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Expanding the Use of Ecosystem-Based Management in the Coastal Zone Management Act

SUMMARY

The current state of the oceans indicates that our single species, single sector, single activity marine management strategies are not the answer. Ecosystem-based management differs from this approach in that it accounts for the interconnectedness within and among ecosystems and human activities. The Environmental Law Institute (ELI) has identified the following six reforms that could be adopted to strengthen ecosystem-based ocean management principles via reauthorization of the Coastal Zone Management Act (CZMA):

1. **Require Ecosystem Assessments**
   - As a condition of program approval, require development of ecosystem assessments that would form the basis for state coastal zone management plans.
   - Expand coastal zone science by bolstering the National Oceanic and Atmospheric Administration's Coastal Services Center.
2. **Require a Coastal Zone Plan That Is Based on Sound Ecosystem Science**
   - As a condition of program approval, require states to create long-term management plans based on ecosystem assessments.
3. **Update Statutory Definitions**
   - Change the definition of the inland boundary of the coastal zone (CZMA Section 304(1)) so that it is based on either an ecosystem assessment or watersheds as identified by USGS hydrologic units or the coastal component of NOAA's Coastal Assessment Framework.
   - Change the definitions of "land use" and "water use" (Sections 304(10) and (18)) to explicitly include conservation measures as acceptable "uses."
4. **Collaborate, Address Cumulative Impacts, and Make Tradeoffs**
   - As a condition of program approval, require states to undertake greater interstate coordination with regard to shared ecosystems based on ecosystem assessments.
   - As a condition of program approval, require states to evaluate cumulative impacts and adopt the precautionary approach when using the evaluation in planning and permitting.
   - As a condition of program approval, require states to develop explicit mechanisms for evaluating, recommending, and deciding trade-offs among different sectors and competing uses.
5. **Use the Special Area Management Program to Enable Ecosystem-Based Management**
   - Reword the definition of "special area management plan" (Section 304(17)) to incorporate the elements of ecosystem-based management.
   - As a condition of program approval, require state programs to develop mechanisms that would allow the development of special area management plans at a local or state scale.
   - Apply the special area management plan approach to other sections of the CZMA.
6. **Maintain Federal Consistency**
   - Encourage greater usage of the federal consistency provisions (Section 307(c)) and simplify the procedures for upholding the enforceable policies of the state program.

INTRODUCTION

More than fifty percent of the U.S. population lives in coastal counties. Growing populations and new and expanding ocean uses make the coastal zone an increasingly complex and important area to manage. As these pressures mount, the multiple and cumulative impacts that are degrading the coastal zone will expand.[1]

Addressing this problem likely will require changes in marine management. Current management strategies tend to focus on a single sector, activity, species, or concern. Many individuals and organizations, including the U.S. Commission on Ocean Policy and the Pew Oceans Commission, have called for a shift away from this approach and to one that is more comprehensive, integrated, and ecosystem-based. As described in the Consensus Statement on Marine Ecosystem-Based Management, ecosystem-based management (EBM) is a place-based approach to management that focuses on the entirety of a specific ecosystem, including humans.[2] EBM considers the cumulative impacts of different sectors; accounts for the interconnectedness within and among systems; and integrates ecological, economic, institutional, and social perspectives. The goal of EBM is to maintain the health, productivity, and resiliency of an ecosystem so that it can continue to provide the services on which humans depend. Both the U.S. Commission on Ocean Policy and the Pew Oceans Commission describe EBM as important to achieving sustainable fisheries, healthy seafood, abundant wildlife, clean beaches, and vibrant coastal communities.

The Coastal Zone Management Act (CZMA) is the best national law currently available to comprehensively address human use and impact in the coastal zone, and can provide a legal framework for implementation of ocean and coastal ecosystem-based management (EBM). With this white paper, the Environmental Law Institute (ELI) presents ideas about how to amend the CZMA to enhance it as a central legal tool for implementing ocean and coastal EBM.

The CZMA establishes a voluntary program within the Department of Commerce that offers cost-sharing grants to coastal states, including the Great Lakes states and U.S. territories, to develop and implement coastal zone management programs.[3] In addition to these financial incentives, the Act authorizes the federal government to delegate "federal consistency review" authority to each coastal state that has an approved coastal management program.[4] Federal consistency review allows states to monitor proposed federal actions and ensure that they are consistent with the enforceable policies of the state's program.[5] This power of review,[6] the financial incentives, and the voluntary nature of the CZM Program have led 34 of the 35 eligible states and territories to participate in the Program.[7]

Despite the Act's long life and high degree of participation, this federal program and some state coastal management programs have been seen as less effective than they could be.[8] This may be caused by a lack of detailed national priorities or the lack of strong state implementation. As a result, some state managers have suggested a variety of reforms, including the idea that a revised CZMA support place- and ecosystem-based management.[9]

The key governance components for implementing EBM include integration of ecosystem science into decision-making, coordinated communication and management among different levels of government and among agencies, consideration of cumulative impacts over time and across sectors, evaluating and deciding on trade-offs among competing interests and uses, and an adaptable and accountable governance system.[10]
Stakeholders from local, state, and federal government;

1 Benjamin Halpern et al., *A Global Map of Human Impact on Marine Ecosystems*, 319 SCIENCE 948 (2008).

2 KAREN MCLEOD ET AL., SCIENTIFIC CONSENSUS STATEMENT ON MARINE ECOSYSTEM-BASED MANAGEMENT (signed by 221 academic scientists and policy experts with relevant expertise) (2005), http://compassonline.org/?q=EBM.

3 *See* 16 U.S.C. §§ 1453(1), 1455(a), 1455b(f) (2005).

