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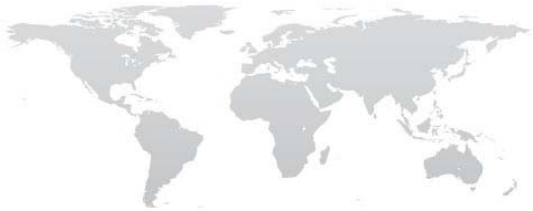

Better-Defined Rights and Responsibilities in Marine Adaptation Policy

James N. Sanchirico[1]

As defined by the Intergovernmental Panel on Climate Change, adaptation includes a set of actions to moderate harm or exploit beneficial opportunities in response to climate change. To date, little research has addressed public policy options to frame the nation's approach to adapt to a changing climate. In light of scientific evidence of extreme and unpredictable climate change, prudent policy requires consideration of what to do if markets and people fail to anticipate these changes, or are constrained in their ability to react. This issue brief is one in a series that results from the second phase of a domestic adaptation research project conducted by Resources for the Future. The briefs are primarily intended for use by decisionmakers in confronting the complex and difficult task of effectively adapting the United States to climate change impacts, but may also offer insight and value to scholars and the general public. *This research was supported by a grant from the Smith-Richardson Foundation.*

Policy Recommendations

Two elements are key to marine environment adaptation policy. One centers on rights and responsibilities, and the other on governance.

A first step in creating an adaptation portfolio for marine and coastal resources would be to establish better-defined rights and responsibilities for commercial and recreational fisheries.

- Adaptation will be enhanced the more that those holding the rights have flexibility in choosing the scale, location, and methods of operation.

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- Implementation of rights-based programs should not be delayed until the impacts of climate change on marine populations are better understood, because experience shows that rights-based institutions have adapted over time with changing environmental, social, and economic conditions.
- Ancillary benefits of rights-based measures include a source of funds (royalty and cost-recovery fees) for research on the potential impacts of climate change.

A second step would be to establish a broader ocean governance framework that includes comprehensive planning, allocation of dominant use zones and user rights within the zones, and ecological standards.

- An adaptive ocean governance seascape needs to
    - create an ownership ethic that fosters the long-term conservation perspective necessary for achieving sustainable and wise use of ocean resources, and
    - reward innovation, permit contract negotiations, trades, and cooperative regimes as a means to have options other than regulation to address use conflicts in the marine environments.
- Species adaptations to climate change will bring new economic opportunities, and users with an ownership ethic will be in a better position to adapt and prosper from such opportunities.

Introduction

Climate change is occurring and at rates faster than originally predicted. Rapid changes and the acidification of the oceans due to the absorption of CO_2 are two reasons scientists believe that self-directed adaptation of marine species is less likely than in past climatic events (Brander 2007). Slowing the rate and reducing the acidification are for the most part addressed with mitigation efforts, such as putting a price on carbon and investments in carbon capture and storage.

Another factor that scientists identify will affect adaptation of marine species is the cumulative impact of the current set of non-climate-related stressors on these resources. The list of individual impacts includes commercial and recreational fishing, loss of coastal wetlands, damage to marine habitats, runoff from point and nonpoint sources, harmful algae blooms, and invasive species.

In addition to reducing the likelihood for autonomous adaptation of the marine species, the cumulative impact leads to economically depressed coastal communities, especially those that depend on the health of the marine and coastal environment. Not surprisingly, similar dynamics regarding self-adaptation are predicted for coastal communities, where economically vibrant

communities are believed to be in a better position to undergo autonomous adaptation. And, as such, the communities will be able to prosper rather than simply survive the coming changes.

Reducing these stressors and thereby improving a coastal community's and species' ability to adapt requires a portfolio of policies that simultaneously improve the economic and ecological health of our oceans and coasts. Developing the portfolio in terms of both the reliance on different types of policies (such as command and control, liability, incentive-based, and the like) and the design of the specific policies is complex because of the coupled human-natural dynamics of marine and coastal environments. Some of the more significant questions on the components of the portfolio follow: What is the appropriate temporal and spatial scale of the policies? What role is there for the federal, state, and local governments in designing and implementing adaptation policies? How and when should the effects of a changing climate be incorporated into the choice of the policies and their design?

Although these questions are critical for the marine and coastal ecosystem, the terrestrial portion of the portfolio is not discussed in this issue brief (see Kling and Sanchirico 2009).

Before discussing the challenge that climate change poses to marine environments, it is imperative to ask why environments are already so stressed. Marine habitat, species, and the water itself are common pool resources.[2] Under these conditions, individual users of these resources do not take into account how their actions affect the welfare and well-being of other individuals using the same resources. For example, a power plant discharging water into the ocean does not necessarily consider how the warmer than normal water will affect the larvae of marine organisms—organisms that are the target of a commercial or recreational fishery.

