Casting Off the Chains that Bind Us to Ineffective Ocean Management: The Way Forward

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INEFFECTIVE OCEAN MANAGEMENT

Coastal nations and coastal communities have been struggling with how to manage our use of and impacts on the oceans for some time. Yet for far too long we have been stuck in a paradigm that has us investing great amounts of time and money in ineffective management of ocean resources and space. We have boosted efforts to manage, indeed, but primarily by throwing more money at escalating problems, hoping that any inefficiencies will be resolved purely by increased funding. Our current paradigm is built on the false assumption that the seas are just like the land, but wetter. Related to this is the systemic problem of focusing our management on provision of goods (as if we were dealing with agricultural lands) as opposed to ecosystem services, which in the conglomerate are ultimately much more important. It is as if we were obsessed with the look of things, the structure, as opposed to the function and how well they work. This conventional yet misguided approach is also bolstered by fear: fear of the unknown, fear of new tools, approaches, and even perspectives, and fear of failure. The end result has been discord between users, between nations, and between those who look to our small-scale successes and say everything is fine, and those who look at the big picture and say alas, it is not. We are desperately in need of a way forward that will unite fractious management interests to work towards common goals.

The first step in that new direction is recognizing where we are now and how we got there. But this is not an easy task, and as any middle school student can tell you, history is not truth but rather an individual's accounting of events, with the most entertaining accounting always involving extreme viewpoints. On the subject of the history of ocean management, we have those who point to the proliferation of coastal management plans, regulatory frameworks, and fisheries agreements, to

Ocean Yearbook 22: 1–17.

bolster the argument that the oceans are receiving all the good care they need. On the other, we have doom and gloom, with projections of imminent collapse of all the world's fisheries, ever-expanding dead zones and extensive eutrophication, dying and disappearing coral reefs, melting ice caps and resulting shifts in currents, sea level and ocean productivity.[1] Indeed the truth lies somewhere in the middle, but that middle ground is not easy to find, and it certainly doesn't make for as good a story.

Fortunately, we do have sober assessments of how we are doing when it comes to the oceans, and how our impacts have ramifications for our future use of ocean and coastal resources and space. The Millennium Ecosystem Assessment, the first ever global assessment of ecosystem services and their connection to human well-being, is a good example. The 2005 Assessment represents the scientific consensus of over 1,300 researchers from 95 countries around the world, and provides a stark view of the extent to which humans have already compromised their well-being by destroying ecosystems and impairing delivery of these essential services.[2] In a related publication, the World Health Organization summarized the human health implications of the loss of ecosystem services.[3] What these assessments highlight about the role oceans play in providing services to humanity is startling—and the plausible futures for sustaining that role alarming.

Coastal and marine ecosystems provide a wide range of services to human beings. Key but generally undervalued services include regulating and supporting services such as shoreline stabilization, nutrient regulation, carbon sequestration, detoxification of polluted waters, and waste disposal; provisioning services such as supply of food (fisheries and aquaculture products), fuelwood, energy resources, and natural products; and amenity services such as tourism and recreation. These services are of high value not only to local communities living in the coastal zone, but also to national economies and global trade.

So it seems we are not doing as well as we should be in managing oceans and coasts, that ecosystem services are being lost, and that human well-being may be at future risk because of it. If this were a business enterprise, members of the board or shareholders would demand that things change. But there is little ocean leadership, and no overarching governance to define our collective goals or to be held accountable. Some

1. See, for instance, the raging debate on fisheries discussed in A. Longhurst, ''Doubt and Uncertainty in Fishery Science: Are We Really Headed for a Global Collapse of Stocks?,'' *Fisheries Research* 86 (2007): 1–5.

2. Millennium Ecosystem Assessment, *Volume 1: Conditions and Trends, Volume 2: Scenarios, Volume 3: Responses* (Washington D.C.: Island Press, 2005), available online: <http://www.MAweb.org>.

3. World Health Organization (WHO), *Ecosystems and Human Well-Being: Health Synthesis* (Geneva, Switzerland: WHO, 2005).

marine conservationists admit that the situation can seem hopeless at times, with the challenges so vast that the good hard work of individuals and organizations is scarcely noticed, and unable to affect serious change.

