

Regulation, private stewardship, and the role of technology in Coastal Zone protection

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The coastal zone of every nation is naturally ripe for exploitation, so it is not surprising to find that it is also ripe for regulation. It is a naturally beautiful area that may attract hordes of tourists, or may be central to commercial activities such as shipping and oil exploration.

There is no doubt that the coast is worth conserving, but is regulation the best tool? A number of examples illustrate that private action is also a powerful protector of the coasts, and regulation that prevents this kind of private action may be counterproductive.

The Sea Ranch

For example, the California Coastal Commission was created in the 1970s to regulate development throughout the coastal zone of California. Shortly before the creation of the Commission, a group of architects began planning the development of an area on the Northern California coast called the Sea Ranch. The Sea Ranch was planned to be a model of environmentally friendly development, with strict covenants over property owners that dictated what sort of materials they could use to build their houses (so that they blended into the landscape), the size of the houses (not too big), and the location of the houses (sited to keep views open and always well back from lands-end). The first few houses built at the Sea Ranch are still heralded today as models of environmentally sensitive building (see Sea Ranch Association, 2002).

One of the first acts of the Coastal Commission, however, was to halt development of the Sea Ranch until its plans were brought into accordance with the new regulations of the Commission. Not surprisingly, they wound up in court, and it was years before the Sea Ranch was able to build more than a handful of houses. In fact, it took a special measure by the California state Assembly to authorize further construction. But by the time this measure came, the Sea Ranch had not had any income for a decade or more, and so they were forced to bring in cash as quickly as they could. Covenants were relaxed, and large, less natural looking houses cropped up along the seashore. By trying to protect the coast through regulation, the Coastal Commission actually wound up with the opposite at the Sea Ranch.

Some private land trusts in the United States have successfully protected the seashore by removing development rights, but one should not forget that conservation through commerce has also played an important role. Oyster growers in Washington state, for example, have had more to do with clean water there than anyone else. The oyster growers in Washington have fee-simple ownership of their tidelands, and they also depend on clean water to sell their oysters. Because of this, they have been fighting

for water quality for over a century, long before there was even an environmental movement (De Alessi, 1996).

In fact, some examples of coastal conservation were even in direct opposition to government mandates of the time. The Sea Lion Caves in Oregon, for example, was set up as a haven for sea lions that had government bounties on their heads in the early part of the twentieth century (Smith, 1984). And there are countless other examples of private stewards, from fishermen, farmers and oyster growers, to hunters, anglers and wildlife enthusiasts, who protect coastal environments. But more importantly, we must consider why some coastal resources are conserved and others are not.

Private Conservation

Private conservation provides environmental amenities through the institutions of private ownership and the marketplace, which provide positive incentives to protect and enhance natural resources. And whether they are profit-seekers or simply motivated by a love of nature, private conservationists tap into the entrepreneurial spirit, providing a plurality of approaches to solving environmental problems.

Private conservation depends on the private ownership of resources. As private rights become more well defined, resource stewardship becomes more attractive and, equally, owners bear more of the costs of any rapacious behavior.

Of course there are also many companies and individuals who aren't good stewards of the environment, but once again, it is a question of ownership. Degraded resources, whether a coast, a river, a forest or an airshed, are generally unowned. Timber leases in the United States are one example. Timber companies tend to behave very differently when they are harvesting trees from their own land or from public lands. Private timberland owners tend not only to invest in the future health of the land, but also to consider alternatives to logging such as fee-hunting or hiking, which they cannot with a short term lease on public forest lands. The problem is not with the timber company but with the incentives created by a system of public ownership. The same applies to the coasts.

Technological Progress

Technology is often seen alternatively as a boon to conservation and as a pariah. Of course, both are possible – what matters is how technology will be applied, which of course depends on the institutions that govern resources.

At Sea

Out at sea, it was once believed that the vast bounty of the oceans was inexhaustible. Not anymore. Around the world, the oceans' fisheries are more often than not suffering decline and mismanagement. Regulation has been the usual response, with limited success. Sometimes harvests are successfully restricted, but fishermen are adept at staying ahead of restrictions. The Alaskan halibut fishery is one of the most telling examples of regulatory failure. Regulations attempted to limit overfishing by reducing the length of the fishing season. With each successive reduction in the season, however, fishermen improved their ability to catch fish by investing in better

technology and bigger boats. Before long a fishery that had once been open for most of the year had seen its season reduced to two days, all without significant reduction in actual harvest (De Alessi, 1998).

It is also certainly true that improvements in fishing technology have allowed for vast increases in harvesting capacity, but to blame technology for depletion fails to appreciate the importance of incentives. It is not technology, but the institutional arrangements governing a fishery that determine whether or not a fishery will be depleted.

Satellites can provide information not only on ship location but also on the ship activity. Scientists at Natural Resources Consultants and the Pacific Remote Sensing Alliance in Spokane, Washington, have developed satellite hardware to monitor ships on the open ocean. These two private firms use Advanced Very High Resolution Radiometry (AVHRR) and Synthetic Aperture Radar (SAR) to tell whether ships are towing nets (Freeberg et al. 1992). When a ship tows a net, its engines work harder, and this is reflected in the ship's heat profile, detected by satellite. These entrepreneurs have proposed that the government use this technology to prevent poaching, but fishermen might be even better clients.