The conditions of ill-defined rights and responsibilities that characterize common pool resources lead to the well-known tragedy of the commons. Commercial and recreational fisheries are a classic example of the tragedy that leads to ecologically and economically depressed marine and coastal ecosystems and communities. These conditions in turn lead to short-term thinking, which is the antithesis of putting in place the necessary policies to improve the resilience of our coasts and coastal communities.

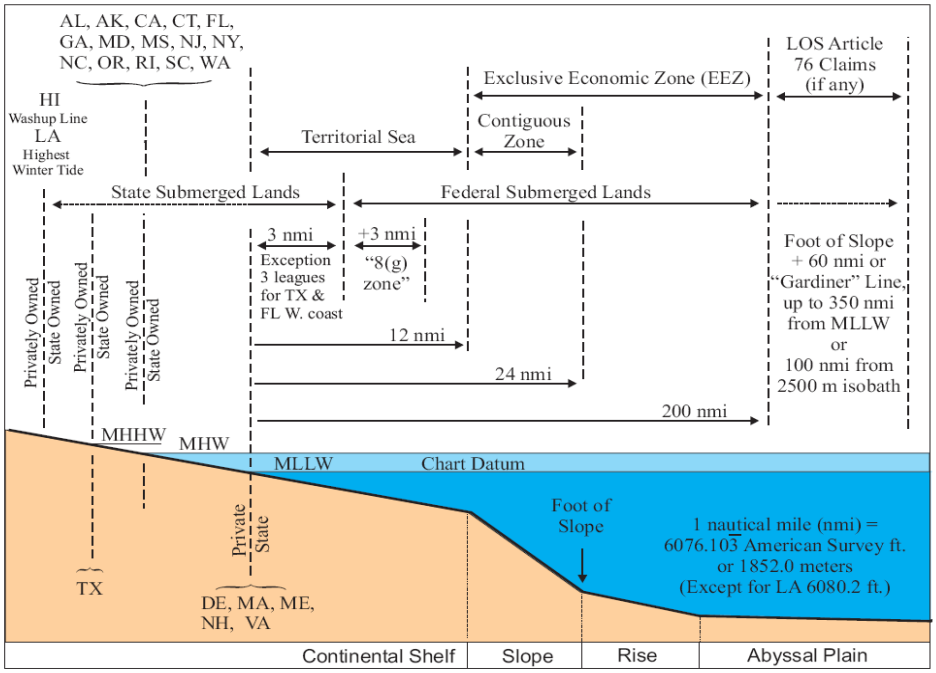
Unfortunately, these problems cannot be left to the market to solve. Government intervention is needed. In the United States, the appropriate level of government is not uniform because jurisdictions of federal, state, and local agencies vary along our coastlines. Figure 1 highlights the differences in private–public coastal lands along with different roles and responsibilities of states and the federal government with respect to marine resources. In most cases, states have primary

[2] Common pool resources have two characteristics: the set of potential users is difficult (costly) to control, and use of the resource by an individual detracts from the others ability to use the resource (e.g., congestion effects). Additional examples of these type of resources, include groundwater pools, clean air, open pasture lands, and wild animal populations (e.g., buffalo).

jurisdiction from the coastline out three nautical miles and the federal government from there to 200 nautical miles.[3] An additional complication is the interaction of the official lines in the water with the differences in the topography of the coasts, such as the expanse of the continental shelf. The majority of marine resources are found on or near the continental shelf.

Fortunately, whatever the level of government, the fundamental cause of the tragedy is a misalignment of the rights and responsibilities of the current users. Without a sense of ownership in some form or degree, the users are not likely to change their behavior in ways beneficial to all those with interests in the economic and ecological health of the oceans.

Figure 1. Private, State, and Federal Rights to Coastal and Marine Resources



Notes: LOS, Law of Sea; MHW, mean high-water; MHHW, mean high high-water; MLLW, mean lower low-water mark.
Source: U.S. Department of Interior 2006.

In commercial fisheries, ownership rights have come in the form of individual fishing quotas and cooperatives. Efforts are under way to take these forms of management and apply them to the recreational charter fishing sector. We discuss in the next section the economic and ecological

[3] For federal fishery resources, NMFS works in conjunction with the eight fishery management councils to set fishery regulations. When considering the effects of climate change on marine resources, jurisdictions are important because of differences in the topography of the coasts, such as the location of the continental shelf and the effects of eutrophication, which occur mainly within the zero- to three-mile limit. Furthermore, in many cases, these boundaries are completely permeable (e.g., pollution and movements of marine populations) and are likely to be changing over the next century (see Kling and Sanchirico 2009).

gains from the current programs in place throughout the world, and how the coming changes in the marine environment should or should not alter the current designs of U.S. programs.

