

House of Sweden
Tapping the Economic Benefits of Ocean and Coastal Ecosystems:
From Concept to Practice

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Poet Walt Whitman once wrote that: “To me the sea is a continual miracle.” The miraculous beauty of the undersea world, our coasts, and estuaries is uncontested. But the possibilities of our oceans stretch beyond their mysteries and magnificence. Sponges, jellyfish, and alga might help us advance human health. Mother of pearl, phenomenally strong structurally, might guide us toward developing new, lightweight but strong materials, perhaps even artificial bones. And we all comprehend the more immediate importance of oceans and coasts to human communities and economies. Overall ocean-based economic activity tallies over \$4 trillion, excluding tourism.

I offer a simple conclusion: oceans matter “big time.” They matter for our economy. They matter for communities. They matter for the environment.

This conference reflects a deepening recognition that natural systems provide benefits to people, communities, and economies. These benefits include those we are traditionally familiar with. They include recreational uses of oceans and estuaries for fishing, boating, and birding. They include tapping ocean wealth for commercial fishing and energy and minerals. These kinds of benefits have long been recognized. Markets for securing these benefits exist.

More recently, the concept of ecosystem services (or value of Nature) has turned our focus toward what is less familiar. Coastal sea marshes reduce adverse impacts of storm surge on the built environment. Oysters purify water. Ocean ecosystems store and sequester carbon.

Nations, communities, and businesses are, thus, re-examining natural systems. They are reexamining their potential to meet their economic, environmental, and safety needs. They are asking, increasingly: “how can we tap Nature’s solutions to secure and sustain safe, prosperous coastal communities and healthy ecosystems?”

Decision makers in governments and businesses increasingly accept idea that nature plays a role in providing economic and social benefits to communities. But they are asking sharper questions. To invest in such benefits, they need to know just how much contribution these natural systems provide? They need to better understand the contexts within which natural systems provide these services and how they might vary over space and time. And they need to better understand the costs of losing these natural systems and the costs of protecting or restoring them. They must also understand who could benefit from these services and, potentially, pay for the costs of maintaining them.

In part, answering these questions requires mapping and synthesizing information at large scales and making such information accessible and useful. The Nature Conservancy is engaged with others in a Global Partnership for Oceans. The Global Partnership for Oceans is now mapping ocean wealth. The focus is on helping link habitat conservation and enhancement with poverty reduction and development.

But The Nature Conservancy and other partners are also engaged in mobilizing Nature’s benefits. Our projects include restoring oyster reefs to enhance community resilience along

coasts. They include improving fisheries for conservation and economic benefits, protecting and restoring coral reefs for multiple economic and environmental benefits, and restoring floodplains and river flows—flows that, in turn, find their way to seas.

Consider coastal resilience. A recent report by The Nature Conservancy and Natural Capital Project scientists suggests that 16 percent of the near-shore coastline in the United States is classified as high-hazard. These high-hazard areas are home to 1.3 million people and \$300 billion in residential property. Reducing risks to these communities involves rethinking the role of nature itself.

Though we need more data and knowledge-building, the potential risk-reducing benefits of nature's assets is not hypothetical. A 2011 meta-analysis examined coastal marshes and their protective role. Across all studies, authors found that salt marsh vegetation had a significant positive effect on wave attenuation and also a significant positive effect on shoreline stabilization.

This protective role of nature is increasingly recognized. In post-Hurricane Katrina planning in Louisiana, 12 of 15 counties have included wetland or other nature system restoration projects. A significant theme in post-Sandy reports is on enhancing the resilience of New York and New Jersey coasts.

We are seeing ecosystems play a role in plans—but also in projects. TNC and its partners are using ecosystem restoration to build resilience into the coastal area of Albemarle Sound. We are expanding marl oyster reefs, sustaining and protecting coastal lands. In Alabama, TNC helped build more than 1.5 miles of oyster reef with help from the National Oceanic and Atmospheric Administration and other funding. These efforts yield multiple benefits—commercial fisheries, shoreline protection, and enhanced coastal resilience.

Let us zero in on oyster reef projects—The Nature Conservancy researcher Tom Kruger looked at two oyster reef restoration projects in Mobile Bay, Alabama to estimate their benefits. The study estimated a 51-90% reduction in wave height and 76-99% reduction in wave energy at the shore from reef restoration. The study notes the local economic value of wave attenuation may be large. And this restoration carries with it other benefits, including enhanced fish and crab catch, for example.

