Journal of Environmental Management 91 (2010) 2358–2369

Contents lists available at ScienceDirect

Journal of Environmental Management

journal homepage: www.elsevier.com/locate/jenvman

The demarcation of arbitrary boundaries for coastal zone management: The Israeli case

Eliraz Sas [a,1], Itay Fischhendler [b,*], Michelle E. Portman [b,2]

[a] Urban and Regional Planning, POB 67, Har Adar 90836, Israel
[b] Department of Geography, The Hebrew University of Jerusalem, Mount Scopus, Jerusalem 91905, Israel

ARTICLE INFO

Article history:
Received 17 September 2009
Received in revised form
1 June 2010
Accepted 29 June 2010
Available online 24 July 2010

Keywords:
Coastal policy
Resource management boundaries
ICZM
Boundary delineation

ABSTRACT

Integrated coastal zone management (ICZM) addresses the interconnections, complexities, and conflicts between many users of the coastal area with different goals. It requires setting managerial boundaries that capture many elements of human and natural systems. Experience teaches us that without a directed effort managerial rules and laws are not likely to coincide with the physical sensitivity of units that reflect different environmental characteristics of the coastal zone. Hence the aim of this study is to explore why coastal managerial boundaries are set arbitrarily and whether and how it is possible to address the problems this poses. We examine what influences the decisions of a new coastal management authority in Israel to determine how this body overcomes the limits of arbitrary boundary demarcation. The study found that real life management succeeded to both address areas outside the arbitrary boundaries and also to respect some of the different socio-economic needs and physical constraints of the coastal sub-units. Israel's Coastal Environment Protection Law allows and, in fact, encourages the regulator to use discretion and to employ various criteria to balance development and conservation. This implies 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.

1. Introduction

In recent decades, resource managers and planners have widely accepted the main tenets of integrated coastal zone management (ICZM)(Sorensen, 1993, 2002; Cicin-Sain and Knecht, 1998; Bridge and Salman, 2000). This mostly western concept[3] is now applied throughout the world in an institutionalized manner in developing countries as well as industrialized countries (Christie et al., 2005). It is designed to overcome the splits in jurisdiction along the coast among different levels of government and in the land–sea interface while acknowledging the mosaic of community based initiatives along the coast.[4] ICZM implemented through coordination among sectors and at various levels of administration is expected to optimize socio-economic demands and ecological needs in the coastal area (Olsen, 2003; Lau, 2005). In a spatial sense this approach integrates the terrestrial and marine components of the coastal environment; but on a finer-grained systems level it integrates physical, chemical and biological processes with human activities and needs in the coastal zone.

In adopting ICZM, managers have built on experience from other sectors and disciplines where integration has taken place. An example is integrated water resource management that first emerged in the early 1930s with the establishment of the Tennessee Valley Authority and then re-emerged in the 1990s (Molle, 2009). More recently, ecosystem-based management, defined as an *integrated* approach to resource management, considers the entire ecosystem, including human needs and constructs. The goal of ecosystem-based management is to maintain an ecosystem in a healthy, productive and resilient condition, objectives that can frequently only be achieved by crossing jurisdictional and sectoral

* Corresponding author. Fax: +972 2 5883347.
E-mail addresses: saselrz@netvision.net.il (E. Sas), fishi@mscc.huji.ac.il (I. Fischhendler), mportman@cc.huji.ac.il (M.E. Portman).
[1] Fax: +972 2 5345992.
[2] Fax: +972 2 5883347.

[3] Integrated management is by and large a western concept. Many indigenous cultures have for years practiced collective action and to some degree elements of integrated management but without coining it "integrated management" (see Ostrom, 1990). In addition, some of the integration spatial elements (the basin approach) can be traced back to the 19th and early 20th century and the conservation movement in the US (see Keiter, 1994).

[4] For more on the multi-cultural aspirations of fostering integration while contribution to building community based management see Hildebrand, 1994.

0301-4797/$ – see front matter © 2010 Elsevier Ltd. All rights reserved.
doi:10.1016/j.jenvman.2010.06.027

administrative boundaries (Schlaepfer, 1997; Communication Partnership for Science and the Sea, 2005) such as those found in the coastal zone. Olsen et al. (2004) point out that ICZM should be a "stepping-stone" toward making ecosystem-based management for the marine environment an operative reality.

Due to its wide acceptance and contrast to sectoral resource management there has been a plethora of attempts to implement ICZM (e.g., Bridge and Salman, 2000; Enemark, 2005) and to study, evaluate and improve it (e.g., Cicin-Sain, 1993; Hershman et al., 1999; Allmendinger et al., 2002). While many previous empirical studies have addressed the programmatic effectiveness of ICZM (e.g., Christie et al., 2005), there is a lack of work focusing on the issue of boundary demarcation (Balaguer et al., 2008). This is important because implementation often begins with delineating the managerial boundaries of coastal zones to correspond with either the physical and ecological units of the coast (Clark, 1996; Kana, 1991) or to address a specific problem of a certain sector such as flooding or water pollution (May et al., 1996; Brenner et al., 2006). Yet, there are still many cases where instead of setting jurisdictions that will encompass physical or even administrative units, boundaries are set arbitrarily. The term "arbitrary" refers to a spatial demarcation of management that does not consider the physical, especially natural elements of the coastal environment. As such it may impede meaningful conservation and integration efforts (Cicin-Sain and Knecht, 1998; Clark, 1996). The aim of this study is to explore the reasons for arbitrary coastal managerial boundaries and whether and how it is possible to address the problems they pose.

As a case study we examine a national governance framework in Israel designed to protect the country's Mediterranean beaches and shores. The regulatory framework gives a relatively new coastal body jurisdictional authority within arbitrary boundaries. Our study aims to statistically define the extent to which the new coastal body makes conservation and development decisions based on the proactively set arbitrary boundaries or in contrast, based on other criteria that correspond to the characteristics of the environment and of the proposed development. Our findings offer insights relevant to coastal and ecosystem protection programs that are dependent on similar constructs.

The next section of this paper reviews literature, theory and examples of demarcation of coastal zones and coastal sub-units. Section 3 describes the Israeli case study and how the regulatory program examined in this study developed. Section 4 covers the core of this research project: statistical analyses of the regulatory decisions made by the planning body created to protect the coastal zone. Finally, Section 5 describes the findings and broad implications of this case study followed by overall conclusions in Section 6.

2. Boundary demarcation and coastal zone management

The definition of boundaries is the first stage in the development of successful management systems for common property resources (Crean, 2000). Generally marine and coastal areas, if not common property resources in and of themselves, at least contain resources held in public trust. Prominent among Ostrom's seven design principles for enduring common pool resource management systems is the presence of clearly defined boundaries (Ostrom, 2001). Building on these principles, other researchers have outlined the importance of spatial dimensions in boundary determination (e.g., Bolin et al., 2008), particularly for activities in the coastal zone (e.g., Crean, 2000; Cowell, 2003; Clark, 1996).

The focus on spatial dimensions stems from the interdependence and the disparity of natural systems and human activities that impact coastal areas (OJEC, 2002). For example, problems resulting from the sectoral management of activities wholly or partially within the coastal zone (Olsen et al., 2004) are aggravated when activities that need to be managed lie outside declared boundaries. In the following section we describe spatial dimension concerns such as scale, referring to levels of administration (i.e., local, regional, national, international), and extent, which we define as the ability to encompass or exclude certain activities. Regulatory programs that operationalize issues of scale and extent spatially often do so using jurisdictional lines stipulated by marked boundaries. Descriptions of some examples of such regulatory programs follow the more theoretical discussion of scale and extent.

2.1. Spatial scale and extent

Spatial dimensions, consisting of the scale and extent of a targeted geographic area, will influence the type of management strategies employed to manage it and vice versa. As an example of the latter, the goals and objectives of a regulatory program will influence scale and extent of management boundaries in the coastal zone. When sustainability is a goal, questions of scale can be fundamental. As a case in point, from a comparative analysis of national, regional and local scale boundaries for fisheries management, Crean (2000) found that local scale boundaries in crab fisheries of the western English Channel came closest to achieving the theoretical ideal of establishing congruence between ecosystem needs for sustainability and governance.

When coupling ICZM with the ecosystem-based management approaches, boundaries are likely to extend across different biophysical units and jurisdictions to encompass areas of varying scales (Convention on Biological Diversity, 2000; Wang, 2004). Large scale boundary demarcation is of concern in proposals for environmental regionalization, such as the marine ecosystems of the world (Sherman and Alexander, 1986), environmental land units of European ecological region proposals (European Environmental Agency, 2003), and proposals for reform of U.S. coastal and ocean policy (Turnipseed et al., 2009). Smaller scale boundary demarcation is important for sub-national or territorial sea marine spatial planning efforts. For example, the Massachusetts Oceans Act (2008) uses a nearshore "fixed" boundary for its Ocean Management Planning Area. This is the merger of a line projected 0.3 nautical miles (nm) from an approximate mean high water and closing lines that ensure the most developed coastal embayments – ports, harbors, and other protruding landforms and infrastructure – are located landward of the nearshore boundary.

