

of destructive fishing practices like bottom trawling and in the establishment of a regime to establish marine protected areas on the high seas—the area beyond any one nation’s jurisdiction.

In short, if we are to have clean beaches, healthy and abundant seafood, and oceans teeming with wildlife for our children and grandchildren to use and enjoy, our next president and Congress must act decisively. Not one but two national commissions have laid out the roadmap for what must be done. The president and Congress now need to implement it. **TAP**

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Water-quality trading or wetlands banking schemes could compensate agrarian stakeholders for protecting the riparian ecosystems that maintain water quality. Farmers benefit from cleaner water and also from selling PES credits. Those with vested interests in clean water would buy these credits. So would industries that cannot or refuse to mitigate their impact on the freshwater ecosystem. Those that benefit from the services—fishers, tourism operators, water-utilizing industries, communities that live downstream—can be expected to pay for them.

The Chesapeake Bay, the country’s largest estuary and an invaluable ecosystem

Toward a Sea Ethic

Expanding our idea of community is a first step to restoring the seas around us.

BY CARL SAFINA

A couple of years ago I was participating as a writing coach in a Sea Education Association “seamester,” sailing 1,000 miles from Hawaii to Palmyra Atoll, while students from Stanford University received lectures and closely supervised instruction and conducted independent projects on high-tech oceanography. These were smart kids, and the professors were superb. Five hundred miles from land, we got into a discussion on whether the ocean is a “wilderness.” The consensus: Obviously it is; there was no sign of humanity, not another boat in sight. Everyone savored the thought: wilderness!

But, I reminded everyone, we haven’t caught a single tuna or seen a marlin or a turtle. Wilderness? I don’t think so. If the Midwest were covered with water, you wouldn’t see that the buffalo were gone, either. There is no ocean wilderness. The whole ocean feels our effects, through fishing, pollution, dying reefs,

altered pH, immortal plastics, oxygen-asphyxiated dead-zones, warming water, and melting ice.

The students were bummed, as they would put it. I’d spoiled the special aura. Most chose simply to cling to the wilderness idea. After all, they didn’t see any cars or shopping malls, just our beautiful sailing laboratory, our home afloat, our own wind-driven island with all the life support that was keeping us healthy and happy and moving forward.

Exactly, I told them. Now, realize this sailboat is also a metaphor for our whole planet. Why do we take such good care of these decks, all the equipment and gear? Why do we keep an eye on our food supply? Because we realize we’re utterly dependent on this ship. Same with the whole ocean and the whole world.

People can more easily see, and better sense, what’s happening on land. We do see that the buffalo have been banished, that the passenger pigeon—

that supports much ocean diversity and productivity, is a fine place to try out such ideas. Despite many decades of interest in improving the condition of the bay, it continues to decline in health. Groups like the Chesapeake Bay Foundation have raised awareness and put out small fires, but the inescapable reality is that the general trend in the bay’s condition remains downward. Emerging PES markets have a solid chance to turn things around.

In order for systems like this to work at the scale needed to create a turnaround in the bay’s condition, leadership is required. The separate efforts of citizen organizations, local communities, state environmental-management authorities, and the business community are all cru-

cial. But the whole will never be greater than the parts without strategic guidance from an entity that does not yet exist: a regional authority with real power and real ability to provide incentives. The federal government has a responsibility to provide that leadership—a responsibility it has so far shirked.

Big-picture, government-led efforts, involving markets and civil society, could prove to be the last salvation for our precious downstream and offshore ecosystems. **TAP**

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once the most abundant bird in North America—is a memory.

Even scientists who should have known better long assumed that the ocean's creatures were immune to extinction. It's true that the ocean's size, and the fact that people can't live in it or pave its surface, has slowed extinctions. But even the vastness is illusory. First, the ocean isn't just a big bathtub. It's a mosaic of different habitats. Within those habitats, different creatures inhabit different fractions of each piece of the mosaic. (As Nancy Knowlton informs us, tropical coral reefs occupy an area smaller than Texas, and yet they house about one-quarter of all the species of the sea.) This makes many marine species vulnerable to depletion, including some of the ocean's larger animals. Even recovering populations of large whales remain at low numbers compared to earlier times. Many fishes of real, ongoing commercial value have declined, on average, about 90 percent worldwide compared to 1950 levels.

Very few fisheries have actually turned the corner toward recovery. They are mainly in the U.S. where the Sustainable Fisheries Act of 1996 established quantitative triggers for deeming fish depleted, and mandated that formal plans must be created for allowing depleted species to recover within 10 years. Implementation of this excellent law has been spotty and subject to some unfortunate legal interpretations. But overall it makes the U.S., though far from perfect, arguably the best of a bad lot. "That's because the record of the other countries is so abysmally low," says University of British Columbia's Daniel Pauly. Many depleted ocean creatures—from Pacific leatherback turtles (sought for eggs and meat, or killed accidentally in fishing gear) to white abalones to west Atlantic bluefin tuna—may soon end up in the "extinct" column unless we reverse current trends.

The question of extinction aside, the depletion devastates human interests. In the long term, depletion will harm businesses such as fishing and tourism. As Colin Woodard tells us, in the Pacific Northwest, shrinking salmon populations have cost 72,000 jobs and more than half a billion dollars. In Atlantic

Canada, crushed fisheries have cost several billion dollars in direct government payouts to fishermen who went from producers to welfare cases because government mismanagement let them—and foreign boats—deplete their waters. A generation ago, Maine was home to over 300 trawl-fishing boats; more than 220 have gone out of business. "At this point, there's hardly any fishermen left," says Bert Jongerden, general manager of the Portland Fish Exchange in Maine. "No young guys are getting in." Consumers don't see this because they're further insulated; fisheries have gone global, and we're still living off the declining principal of our account at the great ocean's great fishing bank. But this leads to wider bankruptcy. People cannot catch or eat fish that aren't there, and tourists won't come to see dead reefs.

