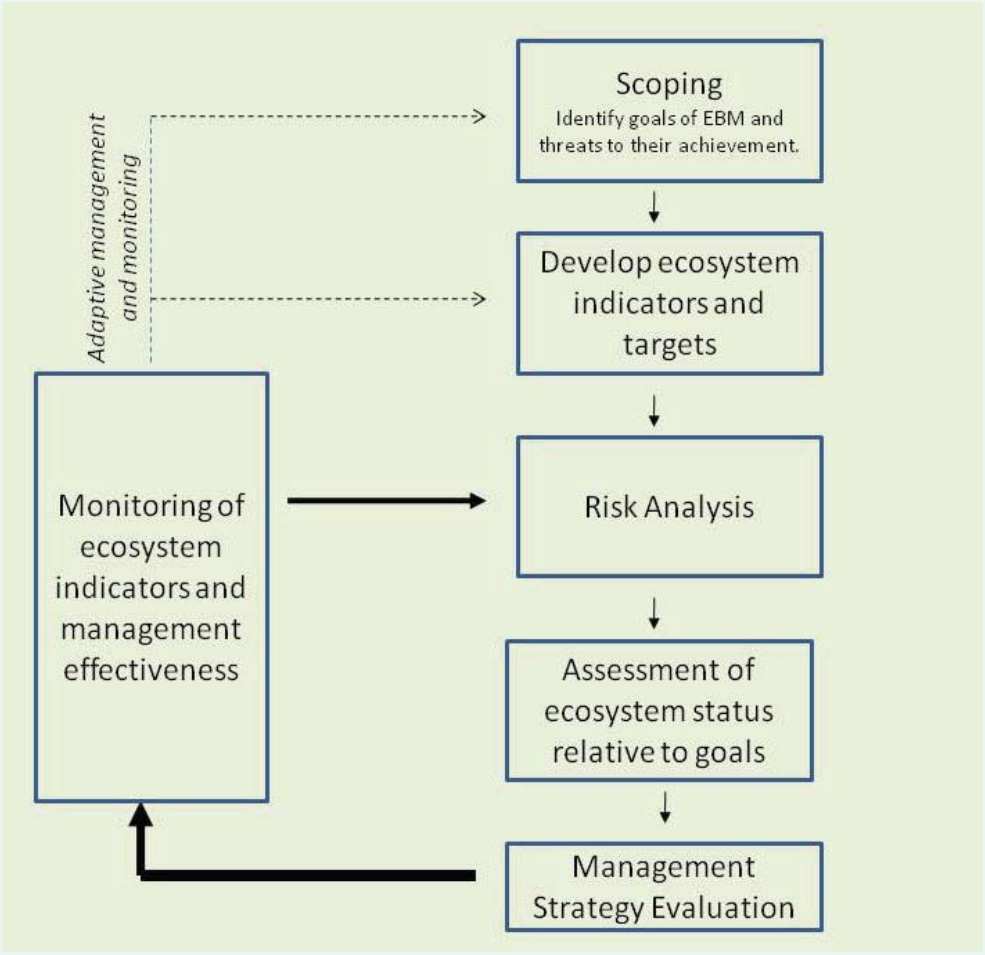
Many international organizations, especially in the EU, promote integration in various sectors. Some examples come from water, transportation, energy policy and from eco-system based (EBM) assessment (see Figure 2).

The EU Water Framework Directive (Directive 2000/60/EC) provides for the identification and analysis of water resources on the basis of individual river basin districts, and the adoption of management plans appropriate for each body of water. Previous to the design and adoption of the Water Framework Directive there was widespread consensus that past European water policy was fragmented in its objectives and operations. The single piece of framework legislation aims to integrate by expanding the scope of water protection to all waters (including surface waters and groundwater), managing inland waters according to river basins, using a combined approach of emission limit values and quality standards, and increasing opportunities for citizen participation in decision-making.

For at least the past decade the European Community's plans for environmental quality improvements have emphasized transportation. At a meeting in Gothenburg in 2001, the European Council of 15 placed shifting the balance between modes of transport at the heart of its sustainable development strategy. The White Paper on European Transportation set goals for integration of various types: integration of different modes of transport; integration of external costs of modes and systems; and integration of different levels of transport from international, to regional, national and local (COM 2001).

Another illustrative example is from the European energy sector. Among the aims of integrating power markets between countries is efficiency that will lead to reduction of electricity prices. This integration stresses the need for coordinated environmental action like the introduction of a production tax uniform to all countries participating in the market (Hobbs et al. 1993; Munksgaard and Ramskov 2002). As for intermodal transportation systems, integration in the energy sector can also refer to the extent to which various sources of energy (e.g., renewables and conventional sources) and technologies are combined and coordinated. The EU's policy on renewable energy laid out in its Green Paper: A European Strategy for Sustainable, Competitive and Secure Energy (COM 2006) promotes this type of integration. Similarly, integrated assessment for

Figure 2: Integrated Assessment for Ecosystem-based Managment (EBM)



Adapted from Levin et al. (2000).

ecosystem-based management, illustrated in Box 1, crosses the science-policy divide by assessing physical conditions of the environment using indicators of ecosystem health, and the ability of management strategies to maintain or improve, as needed, ecosystem health.

Integrated resource planning (IRP) is usually applied to the planning of energy systems. The approach considers both supply and demand-side options to meet the need for use of a resource, while minimizing the costs accruing to the firm and to society (D'Sa 2005). As such, IRP considers energy efficiency and load management programs, the environmental costs of electricity production, and a variety of resource-selection criteria beyond unit price. Long term efficiency and cost advantage is a major goal of IRP as it is for many types of integration. Through the approach, planning has expanded to include the participation of regulatory commissions, non-utility energy experts, and customers, as well as utilities themselves (Hirst et al. 1991).

Other examples of integrated environmental policy and resource management approaches are the EU Directive on Integrated Pollution Prevention and Control (Directive 96/61/EC) and the European Union's strategy on ICZM. The impetus for the former began with the UK's significant efforts to adopt integrated pollution control since the early 1990s, especially in its 1990 and 1995 Environmental Protection Acts. Those legislative measures brought about the creation of a national integrated pollution control agency. Steps taken in the UK toward integration have since been replicated by other European countries and by EU institutions (Weiner 2004).

Arguably, the most prominent integration approaches address freshwater water resources (Teclaffe 1996; Hartje 2002) but there are also many applications in the fisheries and marine sectors. A wide variety of integrated approaches involve resources exploited in the nearshore environment and the land-sea interface. In this geographic region there is the crossing of varied landscapes and a complex tradition of sectoral management.

Integration in the coastal zone is similar to integration in the marine realm. For both, the crossing of physical, administrative or institutional boundaries is necessary for policy development and planning. The Integrated Maritime Policy of the European Union launched in 2007 (COM 2007) introduced integrated maritime assessment as an effort to bring together many European directives, initiatives and data sources with the objective of analyzing the spatial distribution of natural and human features of the sea and their related dynamics (Meiner 2010). Directives include those for fisheries, transport, energy, and climate. Initiatives should be integrated including those related to conservation, such as Natura2000 and the UN's Regional Seas Program, as well as data sources such as fisheries statistics and information obtained from projects of the EUs Framework Program 7.

Of note is that calls for integrated marine policy in the US and integrated ocean and coastal policy adopted by several developing countries (Olsen 1993; Sorensen 1993) significantly predate the EU's adoption of integrated coastal and maritime management, mostly mandated since the beginning of the new millenium.

Shell beds in Algarve, Portugal.

Integration Applied to the Coastal Zone

Integrated approaches to coastal conservation and development did not materialize until the 1970s. Urban planners and landscape architects led some of the early research on the topic (Belknap 1980; Felleman 1982). One of the earliest references to integration in the Coastal Zone Management Journal first published in 1973, is a paper dealing with the lack of integration in municipal policy for managing the New York City waterfront (Moss 1979). In the marine realm, Kiel (1977) called for integrated U.S. ocean policy in an article published in Marine Policy during the first year of the journal's publication. The US has finally adopted such an integrated national

Box 1: What is ICZM?

Exact definitions of ICZM vary as they are dependent on specific objectives and contexts; the terms ICZM and integrated coastal management are often used interchangeably. Some definitions follow:

Integrated coastal management is "a continuous and dynamic process by which decisions are made for the sustainable use, development and protection of coastal and marine areas and resources" (Cicin-Sain and Knecht1998).

ICZM is a dynamic process for the sustainable management and use of coastal zones, taking into account at the same time the fragility of coastal ecosystems and landscapes, the diversity of activities and uses, their interactions, the maritime orientation of certain activities and uses and their impact on both the marine and land parts (Protocol on ICZM in the Mediterranean 2008).

CZM promotes an integrated approach that involves all relevant stakeholders and takes a long-term view of coastal zones. It attempts to balance the needs of development with protection of the resources that sustain coastal economies. It also takes into account the public's concern about the deteriorating environmental, socio-economic and cultural state of the coastline (European Environment Agency 2006).

Yet another definition characterizes ICZM as "an adaptive, multi-sectoral governance approach, which strives to balance development, use and protection of coastal environments. It is based on principles such as holistic and ecosystem-based approach, good governance, inter and intra-generational solidarity, safeguarding the distinctiveness of coasts, precautionary and preventive principle[s]..." (UNEP 2009)

Cicin-Sain, B. and R. Knecht (1998). Integrated coastal and ocean management: Concepts and practices. Washington D.C., Island Press.

Protocol on ICZM in the Mediterranean (2008). Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean, Barcelona,16 February 1976; amended on 10 June 1995.

European Environment Agency (2006). The changing faces of Europe's coastal areas. Coopenhagen, Denmark.

UNEP (2009). Sustainable Coastal Tourism: An integrated planning and management approach, UNEP/Action Programs.

policy that includes the marine environment as well as the terrestrial coasts with President Obama's Executive Order for Stewardship of the Ocean, the Coasts, and the Great Lakes published in July 2010.

Integrated coastal zone management came into common parlance with 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). Despite these clear beginnings, exact definitions of ICZM have developed over time and they vary some depending on specific objectives and contexts as shown in Box 1.

In general terms, ICZM is a process by which rational decisions are made concerning the conservation and sustainable use of coastal and ocean resources and space. It is a process designed to overcome the fragmentation inherent in single sector management, among different levels of government, and in the land–water interface. The European Commission defines ICZM as "a dynamic, multidisciplinary and iterative process to promote sustainable management of coastal zones" (COM 2000).

Box 2: Terms Related to ICZM

Coastal Zone: the area of land affected by the sea and the area of the sea affected by the land. The original definition was interpreted to cover the coastal plain to the edge of the continental shelf. However, the boundaries of coastal zone management in most countries consist of a strip of coastline within a kilometer or two from the shoreline. Sometimes the inland boundaries of coastal management included coastal watersheds or catchment areas. In rare cases, the coastal boundaries extend into the territorial sea and beyond to the exclusive economic zone, designated by international law to 200 nautical miles from shore (Ehler and Douvere, 2009).

Marine and Coastal Ecosystem Based Management: An integrated approach to management that considers the entire ecosystem, including humans. Its goal is to maintain an ecosystem in a healthy production and resilient condition so that it can provide services to humans. It differs from current approaches that focus on single species, sector, activity or concern; it considers cumulative impacts.

> *"Integrated coastal management should be a 'stepping-stone' toward making ecosystem-based management (EBM)… an operative reality" (Olsen 2003).*

Maritime Spatial Planning: a practical way to create and establish rational organization of the use of marine space and the interactions between its uses, to balance demands for development with the need to protect marine ecosystems, and to achieve social and economic objectives in an open and planned way. More specifically, it is a public process of analyzing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic, and social objectives that are usually specified through a political process.