Questions of extent, which also determine jurisdictional reach, are most salient in sectoral management, but also in other types of management regimes. For ecosystem-based fisheries management, extent must be determined at a large enough scale to encompass different stages in a fish's life-cycle, and therefore it usually encompasses regional resources. These types of spatial concerns receive ample attention in overarching programs such as the EU ICZM program and also in practical plans such as the Wadden Sea Protection scheme (Enemark, 2005) and the Great Lakes coastal management plans (Lawrence, 1997). A more localized example is that of regulatory restrictions employed by the US state of Massachusetts for "fishing, fowling and navigating" within flowed tideland areas between high and low water (Portman, 2006).

In determining spatial dimensions for coastal management often "special area" programs are designed to capture coastal systems, such as areas of particular sensitivity such as a watershed that surrounds an estuary system (Sorensen, 1993) or areas particularly prone to coastal hazards (May et al., 1996). The large physical and administrative heterogeneity of these managerial boundaries requires dividing them into discrete homogeneous areas (UNESCO, 1997; Balaguer et al., 2008) or units with similar physical and socio-economic characteristics (Brenner et al., 2006;

Zonnenveld, 1994; Amir, 1987). Ideally, because each discrete homogeneous area will have a different level of sensitivity and will include different ecological values, policy makers and regulators will apply different managerial rules to each unit (Baja et al., 2002). The result of this "zoom in" process is often the delineation of areas designed to solve a specific problem for a specific sector such as pollution which has major influences on many uses in a large area. Balaguer et al. (2008) contends that the type of problem addressed usually determines the spatial scale and scope of a management initiative. For ICZM, this demarcation should at least include both the cause and effect of problems in a zone or management unit.

While it is common for landward lines of the coastal zone to depend on characteristics of the environment for determining boundary extent (Clark, 1996) of note is that in offshore portions of the coastal zone, policy makers have usually determined spatial scale and extent based on jurisdictional lines (Tanaka, 2004). This perhaps reflects a sense of greater understanding and familiarity with the terrestrial environment when compared with the marine environment. For terrestrial bounds, there are several common paradigms such as the use of physical landscape, ecological processes and species, and land uses and infrastructure. Allowing the boundary to correspond with the physical landscape may result in setting an extremely wide managerial unit that may link the coastal zone to river basin management and thus to the entire river-coast ecosystem continuum including discharging rivers and their catchment areas (European Environmental Agency, 2006). UNESCO (1997) describes the use of natural territorial units as the optimal geographical working framework for coherent coastal zone management and illustrates this approach in several cases. Ecological processes may confine the range of certain natural processes. For example, NATURA 2000 established a network of Important Bird Areas that consider sites along wildlife migration routes. An example of a boundary demarcated by land use is the Massachusetts Waterway Regulation Program that uses landward roadways (infrastructure) to determine spatial extent of jurisdiction for coastal development licensing (Portman, 2006).

In contrast to boundaries that follow physical landscape units or ecological processes, administrative lines may unduly confine the terrestrial or marine boundary. Further they likely neglect the important cross-cultural and multi-community, both biocentric and anthropocentric, aspirations of ICZM. Whether these boundary lines constrain management or not, they are frequently in place for convenience of governance and may be historic policy relics that have continued mostly because it is politically difficult to change them. These are human constructs that must be better understood, especially in terms of how they impede or support integrated management of the coastal zone.

2.2. Jurisdiction, regulation and planning in the coastal zone

The need to address the interconnections and conflicts between many users of the coastal area requires an appropriate regulatory framework (Allmendinger et al., 2002). Furthermore, as our technological capabilities to exploit the ocean expand over time, so does the need to revisit the jurisdictional scope and extent within which we apply regulation. For example, offshore wind farms are now being planned in deeper water than they were a decade ago driving some nations, such as Germany and the UK, to extend coastal planning efforts beyond the territorial sea and well into their 200 nautical-mile exclusive economic zone (Portman et al., 2009). Here we identify some coastal units and give examples of boundaries set by different laws, regulations and managerial programs at various spatial dimensions of the landside and nearshore environment that together make up the coastal zone.

The UN Convention on the Law of the Sea (UNCLOS) uses a zonal management approach that divides between marine spaces adjacent to the coast and those beyond state sovereignty (Vallega, 2002). UNCLOS determined that coastal state territorial waters, and therefore coastal planning efforts, extend to a distance of 12 nautical miles from the shoreline. These territorial boundaries have been adopted by most countries, including Israel. By determining jurisdictional limits based on a "distance from shore" criteria, the ecological interaction between marine species, their life-cycle needs as well as ecological conditions of their physical surroundings, are largely ignored (Tanaka, 2004).

In some cases, coastal management is restricted to a narrow strip as is the case for the majority of the US states whose marine zonal boundary is limited to three nautical miles from shore (NOAA, 2004). Offshore jurisdiction can also be set by bathymetric depth such as the case of China that has set 15 m depth as the reference for a boundary (Clark, 1996) or Israel that uses 30 m seabed depth as its seaward limit of the Coastal Strip, as described below in Section 3.3.

At the sub-national level there may be significant variation among coastal states in how boundaries are determined in the coastal zone. Physical landscape elements often determine landward boundaries of the coastal zone such as in the U.S. states of Indiana and Michigan along the Great Lakes coastline that respectively use watershed and geomorphological units. For the latter, boundaries tend to follow estuaries, dunes and flood plains, resulting in an irregular terrestrial management area with varied spatial dimensions. Ecological processes determine boundaries in the state of Alaska where the coastal zone is defined according to the strength of interaction between physical and biological processes (NOAA, 2004). Administrative lines of coastal municipalities confine the management jurisdiction in the states of Washington, Virginia and Ohio, just as state or national boundaries limit integrated management for many countries on a larger scale. In New York, it is the land uses defined as existing infrastructure that determine the boundary of the coastal zone, that is, roads or railways within 500 feet from the coastline (NOAA, 2004).

While in some cases the delineation of boundaries follow physical or administrative elements or lines, in other places the boundaries are set completely or partially arbitrarily.[5] In Denmark, for example, a 3 km lateral coastal strip restricts development and secures public access within 300 m landward from the shoreline. Finland adopted a similar seemingly arbitrary approach: development is restricted to 100 m landward from the shoreline although physical and administrative units stretch far beyond this setback line (Bridge and Salman, 2000).

These differences in boundary demarcation lead to the following questions: Can arbitrary boundary be viable demarcation for integrated coastal zone management? Specifically, does it serve the goals of integrated coastal zone management and/or allow for ecosystem-based management? Such questions highlight the need to examine whether boundary demarcations used in real-world regulatory programs succeed in: a) transcending arbitrary boundaries to regulate the coastal system elements outside the official extent of jurisdiction, and b) creating managerial differentiation within jurisdictions that respect the different needs and constraints of sub-units ignored by the demarcation process. It is based on these questions and concerns that natural resource management experts (e.g., Molle, 2009), and among them coastal zone managers (e.g., Olsen, 2003), call for studies of governance mechanisms for integration. Of particular interest are those environmental policy mechanisms, including ICZM, that balance development with conservation at varying spatial scales (Gibbs and Jonas, 2000).

[5] For the meaning of arbitrary see our definition in the Introduction section.

3. Coastal zone demarcation and management in Israel

3.1. The Israeli coast and development

The 190-kilometer Mediterranean shoreline of Israel is quite straight. It extends from the chalky limestone cliffs of Rosh Hanikra in the north at the border with Lebanon, to the white sandy beaches of Erez in the south at the border with Gaza. The stretch has only one big bay in the city of Haifa (Adler and Inbar, 2007). To the north of Haifa the coast is mostly rocky and lacking the continuous sandy beach characteristic of the area to the south. Outstanding geomorphological features along Israel's coast include three longitudinal sandstone ridges of ancient fossilized dunes which facilitate division to five morphologic units (Emery and Neev, 1960; Goldsmith and Golik, 1980) distinguished by their topography, sand composition, and origin (See Fig. 1).

Following the establishment of the state of Israel in 1948, decision makers in the newly formed planning institutions gave scant attention to the coastal zone. Planners considered areas adjacent to freshwater sources such as the Sea of Galilee to be of value for their natural amenities while they relegated the Mediterranean coast for construction of polluting industrial facilities such as oil refineries, or for resource extraction such as sand mining. The coastal zone became the locale of projects typically associated with NIMBY (Not in My Back Yard) attitudes and development occurred at the expense of nature (Amir, 1984).