Establishing rights for commercial fishers is an important first step in the building of an adaptation portfolio but as we argue in the third section, a more comprehensive approach is needed. In particular, the creation of comprehensive planning and designation of dominant use zones along with user rights is necessary to foster the growth of a broad ownership ethic under which those who use resources internalize how their actions affect others. This ethic is a necessary condition for the long-term perspective most likely to lead to vibrant economic and ecological communities.

User Rights for Commercial Fisheries

Individual fishing quotas (IFQs) and fishing cooperatives address the economic waste associated with the tragedy of the commons. IFQ programs are analogous to other cap-and-trade programs, such as the sulfur dioxide allowance program. They limit fishing operations by setting a total allowable catch (TAC), which is then allocated among fishing participants, typically based on historical catch. In most IFQ fisheries across the world, participants can trade their perpetual right to a share of the TAC and their annual catch entitlement, which is equal to the product of their share and the TAC in a fishing season.

Cooperatives, such as the Pacific Whiting Conservation Cooperative and the two in the North Pacific Pollock Fishery, are formed around a fishing sector such that the set of participants is well defined and the sector has received an allocation of the allowable catch. The allocation to each member, along with any trading among members, is handled through private negotiations and rules as outlined in their charter. Efforts are also under way to expand the sector-based allocation programs in the New England groundfish fishery.

Whether an IFQ or cooperative, the allocation of shares of the TAC reduces the incentives to race for fish, because participants have greater certainty on their catch levels, and the ability to buy and sell shares provides flexibility for participants to adjust the scale of their operations. In commercial fisheries, the gains from ownership and trade include the following:

- reducing the incentive to race for fish resulting in longer seasons,
- shifting the incentives from maximizing numbers of fish caught to maximizing the value of the catch,
- reducing the number of vessels and fishing capacity,
- increasing the flexibility to match quota holdings with catches,
- improving the ability to plan business operations, and

- catching the TAC at the lowest possible costs (because higher-cost, that is, less efficient, vessels find it more profitable to sell or trade their shares than to fish them).

Table 1 presents empirical examples of these benefits. Furthermore, research has shown that these changes resulted in profit rates between 20 and 60 percent—this is in fisheries that were often economically and ecologically depressed before the rights-based system was created (see Sanchirico 2008).

During an interview with a top government scientist in New Zealand in 2002, I asked whether the New Zealand IFQ program, the largest system in the world in terms of number of species and markets, was deemed a success. The answer was "yes." The explanation was that "since the creation of the IFQ system, the relationship between the commercial fishing industry and government has become less confrontational and there is now a sense of working together to improve the conditions of the fishery." This answer was unexpected. I had anticipated hearing about economic efficiency, stock recovery, or the ability to recover costs of fishery management and science. But it is easy to imagine that a partnership between government and marine users is beneficial for adaptation.

Another potential gain from rights-based fishery programs is the ability to recover costs. Throughout the world, cost recovery fees for management are levied on quota owners to offset observer coverage, scientific research, quota registry management, and general costs of fishery management. Unlike other management measures that restrict the quantity of catch, IFQs provide a sustainable source of funds to cover observers, which are an important component of a well-functioning rights-based system and can provide higher quality data on catches. In the United States, legislation places a ceiling on the cost-recovery levy at 3 percent of the value of the fishery (royalty fees are also permitted and there is currently no cap). This limit should be revisited to ensure that enforcement and monitoring programs, such as onboard observers and real-time electronic catch recording, are fully funded. An important ancillary benefit of these funds and efforts is the ability to collect higher quality data on catches, such as species age and size composition, that can be used by marine scientists to improve predictions on the coming changes.