4 *See id.* at §§ 1454, 1456(c)-(d).

5 *See id.* at § 1455(c)-(d).

6 NAT'L OCEANIC & ATMOSPHERIC ADMIN. AND COASTAL STATES ORG., ENVISIONING OUR COASTAL FUTURE 7 (2007), http://coastalmanagement.noaa.gov/czm/media/PhaseIII.pdf.

7 NAT'L OCEANIC & ATMOSPHERIC ADMIN., CZMA FEDERAL CONSISTENCY OVERVIEW 3 (2007). The single non-participating state, Illinois, currently is developing its coastal management program.

8 COASTAL STATES ORG., CZ-1: PROPOSALS FOR REAUTHORIZATION OF THE COASTAL ZONE MANAGEMENT ACT OF 1972 3 (2006).

9 NAT'L OCEANIC & ATMOSPHERIC ADMIN. AND COASTAL STATES ORG., ENVISIONING THE FUTURE OF COASTAL MANAGEMENT: KEY FINDINGS OF MANAGER INTERVIEWS 8 (2007).

10 KAREN MCLEOD ET AL., SCIENTIFIC CONSENSUS STATEMENT ON MARINE ECOSYSTEM-BASED MANAGEMENT (2005).

ocean industries; and recreational and non-governmental interests as well as academics have all recommended the inclusion of "sustainable communities, ecosystem-based management, or watershed-based management as a new component of a reauthorized CZMA" to strengthen coastal management programs.[11]

The potential changes to the CZMA outlined below are based on ELI's research on the practical implementation of EBM and a study of existing coastal management programs in four selected states.[12] These proposed changes are intended to advance EBM principles through the CZMA, while preserving its federal-state structure and the incentives that have made this voluntary program enticing to so many states and territories. With stakeholders clearly interested in the EBM approach, if changes to the CZMA that favor EBM are made carefully, they should receive widespread acceptance and produce more effective coastal management programs.

1. REQUIRE ECOSYSTEM ASSESSMENTS

Many scholars and managers recognize that effective EBM requires a baseline understanding of ecosystem structure, health, and function in order to make informed decisions about management.[13] To facilitate coastal zone management programs that are grounded in sound ecosystem science, the CZMA could be changed in two ways: (1) require the development of ecosystem assessments, preferably on a regional scale, that would be updated every five years; and (2) improve data collection and analyses by enhancing the NOAA Coastal Services Center to play a role similar to the role that NOAA Fisheries Science Centers play for fisheries management.

Ecosystem assessments are vital to effective planning of marine resources and can support other federal and state management efforts. To foster EBM on the regional scale (e.g. for large marine ecosystems), the CZMA could encourage the interstate collaboration necessary for development of these regional assessments by (1) mandating that the state management programs conduct ecosystem assessments in cooperation with NOAA and relevant coastal states and by (2) providing federal technical and financial support for regional assessments conducted by an objective scientific team. NOAA's Coastal Services Center could lead the assessment efforts if the program is expanded. The assessment, whether state or regional, could include physical, biological, and social data based on a synthesis of existing information and identify information gaps and confidence levels to help managers understand the reliability of the assessment. It also could make use of GIS to provide spatial data in a digestible format.

To incorporate such ecosystem assessments into the CZMA, one option is amending Section 306(d) so that it reads "Before approving a management program submitted by a coastal state, the Secretary shall find the following: … (3) The State has– … ***(C) Collaborated with NOAA to conduct an ecosystem assessment of the state's coastal area or, in cooperation with other states, a regional ecosystem assessment encompassing a large marine ecosystem (LME) or otherwise following regional fishery management council areas. The assessment must be updated every five years"*** (proposed new text in bold and italics).

To support the states' participation in regional ecosystem assessments, the federal government could provide funds through coastal zone enhancement grants. Section 309(a) could be amended to read "For purposes of this section, the term "coastal zone enhancement objective" means any of the following objectives: … ***(10) Ecosystem assessments for a multi-state region defined by ecosystem boundaries and conducted by an objective scientific team."***

11 NAT'L OCEANIC & ATMOSPHERIC ADMIN. AND COASTAL STATES ORG., ENVISIONING THE FUTURE OF COASTAL MANAGEMENT: KEY FINDINGS OF MANAGER INTERVIEWS 9 (2007).

12 After consultation with NOAA and CSO staff and its own review of state programs, ELI chose to study the coastal management programs of California, Massachusetts, Virginia, and Washington in order to analyze diverse approaches to setting coastal zone boundaries, direct versus networked programs, and a variety of SAMPs.

13 *See, e.g.*, Heather Leslie & Karen McLeod, *Confronting the Challenges of Implementing Marine Ecosystem-Based Management*, 5 FRONTIERS IN ECOLOGY AND THE ENV'T 540 (2007); Ole Arve Misund & Hein Rune Skjoldal, *Implementing the Ecosystem Approach: Experiences from the North Sea, ICES, and the Institute of Marine Research, Norway*, 300 MARINE ECOLOGY PROGRESS SERIES 260 (2005); Sergi Tudela & Katherine Short, *Paradigm Shifts, Gaps, Inertia, & Political Agendas in Ecosystem-Based Fisheries Management* 300 MARINE ECOLOGY PROGRESS SERIES 282 (2005). This is also evident from the scientific assessment approach that many regional ocean governance bodies take, including the Chesapeake Bay Program, the Gulf of Mexico Alliance, and the California Ocean Protection Council.