Further aggravating matters, rivers that were once important coastal features were used over the years for sewage conduits and much of their natural value has been destroyed (Brachya, 2002). Although there are several national plans that pertain to the coast, including a Master Plan for National Parks and a Master Plan for Tourism approved in 1981 and 1983 respectively, none of them provides direct protection to the coastal area. By the 1990s, Israel's Mediterranean shores contained a slew of poorly sited infrastructure projects including power plants, harbors and polluting industry (Fletcher, 2000).

As the industrialization and development of Israel as a whole continued on a wide scale, the public recognized the value of coastal areas for recreation and accommodation beginning in the mid-1980s. Then, local authorities and municipalities started designating the coast for commercial and residential development (Ariel, 2009). As a result of the multiple uses of the landside area of the coast and a lack of comprehensive coastal protection or management efforts, many conflicts emerged between the different stakeholders (Brachya, 2002), among them conflicts between recreation, energy generation, nature protection, and accommodation uses (State of Israel, 1999).

Today around 70% of the Israeli population is clustered along 15 km of the Mediterranean coastline (State of Israel, 2003). Out of the 190 km of coastline, 50 km are exclusively used for military purposes, power plants and ports. Out of the remaining area, about 60 km are already developed. Another 40 km are designated for future urban or rural development (Papay, 2003) and from among these areas along 70 km bathing is not allowed. Only 13 km are designated public beaches (Papay, 2007). Further conflicts will no doubt emerge over the seaward, submerged area of the coastal zone as proposals for such uses as desalinization plants, energy pipelines, communication cables and artificial islands come to fruition (State of Israel, 1999).

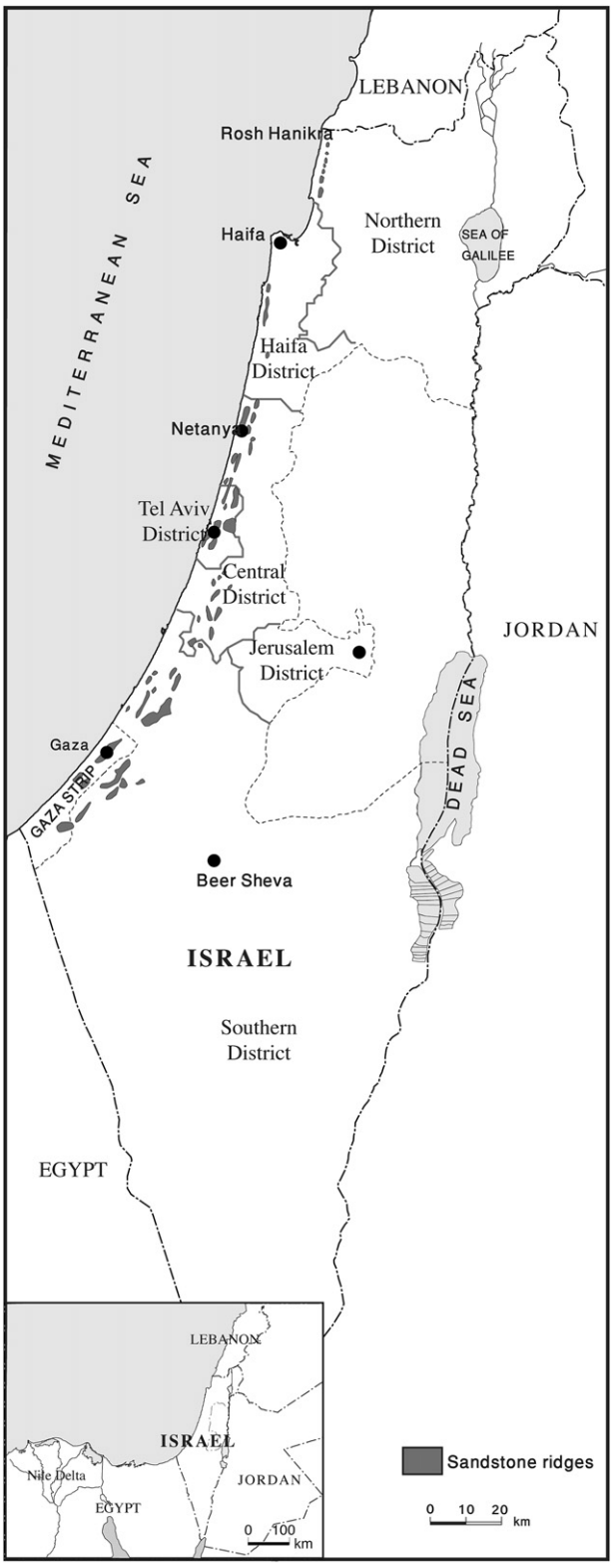

Fig. 1. Location map.

3.2. The emergence of a managerial and legal framework

The Planning and Building Law of Israel of 1965 established a hierarchy of plans and planning authorities at the national, regional, and local level. Based on the previous British Mandate Planning Ordinance, the law is similar in concept to the British Town and Country Planning System (Fletcher, 2000). It requires developers and landowners to obtain approval from the relevant planning authority to realize a project. At the top of the hierarchy is the National Planning and Building Board (NPBB), responsible for

setting strategic polices through the development of National Outline Schemes (NOSs) for specific planning issues. Six district planning and building commissions (PBCs) implement the national outline schemes and their own district master plans; over 100 local planning bodies serve individual municipalities. The regional and local level PBCs make planning decisions and execute national and district planning policy through the approval of detailed plans and the issuance of building permits.

Law makers established the Territorial Water Committee authority to regulate the development of marine structures in Israel's territorial water in the early 1970s (Amir, 1984). Although the NPBB issued guidelines for the use and management of the terrestrial part of Israel's Mediterranean coastal zone in 1970, these were largely ineffective at regulating development (Fletcher, 2000). It was not until 1983 that the NPBB approved the National Outline Scheme for the Coastline (NOS 13). NOS 13 has designated some areas for various levels of protection (i.e., bathing beaches, coastal reserves, and landscape reserves), outlined the uses allowed in the nearshore land area (i.e., tourism, agriculture etc.), and determined a 100 m landward setback line for development. Besides its failure to address submerged areas along the coast, NOS 13 excluded some coastal areas because they are within existing urban and rural communities and therefore have their own plans (State of Israel, 1983).

Israel's obligations to comply with two international treaties helped create new laws and institutions related to the marine environment. The Israeli government ratified the 1976 Barcelona Convention and its Protocol for the Protection of the Mediterranean Sea Against Pollution from Land-Based Sources, and the 1973 International Convention for the Prevention of Pollution from Ships and its 1978 Protocol. It subsequently translated these conventions into two crucial pieces of domestic legislation aimed at protecting marine elements of the coastal zone: the 1980 Prevention of Sea Water Pollution from Oil Ordinance (New Version), and the 1988 Prevention of Pollution from Land-based Sources Law (Talitman et al., 2003; Weinthal and Parag, 2003).

Following the adoption of these laws the government began to regulate, monitor, and grant permits for marine dumping and discharge into coastal waters. A marine pollution prevention fund was established that authorized collection of fees subsequently used for pollution prevention and treatment. This contributed to the establishment of numerous new wastewater treatment facilities and upgrades of older ones. By the early 1990s there was some improvement in coastal water quality. However, the two systems – the physical planning system and the pollution prevention system – worked separately (Amir, 1987). Some agencies are responsible for planning while others for management and enforcement; some regulate the shoreline environment while others the upland areas – all evidence of the need for further integration (Brachya, 1991).

Despite public calls for a more comprehensive integrated approach to coastal zone management including an unsuccessful attempt to make changes to NOS 13 that would have fused socio-economic and environmental concerns with management of the coastal zone (Brachya, 1993), environmental regulations, programs and plans remained ineffective at balancing development and conservation along the coast and protecting public resources. For example, in the 1990s several mega-projects were authorized in coastal areas by the planning system that transformed the costal resource into real estate designed for high income residential development while severely reducing access for the public (Tzafrir, 2005).

With burgeoning population, increased standards of living and intense expansion of the tourist industry, it became clear to policy makers that NOS 13 and regulations rooted in the Planning and Building Law of 1965 were not adequate to protect the coast from destructive development (State Comptroller, 1998). In addition, they recognized the need to overcome disjointed management resulting from the Territorial Waters Committee's responsibility for regulating development in submerged areas and the PBC's responsibility for development on land.