Coastal and Marine Spatial Planning as defined in the USA's Executive Order of July 2010: a comprehensive, adaptive, integrated, ecosystem-based, and transparent spatial planning process, based on sound science, for analyzing current and anticipated uses of ocean, coastal, and Great Lakes areas. Coastal and marine spatial planning identifies areas most suitable for various types or classes of activities in order to reduce conflicts among uses, reduce environmental impacts, facilitate compatible uses, and preserve critical ecosystem services to meet economic, environmental, security, and social objectives.

The latter two spatial planning approaches are similar to ICZM in that they are integrated, strategic, and participatory—and they aim to maximize compatibilities among human activities and reduce conflicts among uses and between human uses and nature.

Ehler, C. and F. Douvere (2009). Marine Spatial Planning: A step-by-step approach toward ecosystem-based management. Paris: UNESCO, Intergovernmental Oceanographic Commission and Man and the Biosphere Programme.

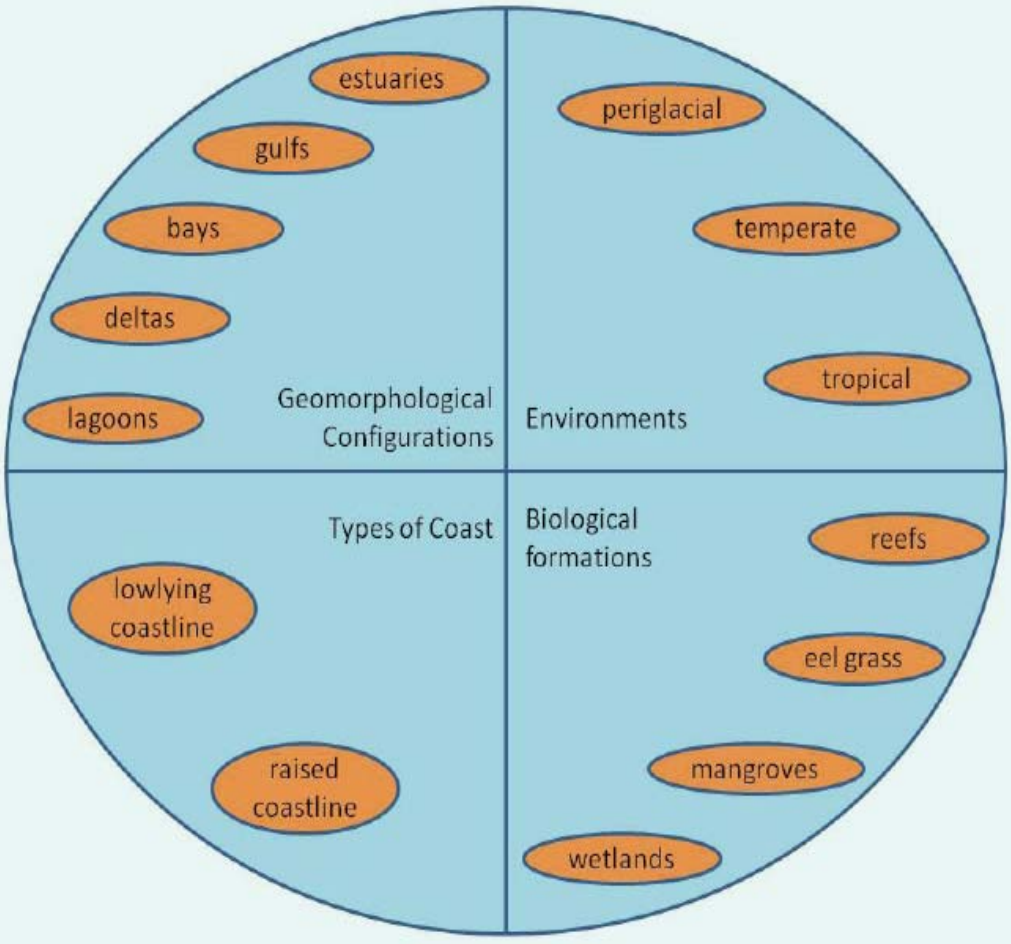
Olsen, S. B. (2003). "Assessing progress towards the goals of coastal management." Journal of Coastal Management 30(4): 325-345.

Some definitions of ICZM are broad and general. They refer not only to what is integrated spatially and at a governance level but also to the management and planning process itself. In other words the integration of objectives and the many instruments needed to meet these objectives. Practitioners, and to some extent the public, must also be aware of related terms in order to have a better understanding of coastal zone management, its elements. and how it can be distinguished from other types of management and approaches. Some of these 'related' terms are defined in Box 2.

Other integrated approaches applied to the land-sea interface include coastal ecosystem-based management (Environmental Law Institute 2009), catchment-area/ watershed management, (Allmendinger et al. 2002) and integrated coastal tourism planning. Ecosystem-based management integrates multiple-use sectors emphasizing the inclusion of human activities as an integral part of ecosystems. Catchment and watershed area management integrates upstream-downstream relations including governance and physical system components. Integrated coastal tourism planning addresses the conflicts between regional economic benefits, the social environment (i.e., the contextual social and cultural identity and values of place), and impacts to the physical environment resulting from urban sprawl, linear urbanization, pressure on sensitive areas, waste production and the fragmentation of habitats resulting from tourism development (UNEP 2009).

Although integrated management has been applied to the coastal zone in many places for some time its application to the high seas is relatively new and corresponds with human activities intensifying at greater distances from shore. Tanaka (2004) describes two opposing management forces in the sea, one zonal that segregates uses and one integrated, that brings them together for management purposes. He makes the case for integrated management based on international legal doctrines such as the Common Heritage of Mankind, embodied under the 1982 UN Law of the Sea Convention (UNCLOS). Tanaka touts integration as an ecology-oriented approach because it involves the simultaneous consideration of different coastal and marine ecosystems types Similarly, integrated marine spatial planning strives to manage the resources of the sea and the nearshore environment considering varying landscape types (Ehler and Douvere 2009). Examples of landscape types (units) commonly found in the coastal zone are illustrated in Figure 3 as adapted from a *Methodological Guide to ICZM* (Barusseau et al. 1997).

Figure 3: A typology of landscape units for consideration in the coastal zone



Adapted from Barusseau et al. (1997).

Dimensions of Integration for coastal management

This section reviews the dimensions of integration. From definitions of ICZM emanating from various forums and from institutional and legal-institutional constructs such as the Earth Summit, the UNCLOS and the US Coastal Zone Management Act of 1972, we see that integration is mandated to address a governance level and a physical level. Dimensions of integration referred to as part of ICZM and common to other types of integration include: inter-sectoral, intergovernmental, spatial , and science-policy (management) integration. Figure 4 illustrates the dimensions and the relationship between them together with some examples in the boxes below the triangles that show what elements are integrated within each dimension.

On the governance level, inter-sectoral integration contrasts with the single-sector approach in which agencies have authority over particular uses or resources in the marine and coastal area or the coastal "zone". In many cases there is redundancy between levels of government dealing with specific sectors. For example, there may be an agency at the federal level designing fisheries management plans while there is a coastal state or provincial agency working on the same matters at the sub-national level. Although they may have jurisdiction in discrete areas of the coastal zone, the EEZ and state coastal waters respectively, there will be some overlap. Certainly fish will not respect these jurisdictional boundaries set according to human conventions. Both

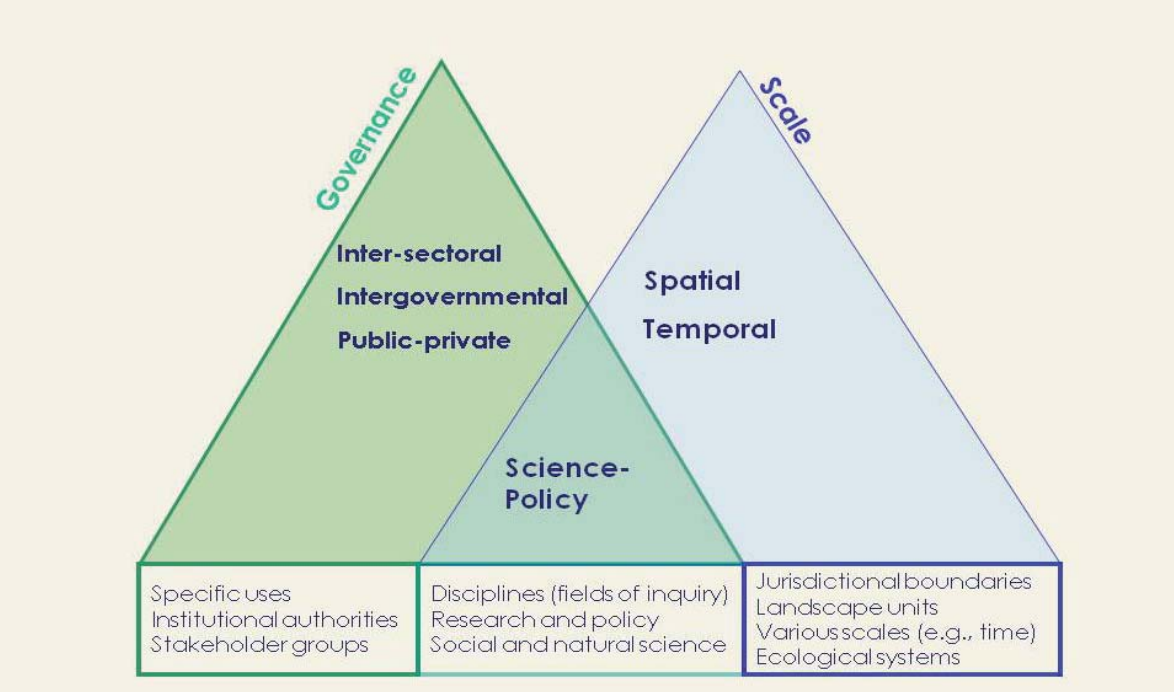


Figure 4: The dimensions of ICZM and other integrated resource management approaches.

inter-sectoral and inter-governmental integration relate to the governance level of integration.

Scale refers to integration of the physical realm, whereas another dimension, that of science and policy, is distinctly a hybrid that combines both elements of governance and of scale. Because over time, physical conditions will naturally change, the former also includes temporal scales.

Spatial integration will involve different landscape units, the crossing of the land and sea interface and consideration of the interdependencies between different elements of ecosystems – even between ecosystems, depending on the management scale. Time scales must be considered too as actions that are taken at any given time will affect future inter-generational human interactions as well as physical elements of ecosystems.

The science-policy dimension of integration is particularly challenging as efforts towards institutional progress tend to be based on advances in the natural sciences or social sciences without merging the two. In the past scientists and resource managers frequently addressed either the biocentric physical aspects of the environment or socio-economic "anthropocentric" concerns (Norgaard 2008). Recently, more efforts have been made to integrate these two spheres of influence for improved coastal and marine resource management.

An example of the merging between science and policy is integrated maritime assessment which strives to improve research and data collection on the oceans in many areas of inquiry for direct application to policy design and management (Meiner 2010). Another example is the amalgamation of natural and social sciences mandated by the U.S. Framework for Effective Coastal and Marine Spatial Planning (White House Council on Environmental Quality 2009).

Issues that arose for the management of the Ria Formosa Delta in Portugal illustrate several of the above described dimensions (see Box 3).

Measures taken to protect a Crusader castle (Appolonia - left) from erosion and protections taken by private property owners (Bet Yanai - center and right) in Israel.