Good ecosystem assessments require a significant amount of quality data. The CZMA could be amended to enhance the role of the NOAA Coastal Services Center to provide ongoing data analysis and collection. The Coastal Services Center is a logical resource for the assessments and beyond as it is client-driven, focused on applied solutions, and has expertise in habitat, hazards, and data gathering and dissemination.

2. REQUIRE A COASTAL ZONE PLAN BASED ON SOUND ECOSYSTEM SCIENCE

In its current form, the CZMA only requires states to create a program, not a long-term plan for sustainable ocean and coastal ecosystems. The CZMA likely would be a better ecosystem-based tool if it supported the development of a coherent vision for coastal management through a state plan with narrative or, ideally, quantifiable objectives and identified means of achieving them. The plan should include management targets, measurable objectives to achieve the targets, a timeline, a budget, a designated lead agency, and legal authority to achieve the targets. This would give direction and goals to the management structure outlined in the state program and improve the effectiveness and accountability of state actions under the CZMA. The plan should be informed by the ecosystem assessment discussed above.

To require states to develop a long-term plan, Congress could add it to the elements necessary for program approval. For example, Section 306(d) of the CZMA could be amended to read "Before approving a management program submitted by a coastal state, the Secretary shall find the following: … (2) The management program includes each of the following required program elements: … (B) ***A plan for preserving, protecting, and developing the coastal zone with quantitative or narrative objectives based on the most recent ecosystem assessment. The plan shall include, but is not limited to, management targets, measurable objectives to achieve the targets, a timeline, a budget, a designated lead agency, and a strategy and legal authority for implementing the plan."***

This amendment would serve as an addition to Section 306(d)(2), not a replacement of the current Subsection (B). Due to the significance and breadth of this requirement, this new subsection should be located directly after "An identification of the boundaries of the coastal zone subject to the management program" rather than at the end of the list in Section 306(d)(2).

3. UPDATE STATUTORY DEFINITIONS

Inland Coastal Zone Boundary

Critical to using the CZMA to implement ecosystem-based management is the geographic boundary within which the Act operates. Theoretically, EBM should consider all effects on an ecosystem, including those generated far upstream in a tributary drainage basin. To ensure that appropriate ecosystem-based boundaries are drawn, ELI recommends revising the definition of the "coastal zone."

The statutory authority of the CZMA is confined within the "coastal zone." The CZMA defines "coastal zone" as

> the coastal waters (including the lands therein and thereunder) and the adjacent shorelands (including the waters therein and thereunder), strongly influenced by each other and in proximity to the shorelines of the several coastal states, and includes islands, transitional and intertidal areas, salt marshes, wetlands, and beaches. The zone extends … seaward to the outer limit of State title ... The zone extends inland from the shorelines only to the extent necessary to control shorelands, the uses of which have a direct and significant impact on the coastal waters, and to control those geographical areas which are likely to be affected by or vulnerable to sea level rise. Excluded from the coastal zone are lands the use of which is by law subject solely to the discretion of or which is held in trust by the Federal Government, its officers or agents.[14]

14 16 U.S.C. § 1453(1).

The seaward boundary of a state's "coastal zone" is the outer limit of state title, which generally is three nautical miles from shore.[15] States designate their inland boundaries in different ways.

For example, Delaware's coastal zone includes the entire state.[16] Indiana's coastal zone was founded on watershed boundaries in Lake, Porter, and LaPorte counties.[17] Washington's coastal zone includes the 15 counties that abut saltwater, the inland boundaries of which generally follow drainage divides.[18] Massachusetts' coastal zone extends 100 feet inland from the first major transportation route.[19] California's coastal zone is variable, extending less than 1,000 yards inland in urban areas and more than 1,000 yards inland in coastal estuarine habitats and recreational areas.[20] These differences in interpretation can have significant effects on the CZMA management area in each state: 100 percent of Delaware falls under the authority of the state program, but only 2 percent of California does.[21] Also, this inconsistency creates significant variability in management of an ecosystem when that ecosystem extends across state lines.

For EBM purposes, the relevant issue is whether the inland boundaries include the areas that significantly affect the marine environment. The best method for boundary delineation would be to determine the sources of direct and significant impacts during the ecosystem assessment. Defining the inland boundary by an ecosystem assessment would provide flexibility to states, just as the current definition does, but it would require a re-analysis of direct and significant impacts using modern mapping and analysis tools. To this end, the CZMA definition of the inland coastal boundary could be amended by adding the following: "…The zone extends inland from the shorelines only to the extent necessary to control shorelands, the uses of which ***are determined by an ecosystem assessment to*** have a direct and significant impact on the coastal waters, and to control those geographical areas which are likely to be affected by or vulnerable to sea level rise…"

Determining coastal boundaries by scientifically rigorous ecosystem assessments does have practical limitations. This approach would be time- and money-intensive, and boundaries still might vary drastically across states. An alternative approach to defining inland coastal zone boundaries would be to use existing hydrologic units to set the boundaries. This latter approach is less flexible and may exclude certain important upland areas in comparison to the ecosystem assessment approach, but it would add significant certainty in boundaries and ease of application.

Since inland areas not directly adjacent to the ocean primarily affect the coastal zone by affecting the streams that lead there, drainage basins are logical hydrologic landmarks around which to draw coastal zone boundaries. However, given the size of some U.S. drainage basins, such a definition of the coastal zone would contain most coastal states and still not capture the entirety of these basins. Using a smaller hydrologic unit for determining the inland boundary of a state's coastal zone could provide a potentially good proxy for lands that significantly affect the coastal zone, adequately considering watersheds but within a politically practical management area.