In a report from 1998 the State Comptroller stressed the need to ease tensions between coastal development and the public interest (State Comptroller, 1998). The Israeli courts frequently echoed these concerns. Some needs were addressed by a new policy report published by the Territorial Waters Committee (State of Israel, 1999); others were addressed by a coastal conservation bill in 1998 developed by the Ministry of the Environment (the Ministry) and influenced by environmental NGOs working to protect the coast. The former report offered guidelines for a new ICZM policy for Israel (Ministry of Environmental Protection, 2003). It recommended dividing both marine and terrestrial parts of the coast into physical sub-units each with a varied spatial structure and corresponding development restrictions based on the estimated carrying capacity of the subunit. The Ministry's coastal conservation bill set up the marine boundary to include all submerged areas to a depth 30 m while the landward boundary would extend to 500 m (Governmental Interior and Environmental Committee, 2000). Within the landward boundary two secondary arbitrary setback lines would prohibit development entirely within 100 m landward from the shoreline and restrict development considerably between 100 and 200 m from the shore (Ben Ari, 2000).

3.3. Reconfiguring the managerial system

Local coastal municipalities objected vigorously to the proposal they considered to include over-zealous development restrictions (Governmental Interior and Environmental Committee, 2000; Ben Ari, 2000). They argued that the landward boundary should correspond with the existing ecological values or lack thereof. For example, in intensely developed urban areas the jurisdiction should be narrower (Kizer, 2000; Alemalich, 2000). The 30 m marine depth demarcation constitutes a 7 km marine jurisdiction in some places which they argued extends beyond the ecological system boundaries (Wisman, 2000). They wanted to exclude many activities from regulation and to narrow the law's spatial extent or to make it flexible (Bibi, 2002). In return, proponents of the bill argued against a flexible boundary based on ecological and social values because of disagreement about what these are (Adler and Shtern, 2000). They advocated a uniform boundary that sets the most precautious standard (Ben Ari, 2002).

Compromise led to a combination of a flexible, yet hard to agree upon boundary addressing the physical system needs, and an easy to draw, clear, yet arbitrary line. The final Coastal Environmental Protection Law of 2004 narrowed the spatial extent of the law's jurisdiction (the Coastal Environment) down to the landward line of 300 m, eliminated the 200 m flexible setback line related to environmental sensitivity, and left the 100 m landward setback in place.[6] The marine area includes all water out to 12 nm seaward from the shoreline with an arbitrary strip that has higher sensitivity to 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 unit, constitutes the "Coastal Strip" (CS) while the outer boundaries define the "Coastal Environment" (CE) and as such, the general area addressed by the law (see Fig. 2).

A major component of the law established the Committee for the Protection of the Coastal Environment (CPCE) and afforded it ample discretion to decide what actions are excluded from the law

[6] The shoreline was also arbitrarily set at 0.75 m above the current sea level to accommodate future sea level rise due to climate change.

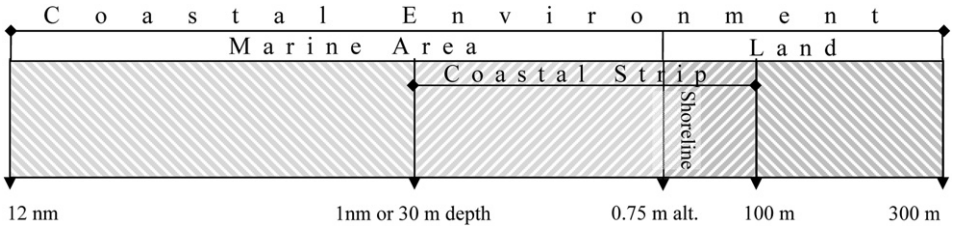

Fig. 2. The regulatory boundaries and units of the Coastal Environment showing the jurisdiction of the CPCE. Varying textures depict the different units.

and according to what criteria to regulate assuming that such discretion could overcome the uniform arbitrary boundaries demarcated by the law (Shtern, 2004) and allow consideration of ecosystem values and concerns as needed. The next section demonstrates whether and how it is possible to overcome a boundary delineation that neglects coastal zone management principles of integration across the marine–terrestrial interface.

4. Hypotheses and methodology

To examine how arbitrary demarcation functions in practice with respect to ICZM criteria, we examined the decisions made by the CPCE since its establishment in 2004. Our intention was to understand how the CPCE's intervention corresponds to the new regulatory program's setback lines and zonal boundaries. If the setback lines set by the new coastal law successfully capture the most vulnerable social and ecological areas of the coast, we expect to find that the CPCE intervenes more often when development is proposed in the Coastal Strip. Acknowledgement of the spatial heterogeneity of the coastal zone based on the actual physical elements of the environment suggests the use of criteria other than arbitrary jurisdictional lines in decision making. Hence, we compared the criteria actually used by the CPCE to the strict consideration of boundaries arbitrarily set by the new coastal law (see Table 1).

From 2004 to 2007 the CPCE reviewed 159 planning proposals[7] ($n = 159$). Proposals may be classified as bounded, transcending or completely external to the Coastal Environment Protection Law jurisdictional line (see Fig. 3). We used various statistical tests to understand how the criteria, expressed as variables, influence intervention by the CPCE. Intervention is represented either by the final decision of the CPCE on the proposal (i.e., the outcome of the committee's review) or by the "intervention index". Section 4.1 and Section 4.2 explain both the criteria that make up the explanatory variables and the two types of intervention.

4.1. Indicator variables (criteria)

We analyzed planning proposals reviewed by the CPCE according to three dimensions: 1) the spatial relation of the proposal to the boundaries stipulated in the new coastal law; 2) characteristics of each proposal, and 3) environmental characteristics of the proposal site. The spatial, project, and environmental characteristics are the explanatory variables of the study; the two indicators of the extent of intervention by the CPCE, either the final decision or the intervention index, make up the dependent variables (explained below).

The following six variables serve as criteria related to the first dimension mentioned above: 1) transcendence (crossing) of the CE boundary; 2) the percentage ("weight") of a proposed project within the CE; 3) some presence in the more limited CS area; 4) the weight of the proposal within the CS; 5) proximity to the shoreline; and 6) the transcendence of several setback lines. Each of these dependent variables is related to the level of intervention exhibited by the CPCE. For example, we examined the relationship between the proposed project's proximity to the shoreline and the level of intervention exhibited by the CPCE.

For criteria related to the second dimension, that is, the characteristics of proposed projects, we used three variables. The first has to do with the size of the project proposed and the second and third have to do with location. They are: 1) area in square meters of the development proposal; 2) location either in the center of the country where the major population centers are or in the periphery away from these centers; and 3) an urban or rural location. Location in the center or periphery is characterized respectively as being: 1) located in the Central or Tel Aviv districts, or 2) located in the Northern or Southern districts. Similarly, we categorized each proposal as urban or rural depending on whether the proposal site is in an urban municipality or within jurisdiction of a regional council and therefore more rural in character.

Lastly we examined intervention by the CPCE with respect to the third dimension: environmental characteristics of the proposal site. For this dimension we used the presence of nature and landscape values and cultural (hereafter: heritage) values. An ordinal index indicates no nature and landscape or heritage values present (0), nature and landscape or heritage values present (1), or all three – nature and landscape and heritage – values present (2). Nature and landscape values are considered together because of the difficulty in distinguishing between these two elements in the environment. For example, a cliff could be considered both a natural asset and also an aesthetic or landscape amenity.

4.2. Intervention defined

CPCE decisions about the proposals reviewed make up the dependent variable in our statistical analyses. We used both the general final decision and an indicator of the level of intervention related to conditions set at the time of approval. The final decision could be approval (1), approval with conditions (2) or rejection (3). These categories are the clearest measure of the statutory authority held by the CPCE. The decision to approve with no conditions assumes no intervention on the part of the CPCE whereas simply stated, rejection assumes maximal intervention. The CPCE chose not to intervene in the review and approval of 60 plans. For the rest, more than 60% of the proposed projects, the CPCE did intervene, either through approval with conditions or rejection.

The Coastal Environment Protection Law gives the CPCE authority to determine the means for limiting the impact of development in areas within its jurisdiction (State of Israel, 2004). The CPCE employs intervention through the imposition of conditions placed at the time of its approval. Examination of CPCE decisions revealed 18 intervention tools employed as conditions for

[7] The CPCE reviews applications that usually consist of plans for development although they could be in the form of anything from requests for building permits to National Outline Schemes. Therefore the authors use the term "proposal" throughout to signify all of the different types of applications reviewed by the CPCE.

Table 1
Hypotheses that address the expected relationship between coastal unit boundaries and the characteristics and location of proposals, and CPCE decisions.