Oyster reefs carry tremendous environmental and economic benefits. Yet they are in peril. One TNC study quantified the extent of oyster grounds in 39 bays and estuaries historically and 51 from recent times. The study estimated a 64 percent decline in spatial extent of oyster habitat and 88 percent decline in oyster biomass over time frames approximating last 100 years.

Consider the meaning of these losses. A market-size oyster filters up to 8 liters of water an hour (nearly two gallons). This filtration has dramatic clearing effects for water. Historically, oyster reef processes were sufficient to filter the entire volume of water passing through many estuaries. Yet filtration declines in the United States are profound, with an estimated median decline of 85 percent in the Gulf of Mexico and Atlantic coasts. These losses have also resulted in a loss of fisheries benefits.

To explore how to reverse these losses, TNC is engaging in the sorts of oyster reef restoration projects described earlier—for biodiversity and community benefits. Our researchers have found that these restoration projects can be more cost-effective than

dominant conventional shoreline armoring of bulkheads and nearly cost competitive with revetments. But they have the added bonus of other benefits beyond erosion avoidance and shoreline protection—benefits neither bulk heads nor revetments can offer.

TNC is not alone in drawing from Nature's solutions along coasts. A variety of "Living Shoreline" initiatives elsewhere are emerging. These include oyster reef enhancement, tidal marsh creation, beach nourishment and dune restoration, riparian vegetation management, and "living" breakwaters. For example, the Delaware Estuary Living Shoreline Initiative is stabilizing eroding shorelines of tidal marshes. The initiative uses ribbed mussels to form a natural breakwater, which traps sediment and absorbs waves that could otherwise wash away aquatic plants. In Palm Beach County, FL—27 miles of its 45-mile coastline is eroding away and compromising coastal storm protection provided by a beach-dune system. To counter this trend, Palm Beach has restored 75 acres of dune and 17 miles of beaches through 19 projects.

There is no one-size-fits-all approach to harnessing the value of nature to enhance coastal protection. Strategies include creation and restoration of wetlands, restoration of barrier islands, restoration of hydrological processes, restoration of oyster reefs, and much more. What is effective depends on many variables.

The Nature Conservancy has a Coastal Disaster Risk Reduction initiative and tools to enhance our understanding of these natural processes. We are examining their role in enhancing coastal resilience, especially in the context of sea level rise. TNC scientists participated in a recent study that concludes that much more work is still needed to understand these approaches. Researchers are looking at how they might be combined with other engineered approaches for greatest effectiveness. Where can they be most effective? What are the relative costs and benefits of different alternatives at local scales?

This same study draws another important conclusion—existing natural assets are already providing coastal defenses. Loss of these existing ecosystems will result in greater damage to people and property or will require massive investments in engineered defenses to protect communities.

TNC has decades of experience with testing and demonstration of models of integrated coastal resource management. We also have growing experience in integrated fisheries management to enhance conservation and economic benefits. We are working on community-based fisheries reform in California, Maine, and elsewhere around the globe in key locations including Indonesia, Peru, Chile, and China. Together with the United States, these nations account for 40 percent of wild caught fish.

Look for moment at the central features of these fisheries efforts. They are fishermen-led with a focus on private- or community-based agreements. All these efforts emphasize measuring stock conditions. They use site-based efforts to leverage broader regional partnerships and policy reform to achieve more extensive results. And these efforts match a focus on sustainable supplies with market demand by establishing certification labels and product differentiation to link new practices with new markets.

Such demonstrations with key partners at individual sites have inspired and encouraged others to adopt, adapt, and implement similar approaches at broader scales. Collaboration, science, scaling up through leveraging—these features recur in TNC ecosystem services investments around the globe.

TNC operates in 35 countries and all 50 U.S. states. It is a science-based and on-the-ground action organization with over 60 years of experiences that provide insights in how to take ideas and translate them into practice. Our experience with fisheries is now being replicated with coral reef restoration.