In its 2004 report, the U.S. Commission on Ocean Policy recommended that the inland boundaries of state coastal management programs be set, at a minimum, at the "boundaries of coastal watersheds."[22] The commission report defines "coastal watersheds" as "that portion of a watershed that includes the upstream extent of tidal influence. In the Great Lakes region, [it] includes the entire geographic area that drains into one of the lakes."[23] The 1992 NOAA document that the Commission cites for this definition provides greater detail, defining the coastal watershed boundary as the inland boundary of the 8-digit USGS hydrologic cataloging units containing the head of tide.[24] For the Great Lakes region and the portions of

15 Submerged Lands Act of 1953, 43 U.S.C. §§ 1301 et seq. Texas and the Gulf Coast of Florida have nine-mile seaward boundaries.
16 NAT'L OCEANIC AND ATMOSPHERIC ADMIN., STATE COASTAL ZONE BOUNDARIES (2004).
17 *Id.*
18 *Id.*; WASH. STATE DEP'T OF ECOLOGY, MANAGING WASHINGTON'S COAST: WASHINGTON STATE'S COASTAL ZONE MANAGEMENT PROGRAM 19 (2001).
19 Mass. Office of Coastal Zone Mgmt., The MA Coastal Zone: CZM Jurisdiction, *at* http://www.mass.gov/czm/zone.htm.
20 NAT'L OCEANIC AND ATMOSPHERIC ADMIN., STATE COASTAL ZONE BOUNDARIES (2004).
21 NAT'L OCEANIC AND ATMOSPHERIC ADMIN., MANAGING COASTAL RESOURCES 37 (1998), http://oceanservice.noaa.gov/websites/retiredsites/sotc_pdf/CRM.PDF.
22 U.S. COMM'N ON OCEAN POLICY, AN OCEAN BLUEPRINT FOR THE 21ST CENTURY 154 (2004).
23 *Id.*
24 NAT'L OCEANIC AND ATMOSPHERIC ADMIN., COASTAL ZONE BOUND-

watersheds along the marine coast that drain directly to marine waters, it is the cataloging units adjacent to the coast.[25]

The advantages of founding an inland boundary of the coastal zone on "coastal watersheds" as determined by USGS cataloging units are the hydrologic significance of these areas, the clarity and consistency of their boundaries, and the ability to access information about each unit from national databases. Yet, these units still may not extend far enough inland to address some significant causes of marine ecosystem degradation.

An alternative definition of inland coastal zone boundaries could be based on the coastal component of the Coastal Assessment Framework (CAF). NOAA developed the CAF using geographic information system technology to provide a consistent, watershed-based digital spatial framework for discussing the nation's coastal, near-ocean, and Great Lakes resources. The CAF divides most of the contiguous United States into Estuarine Drainage Areas, Coastal Drainage Areas, Fluvial Drainage Areas, and Fluvial Coastal Drainage Areas.[26]

While using the CAF in its entirety to define the inland boundary of the coastal zone would have the same benefits as using drainage basins, it also would have the same detriments, namely that it would include nearly the entire country. However, considering only the Estuarine and Coastal Drainage Areas of the CAF would limit the land area addressed by the CZMA but still cover the portions of drainage basins that most directly influence estuarine waters.[27]

The advantage of founding an inland definition of the coastal zone on these two divisions of the CAF is the clarity and hydrologic significance of these boundaries. In some areas, these boundaries are further inland than the boundaries of USGS cataloging units in the "coastal watersheds," making this latter option slightly more comprehensive in geographic scope. Yet, common complaints about the CAF are its need for updating and need to be more narrowly tailored to smaller basins.[28]

Both the "coastal watershed" and CAF alternatives offer nationally uniform, predetermined boundaries, which would simplify the process for the states and, ideally, limit debate over line-drawing. But if Congress chooses either alternative, it should serve as a baseline, not necessarily a cap, to the area covered by a state's coastal zone program. To amend the CZMA definition of the inland coastal boundary so as to base it on either the CAF or 8-digit USGS hydrologic units, one possible wording could be "…The zone extends inland from the shorelines ***to at least the inland boundary of [the 8-digit USGS hydrologic cataloging units adjacent to the shore or containing the head of tide, whichever is further] [Estuarine and Coastal Drainage Areas of the NOAA Coastal Assessment Framework].*** Excluded from the coastal zone are…"

Conservation as a "Use"

The CZMA is focused on harmonizing the protection and use of the coastal zone.[29] What constitutes "use" is critical to the operation of the Act, identifying what must be considered when developing a plan, prioritizing uses, and making decisions among competing or conflicting ocean and coastal uses. For state management programs to be approved, they must define permissible land and water uses and identify means of exerting control over them.[30] The CZMA itself provides some initial structure to this requirement by defining "land use" and "water use." The Act deems "land use" to be "activities which are conducted in, or on the shorelands within, the coastal zone."[31] Similarly, "water use" is defined as "a use, activity, or project conducted in or on waters within the coastal zone."[32] Both of these definitions are very broad, allowing numerous "uses" to qualify but also giving little guidance as to what should be included.

ARY REVIEW, NATIONAL SUMMARY: STATE CHARACTERIZATION REPORTS (1992).

25 *Id.* Cataloging units are the smallest category in the USGS hierarchy of hydrologic units, a subdivision of sub-regions and accounting units. Cataloging units represent part or all of a drainage basin, multiple drainage basins, or a distinct hydrologic feature. U.S. Geologic Survey, What are Hydrologic Units?, *at* http://water.usgs.gov/GIS/huc.html.

26 Nat'l Oceanic and Atmospheric Admin., NOAA's Coastal Geospatial Data Project: Introduction, *at* http://coastalgeospatial.noaa.gov/welcome.html.