Box 3: The Ria Formosa Case Study

The Ria Formosa barrier island system, located along 50 km of the Algarve coast in the south of Portugal, is a unique and highly dynamic ecosystem designated as a protected area since 1978. Throughout the 20th century, Ria Formosa has been occasionally overwashed by storms, creating temporary inlets in a natural process of landward migration of the small islands. The area supports a wide range of conflicting activities (e.g., aquaculture, effluent discharge, fisheries, port activities, sediment mining, tourism). It is under the jurisdiction of several municipalities as well as port, water management, and protected area authorities.

Erosion in Ria Formosa is a serious problem, affecting many of the infrastructures and inhabitants of the area and exacerbating the islands' landward movement. Since the 1930s, numerous local interventions have been made by different authorities along the coast consisting of hard stabilization to protect human occupation and various economic activities. In 1996, authorities initiated the application of soft stabilization techniques to the islands. In 2005, a Coastal Zone Management Plan (CZMP) was approved that is applicable to the wider section of the coast and which includes a retreat program. Promoted by the Ministry of Environment, demolitions of illegal constructions, as well as those in high risk locations, were anticipated throughout Spring 2010 as violent storms destroyed 77 houses over the winter.

In their examination of the coastal vulnerability of Ria Formosa, Ceia et al. (2010) concluded that the main source of sediments to Ria Formosa has been significantly reduced by a groyne field and two marina jetties built in the early 1970s in Quarteira/Vilamoura, about 13 Km west of the barrier islands. Quarteira/Vilamoura is covered by the 2005 CZMP, but measures to counter the fundamental causes of the Ria Formosa erosion and protect the coast were not in the plan.

This case illustrates the role of three dimensions of integration in coastal management: empirical and scientific evidence of the failures of hard stabilization that accumulated over the years have supported the retreat program alternatives (science-policy dimension); municipalities, park authorities, and water management authorities are involved in implementing the retreat program (intersectoral dimension); and municipalities at the local level and the Ministry of Environment at the national level have been involved (intergovernmental integration). The case also shows that spatial integration is yet to be achieved, as sediments from Quarteira/Vilamoura continue to fail to reach Ria Formosa.

Ceia, F. R., J. Patrício, J. C. Marques, and J. A. Dias. 2010. Coastal vulnerability in barrier islands: The high risk areas of the Ria Formosa (Portugal) system. Ocean & Coastal Management 53:478-486.

The Rationale For Integration in The Coastal Zone

To further define ICZM, build a typology and set the stage for further analysis, we articulate the rationales for ICZM. These relate to complexities of: 1) natural system interdependencies, 2) competing and complementary uses, and 3) multiple agencies and overlapping jurisdictions. We derive these three rationales from literature that evaluates ICZM programs and plans and explains the reasons behind their main objectives and goals.

The problem of natural system interdependencies relates to the need for integration between physically limited boundaries and to questions of scale and cross-scale dynamics. Due to the interrelated effects of the broad-scale degradation of ecosystem functions and services, resource scholars and managers alike have called for the revision of traditional geopolitical and economic boundaries for environmental decision making (Schlager and Ostrom1992; Ostrom et al. 1999; Guston 2001;

Box 4: Herzliya Marina Case Study: Why we need integration

The Herzliya marina is the first of thirteen marinas planned and implemented according to the National Development Plan No.13A along Israel's Mediterranean shores. It was completed in 1992. Detailed plans and expected environmental impacts were studied prior to marina construction and were reviewed carefully by the planning authorities that saw it as a precedent for further development of large marinas in Israel. As a prerequisite to approval, the authorizing bodies required that a scaled physical research model be run in a wave pool. This was based on acknowledgement that the marina would bring about changes in the coastline through sediment transport and accelerated coastal cliff erosion. However, in several respects, the model failed to predict the effect of the marina with sufficient accuracy.

Klein and Zviely (2001) compared the changes forecast by the model prior to marina construction to what actually happened to the surrounding coastline once the marina was built using remote sensing techniques. Erosion at distances of up to 750 meters caused by the marina was not foreseen and the model failed to predict any changes in the area south of the marina. The study's authors concluded that the gap between the predicted and the observed coastal changes were significant and cast doubt on whether the modeling pre-requisite was sufficient to plan for a such a megaproject.

This case study illustrates the importance of an integrated approach to coastal management. Integrated assessment should include wide-reaching evaluation of potential impacts on adjacent areas (spatial integration), the monitoring of accumulative impacts over time (temporal integration) and the concurrent concerns of neighboring jurisdictions and administrative units (the governance dimension). Although the model for the Herzliya marina served in the preparation of a required environmental impact assessment, its scope was limited and not sufficiently integrated within other planning mechanisms.

Klein, M. and D. Zviely (2001). "The environmental impact of marina development on adjacent beaches: a case study of the Herzliya marina, Israel." Applied Geography 21(2): 145-156.

Millennium Ecosystem Assessment 2005; Lookingbill et al. 2009). In the coastal zone, the crossing of typically "bounded" systems encourages the consideration of interdependencies between systems in ways that provide appropriate planning and management attention (e.g., suitable regulation, development assistance, inclusive public participation, etc.).

Lack of clear information on natural systems along the coasts has often hindered the consideration of interdependencies. (As an example, a case study of a marina constructed in Isarel described in Box 4 illustrates how lack of knowledge about coastal sediment transport processes led to serious problems on nearby shores.) Knowledge and current data are required – and are frequently in short supply – on a wide range of interdependent phenomena: water quality, wildlife, ecological processes, as well as human impact and human–ecological interactions (Lane 2008). Especially for the marine environment as an example, science needs to provide a much more detailed and holistic picture of the world's ocean ecosystems and the interdependent ecological system services than it has in the past. These services include climate regulation, nutrient cycling, control of fish populations by food web dynamics, disturbance regulation (e.g., flood control by wetlands and mangroves), and waste detoxification by coastal wetlands (Costanza 1987; Young et al. 2007).

Ecosystem-based management, now widely advocated as the basis for ocean and coastal planning considers the entire ecosystem and accounts for the interconnectedness within systems (Environmental Law Institute 2009; MRAG Americas Incorporated et al. 2009). It recognizes the challenges of understanding system interdependencies and promotes integration to address the complexities involved when integrating landscape and habitat units. Such integration is in some ways helped and in some ways hindered by laws and regulations (Keiter 1998) as discussed later in this publication.

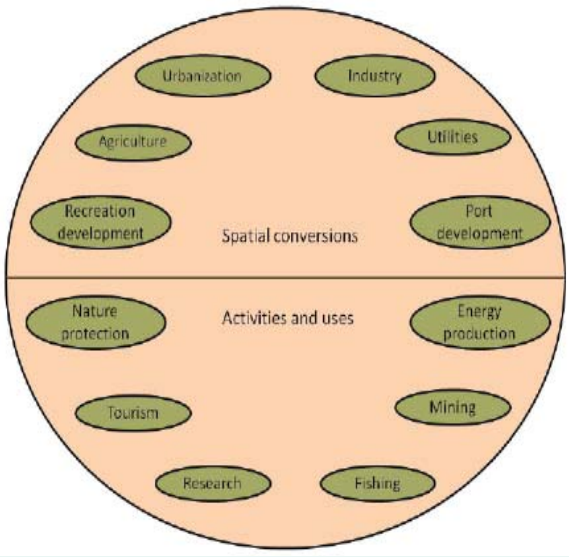
The second rationale for integration addresses the myriad of coastal resource uses. Many uses have been traditionally managed sectorally such as fisheries and oil and gas extraction. As such, characteristics of these uses must be carefully identified to match them with appropriate structures of governance both for institutional and regulatory integration. Uses that exploit the same resources whether they are extractive (e.g., removing resources from the ocean or coastal zone such as sand mining or fishing), non-extractive (e.g., use of ocean space) or non-consumptive uses (e.g., aesthetic) can be characterized as conflicting, compatible or potentially compatible (Vallega 1995; Ehler and Douvere 2009). Another way to categorize these uses is whether are permanent spatial conversions or consumptive resource uses such as fishering or mining. Such a characterization is found in a *Methodological Guide to ICZM* (Barusseau et al. 1997) shown in Figure 5.

In today's very developed environment, uses that are not complementary are often at odds because of the density and intensity of activities in the area of consideration. Technological development allows us ever greater exploitation of coastal resources – especially those of the sea which have in past generations been difficult to access. Even so, not all uses will be in conflict. Some of them will be reciprocally beneficial such as scientific research and exploratory drilling for oil and gas (Vallega 1995) or the development of wind farms in spatial and temporal synchronicity with aquaculture (Hieronymus Buck et al. 2004).

As mentioned, laws and policies aimed at regulating the exploitation of natural resources, especially those of the marine and littoral regions, have in past decades been organized around sectors thus leading to the third rationale for integration: multi-agencies assigned to particular resources with specific jurisdictional mandates. Ehler and Basta (1993) point to increasing conflicts among economic development, environmental protection, and natural resource management objectives each governed by a different ministry.

Experts contend that multiple agency involvement and overlapping jurisdictions are more common in the marine environment than on land (Pew Oceans Commission 2003) although other aspects of governance between land and sea may be similar (Milon 2000). Overlap exists within countries between national and sub-national jurisdictions, particularly in the coastal zone. In the U.S. for example, sub-national states control most but not all

Figure 5: Human activites and uses in coastal environments



Adapted from Barusseau et al. (1997)

activities in waters out to 3 nautical miles. Beyond that, some 20 federal agencies have responsibilities for more than 140 laws that apply to federal waters (Stokstad 2009).

On a global level international law is unevenly applied. Despite the efforts to unify the nature and extent of coastal nation-state jurisdiction in offshore waters, many countries have not ratified the UNCLOS and do not abide by it. In quite a few countries, resources beyond 12 nautical miles from shore remain unclaimed (Leary and Esteban 2009). Complicating the situation further are the growing numbers of international treaties (e.g., OSPAR, Natura2000 and Convention on Biological Diversity) that increase the risk of producing overlaps or conflicts of relevant rules in the sea and along coastal zones (Matz 2002; Tanaka 2004). Even at a national level, the need for multiple permits and authorizations for essentially the same uses and activities is inefficient. Multiple agencies each giving their own permits will be less likely to consider cumulative impacts and they are more likely to have communication problems and conflicting missions (Stokstad 2009).

In any case, work on the evaluation of integrating aspects of coastal zone management programs and policies does exist (e.g., Christie et al. 2005; European Environment Agency 2006; Lane 2008; McKenna et al. 2008). These and other research endeavors together with academic and professional literature give us opportunities to derive a detailed inventory of ICZM mechanisms and their characteristics from which to continue to construct a typology.

Overarching Mechanisms and Operative Tools

There are many mechanisms for policy integration in coastal management. We can categorize these based on earlier research and publications. The categories we choose provide a base typology that will help analyze case studies.

Cicin and Knecht (1998) categorized ICZM tools and approaches in the twenty-two countries they surveyed as falling under coastal and marine policy development; planning processes; studies to diagnose either natural systems issues, socio-economic system issues or government capacity for ICM; and finally, provision of financial incentives for top-to-bottom or bottom-to-top integration. Building on past studies such as these we link the various rationales described in the previous section to the mechanisms mentioned in surveys of ICZM tools in the literature and practically applied.

According to this approach, we separate mechanisms into two major hierarchical levels: overarching mechanisms and operational tools. Overarching mechanisms are those broad approaches mandated by regulatory frameworks and policy declarations. They are the principles driving coastal zone 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. These levels/types of mechanisms can be identified in ICZM programs.