Perhaps, then, it is time for a rethink. And time not only to take stock and recognize the threats to oceans and thus our own well-being, but to do something about it by accentuating the positive and building upon it. We have reasons for hope, and need merely to rid the shackles that keep us tied to discouragingly ineffective management. We have the basis for the way forward in four crucial areas, including: (1) technological advances—most importantly, technology that facilitates the sharing of information and education; (2) local involvement in decision-making; (3) private sector investment and development of markets; and (4) regional approaches to planning and comprehensive ocean zoning. I'll call these the four pillars of hope—giving reason to believe we can change business as usual and begin to halt the degradation that stems from mismanagement and indifference. This can, I believe, happen—but only as long as we build upon the progress we've already made, and couple it to a much needed perception shift.

For underlying all four of these pillars of hope is a basic shift in perspective—one that views the oceans through the lens that focuses on the crucial ecological services they provide. Not a single good or service, but all the ecosystem services en suite. Some might shudder at what they perceive to be a grossly utilitarian approach—one that doesn't suit the great mystical nature of the seas. But nothing could be farther from the truth, since services include not only provision of goods and maintenance of ecological processes, but also those things we hold most dear yet cannot put a price upon. The ecosystem services perspective allows us to alter the way we manage, affecting all four interrelated elements of good management: the exchange of information from one individual to the next; the participation of individuals and institutions at the community level; the involvement of the private sector; and the integration of all of the above in a regional management context.

THE FOUR PILLARS

Improving Technology and Information Flow

Technology has always been changing the nature of ocean use—ever-increasing access to places and resources. But the sort of advance that has the potential to make the most difference to ocean management isn't engineered—it is knowledge and information. And new information technologies allow greater dissemination of knowledge: knowledge intangibly residing in the minds of ocean users, coastal community leaders,

educators, communicators, academics, research scientists, and policy-makers.

Inadequate management of marine ecosystems and their services, manifested as management that falls short of its own goals, has its roots in both science and sociology. Our scientific understanding of marine ecosystem function lags behind that of terrestrial ecology, and policy-makers are uncomfortable with the uncertainties. We are only beginning to recognize and quantify linkages between various sorts of marine habitats, such as the link between intact mangrove and diverse and productive coral reefs many kilometers away.[4] Less well-known are subject areas like benthic-pelagic coupling and other key areas of marine ecological understanding. At the same time, our understanding of thresholds for stress in various ecosystems remains thin, though we are starting to take stock of the existence of such thresholds, and direct research towards identifying more of them.[5]

Yet we certainly have enough scientific information at our disposal to shift management in a more effective direction. Fisheries management is becoming increasingly sophisticated as fisheries scientists have incorporated more and more elements of ecosystems (including the oft-ignored human element) into their calculus and predictive models. Protected area efforts are becoming much more systematic, with the use of both multi-criteria spatial analysis and decision support tools. Coastal management has benefited from these broadened perspectives and new tools as well. Yet though we are moving in the right direction, we seem hopelessly mired in our sectoral worlds, and communication and cooperation between these three major areas of ocean management is still pitifully low.

Clearly technology, and in particular information technology, constitutes a pillar of hope—and has the potential to radically shift ocean and coastal management, in the following areas: (1) by providing better tools for researching the seas, thus immensely improving data acquisition; (2) by making vast improvements in data management, including the ability to assemble and access huge databases and present complex data in ways that are easily understood by lay people (Geographic Information Systems, for instance); and (3) by changing the ways we assess the health and condition of ocean areas, and communicate those findings to decision-makers.

However, information itself is not what is key—using the information to generate knowledge is.

4. P.J. Mumby, A.J. Edwards, J.E. Arias-Gonzalez, K.C. Lindeman, P.G. Blackwell, A. Gall, M. Gorczynska, A.R. Harborne, C.L. Pescod, H. Renken, C.C. Wabintz and G. Llewellyn, ''Mangroves Enhance the Biomass of Coral Reef Communities in the Caribbean,'' *Nature* 427 (2003): 533–536.

5. See, for instance, Millennium Ecosystem Assessment, n. 2 above, *Volume 1 Conditions and Trends* Ch. 28: Synthesis: 834–835.

As Bonnie McCay has pointed out, whereas information can be scientific, knowledge is social.[6] We stand today on a threshold of knowledge generation incomparable to the past: people are connected as never before, and that flow from data to information to knowledge has gone from a trickle to a tidal wave. We have ever-increasing ability to access all sorts of information thanks to the Internet, and some of that information has been well-synthesized to form the basis for knowledge. But making the transition from information to knowledge requires education—not just formal education, but the sort that occurs within families, within religious institutions, and within other social networks. Importantly, there are virtual organizations like the World Ocean Observatory, which grew directly out of a major recommendation of the World Commission on Oceans, providing vital information synthesis and portals on all aspects of marine conservation, maritime history and the arts, ocean sciences, and coastal zone law and policy.[7]

One might argue that even knowledge cannot get us to where we would like to be, or in fact need to be—that what is really needed is not knowledge, but wisdom. Taking data and information and knowledge and using it wisely can be considered what underlies great leadership, and great leadership is quite obviously lacking in ocean management. However, those knowledge gaps and uncertainties that have in the past been used by decision-makers as excuses for inaction are becoming acceptable as excuses each and every day. The opportunity exists now for leadership to emerge, as there is now little room to hide, and every reason to rise to the occasion. This brings us to a second pillar of hope—that nursery ground for good leadership in coastal management and corollary good governance—the coastal community.