Currently, the only widely used satellite technology allows fishermen to receive maps detailing the heat profiles of the ocean's surface. Firms like Ocean Imaging in San Diego can sell this information to commercial fishermen and charter boat captains because it provides accurate clues to the whereabouts of certain species of fish (Silvern, 1992). Not knowing where fish are has been one of the greatest obstacles in their conservation, but the information provided by heat profiles of the ocean's surface could change that.

Nearshore

Another example of how technology affects the coastal environment is in irrigation. In places like Southern California, diversion of water from rivers for irrigation have a tremendous effect on fish populations and on riparian habitat. Technologies exist to allow farmers to grow more with less water, but where are the incentives? In the California, agriculture uses over eighty percent of the state's water, and farmers often pay very little for it. Why invest in efforts to grow more crops with less water when the water is practically free?

It is not uncommon in California to grow rice in a near-desert environment. Yes, we grow monsoon crops in the desert. Can there be any doubt that water is a public resource? Privately owned, it is inconceivable to waste such a precious resource, but when it is publicly owned, there are almost no benefits (at least to individual farmers) to water conservation, since water savings are simply passed along to the next irrigator.

Technology can also be applied to the creation of wetlands; to create habitat for specific species or for specific pollution reduction efforts. Private groups have long been involved in the creation and restoration of wetlands in the United States. One hundred years ago, hunters were especially active working to combat government incentives to fill in wetlands. In fact, the U.S. National Wildlife Refuge program was

created out of a patchwork of private duck clubs. Even today, although government has turned to a program of “no net loss of wetlands,” and many other conservation groups have gotten involved in wetlands protection, Ducks Unlimited (a private organization founded by duck hunters) remains the most active and effective.

Wetlands created for ducks also provide habitat for thousands of other creatures, from frogs to fish to bugs, and they may also be a powerful tool for improving water quality. As regulatory burdens on measures such as TMDLs (total maximum daily loads) are ratcheted down around the country, interest in creating wetlands to improve water quality will certainly skyrocket. But who will create these wetlands? And most importantly, will wetland managers be able to tinker and experiment as they strive to improve their wetlands? The answer depends on whether they are privately owned or not.

The American West

The American West at the turn of the century showed how a system of private ownership fosters the development of innovative technologies and approaches to resource management. When settlers arrived in the American West, land was plentiful. But as population rapidly grew, the West’s water and land became progressively more scarce and therefore more valuable. Economists Terry Anderson and P.J. Hill (1975) have shown that, as the rights to land and freshwater resources became more valuable, more effort went into the enforcement of private property rights, which increased incentives for resource conservation.

Defining private property by physical barriers was certainly desirable, but the raw materials were not there. Government intervention was not an option, and so frontier entrepreneurs figured out new ways to define and enforce property rights.

The first such innovation was to devise a system of branding. Rapid improvements in branding technology, along with the development of cattlemen's associations which standardized and registered the brands, allowed cattlemen to identify, protect, and monitor a valuable roaming resource. Another important innovation came in the 1870s with the invention of barbed wire. Barbed wire radically changed the ability to define private property. It was inexpensive and effective at marking territory, excluding interlopers, and keeping in livestock.

The crucial element spur to change and improve the management of cattle and land was that private property could be fully enjoyed if only the rights to it could be defined and enforced. As the rewards to the private ownership were realized, owners stepped up their efforts to develop new technologies that would secure their property rights even further. Private ownership encouraged innovation.

Artificial reefs

One such innovation has been the development of artificial reefs from such disparate materials as buses, milk crates, and tires filled with concrete. Such reefs provide habitat that attracts some fish and propagates others, and are especially popular with Scuba divers and sports fishermen. To what extent artificial reefs either produce more species or simply lure them from elsewhere varies from site to site. There is no doubt,

however, that artificial reefs do offer a recruitment site for larvae and juveniles that otherwise would not find a place to settle (Stone et al, 1979). We know that artificial reefs increase marine life, just not by how much.

Historically, Alabama has had the most lenient laws regarding the creation artificial reefs. Reefs cannot be owned outright, but permit holders do not have to specify the exact location of their reef. The fishermen sink objects to form artificial reefs and attract fish, and then hope to keep the location secret. Satellite systems, such as GPS, allow fishermen to return to their exact location at sea. A secret location allows for limited exclusion, so fishermen can capture some of the returns on their investment. As a result of artificial reef production, Alabama produced 33 percent of the recreational red snapper catch in the Gulf states in 1992, even though it has only 3 percent of the Gulf shoreline, a huge increase over catches prior to the start of the artificial reef program (Cisar, 1993).

Conclusion

Technology has and will continue to play an important role in the conservation of the coastal zone. From underwater surveillance to irrigation and water conservation to wetlands construction and environmental mitigation, technology has the potential not only to protect our natural environment, but to lighten our footprint on it. However, technology is not the most important aspect of sustainable development. What matters most is the institutions that govern coastal resources, and whether they provide positive incentives for stewardship.

Until we get the incentives and the institutions right, we'll continue to literally and metaphorically grow monsoon crops in the desert.

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