27 Dan Farrow, Presentation to the Regional Ecosystem Delineation Technical Workshop (Aug. 31, 2004), http://ecosystems.noaa.gov/docs/appendix_h_farrow_presentation_9_1_04.pdf.

28 *See, e.g., id.*

29 *See, e.g.*,16 U.S.C. § 1451(a).

30 *Id.* at § 1455(d).

31 *Id.* at § 1453(10).

32 *Id.* at § 1453(18).

Conservation measures often are overlooked as "uses." To give weight to these activities in decision-making procedures concerning the coastal zone, a conservation measure should be classified as a permissible "use" in state programs. One way to encourage this practice is to further define land and water uses in the CZMA. "Land use" could be redefined to read, ***"conservation, development, or other*** activities which are conducted in, or on the shorelands within, the coastal zone." Likewise, "Water use" could be defined as, ***"conservation, development, or other activities*** conducted in or on waters within the coastal zone."

4. COLLABORATE, ADDRESS CUMULATIVE IMPACTS, AND MAKE TRADEOFFS

In addition to requiring the development of a plan to get a CZM program approved, Congress may want to consider changing the program approval requirements to encourage states to tackle three governance challenges: addressing cumulative impacts; making tradeoffs among different ocean uses; and coordinating management decisions, including interstate coordination when appropriate.

The CZMA requires that a state management program meet a number of specific criteria before NOAA may approve the program and the state may begin receiving federal funds.[33] Meeting these criteria does not necessarily require or lead to an ecosystem-based approach; however, certain aspects of EBM are already present in them.

Most notably, the CZMA requires that a state coastal zone management program be coordinated with other governmental entities. The program must have been developed and adopted "with the opportunity of full participation by relevant Federal agencies, State agencies, local governments, regional organizations, port authorities, and other interested parties and individuals, public and private."[34] It must describe the responsibilities and interrelationships of local governments as well as area-wide, state, regional, and interstate agencies in the management process; must contain a mechanism for continuing consultation and coordination with these governments and agencies; and must comply with local, area-wide, and interstate plans.[35]

Other EBM-pertinent criteria for approving a coastal management program include guidelines on priorities of use in certain areas, procedures for the designation of preserves and restoration areas, and requiring the state to designate a lead organization to implement its program.[36] Also of import, the CZMA requires the states to have authority "to administer land use and water use regulations to control development … and to resolve conflicts among competing uses."[37] While quite comprehensive, in practice these criteria leave significant freedom to the states to devise precisely how to structure and implement coastal management programs. Depending on those decisions, the end result may contain many aspects of EBM or very few.

Interstate Coordination

Congress could further promote EBM by rewording and adding to the existing approval criteria when reauthorizing the CZMA. From an EBM perspective, one limitation of the CZMA is that it confines each state's management framework to the boundaries of that state, somewhat isolated from what is occurring in neighboring states (or in federal waters). The current CZMA has a few criteria that begin to overcome this interstate jurisdictional obstacle. Most prominently, Section 306(d)(3) requires the state to coordinate with any existing interstate plans and agencies.[38] But these criteria still ignore the individual programs and plans of other states. It seems unlikely that the CZMA could be transformed into a multi-state program rather than a state-bounded one without major legislative changes; however, the Act could require greater state-to-state coordination with regard to shared ecosystems.

For example, Congress could reword Section 306(d)(3)(A) to require that "(3) The State has–(A) coordinated its program with local, areawide, and interstate plans ***as well as the plans and programs of other coastal states that are applicable to geographic areas affecting the State's coastal zone*** … and (ii) which have been

33 *Id.* at § 1455(d).
34 *Id.*
35 *Id.*
36 *Id.*
37 *Id.* at § 1455(d)(10).
38 *Id.* at § 1455(d)(3).

developed by a local government, an areawide agency, a regional agency, ***a state government***, or an interstate agency." The advantage of this approach would be its emphasis on considering the plans and programs of other states; but it would remain a one-time planning requirement that lacks substantive enforcement.

Congress also could reword Section 306(d)(3)(B) to require that "(3) The State has–(B) established an effective mechanism for continuing consultation and coordination between the management agency designated pursuant to paragraph (6) and with local governments, ***adjacent state governments***, interstate agencies, regional agencies, and areawide agencies within the coastal zone to assure the full participation of those governments and agencies …" The advantage of this approach is that it would set in place an expectation of long-term collaboration among the states that share coastal ecosystems; however, it still would be a planning requirement that lacks substantive enforcement.

A third option, and the strongest of the three in a legal sense, would be to create a formal interstate consistency requirement, similar to the existing federal consistency review (described in the next section). The CZMA could require states' actions to be consistent with the enforceable policies of the adjacent states for issues that are identified in the ecosystem assessment as being regional or transboundary in nature. To ensure that this provision addresses the proper issues and does not overreach in its authority, the transboundary ecosystem issues should be explicitly identified in the ecosystem assessment.