Increasing Local Involvement

Humans have recognized the value of coastal ecosystems for millennia, and even today's pattern of population reflects the extent to which people have and continue to take advantage of ecosystem services coasts provide. Coastal populations are not spread evenly throughout the coastal zone: the majority of the people live close to the sea, with more than half within 25 kilometers. Coastal population densities are nearly three times that of inland areas: in 2000, population density in coastal areas was 99.6 people per square kilometer, while in inland areas density was 37.9 people per square

6. B. McCay, ''The Littoral and the Liminal; Or, Why It Is Hard and Critical to Answer the Question 'Who Owns the Coast?','' Keynote address, MARE Conference 2007, People and the Sea IV.

7. See the World Ocean Observatory website online: <http://www.thew2o.net>.

kilometer.[8] At the turn of the millennium, half of the world's major cities (those with more than 500,000 people) were found within 50 kilometers of a coast. Growth in these cities since 1960 was significantly higher than in inland cities of the same size.

Not only are population pressures high relative to those in many other ecosystems worldwide, but the bulk of those pressures stress many of the most ecologically important and valuable ecosystems within coastal zones. Some 71 percent of the world's coastal people live within 50 kilometers of a major estuary, 31 percent live within 50 kilometers of a major coral reef system, 45 percent live within 50 kilometers of mangrove wetlands, and 49 percent live within 50 kilometers of significant seagrass ecosystems.[9] This is not accidental, of course—these habitats and the ecosystem services they provide present many of the ''pull'' factors that resulted in initial settlement along a coast as well as subsequent migration to it. Historically, settlements first inhabited the sheltered areas near estuarine bays (many with associated mangrove and seagrass) and reef-protected coasts and only later expanded to other coastal areas.

Dependence on coastal zones is increasing around the world, even as costs of rehabilitation and restoration of degraded coastal ecosystems is on the rise. Currently nearly 40 percent of the global population lives within the thin band of coastal area that is only 5 percent of the earth's terrestrial area. In part, this is because population growth is happening simultaneously with increased degradation of terrestrial areas (fallow agricultural lands, reduced availability of freshwater, desertification, and armed conflict all contributing to decreased suitability of inland areas for human use). Resident populations of humans in coastal areas are rising, but so are immigrant and tourist populations.[10] Industries exploit coastal resources of all kinds, including fisheries resources; timber, fuelwood, and construction materials; oil, natural gas, strategic minerals, sand, and other nonliving natural resources; and genetic resources. In addition, people increasingly use ocean areas for shipping, security zones, recreation, aquaculture, and even habitation. Coastal zones provide far-reaching and diverse job opportunities, and income generation and human well-being are currently higher on the coasts than inland.[11]

8. R. Kay and J. Alder, *Coastal Planning and Management* 2d ed. (London: Taylor and Francis, 2005).

9. Millennium Ecosystem Assessment, n. 2 above, Chapter 19: Coastal Systems and Coastal Communities, *Volume 1: Conditions and Trends.*

10. World Resources Institute (WRI), *Pilot Analysis of Global Ecosystems: Coastal Ecosystems* (Washington, D.C.: WRI, 2001).

11. Millennium Ecosystem Assessment, n. 2 above, Chapter 19: Coastal Systems and Coastal Communities, *Volume 1: Conditions and Trends.*

At the same time, the common pool resource nature of fish and other resources, and the open access to ocean space, fuels conceptions about unalienable rights and privileges that are difficult to overcome.[12] Many sectors of society feel they have a right to use, and even damage, coastal and marine ecosystems, because those ecosystems ''belong to them''. In such a sociological climate, cheating the system of regulation is often overlooked, or even worn as a badge of honor. In addition, coastal and particularly offshore areas are difficult to monitor. Surveillance under the water or far out to sea is prohibitively costly, while at the same time, technology has provided users with ever-expanding access to resources.[13]