Overarching mechanisms are consistency, concurrency, cooperation and capacity building (see Figure 6). All of the operative tools serve at least one of these overarching mechanisms and some serve more than one at a time. For example, review required for sub-national coastal state Harbor Plans according to the US Coastal Zone Management Act of 1972 and federal Coastal Zone Management principles is a regulatory tool serving consistency; it is in fact called "consistency review". A multi-sectoral, interdisciplinary review committee such as the Coastal Environment Protection Committee mandated by Israel's Protection of the Coastal Environment Law (described in Box 7) serves the overarching mechanisms of concurrency and cooperation. Table 2 below gives more examples of overarching mechanisms and operative tools and how they fit together.

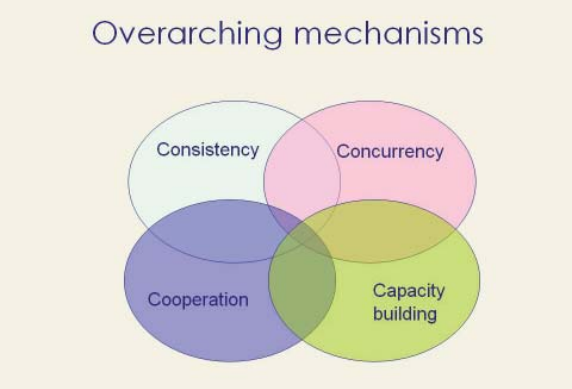


Figure 6: Four overarching mechanisms.

In some cases, a single operative tool, for example a well-designed co-management task force, can support three overarching mechanisms at once: consistency, concurrency, and cooperation. As illustrated in Figure 7, 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.

Concurrency at the local level of government can be achieved by requiring local governments to pursue land use regulations and public investment in harmony with policies of adjacent localities and their own local plans (May et al. 1996). Concurrency is not restricted to the local level. Initiatives for international river management seek concurrency between two or more riparian states at the river basin level. Such cooperation along international waterways is common both in inland and coastal waters alike.

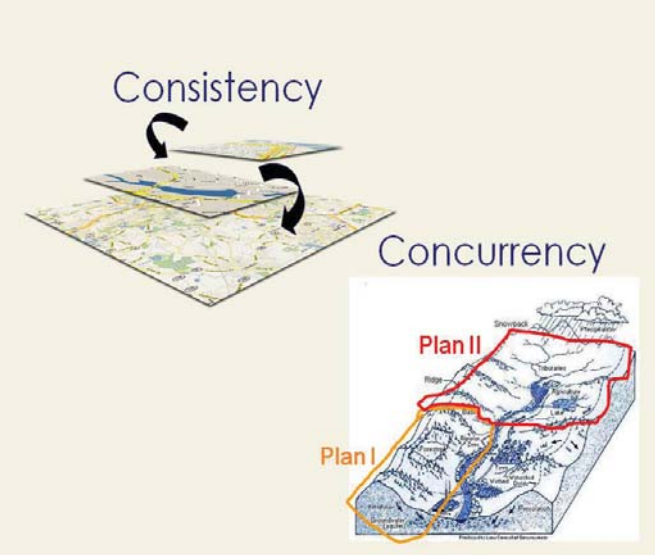


Figure 7: Consistency and concurrency

Simply stated cooperation is a mechanism that brings together various authorities for joint, coordinated management. It usually involves distinct parties working together over time and addressing the same space. For example, the government of the Netherlands, Germany and Denmark established the Wadden Sea Forum in 1980 to manage the Wadden Sea Marine Protected Area. The forum advances cooperation by going between governments and between governments and communities. It seeks to bring all economic and environmental stakeholders and local and regional governments together for the task of creating sustainable development scenarios and strategies for their implementation (Enemark 2005).

Capacity building has been well-explored by scholars of environmental politics. The environmental capacity of a country is a function of the strength, competence and configuration of the governmental and non-governmental proponents of environmental

Rationales	Overarching mechanisms	Operative tools	Examples
Natural system interdependencies	Capacity building	Monitoring ecosystem health	European Environmental Agency
	Capacity building Concurrency	Environmental impact statement requirements	Germany: size and location of projects in the coastal zone may trigger automatic EIA.
	Capacity building Cooperation	Participatory research as part of co-management	US Northeast-Consortium funded cooperative research (Hartley et al. 2006)
Competing / complimentary uses	Consistency Concurrency Capacity Building	Marine spatial planning	MSP in the North Sea following questions about the location of new offshore wind energy facilities
	Concurrency	Set back lines	Israel: 100 meter prohibition of building from waterline
	Capacity building	Social Impact Assessments	Requirements of National Standard 8 of US Magnuson-Stevens Fisheries Management Act
	Cooperation	Public participation	Citizen advisory boards in Danish fisheries (Christensen et al. 2007)
	Concurrency	Water-dependency requirements	US state of Massachusetts Public Waterfront Act of 1866 (Portman 2006)
	Cooperation	Co-management	Abalone fisheries management in WestAustralia (Mitchell et al. 2006)
Multiple jurisdictions / agencies	Consistency	Mandated consistency	U.S. Coastal Zone Management Act of 1972
	Cooperation	Regional Seas Program/ Conventions	UNEP's MAP/CAMP & OSPAR
	Cooperation Concurrency	One-stop-shop permitting	UK Marine & Coastal Access Act 2009
	Cooperation Concurrency	Multi-sector task force	Wadden Sea Marine Park (Enemark, 2005)
	Consistency	Planning hierarchy	Comprehensive national plans that take precedence over lower level plans

Table 2: Rationales, mechanisms and examples. Mechanisms are listed by the rationale that serves as the main driver.

protection and the specific cognitive-information, political-institutional and economic-technological framework conditions. The degree of resource system knowledge, empowered environmental organizations (governmental and non-governmental) 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 Volkery 2007).

After having described the major overarching mechanisms (consistency, concurrency, cooperation, capacity building) we can link these and operational tools to the three rationales for ICZM as follows (see Figure 8): 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 resource users and policy-makers about each others' goals and respective positions. It creates mutual understanding, trust and the likelihood of long-lasting partnerships that support integration (Hartley and Robertson 2006).

The remainder of this section will explicitly describe each of the operative tools commonly mentioned in the literature that serve the overarching mechanisms described above. Following each description, we provide at least one example.

Operational tools that aim to bring about integration in the coastal zone and serve the four overarching mechanisms are **consistency/currency reviews, planning heirarchies, setback lines, statutory management forums, marine spatial planning, modes of public participation, co-management task forces/forums, environmental and social impact assessment,** and **public participation** (See Figure 8 below). These mechanisms were chosen from among many management tools 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 occuring at the marine-terrestrial interface, in other words, within those areas that make up the coastal zone.

Consistency (or concurrency) review: This tool involves the review and evaluation of an administrative regulation, policy document or planning order to determine whether it is consistent with other plans, policies,

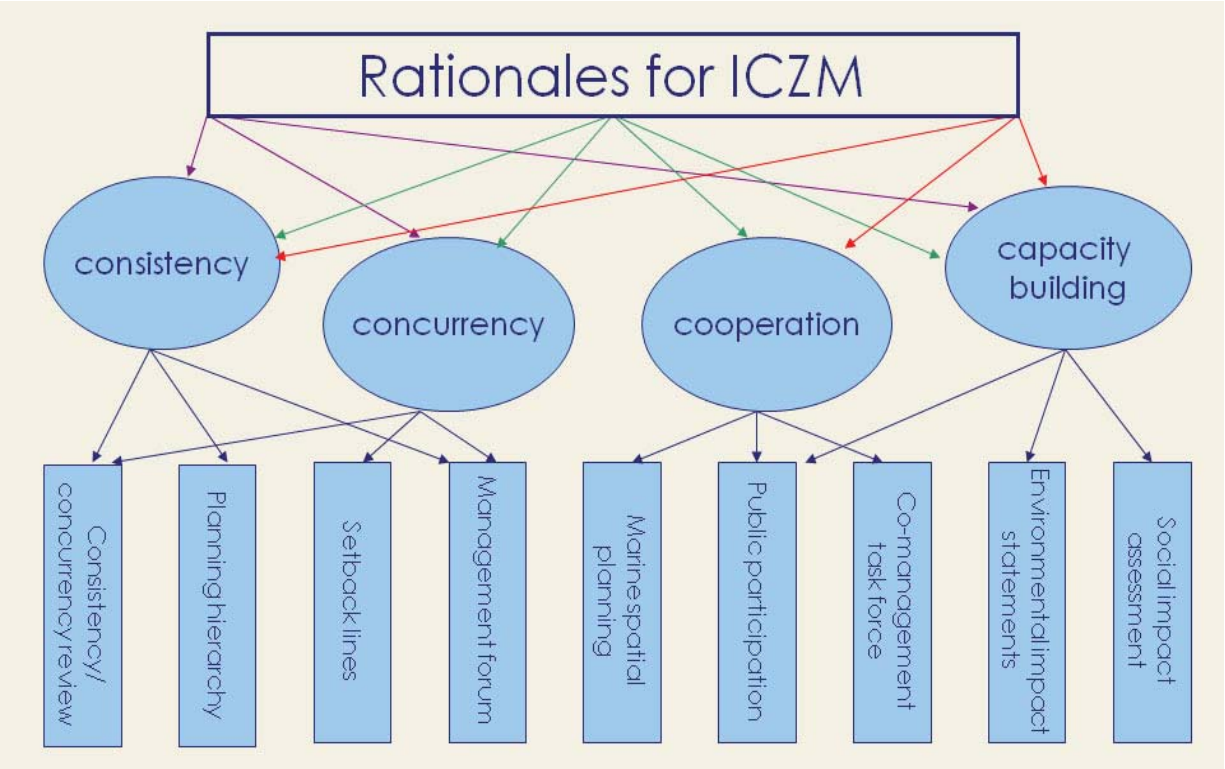


Figure 8: Mechanisms of ICZM – Rationales, overarching mechanisms and operational tools.

Box 5: Setback lines as a tool of integration

A report prepared by Bridge and Salman (2000) for the National Institute for Coastal and Marine Management in the Netherlands (RIKZ) examined ICZM in nine countries. The aim of the study was to gain insights about how European countries manage their coastal zones and to provide an initial review of the effectiveness of these approaches. The report gives an overview of national policy and legislation relevant to ICZM in Denmark, England, Finland, Germany, Norway, Spain, Poland, Sweden, and Turkey. The main instrument explored within this framework is the set-back line; the authors describe the extent to which setback lines help or hinder ICZM.

According to Cambers (1997), a setback line is a prescribed boundary set at a distance from a landscape 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 put in place for one or more of the following functions: to protect of development from natural hazards (e.g., flooding, erosion); to control odevelopment; to protect sensitive areas for conservation; to ensure public access to the shore; and to maintain cultural land and seascapes. Setbacks limits usually either consist of shore parallel linear lines or contour lines. The former is a fixed distance strip measured from a defined point or points along the land-sea continuum. The latter is a variable distance line from the shore based on elevation.

Bridge and Salman (2000) found that shore-parallel lines are used at the national level by all of the nine countries with the exception of England where there is increasing informal use of contour setback lines. They also found that a common problem occurs in delimiting and mapping the line when there is no precise definition of the coastal zone. The baseline, from which to measure the landward or seaward boundary is variable and often depends on legal definitions of waterlines, coastline/shoreline, and low and high water tides.

Goals of integration are served by setback lines in two ways. First of all, by placing limits, they allow for accommodation of myriad needs simultaneously, those of built uses - for example tourist accommodations - and non-built uses such as public access or nature conservation. Secondly, setback lines provide opportunities for planners and stakeholders to consider the natural landscape elements along the shore. By definition, setbacks can be tailored to aspects of the environment such as cliffs, wetlands, and dunes. Ultimately, establishment of a setback line in the land-sea interface is based on identifying at least some elements of the land and seascape.