Consideration of Cumulative Impacts

Another characteristic of effective ecosystem-based management is the consideration and minimization of cumulative impacts to the ocean and coastal zone that occur over time and across different uses and sectors. The CZMA does not expressly require state programs to consider cumulative impacts, but it does allow for coastal zone enhancement grants to help states address cumulative impacts.[39] And the California program authorized by state law, the California Coastal Act, must consider cumulative impacts when siting new development, reviewing local program amendments, and reviewing proposed certified port master plans.[40]

Consideration of cumulative impacts has been required, applied, and litigated and interpreted under other federal environmental statutes. For example, the National Environmental Policy Act (NEPA) requires federal agencies to consider cumulative impacts, defined as "the incremental impact of the [proposed] action when added to other past, present, and reasonably foreseeable future actions,"[41] in determining the scope of an environmental impact statement.[42] In this context, courts have accepted that the availability of data can be a limiting factor in cumulative impact analyses, but they have required that an agency at least attempt to address cumulative impacts where appropriate, regardless of data availability.[43]

The long experience of cumulative impact analyses under NEPA also offers instruction on how such analyses should be accomplished. Congress could require states to have mechanisms in place to conduct robust cumulative impact analyse in the coastal zone. For example, a new CZMA cumulative impacts provision could require the state to: (1) choose a natural or ecologicallysustainable condition as the baseline for comparison; (2) include scientifically defensible and practical thresholds for degradation; (3) identify what projects are close in time or distance, no matter the sector; (4) evaluate the probability of projects and impacts affecting each other; (5) identify other actions likely to accompany the project and ways that the activity may alter ecological processes; and (6) consider all resources likely to be susceptible given the location and nature of the activity.[44]

To further promote responsible decision-making regarding cumulative impacts, Congress could require states

39 *Id.* at § 1456b(5).

40 CAL. PUB. RES. CODE §§ 30250, 30514(d)(1), 30716(c)(1).

41 40 CFR § 1508.7.

42 *Id.* at § 1508.25(a)(2).

43 Michael D. Smith, Recent Trends in Cumulative Impact Case Law, Presented at the National Association of Environmental Professionals Annual Conference 8 (Apr. 16-19, 2005). The Ninth Circuit, for example, has ruled against agencies on multiple occasions on this issue, usually upon a finding that the agency inadequately analyzed the past, present, and reasonably foreseeable future actions or that the data and rationale used in the analysis were inadequate. *Id.*

44 These elements are drawn from: U.S. ENVTL. PROT. AGENCY, CONSIDERATION OF CUMULATIVE IMPACTS IN EPA REVIEW OF NEPA DOCUMENTS (1999).

to adopt the precautionary approach into their respective management programs. Under this approach, precautionary measures are taken for activities that raise threats of harm to environmental or human health, even if the cause and effect relationships are not fully scientifically established. The precautionary approach shifts the burdens of incomplete science onto proponents of activities that have a threat of harm, requiring proponents to demonstrate that the potential harm is minimal or non-existent. In addition to providing greater security for coastal resources, adoption of the precautionary approach likely would encourage greater scientific research into cumulative impacts, since project proponents would need that information to receive project approval.

Thus, Section 306(d), which sets the requirements for state program approval, could be rewritten to read: "Before approving a management program submitted by a coastal state, the Secretary shall find the following: … ***(17) The management program provides for adequate consideration of the cumulative impacts of any action on coastal resources, and employs a greater margin of safety the more incomplete the available scientific information is about a potentially harmful action."*** A more robust statutory requirement could expressly include the six elements of cumulative impact analysis listed above.

Resolution of Trade-Offs Among Different Ocean and Coastal Uses

Making trade-offs among different ocean uses can be accomplished through a suite of approaches. At the outset, the CZMA could require states to prioritize ocean uses in different areas in its coastal zone plan. Like the designated water-body uses under the Clean Water Act, some areas could list ocean and coastal industries as a priority use, while other areas could have recreation or conservation as priority uses. Development of an ecosystem plan with designated priority uses could be based on consensus among the state agencies developing the plan, and the CZMA could require agencies to adhere to the planned uses or otherwise provide an explicit rationale to the state legislature and public as to why they deviated from the plan.[45]

Even with these prioritizing mechanisms in place, there is likely to be disagreement among stakeholders, and potentially among agencies, during implementation of the program. This in turn requires dispute resolution mechanisms to serve as a backstop when cooperation fails. Ideally, cooperation and mediation among stakeholders would precede conflict resolution by the state, but the former route is not always attempted or successful.

The current CZMA does require the participating state, through its agencies, to have the authority "to resolve conflicts among competing uses."[46] However, it does not require the state to have an established mechanism or policy basis for how it resolves these conflicts. One approach is that authorized by the California Coastal Act: "conflicts [shall] be resolved in a manner which on balance is the most protective of significant coastal resources."[47] Similar qualitative language could be included for all states in the reauthorized CZMA.

Alternatively, more quantitative mechanisms for conflict resolution, including multiple criteria analysis (MCA), integrated ecosystem assessment (IEA), and ecosystem service trade-off analysis, currently are being developed and refined. MCA assigns weights to identified ecosystem criteria based on their relative importance, runs these weighted criteria through a decision-making matrix for each management option, and reveals an ideal trade-off scenario from the outputs of the matrix. IEA establishes goals and indicators for key ecosystem criteria, analyzes the risk of human activities and natural processes to those indicators, and from that framework evaluates management options based on modeling and simulated ecosystem responses.[48] Ecosystem service trade-off analysis borrows from decision theory and economics, using graphical representations of the relationship among two or more services to identify 'compatible' services with win-win management strategies from among inferior management options.[49] It also demonstrates the cost of using single-

45 This type of approach is used in North Carolina for the development and implementation of the Coastal Habitat Protection Plan as mandated under the Fisheries Reform Act. *See* N.C. GEN STAT. § 143B-279.8.

46 16 U.S.C. § 1455(d)(10)(A).

47 Cal. Pub. Res. Code § 30007.5.

48 *See* Phillip S. Levin, *Integrated Ecosystem Assessments: Developing the Scientific Basis for Ecosystem-Based Management of the Ocean*, 7 PLoS Biology 1, 2-3 (2009).