Despite these challenges, there is great potential in fostering ocean management, decision-making, and leadership creation at the local level. Coastal communities have ever-greater reliance on the coasts and oceans. This reliance can be transformed into stewardship if users are given the opportunity, since a key component of responsible behavior is the recognition of how such behavior is to one's own benefit. Stewardship means participation in decision-making and management, but it also means taking on the responsibility for care. This, in my opinion, is best achieved through local involvement in all forms of governance, including not just ''government'', but also civil society and the private sector.[14]

The interesting and new development in ocean management is thus not increasing stakeholder involvement, *per se*, but rather increasing *local* stakeholder involvement. Rather than being the recipients of plans for management of local coastal and marine areas, local communities and institutions have become active participants in goal-setting, planning, management, monitoring, enforcement, and evaluating outcomes.

The emerging sea change in participatory management down to the local level (or perhaps ''back down to the local level'' would be more correct) is exemplified in ways too extensive to treat comprehensively here. But a few examples can point to how differently this local involvement manifests itself. For instance, there is the growing movement of communities hiring watchdogs to monitor compliance with existing pollution and/or fishing regulations, and to publicly blow the whistle when infractions occur,

12. S. Curran and T. Agardy, ''Common Property Systems, Migration, and Coastal Ecosystems,'' *Ambio* 31, 4 (2002): 303–305; see also Curran, S. and T. Agardy, ''Considering Migration and Its Effect on Coastal Ecosystems,'' *in* J.D. Unrun, M. Krol, and N. Kliot, eds. *Environmental Change and Its Implications for Population Migration,* Volume 20 in *Advances in Global Change Research* (Dordrecht, The Netherlands: Kluwer Academic Publishers, 2004): 201–230.

13. C. Birkeland, ''Ratcheting Down the Coral Reefs,'' *Bioscience* 54 (2004): 1021–1027.

14. S. Olsen et al., 2006. *A Handbook on Governance and Socioeconomics of Large Marine Ecosystems* (University of Rhode Island, Coastal Resources Center), 103 pp.

such as occurs with the pooling of community funds to underwrite the salary and expenses of a ''Soundkeeper'' in Long Island Sound (U.S.A.). Local non-governmental organizations and even ''unorganized'' community institutions are taking on the stewardship of marine protected areas all over the world, from Mafia Island in Tanzania and Apo Island in the Philippines to Abrolhos Marine Park in Brazil. Local community groups have begun to foment the development of voluntary coastal and marine zoning plans, such as is occurring in the San Juan Islands of northwestern United States. Community development banks, providing loans to underinvested communities in order to reinvigorate local economies and create healthier local environments, are springing up in developing and developed countries alike.[15]

Localized decision-making and co-management can pave the way to better governance, and clearly better governance of coastal and ocean areas is needed. Municipal and other local governments are strengthening in power, and in their ability to influence environmental and public policy at broader levels of government as well (note how the State of California, for instance, has affected U.S. national energy and environmental policy, providing leadership through example). Divesting power and authority to the local level in an effort to find ways to co-manage is not something most governments are in a rush to do, yet this fear must be overcome. We cannot expect to build on this key pillar and achieve the forward momentum we need without finding ways to share responsibility and adopt differing but complementary roles of management for communities and for governments.

At the same time, local involvement also allows for better governance beyond government, such as creating and sustaining truly effective, goal-oriented and streamlined non-governmental institutions. And the engagement of the private sector, which will be discussed in greater detail in the following section, can also be strongly catalyzed at the local level, through chambers of commerce, trade associations, and individual companies with vested interests in sustaining the local environment.

Local efforts to better ocean management will not add up to much, however, unless small-scale and disparate local efforts are systematically guided along a process which aims for a whole that is vastly greater than the sum of its parts. In donor circles, there is much discussion about whether ''letting a thousand flowers bloom'' has more chances for success than directing significantly more funds into fewer projects of much larger scale. A parallel exists here: we have witnessed that the great amount of investment of time and effort into small-scale advocacy campaigns, marine

15. See, for instance, the article on ShoreBank, which operates in the U.S. online at: <http://www.ens-newswire.com/ens/aug2007/2007-08-27-03.asp>.

protected areas, consumer choice initiatives, stock-by-stock fisheries management, pollution control, and national regulations to protect endangered habitats and species is not making enough of a difference. I would argue that all these valid efforts need to be guided by institutions that can keep the big picture in mind.[16] While many are clamoring for a new direction, in whatever form it must take to improve ocean management, global fora and agreements are in all likelihood too large scale to make this practical, and have only limited influence on what actually happens at the site level.[17] Regionally guided efforts, however, have better chances for success to make coastal and ocean management integrated, comprehensive, and effective.[18] Countries within a region understand the shared nature of natural resources and environmental problems alike, are usually affected by the same drivers and can work together more efficiently than singly to address them, and often have cultural affinities that make negotiation and cooperation easier to achieve.