Bridge, L. and A. Salman (2000). Policy Instruments for ICZM in Nine Selected European Countries. Leiden, The Netherlands, Dutch National Institute for Coastal & Marine Managment (RIKZ).

Cambers, G. (1997). Planning for Coastline Change: Guidelines for Construction Setbacks. Environment and Development in Coastal Regions and Small Islands (CSI).

laws and regulations administered at different levels of government or between spatially adjacent authorities at the same level of governement. Most simply the review is designed to coordinate between various policies, plans or legislation, regardless of the implementing authority.

The most prominent example of the use of this mechanisms is likely the federal consistency requirement of the US Coastal Zone Management Act (CZMA). The requirement promotes consistency by imposing limitations over state actions that must be approved by federal agencies and concurrency by limiting inconsistent interstate actions making sure that contradictory actions are not taking place simultaneously. Not only does the CZMA provision support intergovernmental cooperation but it also provides incentives for the US states to continue maintaining their coastal zone management programs. For states to have 'veto' power over federal proposed actions and activities in the coastal zone, they must have current coastal zone management programs and plans.

Planning hierarchy: This tool consists of a top-down hierarchal approach usually perscribed by existing planning and building laws, codes or regulations. 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.

In Sweden for example, national policy is implemented using non-binding strategic plans through The Planning and Building Act of 1987. These guide local (municipal) decisions regarding coastal management issues. Swed-

ish municipal comprehensive plans must introduce new areas of national priority affecting coastal management as mandated in the strategic plans and in the Environmental Code (e.g., for conservation, wind power, marine transport) (Morf 2005). The national guidance cannot be appealed against; this provides a comprehesnive, integrated view at larger scale and scope for on-the-ground implementation at the lower (municpal) level.

In Israel, district and local master and detailed plans that include areas of the coast must match the National Outline Scheme (NOS 13) for the Coast. All Israeli National Outline Schemes (NOSs) take precedence over the lower level plans. Many NOSs are sectoral. NOS 13 is a comprehensive plan that balances coastal development (i.e., tourism, agriculture) and protection (i.e., bathing beaches, coastal and landscape reserves), and established a setback line restricting development within 100 meters landward of the tideline.

Setback lines: A setback line is 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 put in place for a number of different reasons, such as to avoid hazards to development from erosion risks, to ensure public access. They are usually set on the landward side of the coast.

Box 5 provides detail on how this mechanism was used as an indicator of progress on ICZM and Box 7 highlights how setback lines are used in combination with another ICZM tool, a statutory regulatory commission. In the former case, Bridge and Salman (2000) describe the use of setback lines, how they contribute to ICZM and the findings from the setback line use inventory they conducted among nine European countries.

In the later case, in Israel, the setback lines are used under the Law for the Protection of the Coastal Environment. First of all, setback lines prohibit construction and most development in the coastal zone, but additionally they determine whether certain types of development proposed within wider boundaries must be reviewed by the Committee for the Protection of the Coastal Environment. Setback lines bring about integtration by indicating important characteristics of various coastal

Box 6: Stakeholder participation - the role of public participation in ICZM

Public participation is an important tool for integrated planning and management approaches. There are many ways to ensure the public and stakeholders provide input to coastal planning and management processes. To chose the correct tools, policy makers and planners should consider the context within which they are working and they should be as inclusive as possible.

Who are the stakeholders? Stakeholders constitute the subset of "the public". They are those members who have a direct interest in use of an area thus referring to those who use resources in the area, the general public, government and agency officials. The term "stakeholder" can be quite broad; it can include anyone who cares about the coastal area.

Why involve stakeholders? Planning outcomes are better accepted and policies are more likely to be complied with by those who have participated in designing them. Further, there is much that planners and policy makers can learn from stakeholders about ecosystems, how ecosystems interact, cumulative impacts from various activities and the changing condition of a natural resource. Stakeholder participation is at least a two-way learning process.

How do planners involve stakeholders? It is important to use public participation modes that cater to all parties that have an interest in the use of an area. Such modes include hearings, surveys, workshops, advisory committees, and commenting on written documents. According to Arnstein's (1969) seminal work on citizen participation, each supports varying degrees of empowerment that can be conceptualized on a scale from manipulation to consultation to total citizen control of decision making.

Arnstein S.R., (1969). A ladder of citizen participation. Journal of the American Institute of Planners 35(4): 216–244.

landscape units through boundary demarcation and they cause policy makers to consider these characteristics in decision making regarding development and preservation.

Management forums: A statutory (i.e., mandated by law) entity consisting of representatives of government agencies including local and regional authorities. Such forums can also include 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. These forums provide opportunities for integration by including representatives of sectoral interests. A good example is the Committee for the Protection of the Coastal Environment established by the Law for the Protection of the Coastal Environment passed in Israel in 2004 and described further in Box 7.

Although the UK's new Marine Management Organization (MMO) created by the Coastal and Marine Access Act of 2009 pertains more to submerged lands than to terrestrial areas of the coast, its establishment as a cross-government delivery partner marks a fundamental shift in planning, regulating and licensing activity. By bringing together various sectoral interests in a 'one-stop-shop' licensing approach, the MMO aims to provide more certainty to stakedholders interested in conducting activities along the shore and in the marine environment.

Other examples are the Strategic Coordinating Group (SCG) in Portugal created to support the implementation of the Portuguese national ICZM framework. It is made up of regional and sectoral representatives. The main purpose of the SCG is the development of a methodology to help define goals and priority actions for coastal managment and the implementation of regional coastal management plans.

Marine spatial planning (MSP): A process of analyzing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic, and social objectives usually specified beforehand through a political process. Marine spatial plans bring about integration through multi-level governance, the balancing of sectoral activities and consideration of problems unique to the marine-terrestrial interface, such as land-based marine pollution.

As an example, a major element of the recently promulgated UK Marine and Coastal Access Act, is the preparation of marine spatial plans for the English inshore and offshore regions. These regional plans must be consistent with the national Marine Policy Statement, thus improving multi-level governance integration. In Belgium, the Coordinator Center on ICZM within the C-Scope project (Combining Sea and Coastal Planning (http://www.cscope.eu) set up an expert group on Marine Spatial Planning in 2009.

Similarly, Portugal initiated national MSP according to a new National Sea Strategy (EMAM), the outcome of Ministers' Resolution No. 163/2006. EMAM calls for the preparation of a marine spatial plan, Plano de Ordenamento do Espaço Marítimo (POEM) whose principal aims are nature and cultural amenities protection, development of marine renewable energy, interest in reforming fisheries management and port development. The plan aims to balance development and environmental protection, bring about coherence between land and marine planning strategies and will employ legally binding zoning. It involves a baseline study and analysis, followed by scenario development which will then lead to a preliminary plan proposal expected to be completed by 2011 (Vasconcelos 2009; Borges 2010).

Co-management task force: A forum consisting of representatives of user-groups, government agencies and research institutions working together in a collaborative and participatory process for the purpose of regulatory decision-making. In most cases this will be a non-statutory forum (i.e., not mandated by law) that includes a high level of collaboration with members of the public, particularly stakeholders who are resource users.

In resource management literature, "co-management" is defined as the collaborative and participatory process of regulatory decision-making among representatives of user-groups, government agencies and research institiutions (Jentoft et al. 1998). It has become a prominent tool for fisheries management. Co-management embodies the "bottom-up" approach and allows the management system to be decentralized. In a co-management arrangement users are granted both rights and responsibilities. Co-management differs from public

Salt beds in Algarve, Portugal.

participation in that resource users and the public have a long term committment to adaptiive (evolving) management and they also have responsiblities for some part of implementation.

In the Atlantic Canada's dragger fishery co-management rights and responsibilities have been assigned to representatives of fishing industry organizations or otherwise-defined groups of harvesters and landside processors. Integration in management of a coastal resource in this case is achieved by bringing together government, resource users and the public (Jentoft et al. 1998).

Environmental impact assessment (EIAs): The process by which a report, called an environmental impact statement (EIS), is prepared. The assessment identifies and evaluates the possible positive or negative impacts that a proposed project may have on the surrounding environment including impacts on the quality of the environment and health of ecosystems. In some contexts, EIA is the principal medium through which governmental systems have incorporated the environmental sciences into political decision-making (Dimento and Ingram 2005).

The importance of EIA to coastal and marine planning and management should not be underestimated. In Britain, for example, the first examples of EIAs undertaken were for developments within the North Sea oil and gas production industry in the early 1970s. In fact up until 1995 of all the development requiring EIAs in Britain, 10% were prepared for marine projects (Budd 1999). Many countries have special EIA requirements for any type of development proposed in the coastal zone which is considered a landscape unit of particularly sensitive ecosystems and resources.

EIA can contribute to integration through the identification of potential adverse impacts that could jeopardise the quality of the coastal environment over time (temporal integration), and through the assessment of impacts outside of the immediate project area (spatial integration). Also, the provision of opportunities for public participation (such as in a scoping process) will promote further consideration of alternatives and the adequacy of any proposed mitigation.

Social impact assessments: Social impact assessment (SIA) began as a field in the 1960's as people became more concerned with human impacts on the environment (Pollnac et al. 2006). It is a way to assess the impacts on society of certain development schemes and projects before they go ahead. It has been incorporated into the formal processes in several countries for planning and resource management. As a tool for ICZM it takes the form of an assessment whose findings are presented in a report that identifies and evaluates the possible positive and negative impacts that a proposed project may have on surrounding coastal populations and communities.

Coastal tourism in Cat Bá, Vietnam.

SIAs examine socio-economic impacts, including cultural impacts of projects similar to how environmental impact assessments explore the impacts of regulatory programs and projects on the physical environment. SIA is required for certain types of marine or coastal planning and management in the United States. Preparation and passage of the Fishery Conservation and Management Act of 1976 (now the Magnuson-Stevens Fishery Conservation and Management Act) led to efforts to gather social data and to carry out impact analysis specifically for fisheries management. For this reasons, social scientists working with the US National Marine Fisheries Service have been developing SIA approaches since the 1980's. Their aim is to improve marine fisheries management by understanding the impacts of certain retulatory changes on coastal communities (Pollnac et al., 2006). Examining socio-cultural aspects of fisheries includes looking at various expected changes in communities along the coast including structural changes in land uses (Portman et al. 2009b).

SIAs bring about integration by providing information about how terrestrial uses interact with uses and activities occuring in marine areas thus helping to manage the marine-terrestrial interface. They also contribute to capacity building in that they generate new data with which to review projects.

Public participation: Among the well-known mechanisms for ICZM are modes of public participation. These generally consist of any processes that involves stakeholders, resources users and the general citizenry in planning and resource management endeavors. Public participation can take many forms. Arnstein's (1969) seminal paper explains that "citizen participation" is a categorical term for citizen power: "It is the redistribution of power that enables the have-not citizens....to be deliberately included in the future." Common modes of public participation for use by the coastal planner or manager are hearings, surveys, and workshops,

and charrettes (a French term referring to an intense collaborative design session).

In regards to ICZM, this mechanism facilitates integration at various levels of jurisdiction and authority. Planning and management that includes public participation is usually more successful (Portman 2009) although some authors have criticized the bottom-up approaches that begin with public involvement. This criticism is based on shortcomings and difficulties of some ICZM programs, particularly in Europe (see McKenna and Cooper 2006).