Criteria	Examples (See Fig. 3)	Hypotheses
1. First Dimension – Spatial Relationship of Development Proposal to Boundaries		
1a. Spatial Relationship of Proposal to Coastal Environment (CE)		
Presence outside (transcending) the CE i.e., landward of the 300 m boundary	1	A proposal that transcends the CE will be subject to a higher degree of CPCE intervention.
Weight (percentage) of proposal outside the CE	1	A proposal with a greater weight outside the CE will be subject to a higher degree of CPCE intervention.
1b. Spatial Relationship of proposals to the Coastal Strip (CS)		
Presence in the general CS (either land or sea)	8, 9	Greater intervention is associated with proposals within in the CS than for those that are not within the CS
Weight (percentage) of proposal within the CS	8, 9	Greater CPCE intervention is associated with greater weight of the proposal within the CS
Proximity to the shoreline	n/a	Greater CPCE intervention is associated with the proposal being closer to the shoreline
Proposal transcends several setback lines or is bounded within them	Transcend: 8,10,14 Bounded: 2,3,4,5	Greater intervention is association with transcendence of the CS setback lines
2. Second Dimension – Characteristics of Development Proposal		
Size of proposal	n/a	Greater intervention is associated with proposals that are larger in size
Location: center vs. periphery	n/a	Greater intervention is associated with projects located in the periphery
Location: urban vs. rural	n/a	Greater intervention is associated with projects located in rural areas
3. Third Dimension – Environmental Characteristics of Proposal Site		
Presence of nature and landscape or heritage values	n/a	Greater presence of nature and landscape values or heritage values will be associated with greater intervention

approval. These are conditions such as phased development, reduction of the intensity of development or of the area addressed by the plan. The CPCE used a maximal amount of 12 tools in its decisions for any one of the 159 plans. Therefore, a scale of zero to 13 makes up the intervention index, with zero signifying complete approval with no conditions and 13 signifying rejection, the ultimate intervention. Numbers from 1 to 12 indicate the number of intervention tools employed. For example, if the CPCE used all 12 intervention tools, the index would be 12. The intervention index gives each of these tools the same strength, given that a develop plan cannot be realized if it fails to meet any one of the conditions imposed on it.

For 55% of the plans reviewed by the CPCE, the level of intervention was between 1 and 12 on this index. The most common level of intervention, level 2, occurred in 24% of the projects reviewed. After that the most common were levels 3 and 6, each at 13%. It is interesting to note that the highest level of intervention, level 12 one short of rejection of the proposed project (level 13),

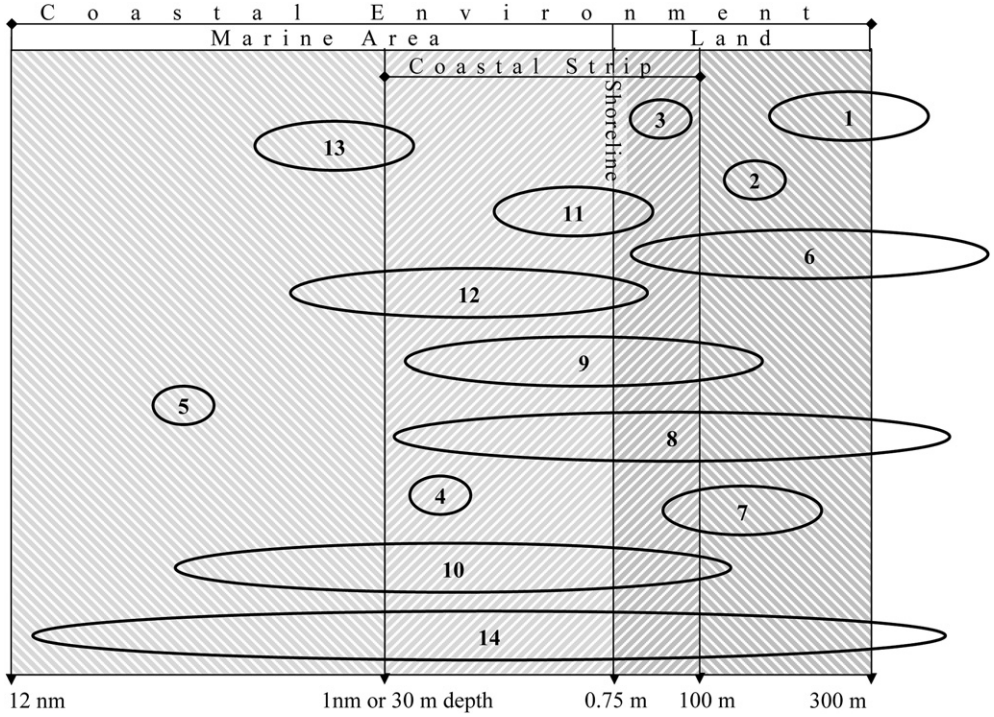

Fig. 3. Spatial dispersion of proposals within the Coastal Environment (CE), showing the potential location of proposals relative to the coastal units and setback lines. For example, those polygons that transcend setback lines are numbered 8, 10, 14, whereas polygons 2, 3, 4 and 5 represent bounded proposals.

occurred only in 2% of the decisions. The next least common were levels 10 and 11, at 3% each.

To analyze the relationship between the final decision of the CPCE which is an ordinal variable, and the explanatory variables (the criteria used by the CPCE) we used contingency analysis. This is a statistical significance test appropriate when sample sizes are small and data are categorical; it is used to examine the significance of the association, or contingency, between classifications. For analyzing the relationship between the intervention index and the spatial characteristics of the proposal (i.e., location in relation to the coastal units and setbacks), we used either a bivariate fit or one-way analysis of variance (ANOVA). The intervention index is a continuous variable. The bivariate fit and ANOVA are appropriate tests when the explanatory variable is continuous or ordinal, respectively. The p-value threshold for rejecting the null-hypotheses which supports the conclusion that the characteristic being examined does not influence decisions of the CPCE, was at the <0.05 levels. To conduct the analyses we used JMP7 statistical software (JMP , 1989–2007).

5. Results

In this section we first summarize the universe of proposals and decisions that make up the data set. Then we describe findings of the statistical analyses and their possible implications.

5.1. Spatial characteristics of the proposed plans

Overall most of the proposals were for projects in the center of the country, in urban environments, were local scale plans, and were submitted by private entities. The CPCE made decisions about more than 100 local detailed proposals – 80% of these were within urban municipalities. Proposals were submitted by private entities, municipalities or the national government, with the breakdown of these being 56%, 23% and 21% respectively.

About 70% of the proposals were located in urban areas, particularly in the cities of Tel Aviv-Yafo and Netanya that together made up 45% of all the project proposals submitted and 65% of urban proposals. Geographically, about 57% proposed development in the central district of the country; otherwise 27% proposed development in the northern district and 16% in the southern district.

Altogether, 14 spatial types of proposals (Fig. 3) are possible, in relation to coastal boundaries. More than 50% of the proposals reviewed by the CPCE were completely within the CE. Others had varying amounts (weights) of area within the CE. About 14% of the proposals covered areas that were less than 5% within the CE. In regards to the more restrictive CS, 46% of the proposals were not at all within either the marine or terrestrial CS (as such, each of their weights was 0%). About 10% of the proposals were completely within the CS and these made up about 20% of the proposals that were completely within the CE.

About a third of all proposals fell completely within one of the CE's four units (e.g., polygon 2 in Fig. 3), and another third we found crossed two units (e.g., polygons 1 and 11 in Fig. 3). The last third of the proposals crossed three or four units (e.g., polygons 9 and 10 in Fig. 3). Close to 90% of the proposals fall within one of the outer zones, meaning in the CE yet not in the CS. Less than a quarter of the proposals covered areas of the marine CS and more than half covered areas of the terrestrial CS. About 23% covered areas in both. Only 3 proposals of the 159 fell in areas within the marine outer unit of the CE; two of those were completely within this unit. About 87% of the proposals covered areas within the outer unit of the terrestrial CE, and about 30% of these covered areas that were completely within this unit.

5.2. Statistical analysis and testing of CPCE's decisions

The results of our statistical analyses (Table 2) suggest that the CPCE: 1) largely ignores jurisdictional boundaries stipulated in the Coastal Protection Law; and 2) makes decisions and mandates changes in proposals based on other locational or environmental factors. This is reflected particularly in analyses involving the intervention index. Results of the study suggest that the CPCE makes decisions based on characteristics of the project proposal such as proximity to the shoreline or the proposal's geographic scope. Also, aspects of the environment such as landscape values and intensity of surrounding development are important influencing factors.