Engaging the Private Sector

With the exception of the highly regulated energy industry, the private sector has to date avoided becoming involved in management of the oceans. That is, while industries such as commercial fisheries and shipping have been granted use privileges, there has been little private sector interest in investing in coastal and ocean management measures to sustain the benefits that well-managed ecosystems could provide. This is true for myriad reasons: (1) there is an enduring assumption that the public sector will manage ocean resources and space sufficiently, (2) without the development of markets, the vast majority of social and economic values associated with coastal and ocean areas remain unaccounted for in capital market transactions, and (3) the very nature of oceans with its common property regime has required innovative new approaches to involving the private sector that are untested at large scales. Yet the very void in ocean-based markets points to immense opportunities for both improving ocean management and doing so profitably.

16. See T. Agardy, ''Global Marine Policy Versus Site-Level Conservation: The Mismatch of Scales and Its Implications,'' Invited paper, *Marine Ecology Progress Series* 300 (2005): 242–248, for a more detailed discussion of linking large-scale and local-scale conservation.

17. See a discussion of the inherent limitations of global agreements put forward by G. Speth in *Red Sky at Morning* (New Haven, CT: Yale University Press, 2004).

18. See L. Kimball's *International Ocean Governance: Using International Law and Organizations to Manage Marine Resources Sustainably* (Gland, Switzerland: IUCN, 2001).

Much of what people value in the coastal zone—natural amenities (open spaces, attractive views), good beaches for recreation, high levels of water quality, protection from storm surges, and waste assimilation/nutrient cycling—is provided by key habitats within coastal systems. Coastal housing values are strongly correlated to characteristics such as ambient environmental quality (proximity to shoreline, for example, or water quality).[19] These coastal values also underlie much of the world's coastal and marine tourism.

Coastal areas support marine capture fisheries which have been valued at more than US$34 billion annually, and also provide the foundation for the mariculture (marine aquaculture) industry, which uses coastal space or relies on wild stock to produce valuable fisheries products, from tiger prawns to bluefin tuna. Human reliance on farmed fish and shellfish is significant and growing. Global annual per capita consumption of seafood averages 16 kilograms, and one-third of that supply currently comes from aquaculture. Globally, aquaculture is the fastest growing food-producing sector, with production rates doubling in weight and value from 1989 to 1998.[20]

.Landscape features and ecological processes within the coastal zone also provide critical natural services that contribute to human well-being and have significant economic value..... These non-market values often exceed market values. For instance, studies suggest that while shrimp farms created from converted mangrove can yield US$200 a hectare in providing space for aquaculture, intact mangroves are estimated to be worth US$1,000 a hectare in the totality of services they provide. In Thailand, the conversion of mangroves to shrimp aquaculture ponds reduced the total economic value of the intact mangroves by 70 percent in less than a decade.[21]

Surveys of how coastal ecosystems are protected show that innovative financing mechanisms that tap into the private sector are very few and far between. With a few exceptions, the protection of these services has generally fallen to the public sector. Government agencies regulate coastal land use, freshwater and wetlands use, maritime activities, resource extraction, and the protection of threatened species and critical habitat. Yet the funds available to manage the coastal and ocean areas, both terrestrial and marine, are generally inadequate. There are inequities in the way coastal areas are managed, such that taxpayers shoulder the costs of protection, while many industries receive an almost free ride in taking

19. This and the following three paragraphs come from the contribution of Matthew Wilson to Ch. 19: ''Coastal Systems and Coastal Communities,'' of the Millennium Ecosystem Assessment <http://www.MAweb.org), n. 2 above.

20. Millennium Ecosystem Assessment, n. 2 above, *Volume 1: Conditions and Trends*, Ch. 19: 531–532.

21. *Id.*

advantage of the benefits coastal ecosystems provide. This indicates that there is much room for a dramatic shift in the engagement of business in ocean management.