Research on ICZM in the Philippines and Indonesia found that there is an inherent expectation that coastal management projects will seek and encourage opportunities for stakeholder involvement that include the general public, particularly at the local level. When these expectations are not met, chances are that the project will not be sustained over time (Olsen 2003; Christie et al. 2005). As with SIA, better understandings of coastal environments can be achieved through public participation because community members, stakeholders and resource users will often be more knowledgeable about local conditions. Box 6 gives more information about the means and importance of public participation for ICZM.

Of note is that policy makers frequently choose to use any number operational tools together in a regulatory program or in an ICZM plan or program. This is the case in Israel where the 'Coastal Environment' is protected from development by more than one mechanism within a single regulatory program (See Box 7). Policy makers should choose to implement operational tools that serve overarching goals and alleviate particular problems in specific contexts. For example, tools that alleviate problems caused by redundancies arising from multiple jurisdictions and agencies are consolidated one-stop-shop permitting administered by statutory management entities put in place by laws and conventions and/ or by planning hierarchies. Consolidated permitting promotes collaboration between permit-issuing entities in a proactive manner. Multi-sectoral task forces bring various user groups and sectoral agencies together for coordinated management. Planning hierarchies bring about consistency through oversight between local, regional, sub-national and national authorities.

Sometimes integration can be achieved using variations of these mechanisms even on the international level. For example, OSPAR is the mechanism by which fifteen governments of the western coasts and catchments of Europe, together with the European Community cooperate to protect the marine environment of the North-East Atlantic. This is a good example of a successful management task force. The mechanism fosters integration between entities at the same level of government (concurrency) and by setting up oversight from the regional level over the local level (consistency).

Although based on a preliminary typology that requires further research, testing and refinement, this sections has provided basic descriptions of tools for ICZM and an understanding of how they interact. From these beginnings we can better analyze the use of various tools for ICZM. Analyzing these tools should consist of identifying their use and then characterizing aspects of their use as supports or impediments to integration.

Before going on to analyze cases and further examples in future work, we add a word about the costs of integration in those toolkit so that policymakers and professionals who use ICZM can anticipate the resources necessary for successful implementation. Also, before describing the common costs of integration, we acknowledge conflicts inherent in efforts at integration. Such conflicts are known impediments to ICZM. In any case, we believe the framework of analysis (presented in Figure 1 of this Toolkit) is structured enough to be followed and repeated in future case studies.

Box 7: Combining tools - a case study

Conflicts about use of the coastal zone along the Mediterranean Sea in Israel have intensified since the early 1990s. With burgeoning population, increased standards of living and expansion of the tourist industry, it was clear that Israel's National Outline Scheme for the Mediterranean Coastal (NOS 13) approved in 1983 and regulations rooted in the country's Planning and Building Law of 1965 were not adequate to protect its coast from destructive development (State Comptroller 1998).

A policy report published in 1999 by the Territorial Waters Committee offered guidelines for an ICZM policy for Israel. It recommended dividing both marine and terrestrial parts of the coast into physical subunits each with a varied spatial structure and corresponding development restrictions. Although ultimately lawmakers did not adopt these recommendations in full, public outcry and subsequent deliberation led them to pass the Law for the Protection of athe Coastal Environment of 2004.

This law has two major components: jurisdictional boundary demarcation and establishment of a regulatory authority that makes decisions about development within these boundaries. Regulators have special authority to protect the "Coastal Environment" designated as an area between a landward line of 300 m and a seaward line of 12 nautical miles (nm) from shore. The law establishes a littoral strip within the Coastal Environment of greater sensitivity extending one nm seaward from the shoreline or to 30 m depth, depending on which is further from the shoreline. This unit, together with the 100 m landward setback originally promulgated in NOS 13 and reinforced by the new law constitutes the "Coastal Strip".

The 2004 law established the Committee for the Protection of the Coastal Environment (CPCE), another mechanism of integration. The law gives ample discretion to the CPCE to decide what actions are excluded from further review and consideration and according to what criteria to regulate. Such discretion has the potential to overcome the uniform arbitrary boundaries demarcated by the law and to infuse particular concerns as needed.

Sas et al. (2010) conducted a study that examined over 159 decisions of CPCE made between 2004 and 2007. The study aimed to determine how this body overcomes the limits of arbitrary boundary demarcation to allow case by case flexibility and integration as needed. The study found that despite jurisdictional boundaries expressed as set-back lines, the CPCE does consider the needs for management in areas outside these boundaries, thus respecting both socio-economic needs and physical constraints of various coastal subunits. Study results also suggest that policy makers are cognizant of a need to balance ecologically-sensitive boundaries that consider the homogeneity of the coast with politically feasible boundaries that are set arbitrarily.

Sas, E., I. Fischhendler and M. E. Portman (2010). "The demarcation of arbitrary boundaries for coastal zone management: The Israeli case." Journal of Environmental Management 91(11): 2358-2369.

State of Israel, 1999. Coastal Policy for Israel: Policy Report. Territorial Water Committee Authority, Jerusalem, Israel (in Hebrew).

State Comptroller, 1998. State Comptroller Report No. 49 on Land Use Planning along the Mediterranean Coast, Jeruslaem, Israel (in Hebrew).

Conflict and ICZM

In one of the first texts on coastal zone management, Mac Cutcheon (1972) describes conflicts at the interface between land and sea. In his chapter on marine traffic and transport needs, he concludes:

> "*It is not even easy to classify the systems [in the coastal zone], must less the conflicts. It appears that one useful way of handling problems is to group them by geographical regions and handle the problems of each region collectively. This at least offers a chance of a comprehensive view of the problems even if it does not offer a means for their solution.*"

Without being phrased as such, Mac Cutcheon's words are clearly a call for integration and they relate integration to conflicts and their reduction. These characteristic conflicts mentioned by Mac Cutcheon and others are directly related to the rationales for integration

Today we acknowledge the advantages of integration, but experience also teaches us about the challenges of integration for the management of natural resources. Difficulties can be found in the plentiful literature on the types of integration (e.g., Blomquist and Schlager 2005); many of these difficulties also exist for ICZM.

Perhaps not surprisingly, ICZM has become a panacea for coordination between agencies operating in multiple and frequently overlapping jurisdictions, among natural systems and between user groups. It is generally accepted that interdependence of activities and resources in the coastal area, accompanied by complex institutional constructs, demands the implementation of holistic approaches to coastal management provided by integration mechanisms. But in many cases these mechanisms can simultaneously raise the likelihood of conflict and the subsequent response to the ensuing conflict can also support or impede integration. A logical topic of concern is whether integration brings about greater conflicts in certain situations.

In this section and the next we discuss the complications of integration, problems that can arise due to integration and its costs. Since we have focused so far on the need for integration and its potential contributions, in this section the focus is on impediments and challenges to integration in the coastal zone.

Despite a plethora of work in coastal management literature describing and categorizing the origins and nature of conflict, there has been little theoretical work on conflict resolution in the coastal zone or even acknowledging the positive contributions of integration to conflict reduction. An early 1989 issue of Ocean and Coastal Management dedicated to the topic of conflicts does not once mention the word integration. Only one article, Johnson and Pollnac (1989), refers to the conflicts arising as a result of fragmented management (i.e., lack of integration) across a variety of sectoral interests.

Shoreline protection in Vietnam.

Conventional wisdom informs that integration will reduce conflicts. However, the fact that ICZM has been implemented with some measure of success for over three decades yet we still have significant conflicts in the coastal zone suggests that more research and analysis on this topic is called for.

Miles (1991) contends that conflicts in the coastal zone involve the following: competition for ocean and coastal space; adverse effects of one use on another; adverse effects on ecosystems; and effects of offshore systems on those onshore. More recently, UNEP's 2009 Coastal Tourism Handbook, points out that conflicts in the coastal zone occur over: 1) access to the coastline for activities such as marinas which require locations within the sea-land interface; 2) incompatible uses which cannot exist in juxtaposition, such as recreational activities and tuna farming in marine areas; 3) private ownership, which can (in some countries) restrict public use of or access to coastal resources; 4) conservation of important natural environments which inhibit immediate economic interests, e.g. preserving versus draining wetlands.

ICZM requires the active and sustained involvement of the interested public and many stakeholders (GESAMP 1996) which provides plenty of opportunity for conflict to arise. There can be high transaction costs as more groups with potentially conflicting agendas are brought into the management milieu (Ostrom 1990). Significant conflicts are those between the interests of individual users of coastal resources and the coastal population at large. Some conflicts occur when the expectations and responsibilities of stakeholders are not clearly defined (Cicin-Sain and Knecht 1998; Crean 2000).

Many authors have pointed out how integration can bring about conflict. Fittingly, some texts that call for increased integration list techniques for resolving disputes. As an example, the FAO's Code of Conduct for Responsible Fisheries (FAO 1995) recommends direct negotiation, conciliation, facilitation, mediation, arbitration and various combinations of techniques such as negotiated rule-making for resolving conflicts between stakeholders.

Just as integration can be vertical or horizontal as articulated by the terms consistency and concurrency, so can conflict. The Coastal Tourism Handbook (UNEP 2009) describes some conflicts as "vertical" in nature, i.e. they occur between the authorities and interests at various levels (international, national, regional, and local). Others are "horizontal" conflicts between the users and activities of one site or on adjacent sites. The responses to these forms of conflict will likely be different.

An important question is whether some conflicts in the coastal zone are caused by efforts at integration. Researchers have yet to focus on such fundamental issues. Successes and failures of ICZM plans and programs may be apparent but direct outcomes of integration are less clear. Under what circumstances does integration contribute to conflicts and under what circumstances does it reduce them? Simply stated: what is the role of integration *vis á vis* conflict ?

As an example, a new agenda of integrated management saved abalone fisheries in Western Australia. Mitchell and Baba (2006) describe the role of integration as one that reduced conflicts between commercial fishers and the growing recreational fishing sector. Operative tools of integration they describe (that are also included in our typology (see Figure 5)) are broad public partiicpation of fisherfolk of the two sectors and co-management strategies. As an outcome of participation and co-management, regulations were introduced that are appropriate to each sector. Regulators restricted the commercial catch using a total allowable catch limit with additional spatial and temporal controls preventing direct conflict over fishing grounds with the recreational sector. Controls on the recreational catch were instituted through use of a spatially and temporally limited fishing season along with daily bag possession and minimum size limits. In summary, the integrated management of the fishery was successfully achieved because managers accomplished a set of goals defined in the management plan that dealt with sustainability issues, social objectives and allocation of catch shares among all users of the fishery. But what about other non-fishery use sectors in the same area and dependent on some of the same ecosystem services throughout the coastal zone? Further analysis of such case studies would help us understand supports and impediments to ICZM.

Coastal formations at Rosh Hanikra Israel.

The Costs of Integration

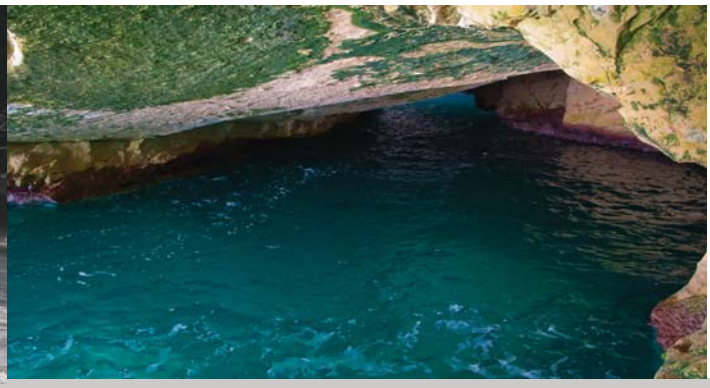
ICZM is not free. To be effective, ICZM requires time, both to implement and to see real results, and it requires resources, such as trained personnel and good channels of communication. ICZM also calls for good spatially-explicit information about ecosystem characteristics and human activities (current and future) including their social and economic characteristics. This information is often not readily available and it is expensive and time consuming to collect. There are transaction costs involved when various sector representatives, users and institutions participate in management. But there are also costs when coastal development, management or even conservation takes place without integration. These are usually the costs of protracted conflicts, but costs can also take the form of increased, unexpected externalities, inefficiences and loss or degradation of important ecosystem services.