Specifically, the areas outside of the CE boundary are important and the weight of the proposal in the general CE does not influence the CPCE decision or the propensity to intervene. The CPCE is prone to intervene in decisions about plans that have some part within the CS, with the level of intervention increasing as the weight of this part rises. There seems to be more intervention when a plan is mostly on land than mostly in the marine area. This may reflect the planning body's greater familiarity with asserting its authority over terrestrial resources.

Although intervention in decisions regarding proposals that are completely in the marine area may be minimal, the proximity of these proposals to the shoreline is important. The shoreline is an element of the meeting of land and sea and therefore a sensitive landscape element. This is reinforced by the fact that intervention is high for proposals that have a small portion of their area in the sea. Results suggest that the location of the plan within the CE and the environmental values of the site greatly influence the propensity to intervene.

We found that the following factors significantly affect the development of the coast: the distance of proposed development from the shoreline; transcendence of several setback lines; the percentage of the proposed development within the CS; and whether or not a proposal also transcends the general CE. As to the latter criteria we found that the size of the development program and whether the program falls into an urban or a rural area tends to influence the decisions of the CPCE. The 100 m arbitrary setback line set by the law was found to be insignificant in light of the CPCE decisions. In summary, the CPCE does not limit its intervention to the CE, sensitive elements of the environment take precedent over CE boundaries, and the CPCE generally does not use the legislated boundaries categorically.

6. Discussion

Experience throughout the world teaches us about the impediments to integration in the governance of natural resources (e.g., Biswas, 2004; Blomquist and Schlager, 2005), and of coastal resources in particular (Shipman and Stojanovic, 2007). For example, barriers could be either insufficient political stability of national administration (Sorensen, 1993) or insufficient economic resources to cover transaction costs related to coordination between multiple agencies. In the Israeli case the spatial discrepancy between physical units and jurisdictional boundaries begins at the national level where due to political realities true integrated coastal management is already curtailed.[8]

[8] In the Israeli case, for example, ideal ICZM would capture the entire coastal sediment cell which by necessity includes Egypt and Lebanon. Under the current political conditions the discrepancy between the political and national boundaries will hamper any ideal ICZM management.

Table 2
The relationship between boundaries, characteristics and location of proposals and CPCE decisions.

Criteria	Final decision contingency analysis[a] (p-value)	Intervention index bivariate fit or one-way analysis[b] (p-value)
1. First Dimension – Spatial Relationship of Development Proposal to Boundaries		
1a. Spatial Relationship of Proposal to Coastal Environment (CE)		
Transcending the CE	Approval is more likely for proposals that are completely within the CE than for those that transcend the CE boundary (0.0256)	Greater intervention is observed for proposals that transcend the CE boundary than for those completely within it (0.0346)
Weight (percentage) of proposal within the CE	No connection between weight of proposal within the CE and the final decision	Intervention increases as the weight of a proposal within the CE increases for weights <55%; if >55%, the level of intervention decreases as the weight of the proposal within the CE increases (0.0029).
1b. Spatial Relationship of proposals to the Coastal Strip (CS)		
Presence in the general CS (either land or sea)	Approval is more likely for a proposal not within the CS than one that is partially or completely in the CS (0.0001)	Greater level of invention for those proposals that are partially or completely within the CS compared to those not in the CS (0.0001)
Weight (percentage) of proposal within the general CS	Approval is less likely as the weight of the proposal within the CS increases (0.0018)	Intervention increases as weight of a proposal within the CS increases for weights <60%; for weights >60%, the level of intervention decreases as the weight of the proposal within the CS increases (0.0001).
Proximity to the shoreline	Approval is more likely the greater the distance from the water line (0.0001)	The closer the proposal is to the shoreline, the greater the intervention level (0.0001). However, level o intervention steadily decreases up to 150 m landward from the shoreline, and increases beyond.
Proposal transcends several setback lines or is bounded within them	Approval is less likely the greater the spatial dispersion across setback lines (0.0004)	Level of intervention increases as wide spread across the CE the proposals are (0.0001)
2. Second Dimension – Characteristics of Development Proposal		
Size of proposal	Approval is less likely the larger the proposal (0.0009)	Level of intervention goes up as does the size of the proposal, peaking at size 100–1000 dunam size category (0.0013)
Location of proposal: center vs. periphery	Approval is more likely in the center of the country than in the periphery (0.0438)	The level of intervention is greater for proposals in the center of the country than for those in the periphery (0.0095)
Location of proposal: urban vs. rural	Approval is more likely in an urban municipality than if proposal is within a regional council (0.0022)	Level of intervention is lower for proposals in an urban municipality than in a regional council (rural) (0.0001)
3. Third Dimension – Environmental Characteristics of Proposal Site		
Presence of nature and landscape or heritage values	Approval is more likely if there are no natural and landscape or legacy values, or values from either of these groups (0.0001)	Level of intervention is greater if natural and landscape and/or legacy values are present (0.0001)

[a] Decisions to approve, approve with conditions, or reject.
[b] Levels of CPCE intervention (levels 0–13) in relation to three categorical dimensions of project proposals.

These costs and the complexity of integration often reduce the scale and scope of integration and address only a specific problem, a situation that clearly deviates from the holistic definition of ecosystem-based management (Tanaka, 2004; Balaguer et al., 2008). Even in places where the planning and management authorities can adopt ICZM principles, coastal boundaries are often set arbitrarily and therefore counter integration that would otherwise consider ecosystem characteristics.

When coastal boundaries are set arbitrarily, managerial rules and laws are not likely to coincide with the physical sensitivity of the coastal units or with the area of influence of the problem and therefore negatively impact the effectiveness of management programs. Thus, this study examines arbitrary coastal managerial boundaries – particularly, whether and how managerial bodies supersede these when they have the opportunity.

Some policy analysts have asserted that arbitrary jurisdictional lines do not favor integrated coastal zone management and ecosystem-based management principles (e.g., Tanaka, 2008), but the Israeli case shows that when a certain amount of flexibility is allowed, some integration occurs. This integration considers physical aspects of the environment, recognizes the sensitivity of the land–sea interface and also acknowledges to some degree the social dimension as rural areas are considered more valuable than areas already intensely developed.

In Israel, coastal boundary demarcation that corresponds with ecological units or administrative ones was not politically feasible. The Israeli coastal area is heterogeneous in terms of geomorphology, vegetation and biotic types even though the new Coastal Environment Protection Law treats the coast as homogeneous. In designing the law, policy makers have clearly relied on arbitrary boundary and setback lines. Yet we found that in practice CPCE members take the liberty to consider other factors when deciding on whether to restrict or intervene with development and they do so in ways that to some extent correspond to the ecological and social heterogeneity of the coast. Some of their criteria for intervention address the spatial relations between the development programs and the different sub-units of the Coastal Environment; others relate to the characteristics of the particular development proposal and some high value elements of the environment such as ocean views and geomorphological amenities (e.g., cliffs).

Many of the criteria used by the CPCE are not within the committee's narrow mandate and are free interpretations of the law which lacks detailed guidelines for protecting the coast. Extending the CPCE's influence beyond the coast by intervening in proposals that fall mostly outside the formal jurisdiction of the committee is one example. This phenomenon is evidenced by greater levels of intervention being observed for proposals that transcend the CE boundary than for those completely within the boundary. Extending

the meaning of the law is possible due to its ambiguities which lead to various interpretations of the CPCE's mandate (Tzafrir, 2005).

The flexibility used by the CPCE highlights the tension described in the literature between certainty and discretion (Booth, 1955, 1996). The former stems from the regulatory planning system that requires the approval of detailed land use plans. These plans allocate rights in advance and therefore provide certainty. This approach characterized Israeli coastal management prior to the new coastal law (Alfasi, 2008). The new coastal law adds more opportunities for discretion. It opens avenues for interpretation and greater judgment by the CPCE while also allowing it to overcome arbitrary boundary demarcation. Yet, too much discretion provides opportunities for regulatory capture[9] and may favor those who have financial and legal resources (Stigler, 1971) and hence will not necessarily provide better outcomes. How to solve the certainty-discretion dilemma while at the same time maintaining the viability and usefulness of arbitrary boundary demarcation, is a topic for further research.

A limitation of this research is clearly its failure to control for the capacity of certain stakeholders, most likely developers, but also NGOs well versed in planning advocacy, to have the upper hand in influencing decisions of the CPCE. Since we have addressed the CPCE as a homogeneous body it is impossible to identify the marginal affect of these forces within the CPCE.[10] With the limitation of the type of quasi-experimental study design we employed, our research looks at what influences decisions of the CPCE by looking at the relationship of the decision, or intervention, to the spatial location of the proposed development. The spatial location is expressed in reference to the arbitrary boundaries of the regulatory program. The main assumption we make that has influenced the study design and therefore our conclusions, is that spatial location within the confines of the CE is a major factor affecting the decisions of the CPCE and one that can be observed and measured.