We have the foundations in place upon which to build upon this pillar. There are already good examples of public/private partnerships in conservation, albeit all small scale and most having to do with single transactions as opposed to the development of markets. In some places, municipal governments team with the local chambers of commerce to protect coastal wetlands beyond what is required under national law. Environmental organizations commonly execute the kinds of surveillance, ecological monitoring, and use surveys that would normally be under the purview of government or other management agencies. In the Florida Keys (U.S.A.), for instance, The Nature Conservancy has a long tradition of patrolling Florida Bay using trained volunteers, who notify authorities of regulation infractions, and who do simple ecological and resource use monitoring. In another example, an independent non-governmental organization undertakes patrols in Port Honduras' marine reserves. In some cases the organizations are subsidized by government funds, but in most cases, private monies are funneled through to allow fiscal co-management with under-funded government agencies otherwise unable to execute their environmental mandates.

As recognition of the value of ecosystem services grows, new sources of potential market demand are emerging for ecosystem services. Payments for ecosystem services markets are expanding rapidly on land, and there is growing awareness of market potential for carrying this seaward among business, investment and conservation communities. The business community is beginning to see real opportunities for moving from single transactions to the full blown development of markets. Some of these markets will likely be modeled on the carbon emissions markets of the European Union and the Chicago Exchange, with polluters buying credits from companies or property owners that have taken steps to reduce water quality impacts.[22] Other markets which are likely to develop include wetlands mitigation-type markets extended into the marine zone, marine biodiversity offsets, marine species banking, and habitat management supported by the very industries that realize the benefits: the fishing industry protecting nursery habitats, for instance, or the tourism industry protecting mangrove for its water filtration and buffering roles. The opportunities are almost as vast as the oceans themselves.

22. Water quality markets have already successfully been developed in Australia and elsewhere; these are riparian in nature. The extension of water quality markets to the sea follows a natural logic, although there is broad recognition that the marine environment poses special challenges with its common property or common pool resources. These challenges are not, however, insurmountable.

Guiding Management on Regional Scales

The vastness of the oceans brings us to another point: piecemeal and fragmented attempts at ocean management can result in wasted time and resources. Oceans differ from land not just in the question of ownership of property, but in their interconnectedness and their dynamics. It really doesn't make sense to manage oceans on scales inappropriate to the scales of the system and the widespread linkages. Regionally guided management seems the very best strategy. By this I mean, while local involvement should be fostered and the power of the individual should be recognized, the collective efforts of small-scale management interventions should be guided by institutions that operate on the regional scale.[23] It is only at the regional scale that the big picture can be developed in a way that is practical for the improvement of ocean management.

The decline of marine and coastal ecosystem services is at times the result of ignorance: people not realizing their actions were causing harm because many of these ecosystems are out of sight, out of mind.[24] But another big reason for mismanagement has been conflict: between various uses, between the cultures of various users, and between jurisdictions charged with management. So while on the one extreme we have ignorance and apathy, on the other we have clashing vested interests. And all along the two extremes we have fragmentation: coastal planners looking almost exclusively at the land side of the coastal zone; watershed management authorities focused on freshwater flows; fisheries managers controlling exploitation of single stocks; shipping authorities influencing ports and ship traffic; navies keenly guarding national security interests; conservationists safeguarding threatened species and bits of reef and wetland; developers and tourism ministries eagerly eying sites for the newest resorts; and bewildered local communities trying to interject their own visions and needs into the mix.

Fragmentation in our approach to governance of ocean and coastal uses has been brought up time and time again as a major constraint to effectively dealing with the growing onslaught of problems and issues. In 1969, the U.S. Stratton Commission highlighted the fractured nature of governance and urged the creation of a fully integrated ocean entity. As

23. Note that I do not use the word ''dictated'', nor is this the hidden meaning of what I am suggesting. Rather, while there are critical roles of individual leaders to carry out conservation and effective management at the local level, there is also a need to coordinate disparate efforts so that the whole is greater than the sum of its parts, and better management occurs. This does not require top-down ''control'', so much as guidance towards common goals.

24. This paragraph paraphrases T. Agardy, ''Soapbox: How Long Will We Resist Ocean Zoning—And Why?,'' *Sea Technology* June 2007: 77.

recently as 2004 with the launch of U.S. Oceans Commission report, and 2007 with the launch of the National Research Council Report entitled ''Increasing Capacity for Stewardship of Oceans and Coasts: A Priority for the 21st Century,''[25] the lingering difficulties in bringing together vested interests to develop strategic and comprehensive plans for oceans were still front and center. But overcoming fragmentation takes political will and compromise among warring parties, such that as long as apathy and conflict weigh down either end of the ocean management spectrum, the search for a balanced center is impeded.