As we've depleted the ocean of wild fish, fish farming or aquaculture has come on strong. But it's not a panacea. For one thing, fish-farming companies often make fish ponds by destroying productive natural habitats that are critical nursery areas for many wild fish. For another, most fish eat other fish, and

We need an ocean ethic that incorporates the interests of those who will come next.

the fish that farmers feed their fish come from the wild. This intensifies pressure on the populations of small fish that wild fish and seabirds also need for food. Fish farms can also be significant sources of pollution. Fortunately, some fish-farming companies are trying to streamline their operations and address these issues.

Fixing some of these problems will require stricter management of fishing and establishing numerous reserves where fish, their habitats, and all the associated species can recover their numbers and productivity. I write these words while drifting 30 miles off Montauk, New York, with some scientists, intent on tagging sharks for studies of their travels. The shark fishing is slow, because of depletion due to their international routes and the depredations of many countries' boats. But on the way

out we passed flocks of gulls and clusters of boats taking advantage of an excellent run of striped bass, benefiting from the world's best example of recovery due to fishery management. What worked was disciplined protection of breeding fish. The lesson we should take from this success is: When you defend your fishing, your fishing deteriorates; when you defend the fish, your fishing improves.

But better management won't be able to do it all. In the next few decades, we expect to welcome two Chinas worth of new people to compete for the world's food sources. This will further complicate everything. People will increasingly occupy the beaches needed by sea turtles who owned beachfront property 100 million years before evolution veered toward anything like an upright ape. Meanwhile, rising sea levels will increasingly squeeze beaches and beachside development.

All the fishery management and protected areas in the world can't solve the problems of climate disruption. Warming waters hold less oxygen, and the ocean has already warmed an average of roughly one half of a degree Fahrenheit to a depth of 1,000 feet in the past 50 years.

Some of the polar regions are warming more. Melting the Arctic Ocean's summer ice threatens not just polar bears but everything that depends on ice—ringed seals, bearded seals, harp seals, ribbon seals, ivory gulls, various seabirds, and others. In the icy southern seas, krill and penguin populations are declining or shifting their ranges as ice melts. Among those organisms with changing ranges are pathogens, so warming is helping spread diseases to new areas.

Carbon dioxide dissolving into the ocean is changing the water chemistry, pushing it more toward the acidic end of the pH scale. This means that creatures with calcium carbonate shells, such as certain basic planktonic organisms, as well as clams, oysters, scallops, and hard corals, will have to expend more energy toward building their shells. That energy



Children play in the surf on a Balinese beach.

must come from their overall budget, meaning it gets taken out of the energy that would otherwise have gone for growth, reproduction, immune function, and healing. In other words, their health and fertility will decline. Eventually, the ocean will begin *dissolving* coral reefs.

Even that nightmare scenario isn't the end of it. Animals must keep their blood at the right pH to let chemical reactions proceed normally to keep all systems functioning. They, too, will have to divert energy to just keeping their bodies working properly. And as Marah Hardt tells us, this is basically a carbon "tax," a carbon burden on everything that lives in the ocean. Warming waters and changing ocean chemistry can only be addressed with major new energy sources, and soon. We know what we need to do.

But we'll never make the right decisions while it's cheaper to make the wrong decisions. And it'll be cheaper to make the wrong decisions as long as people who pollute and deplete do not pay for pollution and depletion as they go. We'll never make the right choices if markets discount the future and we systematically privatize profits while socializing costs. As long as we continue to accept these costs, as long as our markets consider these major aspects of doing business to

be "external to the market," we have a system that is so out of sync with reality it's basically irrational. We have a mortgage crisis and a federal bailout for largely the same reason: We don't pay as we go.

No single thing will solve these problems. We need new energy sources and fishery reform, and we must replace the traditional fishery-management paradigm focused on taking with one focused on recovery. We need to set aside large areas of ocean. After all, not every place can be a store from which we take; we need some factories whose rationale is to produce the goods. Subsidies have long encouraged overfishing and building along the coast; these should be zeroed-out. Globally, we need to fence the open ocean in a framework of law. The United States should ratify the Law of the Sea Convention, and existing fishing treaties must be reoriented to let scientists, rather than fishing companies and their government representatives, set quotas. We also need a new U.S. oceans agency, as recommended by the Pew Oceans Commission. Currently, U.S. ocean management is lodged within the Department of Commerce, an agency that will never understand living resources, nor value them as its prime concern.

We need new policies. But policies

reflect our values. So what we really need is a new ethic. It will have to be an ethic that considers the long term, not just the present. There is no real tradeoff between the economy and conservation. The tradeoff is always between short-term and long-term thinking. Today versus tomorrow. But tomorrow has a funny way of arriving. And we need to incorporate the interests of those who will come next. No system of ethics, no religious tradition, tells us that it is our right to consider only ourselves and destroy the future. We need to expand our idea of community. In his classic book, *A Sand County Almanac*, Aldo Leopold tells us that our community includes not just people but "the land." This truly original idea recognizes the value of interrelationships and our total dependence on a functioning world. We can extend this awareness to below the high-tide line. People need the land, of course, but the ocean makes our planet alive and habitable. We need to recognize and incorporate this fact; we need a "sea ethic." **TAP**

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