Through our engagement in a Coral Triangle Initiative, we have partnerships in six locations. The Initiative is focusing on coral reef protection projects that link marine biodiversity conservation, climate adaptation, and improved community livelihoods. The Initiative applies a “theory of change” that uses demonstration opportunities—sometimes small in scale; the development and implementation of integrated planning focused on delivering specific objectives; and monitoring, evaluation, and the building of knowledge products that inform, are accessible, and usable given community capacities. With our partners, we use these site-based experiences to build knowledge, leverage experiences, and attract public and private support for scaling up.

I want to conclude by putting on my hat as a political scientist. Perhaps the biggest challenges in going from concept to action often are not technical. Nor are they linked to limitations on economic valuation or ecosystem characterization. Around the globe, economists and scientists have honed and improved these capabilities.

Perhaps our biggest challenges may be those of governance. Ecosystem services often are meaningful at scales that transcend the jurisdictional boundaries of political institutions. High-intensity storms along the Gulf of Mexico, for example, affect multiple communities, even multiple nations. Degradation in the Chesapeake Bay results from actions that extend from land to sea and among multiple US states and many communities. These and other challenges unfold at landscape and seascape scales.

Thus, we need institutions and decision processes that facilitate coordination across jurisdictional boundaries and among public and private resource ownerships. We need both horizontal and vertical interaction among multiple governing units at different governing levels.

Such interaction is not new. Indeed, in the United States, the entire governing framework is one of federalism. Such federalism implies some sharing of public decision making and a vertical distribution of governing roles and responsibilities. Also, in the United States and elsewhere, we have many examples of regional governance. But these governing forms of federalism and regional decision making may require a different character to respond effectively to the challenges of fully realizing potential of ecosystem services.

Responding to these challenges, we see the emergence of models of shared and network governance. The concepts of shared governance and network governance may be applicable for investing in ecosystem services at regional scales and in contexts that involve many interacting jurisdictions striving to coordinate policy and action at large scales.

But shared and network governance models present challenges. How might one convene and motivate a cross-jurisdictional polity? Consider beach replenishment along coasts, in which dune protection may be required beyond a city’s boundaries to secure the desired protections. Or consider “ridges to reefs” endeavors to reduce nutrient runoff into seas.

I want to mention two central challenges of multi-jurisdictional governance. Fundamentally, communities and governments face the challenge of how to achieve a

decision scale “big enough to surround the problem, but small enough to tailor the solution,” as scholars at the Lincoln Institute for Land Policy have observed.

At The Nature Conservancy, we often start with pilots and at smaller scales to learn, demonstrate feasibility, and test outcomes. We build partnerships to scale up and leverage investments across multiple sites. But sometimes sustainable outcomes require ongoing, durable, large-scale ecosystem management involving many participants—both public and private—and multiple jurisdictions or even multiple nations.

Cross-boundary governance options include both structural and non-structural tools. Structural tools include the creation of dedicated agencies, multi-agency or multi-national compacts, and multi-lateral institutions. Nonstructural tools include service agreements, partnerships, joint programs, and other informal coordinating arrangements. Some “water funds” that TNC has partnered to establish, for example, involve service agreements and easements between cities and landowners in watersheds that sustain source waters but may be outside the boundaries of the cities.

Both structural and nonstructural options may be relevant in the context of investing in and protecting ecosystem services, depending on the particular issue and community circumstances. In the United States, we see many emergent models. Take just one example—an example not along a coast but nonetheless instructive. In southeastern Wisconsin, 28 municipalities with separate stormwater management authorities have joined in a public-private partnership to create a trust to coordinate stormwater management in an area encompassing six watersheds. In many ways the Coral Triangle Initiative exemplifies a network governance model. It involves multinational formal institutions within which nested operational partnerships coordinate actions.

In closing, let us telescope outward to the big picture. Our actions to conserve and manage ocean and coastal ecosystems unfold locally. But oceans, their ebbs and flows, their deep sea mysteries, and the webs of life they sustain interlink with lands and people. How we invest in infrastructure, housing, agriculture, resource access, and conservation along coasts affect oceans. Actions up and down the Mississippi River watershed and its tributaries result in chemical runoff that affects the Gulf of Mexico. Even something as prosaic as tossing a discarded plastic bottle in an urban street can link to oceans as the cup flows with stormwater down streams and, eventually perhaps into an ocean.

Applying an ecosystem services framework for analysis and action can help illuminate these interconnections so that we might have healthy lands and waters, thriving communities, and dynamic economies.