Many believe the most logical response to this apathy, fragmentation, and conflict is a comprehensive and strategic approach that harnesses the good science we already have to guide use so it is sustainable and beneficial to the greatest number of parties (human interests as well as those of other species). Watershed to ocean basin management is one approach, ecosystem-based management of fisheries another. Regional seas programs such as those established by the United Nations Environment Programme provide the geopolitical framework for strategic approaches to conservation and management, though few examples as yet exist of truly functioning regional management bodies (with the exception of regional fisheries management bodies, which have a much narrower mandate than what I am alluding to here).

Perhaps the most powerful tool to bring about this response at the regional level is regional planning that uses ocean zoning as a management tool. Ocean zoning provides many benefits over smaller scale interventions: it can help overcome the shortcomings of small-scale protected areas; it recognizes the relative ecological importance and environmental vulnerability of different areas; it allows harmonization with terrestrial land use and coastal planning; it better articulates private sector roles, responsibilities and market opportunities, and it moves us away from fragmented sectoral efforts to integrated and effective management that fully includes all uses of, and impacts on, the oceans.

How, one might ask, can a tool developed for use on land help us overcome the misguided management approach that views the oceans just like terrestrial areas, only wetter? The answer lies in the scales on which it is planned and the way that it is implemented across the mosaic of private property, common property, and use-restricted landscapes and seascapes. For whereas terrestrial zoning is usually small scale, often within the remit of municipal planning authorities, ocean zoning must recognize the wide

25. Report to be released by the National Academies of Science [U.S.] Oct. 24, 2007; published version will be National Research Council, *Increasing Capacity for Stewardship of Oceans and Coasts: A Priority for the 21st Century* (Washington D.C.: National Academies Press, 2008).

linkages and grand scales of marine and coastal ecosystems, and systematically address uses of and impacts on the marine environment at the scale of entire regions. So, though we are aided by the fact that zoning has occurred on land for decades, ocean zoning will require planning on scales hitherto largely shunned. Those courageous enough to embark on holistic and systematic zoning at the regional scale, incorporating not only large marine ecosystems or regional seas but also adjacent (and ecologically linked) watersheds, will find the investment of time well worth the price.

Not only does ocean zoning seem inevitable, it may inevitably prove to be the kind of paradigm-shifting tool of which marine conservationists have only dreamed.[26] Arguably we have the scientific information we need to employ this crucial methodology. The remaining need is for leadership that understands the value of the ocean zoning tool and is not afraid to use it. Part of this leadership will derive from a change in perspective: one that avoids looking at fisheries, energy, transport, tourism, or conservation in isolation from one another, but focuses instead on the entire suite of services that ocean and coastal areas provide.

Effectively we have in these four pillars of hope the three essential components of good governance: civil society, markets, and government (in this case, governments working together under a regional framework).[27] The remaining leg is something that actually connects the other three in ways that make this foundation for better management possible: information technology, education, and awareness creation. All four pillars, however, can and must be supported by a radical change in the way we view the world more generally, and the oceans and coasts more specifically. This change in perception is described below.

THE FOUNDATION FOR THE FOUR PILLARS OF HOPE: OCEAN MANAGEMENT FROM AN ECOSYSTEM SERVICES PERSPECTIVE

Underlying the movement away from ineffective ocean management is a badly needed perception shift.[28] We must open our eyes to the complex suite of ways in which oceans contribute to life on earth and human well-being, and manage to sustain as much as possible of the entire complement

26. Agardy, n. 24 above.

27. L. Juda, ''Considerations in Developing a Functional Approach to the Governance of Large Marine Ecosystems,'' *Ocean Development and International Law* 30 (1999): 89–125.

28. I am indebted to an anonymous reviewer who pointed out that much of this paper indeed focuses on a necessary perception shift, which recognizes the inclusive value of the oceans and coasts for the immense range of both goods and services they provide.

of benefits. We have been moving in this integrated and holistic direction in coastal (read land near the sea) management for some time now, but even there the focus has been more on goods than services, and rarely has the integrated approach been pushed out to adjacent seas or beyond.

It is a fact of human nature that we are moved to protect only what we value. A perception shift will not require us to abandon this attitude, but rather to recognize the vast value of oceans, with benefits accruing to a wide range of user groups and even non-users of marine resources. Such is the case for myriad ecological services provided by marine and coastal ecosystems. While many of these ecosystems are highly valued for the provision of goods: fisheries products, fuelwood, places to recreate—less well-known is the extent to which marine ecosystem services of all kinds support the lives and well-being of humans the world over. A major challenge is thus ''valuing the priceless'':[29] allowing us to recognize the vital role that ecosystem services play in maintaining life on the planet and human well-being so that management may be oriented to protecting those services.