In Mac Cutcheson's (1972) chapter on coastal conflicts, he laments: "The interactions among the systems at the coastal zone are multiple, and each interaction may generate several conflicts. It would help if there existed some theory to determine the value or costs of the conflicts, but none seem to exist." One way we can try to estimate the costs of integration is by identifying and then evaluating factors that impede or support the various mechanisms described in this toolkit.

We can learn a lot about impediments to integration from a review of common property resource (CPRs) theories, from environmental economics and from evaluating how operative integration tools are implemented. For the latter, imagine one such operative tool: the environmental impact assessment of proposed oil and gas extraction activities. Farrow (1990) points out the difficulties that stem from the need to consider interdependencies among a range of factors when assessing externalities from these uses in the outer continental shelf. For example, to estimate the risk from spills, it is necessary to estimate the magnitude of resources to be produced, annual production, the transport mode(s) and the likely fate of spilled oil. Estimating some of these costs, such as the effects on wildlife or the losses in beach use value if the oil ends up there, is particularly difficult because these are generally non-market goods.

Furthermore, increased transaction costs, i.e., the costs of negotiating, bargaining, cooperation and coordination are known to impede institutional change which can make the transition from sectoral to integrated management, slow, difficult and expensive (Williamson 1981; Ostrom 1990; Taylor et al. 1993; Warner 2006). Despite this, experience shows that the recognition and successful exploitation of opportunities for integration through all its dimensions -- scale, governance and science/policy -- have contributed to the improvement of many environmental management plans and actions (Cash et al. 2006; Mitchell and Baba 2006; Frost et al. 2007). In this way, the coastal zone is like other spatial or environmental systems that contain public goods and externalities.

Drainage to prevent erosion in Herziliya, Israel.

Conclusions and Next Steps

It is important to acknowledge the challenges inherent in the implementation of ICZM through examination of its overarching mechanisms and operational tools. To some extent, ICZM is an ideal or a process that is rarely fully implemented (Environmental Law Institute 2009). In many places, integration still has sectoral underpinnings even though decisions to adopt an integrated management approach were taken some time ago.

A case in point is ICZM in Europe. A significant step in the promotion of ICZM resulted from the European Parliament and Council's Recommendation to the Member States concerning Integrated Coastal Zone Management (COM 2000). This Recommendation called upon the Member States to develop their own national strategies for ICZM, starting from a full assessment of how the coastal zones within each country are used and managed. It directs countries to adopt national strategies that include measures to coordinate the relevant legislation and regulations, ensure adequate monitoring and information diffusion, and address questions related to capacity building (Europa Press releases RAPID 2000). The European Environmental Agency's 2006 review of the implementation of Integrated Coastal Zone Management in Europe (2002 /413/EC) found either sectoral policies that required further integration or integrated policies that require full implementation (European Environment Agency 2006).

While it is widely accepted that integration should be an objective of coastal planning and development, it is often not understood what that entails or how the success of ICZM can sometimes be impeded by the greater conflict arising from integration in the short-term. In any case, policy makers and practitioners dealing with the many conflicts that can arise related to use of resources in the coastal zone cannot afford to wait until the perfect method of implementing ICZM is devised.

Newer research and texts on ICZM give the impression that we are close to a shifting or renewal of the ICZM discourse in which the older principles and ideas may not longer be sufficient. Perhaps a second generation of principles is needed that will imply changes for practitioners. For example, principles and approaches that incorporate lessons from research and discourses about climate change, sea level rise and even new modes of information sharing.

Clarifying what is integration, why it is needed, and how it can be achieved as laid out in this publication is an initial step for improving techniques and approaches to ICZM. It is the intention of this research effort to continue to refine the topology presented here based on real-world case studies. Through the case studies researchers will identify what tools are best suited to particular contexts. A handbook of best-practices for ICZM appropriate to the countries involved in this study will be the final output. Such a handbook will benefit all those interested in reducing conflicts and improving management of the important resources that exist in the coastal zone and beyond.

REFERENCES

Allmendinger, P., A. Barker and S. Stead (2002). "Delivering integrated coastal-zone management through land-use planning." Planning Practice & Research 17(2): 175 - 196.

Barusseau, P., L. Brigand, J. Denis, B. Gerard, C. Grignon-Logerot, Y. Henocque and M. Lointier (1997). Methodological Guide to ICZM. Paris, France, UNESCO Integovernmental Ocean Commission.

Belknap, R. K. (1980). "Corporate response to coastal zone management: A case study of the Irvine coastal area." Coastal Zone Management Journal 8(2): 123- 164.

Biermann, F., O. Davies and N. van der Grijp (2009). "Environmental policy integration and the architecture of global environmental governance " International Environmental Agreements: Politics, Law & Economics 9(4): 351- 369.

Blatter, J. and H. Ingram (2000). "States, markets and beyond: governance of transboundary water resources " Natural Resources Journal 40(2): 439-471.

Blomquist, W. and E. Schlager (2005). "Political Pitfalls of Integrated Watershed Management." Society and Natural Resources 18(2): 101-117.

Borges, O. (2010). Plano de Ordenamento do Espaco Maritimo (Presentation in Portuguese). Funchal, Madeira, Ordenamento do Espaço Marítimo e Programa M@rBis.

Bridge, L. and A. Salman (2000). Policy Instruments for ICZM in Nine Selected European Countries. Leiden, The Netherlands, Dutch National Institute for Coastal & Marine Managment (RIKZ).

Brundtland, G., Ed. (1987). Our common future: The World Commission on Environment and Development. Oxford: Oxford University Press.

Budd, M. (1999). "The application of environmental assessment to marine developments and activities in Great Britain." Marine Policy 23(4-5): 439-451.

Cash, D. W., W. Adger, F. Berkes, P. Garden, L. Lebel, P. Olsson, P. Pritchard and O. Young (2006). "Scale and cross-scale dynamics: governance and information in a multilevel world." Ecology and Society 11(2): 8. [online] URL: http://www.ecologyandsociety.org/vol11/iss2/art8/.

Christensen, A., J. Raakjaer and T. Olesen (2007). "The voices of Danish fishermen in resource management -- An examination of the system of negotiated economy." Ocean & Coastal Management 50(7): 551-563.

Christie, P., K. Lowry, A. White, E. G. Oracion, L. Sievanen, R. S. Pomeroy, R. B. Pollnac, J. Patlis and L. Eisma (2005). "Key findings from a multidisciplinary examination of integrated coastal management process sustainability." Ocean and Coastal Management 48(3-6): 468-483.

Cicin-Sain, B. and R. Knecht (1998). Integrated coastal and ocean management: Concepts and practices. Washington D.C.: Island Press.

COM (2000). Communication On Integrated Coastal Zone Management: A Strategy For Europe.

COM (2001). European transport policy for 2010: time to decide. Commission of the European Communities. Brussels, Belgium.

COM (2006). 105 final: A European Strategy for Sustainable, Competitive and Secure Energy. {SEC(2006) 317}. Brussels, Belgium.

COM (2007). Communication from the Commission to the European parliament, the Council, the European economic and social committe and the Committe of the Regions -- An integrated Maritime Policy for the European Union. Brussels, Belgium.

Costanza, R., R. d'Arge, R. de Groot, S. Farber, M. Grasso, M. Hannon, K. Limburg, S. Naeem, R. V. O'Neill, J. Paruelo, R. G. Raskin, P. Sutton and M. van den Belt (1987). "The Value of the World's Ecosystem Services and Natural Capital." Nature 387:253-260.

Crean, K. (2000). "The influence of boundaries on the management of fisheries resources in the European Union: case studies from the UK." Geoforum 31(3): 315-328.

Dimento, J. F. C. and H. Ingram (2005). "Science and Environmental Decision Making: The Potential Role of Environmental Impact Assessment in the Pursuit of Appropriate Information." Natural Resources Journal 45(2): 283-309.

D'Sa, A. (2005). "Integrated resource planning (IRP) and power sector reform in developing countries." Energy Policy 33(10): 1271-1285.

Ehler, C. and F. Douvere (2009). Marine Spatial Planning: A step-by-step approach toward ecosystem-based management. Paris: UNESCO, Intergovernmental Oceanographic Commission and Man and the Biosphere Programme.

Ehler, C. N. and D. J. Basta (1993). "Integrated management of coastal areas and marine sanctuaries: a new paradigm." Oceanus 36(3): 6-8.

Enemark, J. (2005). "The Wadden Sea protection and management scheme--towards an integrated coastal management approach?" Ocean & Coastal Management 48(11-12): 996-1015.

Environmental Law Institute (2009). Ocean and Coastal Ecosystem Based Management: Implementation handbook. Washington, D.C., Environmental Law Institute.

Ernsteins, R. (2010). "Editorial; Participation and integration are key to coastal management " DG Environment News Alert Service of the European Commission: Science for Environmental Policy 23 February 2010(S19): 1.

Europa Press releases RAPID, (2000). "Commission proposes European Strategy for ICZM." Accessed: April 30, 2010, http://europa.eu/rapid/pressReleasesAction.do?reference=IP/00/1080&format=HTML&aged=1&language=EN&guiLanguage=en.

European Environment Agency (2006). The changing faces of Europe's coastal areas. Copenhagen, Denmark.

Food and Agriculture Organization (FAO) (1995). Code of Conduct for Responsible Fisheries. Rome, Italy.

Farrow, R. S. (1990). Managing the Outer Continental Shelf Lands: Oceans of Controversy. New York, Taylor & Francis.

Felleman, J. P. (1982). "Visibility mapping in New York's coastal zone: A case study of alternative methods." Coastal Zone Management Journal 9(3): 249-270.

Frost, P., B. Campbell, M. Luckert, M. Mutamba, A. Mandondo and W. Kozanayi (2007). "In search of improved rural livelihoods in semi-arid regions through local management of natural resources: lessons from case studies in Zimbabwe", World Development 35(11): 1961-1975.

GESAMP (1996). The contributions of science to integrated coastal management., IMO/FAO/UNESCO-IOC/WMO/WHO/IAEA/UN/UNEP Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection.

Guston, D. H. (2001). "Boundary organizations in environmental policy and science: an introduction." Science, Technology, and Human Values 26: 399-408.

Hartje, V., (2002). International dimensions of integrated water management. In Cooperation on Transboundary Rivers. I. Al Baz, V. Hartje and W. Scheumann (ed.). Baden-Baden: Nomos, pp. 7-34.

Hartley, T. W. and R. A. Robertson (2006). "Stakeholder engagement, cooperative fisheries research and democratic science: The case of the Northeast Consortium." Human Ecology Review 13(2): 161-171.

Herb, J., A. White and S. Helms (2000). Pathways to State Pollution Prevention Regulatory Integration: The Sprint Compedium. Boston, MA, Tellus Institute.

Hieronymus Buck, B., G. Krause and H. Rosenthal (2004). "Extensive open ocean aquaculture development within wind farms in Germany: the prospect of offshore co-management and legal constraints." Ocean & Coastal Management 47(3-4): 95-122.