49 Personal Communication with Sarah Lester, Project Scientist, Marine Science Institute, University of California, Santa Barbara (Jan. 21, 2009).

sector management when there are important interactions among services.[50]

Upon CZMA reauthorization, Congress could add a new provision in Section 306(d) that specifically identifies and requires one or more of these trade-off mechanisms, requires a general provision like that in California law; or simply states "Before approving a management program submitted by a coastal state, the Secretary shall find the following: … ***(17) The management program identifies -- (A) a mechanism for resolving conflicts between competing uses in a manner that accounts for the needs of the ecosystem as a whole; and (B) the agency or agencies responsible for administering this mechanism."***

5. USE THE SPECIAL AREA MANAGEMENT PROGRAM TO PROMOTE LOCAL ECOSYSTEM-BASED MANAGEMENT

In addition to authorizing state management programs, the CZMA provides funding for specific coastal zone enhancement projects, including preparing and implementing Special Area Management Plans (SAMPs).[51] The CZMA defines a SAMP as "a comprehensive plan providing for natural resource protection and reasonable coastal-dependent economic growth containing a detailed and comprehensive statement of policies; standards and criteria to guide public and private uses of lands and waters; and mechanisms for timely implementation in specific geographic areas within the coastal zone."[52] A SAMP often supplements a state program, addressing specific management goals in a particular coastal area.

In practice, some SAMPs have many characteristics of EBM, incorporating science in decision-making and addressing cumulative impacts, tradeoffs, and accountability through the collaboration of relevant parties. Often, a single unifying environmental issue drives cooperation among governments, stakeholders, and other key participants who are important to solving the problem in the geographic area.

For example, in an effort to preserve the Dragon Run Watershed in Virginia, four counties and the Middle Peninsula Planning District Commission signed a memorandum of agreement to participate in a SAMP and to consider the recommendations of the Dragon Run Steering Committee, which consists of landowners and local elected officials.[53] Similarly, the Northampton County SAMP in Virginia is designed to preserve migratory bird habitat and create sustainable industries along a section of the coast. Northampton County, the Virginia Coastal Program, NOAA, the Accomack-Northampton Planning District Commission, the Virginia Department of Conservation and Recreation's Division of Natural Heritage, the Virginia Department of Game and Inland Fisheries, and many local stakeholders have all engaged in the planning and management of this SAMP.[54]

SAMPs also are scalable. While most SAMPs completed to date cover a relatively small area, SAMPs offer a potential mechanism for state-wide and regional planning. Presently, the Rhode Island Coastal Resources Management Council is developing an Ocean SAMP that covers most, if not all, state marine waters as well as federal waters off the coast of Rhode Island. In this instance, the SAMP offers a means by which state and federal agencies coordinate marine planning in hopes of expedited approval procedures and long-term enforcement of the plan by all parties. SAMPs also may serve as building blocks for EBM, each SAMP playing a role in a larger, comprehensive coastal management strategy.

The CZMA definition of SAMPs is broad enough to include many traits of EBM. To explicitly encourage or mandate EBM approaches upon reauthorization, Congress could add language to the CZMA that further advances elements of EBM within each SAMP. NOAA has created a list of characteristics of effective SAMPs, many of which reflect EBM principles. Among these are identifying and including key participants in the planning process, identifying and articulating specific plan objectives as early as possible, and designating a leader or lead agency.[55]

50 *Id.*
51 *See* 16 U.S.C. § 1456b(a)(6).
52 *Id.* at § 1453(17).
53 *See* Memorandum of Agreement between Middle Peninsula Planning District Commission; County of Essex, Virginia; County of Gloucester, Virginia; County of King and Queen, Virginia; County of Middlesex, Virginia to Participate in the Dragon Run Watershed Special Area Management Plan, Aug. 1, 2002.
54 Virginia Department of Environmental Quality, SAMP Descriptions, at http://www.deq.virginia.gov/coastal/documents/sampdesc.pdf.
55 Nat'l Oceanic and Atmospheric Admin., In Depth: Understanding Special

Such details regarding SAMPs could be added to their definition in Section 304 of the CZMA, for example, by amending it to read: "The term 'special area management plan' means a comprehensive plan, ***established and supported by key public and private parties with decision-making authority***, providing for natural resource protection and reasonable coastal-dependent economic growth containing a detailed and comprehensive statement of ***enforceable and non-enforceable*** policies; standards and criteria to guide public and private uses of lands and waters; ~~and~~ mechanisms for timely implementation ~~in specific geographic areas within the coastal zone~~; ***and geographic boundaries that will fully address pertinent issues."*** These details also could be added to the references to SAMPs in the Section 303 declaration of national policy or in Section 309 regarding coastal zone enhancement grants.

Perhaps more importantly, Congress could better promote the use of SAMPs. One of the six national policies declared by Congress in the CZMA is "to encourage the preparation of special area management plans."[56] Yet, apart from that reference and its definition, SAMPs are mentioned only once in the CZMA, as a form of state program approved to receive federal funding under Section 309. A greater emphasis on SAMPs through increased funding, federal technical assistance, and streamlined approval processes for funding would promote EBM and the declared national policy.