Coastal communities derive great benefits from intact coastal ecosystems and the provisioning and regulating services they provide. Wetlands such as mangroves and coastal marshes maintain hydrological balances, contribute to freshwater recharge of aquifers, prevent erosion, regulate flooding, and buffer land from storms. Rock and coral reef habitats also buffer land from storms. As the December 2004 tsunami event in Asia and the U.S.'s Hurricane Katrina of 2005 suggest, those coastal areas and islands that have intact marshlands, barrier beaches, mangrove, seagrass, and reef habitats suffer relatively less loss of life and property in the face of natural disaster than those areas with major coastal habitat loss. Coastal and marine ecosystems present a complex web of goods and services, perhaps more so than any other major ecosystem type.

Yet we do not manage our uses to protect these vital services. Conventional management of ocean areas is currently inadequate and innovative mechanisms that utilize free market or co-management principles have yet to be broadly applied.[30] There is still little political will to try new approaches in which local communities or the private sector share responsibility for management. And few places have attempted to approach ocean management from the ecosystem services perspective.[31] While the

29. Ecosystem Marketplace <http://www.ecosystemmarketplace.com> uses the phrase ''making the priceless valuable.''

30. Kay and Alder, n. 8 above.

31. There is no question that ecosystem services are less well understood, and more difficult to value, than goods. At the same time, ocean management has intrinsically many more uncertainties than land management. A logical response would be to create adaptive management measures, *sensu strictu*, which in the process of management work to improve understanding of marine ecosystems.

countries of Europe, Canada, Australia, and the U.S. have long been considered pioneers in coastal management, their general approach is very much command and control, with few incentives for users to practice good stewardship and direct needed energies towards safeguarding not only goods but also ecosystem services. Some of these governments seem to fear not only the unknown, but also the loss of power that they perceive might come about either through sharing management with local institutions or the coordination of management in regional frameworks. And smaller developing countries that have embraced innovative ways to promote better ocean governance are stymied by lack of support and funds. We see hesitation arising from misconceptions, and barriers that block progress. Better to retreat to conventional forms of management, even if they fail—or so appears the reasoning in the minds of many ocean and coastal managers.

At this point, we may have to adopt the perspective of a physician in order to free ourselves from the cycle of inadequate management and wasted effort. The ocean patient is sick, yet we continue to be focused on its anatomy rather than its physiology. If we were to take what we know and adhere to a functional approach (as any good physician would do), we would work together to understand what ails the patient (i.e., undertake rigorous assessments of threat), protect the vital organs (i.e., offer strictest protections to what is ecologically most important), and address the root causes of the ailment (i.e., develop ways to minimize our multiple and cumulative impacts so as to make the use of ocean resources and space sustainable). Looking at ocean and coastal ecosystems through the ecosystem services lens will allow us to do this. And recognizing the immense value of ecosystem services cannot help but spur decision-makers the world over to do what can be done to save this patient.

CONCLUSION

Leadership is needed to cast off the chains and move forward towards truly effective ocean management. But leaders will need to take advantage of opportunities at all levels: at the level of individuals and how they generate knowledge and even wisdom from the exchange of information; at the level of communities and how they drive management and decision-making; at the level of the marketplace and how businesses can become truly engaged in management; and at the level of entire regions, integrating management in a strategic way that uses the best available information to protect what is ecologically most important and socially most valuable.

Yes, readers of the *Ocean Yearbook* will recognize that many of the ideas described in the four pillars have been in place and growing in influence for some time. But for a significant shift in the way we deal with oceans to come about, and to finally be able to cast off the chains that bind us to ineffective

management, we will first have to recognize that we are indeed bound, and then move confidently forward. The localities that will be able to move forward will be those that perceive the need to change things and focus more fully on sustaining the ecosystem services upon which we depend. This recognition is necessary but not sufficient: success will likely only come to those that build upon all four pillars, investing in awareness creation, involving local institutions, engaging the business world, and coordinating management at the regional level.

Clearly this is a time of hope, despite the sobering nature of what we are coming to find out about the importance of our oceans and how they stand at risk from myriad human impacts. Armed with information, we can loosen the shackles that bind us to ineffective and inefficient management, and move forward with ever-increasing local involvement, better engagement of the private sector and regional management that is appropriate to the ecological scales of vast, interconnected coastal and marine systems. The ocean is indeed different from land, not because it is wetter, but because no entity seems able to recognize responsibility for it. It is up to all of us to take on this responsibility, for if we act as ocean stewards, rather than its plunderers, we will be able to continue to reap the benefits of productive coastal and marine ecosystems for many years to come.