Study findings not directly resulting from statistical analysis of chosen criteria and levels of intervention have to do with how the CPCE takes initiative and exploits its ability to interpret the new Coastal Environment Protection Law. The CPCE tends to involve other authorities by delegating the responsibility for implementing conditions to other agencies. This can be understood as an attempt to make up for CPCE limitations as a reactive authority with limited operational power to affect protection of the coastal environment. The CPCE is a planning body and as such lacks the force and influence that a stand-alone jurisdictional management authority responsible for the coastal zone might have. Further the CPCE takes action at the late stages of the planning process. Further study is needed on how these aspects of the law and the operation of the CPCE fits with the ideals of ICZM.

7. Conclusion

Boundary demarcation in the coastal zone is an important part of the managerial process for ICZM, yet it continues to challenge coastal managers and scientists (Balaguer et al., 2008). Many argue that zonal boundaries should be set according to physical landscape, ecological processes, administrative lines and land uses. Yet, the real life spatial and scalar configuration of governance reveals the struggle between stakeholders and decision makers on how to balance development with environmental concerns (Bulkeley, 2005). This struggle is illustrated by the great variation in how and according to what criteria boundaries are established for the management of natural resources (Feitelson and Fischhendler, 2009), especially those designed for management of the coastal zone. One option is arbitrary boundary delineation that ignores both the physical and administrative heterogeneity of the coastal area and therefore is likely to hinder the implementation of ICZM and ecosystem-based management approaches.

There are many barriers for the implementation of ICZM across the world and in different contexts. Some impediments are associated with the complexity of the relationship between physical, economic and social sectors as expressed in current administrative and institutional constructs. This explains for example, why the dominate model of ICZM in Europe is one of inconsistency and fragmentation (Shipman and Stojanovic, 2007). Hence it is unrealistic to assume that ICZM initiatives will easily contain the entire ecological or administrative systems or even those that influence a specific problem for which a solution is sought (Balaguer et al., 2008).

This case study found that despite the physical irrationality of arbitrary demarcation, the CPCE succeeded to both address areas outside the arbitrary boundary demarcation and also to respect some of the different needs and constraints of the coastal sub-units. Israel's Coastal Environment Protection Law allows and, in fact, encourages the regulator to use discretion and to employ various criteria to balance development and conservation in the coastal zone.

Policy makers and resource managers must consider the balance between boundaries that optimize environmental needs by capturing entire ecosystems versus boundaries that are politically feasible. This balance is now tilted towards arbitrary lines – as evidenced, for example, by the use of setback lines for coastal management in Europe (Bridge and Salman, 2000). We conclude that despite the frequent use of arbitrary boundary demarcation, the interconnections among physical coastal and human systems can still be addressed. The approach implemented by the CPCE has some clear advantages. While flexible boundary demarcation based on environmental values opens the window to disagreements on the meaning of values, arbitrary lines in programs that encourage flexibility are useful and practical. Such boundaries are consistent and easily understood by developers, regulators and the public at large. In any case, criticisms associated with arbitrary boundary demarcation should also consider the benefits such a system can provide.

[9] Regulatory capture is a process whereby those entities being regulated capture power using their economic and political resources. As a result a policy or a program will be biased toward the interests of the capturing group (Stigler, 1971).

[10] However, since the CPCE is a national board and various interests are represented by members of the committee, including environmentalists, developers and the national planning establishment, there is at least a balance among the decision makers. Also, all proposals are subject to the same interests before the CPCE throughout the country so there is a level playing field, so to say.

References

Adler, E., Inbar, M., 2007. Shoreline sensitivity to oil spills, the Mediterranean coast of Israel: assessment and analysis. Ocean & Coastal Management 50 (1–2), 24–34.

Adler, A., Shtern, U. 2000. Testimony of Alik Adler from the Ministry of Environmental Protection in front of the Interior and Environment Committee, 27 June 2000.

Alemalich, R., 2000. Testimony of Rafi Alemalich in front of the Interior and Environment Committee, 27 June 2000.

Alfasi, N., 2008. From Rude Illegalism to the Rule of Policy: the Shift from Regulatory to Discretionary Planning in Israeli Coastal Planning. Law and Environment Working Papers 2/5769. The Department of Geography and Environmental Development, Ben Gurion University of the Negev.

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

Amir, S., 1984. Israel's coastal program: resource protection through management of land use. Coastal Zone Management Journal 12 (2–3), 189–223.

Amir, S., 1987. Classification of coastal resources: a Mediterranean case study. Landscape and Urban Planning 14, 399–414.

Ariel, A., 2009. The Determinants and Implications of Scale and Scope of Coastal Management in the Mediterranean. PhD dissertation, the Hebrew University Jerusalem.

Baja, S., Chapman, D.M., Dragovich, D., 2002. A conceptual model for defining and assessing land management units using a fuzzy modelling approach in GIS environment. Environmental Management 29 (5), 647–661.

Balaguer, P., Sardá, R., Ruiz, M., Diedrich, A., Vizoso, G., Tintoré, J., 2008. A proposal for boundary delimitation for integrated coastal zone management initiatives. Ocean and Coastal Management 51, 806–814.