Since SAMPs embody most characteristics of EBM, the CZMA could better reflect EBM if Congress amended the Act to require that states include SAMPs in their coastal management programs. Presently SAMPs are optional, and despite the federal financial incentives for undertaking such projects, numerous coastal states still do not use them as part of their coastal management efforts. But a review of successful SAMPs suggests that they are more effective when constructed from the bottom up, rather than imposed by a higher authority, so requiring that states develop SAMPs may not be the best approach. Instead, the CZMA should require that SAMPs be an available tool in the coastal management kit, in other words that it be a viable option in all approved state programs. To this end, Congress could amend Section 306(d) of the CZMA to read "Before approving a management program submitted by a coastal state, the Secretary shall find the following: … (2) The management program includes each of the following required program elements: … ***(J) Guidelines for preparing and implementing special area management plans."***

Additionally, applying a SAMP-like area-based approach to other sections of the CZMA would spread EBM principles and likely make state programs more effective. For example, Section 306(d)(9) requires that state programs include procedures for designating areas of recreational, ecological, historical, or aesthetic value for preservation and restoration.[57] This provision indicates where conservation programs should occur and what the objectives should be, but not how they should be accomplished. Emphasizing key party involvement, enforceable land-use policies, and geographic boundaries that will comprehensively address the pertinent issues likely would improve the effectiveness of this provision. Similarly, Section 306(d)(13) requires "specific and enforceable standards to protect [coastal resources of national significance],"[58] but these "standards" could be more effective if explicitly framed as a SAMP-like approach.

6. MAINTAIN FEDERAL CONSISTENCY

A primary reason for the widespread participation of states in the CZMA has been the delegation to each state with an approved program of limited authority to ensure that the federal government abides by the program's enforceable policies. This "federal consistency" authority covers actions by federal agencies, state or local government activity conducted with federal assistance, and any activities under a federal license or permit "affecting any land or water use or natural resource of the coastal zone."[59]

Area Management Plans, *at* http://coastalmanagement.noaa.gov/issues/special_indepth.html.

56 16 U.S.C. § 1452(3).

57 *See id.* at § 1455(d)(9).

58 *Id.* at § 1455(d)(13).

59 *Id.* at §§ 1456(c)(1)(A), 1456(d), 1456(c)(3)(A).

It also covers any plan submitted to the Secretary of the Interior "for the exploration or development of, or production from, any area which has been leased under the Outer Continental Shelf Lands Act."[60] Thus, the language of the current CZMA covers most of the various federal actions that may affect a state's coastal zone, including NPDES permits, USDA rural development grants, Coast Guard licenses for deepwater port construction, FWS funding for wildlife management plans, and many others.[61]

A state coastal plan has little chance of successful implementation if it cannot affect the sources of coastal degradation, whether those sources be federal, state, or local. But a state's authority to regulate federal actions is only as extensive as the enforceable policies in its state program. Guidelines and other non-binding regulations do not qualify for federal consistency enforcement. Hence, states already can increase their authority over federal actions by expanding the number and breadth of their enforceable policies.

For example, the Massachusetts Coastal Zone Management Program could have greater control over federal influences on growth if it converted its three non-enforceable growth management principles into enforceable policies.[62] This incentive to make state policies enforceable so as to establish oversight of pertinent federal activity is doubly beneficial for EBM, as both governments then must comply with comprehensive management requirements. Therefore, federal consistency is critical to both the widespread participation of states in the CZMA and the potential for advancing EBM under the CZMA.

Not only is it important for federal consistency to remain intact in the CZMA, but the states also must capitalize on the opportunities that it presents. However, this does not preclude the federal government from playing a role in further incorporating EBM into the CZMA's federal consistency provisions. In 2003, NOAA changed a few of the regulations governing federal consistency in an effort to improve data sharing and procedural efficiencies.[63] These changes included mandating a greater level of information specificity for federal license or permit activities, creating a "General Negative Determination" for repetitive activities that do not have coastal effects, and clarifying the scope of a "federal license or permit" and an agency "function."[64]

Congress has an opportunity to achieve similar objectives in the course of CZMA reauthorization. For example, Congress could require that a standardized suite of federal activities always be reviewed by the states,[65] simplifying the consistency review process by clarifying that in every instance these specific activities must be reviewed. Additionally, Congress could establish mechanisms that increase states' use of federal consistency review as a tool for program implementation.[66]

60 *Id.* at § 1456(c)(3)(B).
61 See, e.g., DEP'T OF ENVTL. QUALITY, FEDERAL CONSISTENCY INFORMATION PACKAGE FOR VIRGINIA COASTAL RESOURCES MANAGEMENT PROGRAM 15-17.
62 *See* Mass. Office of Coastal Zone Mgmt., Coastal Zone Management Program Policies, *at* http://www.mass.gov/czm/policies.htm.
63 Nat'l Oceanic and Atmospheric Admin., Public Communication Information: Proposed Rulemaking - Coastal Zone Management Act Federal Consistency Regulations 1 (June 11, 2003).
64 *Id.* at 2-3.
65 NAT'L OCEANIC & ATMOSPHERIC ADMIN. AND COASTAL STATES ORG., ENVISIONING THE FUTURE OF COASTAL MANAGEMENT: PRINCIPLES FOR ADVANCING THE COASTAL ZONE MANAGEMENT ACT 11 (2007).
66 *Id.*

CONCLUSION

In its current form, the CZMA includes many concepts that are essential to ecosystem-based management. But by making mandatory some currently optional approaches to coastal management and by adding a few new elements, the CZMA could move in the direction of an EBM framework law. This white paper summarizes six potential approaches to expanding EBM concepts in the CZMA, which include:

(1) Requiring ecosystem assessments and supporting the means for their completion;

(2) Requiring the development of state coastal zone plans based upon ecosystem assessments;

(3) Updating statutory definitions to consider the ecological boundaries of the inland coastal zone, and explicitly recognizing conservation as a "use";

(4) Requiring a more integrated management approach through interstate collaboration and consistency, assessment of cumulative impacts, and establishment of mechanisms to make tradeoffs among competing or conflicting uses;

(5) Further developing the special area management program to incorporate EBM principles and be more widely used;

(6) Maintaining federal consistency and encouraging greater state usage of it.

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