Hirst, E., C. Goldman and M. E. Hopkins (1991). "Integrated resource planning: Electric and gas utilities in the USA." Utilities Policy 1(2): 172-186.

Hobbs, B. F., Rouse and D. T. Hoog (1993). "Measuring the economic value of demand-side and supply resources in integrated resource planning models." IEEE Transactions on Power Systems 8(3): 979-987.

Jacob, K. and A. Volkery, (2007). Modelling Capacities for Environmental Policy-making in Global Environmental Politics. In Environmental Governance in Global Perspective: New Approaches to Ecological and Political Modernisation. M. Jänicke and K. Jacob (ed.). Berlin: Freie Universität Berlin, pp. 67-94.

Jänicke, M., (2002). The Political System's Capacity for Environmental Policy: The Framework for Comparison. In Capacity Building in National Policy. M. Jänicke and H. Weidner (ed.). Berlin: Springer-Verlag, pp. 1-18.

Jentoft, S., B. J. McCay and D. C. Wilson (1998). “Social theory and fisheries co-management.” Marine Policy 22(4-5): 423-436.

Johnson, J. C. and R. B. Pollnac (1989). "Introduction to managing marine conflicts." Ocean and Shoreline Management 12(3): 191-198.

Keil, A. A. H. (1977). "The USA and the oceans: Opportunities for independence." Marine Policy 1(1): 16-25.

Keiter, R. B. (1998). "Ecosystems and the Law: Toward an Integrated Approach." Ecological Applications 8(2): 332-341.

Kraft, M. E. (2007). Environmental Policy and Politics. New York, Pearson Education, Inc.

Lane, M. B. (2008). "Strategic coastal governance issues in Fiji: The challenges of integration." Marine Policy 32(6): 856-866.

Leary, D. and M. Esteban (2009). "Climate Change and Renewable Energy from the Ocean and Tides: Calming the Sea of Regulatory Uncertainty." The International Journal of Marine and Coastal Law 24(2009): 617-651.

Levin, P. S., M. J. Fogarty, S. A. Murawski and D. Fluharty (2009). "Integrated Ecosystem Assessments: Developing the Scientific Basis for Ecoystem-Based Management of the Ocean." PLoS Biology 7(1): 23-28.

Lindemann, S., (2007). Success and Failure in International River Basin Management -- The Case of Southern Africa. In Environmental Governance in Global Perspective: New Approaches to Ecological and Political Modernisation. M. Jänicke and K. Jacob (ed.). Berlin: Freie Universität Berlin. pp. 411-435.

Lookingbill, T. R., S. S. Kaushal, A. J. Elmore, R. Gardner, K. N. Eshleman, R. H. Hilderbrand, R. P. Morgan, W. R. Boynoton, M. A. Palmer and W. C. Dennison (2009). "Altered Ecological Flows Blur Boundaries in Urbanizing Watersheds." Ecology and Society 14(2) 10 [online] URL: http://www.ecologyandsociety.org/vol14/iss2/art10/.

Mac Cutcheon, E. M., (1972). Traffic and Transportation Needs at the Land-Sea Interface. In Coastal Zone Management: Multiple Use with Conservation. J. F. P. Brahtz (ed.). New York: John Wiley and Sons, Inc., pp. 105-148.

Matz, N., (2002). The Interaction between the Convention on Biological Diversity and the UN Convetion on the Law of the Sea. In Marine Issues. P. Ehlers, E. Mann-Borgese and R. Wolfrum (ed.). The Hague: Kluwer: pp. 203-220.

May, P. J., R. J. Burby, N. J. Ericksen, J. W. Handmer, J. E. Dixon, S. Michaels and D. I. Smith (1996). Environmental Management and Governance: intergovernmental approaches to hazards and sustainability. London, Routledge.

McKenna, J. and A. Cooper (2006). "Sacred cows in coastal management: the need for a 'cheap and transitory' model." Area 38(4): 421-431.

McKenna, J., A. Cooper and A. M. O'Hagan (2008). "Managing by principle: A critical analysis of the European principles of Integrated Coastal Zone Management (ICZM)." Marine Policy 32(6): 941-955.

Meiner, A. (2010). "Integrated maritime policy for the European Union — consolidating coastal and marine information to support maritime spatial planning." Journal of Coastal Conservation 14(1): 1-11.

Merriam-Webster (2003). Merriam-Webster's Collegiate Dictionary, Merriam-Webster.

Miles, E. L., (1991). Future challenges in Ocean Management: Towards integrated national ocean policy. In Ocean Management in Global Change. P. Fabbri (ed.). New York: Elsevier Applied Science: pp. 594-620.

Millennium Ecosystem Assessment (2005). Ecosystems and human well-being: synthesis. Washington, D.C., Island Press.

Milon, J. W. (2000). "Pastures, fences, tragedies and marine reserves." Bulletin of Marine Science 66(3): 901-916.

Mitchell, R. and O. Baba (2006). "Multi-sector resource allocation and integrated management of abalone stocks in Western Australia: review and discussion of management strategies." Fisheries Science 72(2): 278-288.

Morf, A. (2005). "Public Participation in Municipal Planning as a Tool for Coastal Management: Case Studies from Western Sweden." Ambio 34(2): 74-83.

Moss, M. L. (1979). "The lost waterfront of New York." Coastal Zone Management Journal 6(2): 167–185.

MRAG Americas Incorporated and The Massachusetts Ocean Partnership (2009). Science Tools to Implement Ecosystem Based Management in Massachusetts. Boston, MA.

Munksgaard, J. and J. Ramskov (2002). "Effects of internalising external production costs in a North European power market." Energy Policy 30(6): 501-510.

Nilsson, M., M. Pallemaerts and I. van Homeyer (2009). "International regimes and environmental policy integration: introducing the special issue " International Environmental Agreements: Politics, Law & Economics 9(4): 337-350.

Norgaard, R. B. (2008). "Finding Hope in the Millennium Ecosystem Assessment." Conservation Biology 22(4): 862-869.

Oberthür, S. (2009). "Interplay management: enhancing environmental policy integration among international institutions " International Environmental Agreements: Politics, Law & Economics 9(4): 371-391.

Oldekop, J. A., A. J. Bebbington, D. Brockington and R. F. Preziosi (2010). "Understanding the lessons and limitations of conservation and development." Conservation Biology 24(2): 461-469.

Olsen, S. B. (1993). "Will integrated coastal management programs be sustainable: The constituency problem." Ocean and Coastal Management 21(210-225).

Olsen, S. B. (2003). "Assessing progress towards the goals of coastal management." Journal of Coastal Management 30(4): 325-45.

Ostrom, E. (1990). Governing the Commons: the evolution of institutions for collective action. New York, NY: Cambridge University Press.

Ostrom, E., Burger, J., Field, C. B., Norgaard, R. B., Policansky, D (1999). "Revisiting the commons: local lessons, global challenges." Science 284: 278-282.

Parson, E. A. (1995). "Integrated assessment and environmental policy making : In pursuit of usefulness." Energy Policy 23(4-5): 463-475.

Pew Oceans Commission (2003). America's Living Oceans: Charting a Course for Sea Change. A Report to the Nation. Arlington, VA, Pew Oceans Commission.

Pollnac, R. B., S. Abbott-Jamieson, C. Smith, M. L. Miller, P. M. Clay and B. Oles (2006). "Toward a Model for Fisheries Social Impact Assessment." Marine Fisheries Review 68(1-4): 1-18.

Portman, M. (2006). "Tidelands management: implementation of the Massachusetts Public Waterfront Act." Journal of Environmental Policy and Planning 8(4): 293-308.

Portman, M., (2009). "Involving the Public in Impact Assessment for Offshore Renewable Energy Facilities", Marine Policy, Vol. 33(2), pp. 332-338.

Portman, M. E., J. A. Duff, J. Köppel, R. J. and M. E. Higgins (2009a). "Offshore wind energy development in the exclusive economic zone: legal and policy supports and impediments in Germany and the U.S." Energy Policy 37(9): 3596-3607.

Portman, M. E., D. Jin and E. Thunberg (2009b). "Waterfront Land Use Change and Marine Resource Conditions: The Case of New Bedford/Fairhaven Harbor." Ecological Economics 68(8-9): 2354-2362.

Schlager, E., (2004). Common Pool Resources Theory. In Environmental Governance Reconsidered: Challenges, Choices and Opportunities. R. F. Durant, Fiorino, D. J and O'Leary, R. (ed.). Cambrige, MA: MIT Press, pp. 145-175.

Schlager, E. and E. Ostrom (1992). "Property Rights Regimes and Natural Resources: A Conceptual Analysis." Land Economics 68(3): 249-262.

Segger, M. C. (2004). "Significant developments in sustainable development law and governance: A proposal." Natural Resources Forum 28(1): 61-74.

Sorensen, J. (1993). "The international proliferation of integrated coastal zone management efforts." Ocean & Coastal Management. 21: 45-80.

Stokstad, E. (2009). "U.S. Poised To Adopt National Ocean Policy." Science 326: 1618.

Tanaka, Y. (2004). "Zonal and integrated management approaches to ocean governance: Reflections on a dual approach in international law of the sea." The International Journal of Marine and Coastal Law 19(4): 483-514.

Taylor, M. and S. Singleton (1993). "The communal resource: transaction costs and the solution of collective action problems." Politics and Society 21(2): 195-214.

Taylor, P. G., T. Wiesenthal and A. Mourelatou (2005). "Energy and environment in the European Union: An indicator-based analysis." Natural Resources Forum 29(4): 360-376.

Teclaffe, L. A. (1996). "The evolution of the river basin concept in national and intenational law." Natural Resources Journal 36(2): 359-392.

UN Department of Economic and Social Affairs, (1992). "Earth Summit Agenda 21: The United Nations Program of Action." Accessed: May 13, 2010, http://www.un.org/esa/dsd/agenda21/index.shtml.

Underdal, A. (1980). "Integrated marine policy : What? Why? How?" Marine Policy 4(3): 159-169.

United Nations Environment Program (UNEP) (2009). Sustainable Coastal Tourism: An integrated planning and management approach, UNEP/Action Programs.

Vallega, A. (1995). "Towards the sustainable management of the Mediterranean Sea." Marine Policy 19(1): 47-64.

Vasconcelos, S. (2009). Plano de Ordenamento do Espaço Marítimo concluído até 2010 (in Portuguese). Ambiente Online. Accessed, from http://www.ambienteonline.pt/noticias/detalhes.php?id=7844.

Warner, J. F. (2006). "More sustainable participation? Multi-stakeholder platforms for integrated catchment management." International Journal of Water Resources Development 22(1): 15-35.

Watt, D. C. (1980). "Integrated policy for the oceans -- teaching in the university world." Marine Policy 4(1): 67-68.

Weiner, J., (2004). Convergence, Divergence, and Complexity in US and European Risk Regulation. In Green Giants? Environmental Policies of the United States and the European Union. N. J. Vig and M. G. Faure (ed.). Cambridge, MA: MIT Press, pp. 73-109.

White House Council on Environmental Quality (2009). Interim Framework for Effective Coastal and Marine Spatial Planning. Washington, D.C. USA.

Williamson, O. E. (1981). "The economics of organization: The transaction cost approach." American Journal of Sociology 87(3): 548-577.

Young, O. R., G. Osherenko, J. Ekstrom, L. B. Crowder, J. Ogden, J. A. WIlson, J. C. Day, F. Douvere, C. N. Ehler, K. L. McLeod, B. S. Halpern and R. Peach (2007). "Solving the crisis in ocean governance." Environment 49(4): 21-32.