Ben Ari, E., 2000. Testimony of Eli Ben Ari from Israel Union for Environmental Defense in front of the Interior and Environment Committee, 27 June 2000.
Ben Ari, E., 2002. Testimony of Eli Ben Ari, from Israel Union for Environmental Defense in front of the Interior and Environment Committee, 14 April 2002.
Bibi, Y., 2002. Testimony of Cabinet Member Yegal Bibi in front of the Interior and Environment Committee, 14 April 2002.
Biswas, A.K., 2004. Integrated water resources management: a reassessment: a water forum contribution. Water International 29 (2), 248–256.
Blomquist, W., Schlager, E., 2005. Political pitfalls of integrated watershed management. Society and Natural Resources 18 (2), 101–117.
Bolin, B., Collins, T., Darby, K., 2008. Fate of the verde: water, environmental conflict, and the politics of scale in Arizona's central highlands. Geoforum 39 (3), 1494–1511.
Booth, P., 1995. Zoning or discretionary action: certainty and responsiveness in implementing planning policy. Journal of Planning Education and Research 14 (2), 103–112.
Booth, P., 1996. Controlling development: certainty and discretion in Europe, the USA and Hong Kong. In: The Natural and Built Environment Series 9. UCL Press, London.
Brachya, V., 1991. Integrated Planning and Management of Coastal Zones. Israel National Report to Regional Activity Centre, Priority Actions Program, Nairobi, Kenya.
Brachya, V., 1993. Environmental assessment in land use planning in Israel. Landscape and Urban Planning 23, 167–181.
Brachya, V., 2002. Integrated coastal zone management in Israel. In: Cicin-Sain, B., Pavlin, I., Belfiore, S. (Eds.), Sustainable Coastal Manangement: a Transatlantic and Euro-Mediterranean Perspective. Kluwer Academic Publishers, the Netherlands, pp. 113–121.
Brenner, J., Jimenez, J.A., Sardá, R., 2006. Definition of homogeneous environmental management units for the Catalan coast. Environmental Management 38, 993–1005.
Bridge, L., Salman, A., 2000. Policy Instruments for ICZM in Nine Selected European Countries: Final Study Report Prepared for the Dutch National Institute for Coastal and Marine Management. RIKZ, Leiden, The Netherlands.
Bulkeley, H., 2005. Reconfiguring environmental governance: towards a politics of scales and networks. Political Geography 24, 875–902.
Christie, P., Lowry, K., White, A., Oracion, E.G., Sievanen, L., Pomeroy, R.S., Pollnac, R.B., Patlis, J., Eisma, L., 2005. Key findings from a multidisciplinary examination of integrated coastal management process sustainability. Ocean and Coastal Management 48, 468–483.
Cicin-Sain, B., 1993. Special issue on integrated coastal management. Ocean & Coastal Management 21 (1–3), 1–377.
Cicin-Sain, B., Knecht, R., 1998. Integrated Coastal and Ocean Management: Concepts and Practices. Island Press, Washington D.C.
Clark, J.R., 1996. Coastal Zone Management Handbook. Lewis Publishers, New York, NY.
Communication Partnership for Science and the Sea, 2005. Scientific consensus statement on marine ecosystem-based management. http://compassonline.org/pdf_files/EBM_Consensus_Statement_v12.pdf (accessed September 2009). Convention on Biological Diversity, 1999. Liaison Group on the Ecosystem Approach. Convention on Biological Diversity & UNESCO, Workshop Report, Paris.
Convention on Biological Diversity, 2000. The Ecosystem Approach Decisions Adopted by the Conference of the Parties to the Convention on Biological Diversity at its Fifth Meeting Nairobi, Kenya.
Cowell, R., 2003. Substitution and scalar politics: negotiating environmental compensation in CardiffBay. Geoforum 34 (3), 343–358.
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.
Emery, K.O., Neev, D., 1960. The Mediterranean beaches of Israel. Israel Geological Survey Bulletin 26, 1–24.
Enemark, J., 2005. The WaddenSea protection and management scheme – towards an integrated coastal management approach? Ocean & Coastal Management 48 (11–12), 996–1015.
European Environmental Agency, 2003. DMEER: digital map of European ecological regions. http://dataservice.eea.europa.eu/atlas/viewdata/viewpub.asp?id=7 (accessed September 2009).
European Environmental Agency, 2006. The Changing Faces of Europe's Coastal Areas. Office for Official Publications of the European Communities, Luxembourg.
Feitelson, E., Fischhendler, I., 2009. Spaces of water governance: the case of Israel and her neighbors. The Association of American Geographers 99 (4), 728–745.
Fletcher, S., 2000. The evolution of coastal management policy in the state of Israel. Marine Policy 24, 395–405.
Gibbs, D., Jonas, A.E.G., 2000. Governance and regulation in local environmental policy: the utility of a regime approach. Geoforum 31 (3), 299–313.
Goldsmith, V., Golik, A., 1980. Sediment transport model of the southeastern MediterraneanCoast. Marine Geology 37, 137–145.
Governmental Interior and Environmental Committee, 2000. Meeting from 29 May 2000.
Hershman, M., Good, J., Bernd-Cohen, T., Goodwin, R., Lee, V., Pogue, P., 1999. The effectiveness of coastal zone management in the United States. Coastal Management 27, 113–138.
Hildebrand, L., 1994. Cooperation in the coastal zone. Ocean and Coastal Management 25, 233–235.
JMP, 1989–2007. Version 7. SAS Institute Inc., Cary, NC.
Kana, T.W., 1991. Treating the coast as a dynamic system. CAMPANET. In: Clark, J.R. (Ed.), The Status of Integrated Coastal Zone Management: a Global Assessment. University of Miami/RSMAS, Miami, pp. 60–61.
Keiter, R.B., 1994. Beyond the boundary line: constructing a law of ecosystem management. University of Colorado Law Review 65 (2), 293–333.
Kizer, D., 2000. Testimony of Danny Kizer from the Municipality of Tel Aviv in front of the Governmental Interior and Environmental Committee, 29 May 2000.
Lau, M., 2005. Integrated coastal zone management in the People's Republic of China: an assessment of structural impacts on decision-making processes. Ocean & Coastal Management 48, 115–159.
Lawrence, P.L., 1997. Integrated coastal zone management and the Great Lakes. Land Use Policy 14 (2), 119–136.
Massachusetts Oceans Act, 2008. (codified at Chapter 21A M.G.L. Section 4c(b) § §).
May, P.J., Burby, R.J., Ericksen, N.J., Handmer, J.W., Dixon, J.E., Michaels, S., Smith, D.I., 1996. Environmental Management and Governance. Ministry of Environmental Protection, 2003. Coastal area report. Routledge, London. http://www.sviva.gov.il (Accessed September 2009).
Molle, F., 2009. River-basin planning and management: the social life of a concept. Geoforum 40, 484–494.
NOAA, 2004. State coastal zone boundaries – ocean and coastal resource management. http://coastalmanagement.noaa.gov/mystate/docs/stateczboundaries.pdf (Accessed September 2009).
OJEC, June 2002. L148/24: recommendation of the European Parliament and the council of 30 May 2002 concerning the implementation of integrated coastal zone management in Europe (2002/413/EC). Official Journal of the European Communities 45 (6).
Olsen, S.B., 2003. Assessing progress towards the goals of coastal management. Journal of Coastal Management 30 (4), 325–345.
Olsen, S.B., Kenchington, R., Davies, N., Dutra, G.F., Hale, L.Z., Robles, A., Wells, S., 2004. A global network for sustained governance of coastal ecosystems. In: Glover, L., Earle, S. (Eds.), Defying Oceans End. Island Press, Washington D.C., pp. 43–70.
Ostrom, E., 1990. Governing the Commons: The Evolution of Institutions for Collective Action. CambridgeUniversity Press, Cambridge, U.K.
Ostrom, E., 2001. Reformulating the commons. In: Burger, J., Ostrom, E., Norgaard, R. B., Policansky, D., Goldstein, B.D. (Eds.), Protecting the Commons: a Framework for Resource Management in the Americas. Island Press, Washington, D.C, pp. 17–41.
Papay, N. (Ed.), 2003. The coast of Israel: the gap between the existing coast and the desired one. Report # 4, Society for the Protection of Nature in Israel (in Hebrew).
Papay, N. (Ed.), 2007. Follow up Report on the Situation of the Israeli Coast. Society for the Protection of Nature, Israel (in Hebrew).
Portman, M., 2006. Tidelands management: implementation of the Massachusetts public waterfront act. Journal of Environmental Policy and Planning 8 (4), 293–308.
Portman, M.E., Duff, J.A., Köppel, J.J.R., Higgins, M.E., 2009. 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.
Schlaepfer, R., 1997. Ecosystem-based Management of Natural Resources: a Step towards Sustainable Development. International Union of Forestry Research Organization, Slovakia.
Sherman, K., Alexander, L.M., 1986. Variability and Management of Large Marine Ecosystems AAAS Selected Symposium 99. Westview Press, Boulder, Colorado.
Shipman, B., Stojanovic, T., 2007. Facts, fictions and failures of integrated coastal zone management in Europe. Coastal Management 35, 375–398.
Shtern, U., 2004. Testimony of cabinet member Yuli Shtern in front of the Interior and Environment Committee, 8 June 2004.
Sorensen, J., 1993. The international proliferation of integrated coastal zone management efforts. Ocean & Coastal Management 21, 45–80.
Sorenson, J., August 2002. Baseline 2000. Background report. The Status of Integrated Coastal Management as an International Practice. Urban Harbours Institute, Boston, Second Iteration. pp. 26.
Stigler, G.J., 1971. The theory of economic regulation. The Bell Journal of Economics and Management Science 2 (1), 3–21.
State Comptroller, 1998. State Comptroller report No. 49 on Land Use Planning along the Mediterranean Coast.
State of Israel, 1983. Planning and Building Law, National Master Plan for the Mediterranean Coast of Israel # 13 Israel (in Hebrew).
State of Israel, 1999. Coastal Policy for Israel: Policy Report. Territorial Water Committee Authority, Israel (in Hebrew).
State of Israel, 2003. Facts on the Mediterranean Sea. Ministry of Environmental Protection. http://www.sviva.gov.il (Accessed September 2009).
State of Israel, 2004. Coastal Environmental Protection Law Israel (in Hebrew).
Talitman, D., Tal, A., Brenner, S., 2003. The devil is in the details: increasing international law's influence on domestic environmental performance – the case of Israel and the Mediterranean sea. New York University Environmental Law Journal 11, 414–478.
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.
Tanaka, Y., 2008. A Dual Approach to Ocean Governance: The Cases of Zonal and Integrated Management in International Law of the Sea. Ashgate Publishing, Aldershot, U.K.
Turnipseed, M., Crowder, L.B., Sagarin, R.D., Roady, S.E., 2009. Legal bedrock for rebuilding America's ocean ecosystems. Science 324 (5924), 183–184.
Tzafrir, D., 2005. The coastal zone act: the social purpose and environmental justice. Mekarkeyin 4 (1), 38–54 (in Hebrew).

UNESCO, 1997. Methodological Guide to Integrated Coastal Zone Management. Intergovernmental Oceanographic Commission, Manuals and guides. pp. 36.
Vallega, A., 2002. The regional approach to the ocean, the ocean regions, and ocean regionalization – a post-modern dilemma. Ocean & Coastal Management 45 (11–12), 721–760.
Wang, H., 2004. Ecosystems management and its application to large marine ecosystems: science, law, and politics. Ocean Development & International Law 35, 41–74.
Weinthal, E., Parag, Y., 2003. Two steps forward, one step backward: societal capacity and Israel's implementation of the Barcelona convention and the Mediterranean action plan. Global Environmental Politics 3 (1), 51–71.
Wisman, A. 2000. Testimony of Wisman Aaron, The Shipping and Ports Administration in front of the Interior and environment committee, 27 June 2000.
Zonnenveld, I.S., 1994. Basic principles of classification. In: Klijn, F. (Ed.), Ecosystem Classification for Environmental Management. Kluwer Academic Publishers, The Netherlands, pp. 23–47.