Table 1. Rights-Based Approaches for Commercial Fishery Management

Benefits	Empirical finding
Reducing the incentive to race for fish resulting in longer seasons	In the British Columbia (BC) Halibut Fishery, the season length went from 10 days the year before the implementation of the IFQ (1990) to 260 days the year after. The season length went from 75 days in 1998 to 149 days in 1999 after the creation of the cooperatives in the North Pacific Pollock fishery, even though the offshore sector had a reduction in their allocation of the TAC. A similar result occurred in the Pacific Whiting Cooperative.
Shifting the incentives from maximizing quantity of fish caught to maximizing the value of the their catch	Since the creation of the cooperatives in the Pacific Pollock fishery, the share of catch going to produce fillets has increased. The shift to higher valued end products was also evident in the Pacific Whiting Cooperative. The NZ Red Snapper fishery moved from mainly a frozen product to the live fish market in Japan. In the BC Halibut fishery, fresh product increased from 42 percent of the catch to over 90 percent after implementation. Iceland's demersal fisheries experienced total revenue increases of $6 million dollars in 1984 due to higher quality fish.
Reducing the number of vessels and fishing capacity	In the first year after the implementation of the Pollock Cooperative only 16 of the 20 vessels fished; only 6 of 10 fished in the Pacific Whiting fishery post implementation of the cooperative. New Zealand fisheries have seen a reduction in quota owners on the order of 35% since the program's inception in 1986. As of 2003, the majority of the reductions were in mid-size firms.
Increasing the flexibility provided for participants to match quota holdings with catches	Annual trades or leases of catches for the median fish stock are on the order of 40 percent of the total allowable catch in New Zealand 30 percent in Iceland 40 percent in South East Australian trawl IFQ fisheries.
Improving the ability to plan business operations	NZ fishermen reported shifting fishing trips to later in the season when prices were traditionally higher. Surveys of Canadian fish processors working with the BC Halibut fishermen support this statement. For example, they noted that fishermen were calling in to find out what the expected price of fish is before heading out to sea.
Catching the TAC at the lowest possible costs, as higher-cost (less efficient) vessels find it more profitable to sell or trade their shares than to fish them.	*Ex ante* predicted estimates of the potential cost reductions, are on the order of 50 percent of total revenues in the Mid-Atlantic surf clam and ocean quahog IFQ. Cost reductions ($8 million) are estimated to be greater than two times the potential revenue gains ($3 million) for 1993 in the Gulf of Mexico Red Snapper fishery.

Source: Sanchirico 2008.

What about coastal communities that depend on the commercial fishing industry? On this front, your perspective depends on your position. We know that rights-based measures will lead to a consolidation of the fishing fleet, as many fisheries are characterized by "too many boats chasing too few fish" before implementation. We also know that the economic returns in these overcapitalized fisheries are depressed. If you think that a fishery with 100 boats and associated crew is better than one with 40 boats, even though the former is barely making an economic return, then the social impacts are negative. If, however, vibrant ports and coastal communities with fewer boats are better than depressed ports with more boats, then the changes brought on by rights-based measures are positive.

Another legitimate concern is that a particular location on the coast can end up with no boats as vessels sell their quota to boats with other home ports or locate in areas closer to markets, and so on. Restrictions on trading quota across regions in Iceland's IFQ program were instituted to reduce the likelihood of this occurring. Other means of reducing it are to develop community-based quota systems, such as the one currently in place in Alaska, where a community is allocated the catch and determines who fishes it. The catch could be allocated to port and harbor masters (though I am unaware of any programs with this feature in place). They could in turn use the quota to entice fishermen to dock at their port, processors to locate or remain in their community, and as a stable source of demand for shipping and other infrastructure services.

What challenges does climate change pose to the design of rights-based systems? In the near term, it is not clear that regional fishery management councils in the United States, which design the policies, should make any course corrections. First, the predicted changes are many years off, even though they are occurring at faster rates than originally predicted. In addition, everywhere that rights-based measures have been implemented, the designs have changed over time as fishermen, conservationists, politicians, and managers determine what is working and what is not. Therefore, there is no ex ante reason to think that these systems couldn't be changed over time as the need develops.

Second, in the United States, these programs have not been an easy sell to the current constituencies, who are uncertain how they will fare under a new institutional system and are interested in ensuring an adequate initial allocation. Complicating the discussions in the preliminary design phase will likely only delay matters.

Finally, limited rights-based measures can open the door for more wide-ranging systems as fishermen gain experience on how they work and capture the benefits (even if they are limited) of better-defined rights. In other words, an incremental approach could be the path of least resistance, especially under the current U.S. fishery management system.

What dimensions of the current designs should be revisited with the changing climate? In general, the focus should be on removing design features that reduce the ability and flexibility of the right holder to capture all of the potential efficiency gains. Programs in the United States are often denominated on a sector-species-area basis, where shares of the TAC are allocated to different fleets or sectors (e.g., the trawler IFQ program) for a species or species complex in a particular area.

The sector-species-area basis constrains fisherman's choices across multiple dimensions. It specifies the type of gear used to harvest the species and as such reduces the flexibility of the fishermen to adjust their inputs to changing ecological and economic conditions. Gear switching rules are sometimes included in programs but are often limited. The basis of New Zealand's quota management system is species-area combinations, where quota owners are free to choose the appropriate gear (subject to oversight regarding potential ecological impact).

There are restrictions, however, in the New Zealand system on trading quota across management areas within the same species. For example, the New Zealand red snapper fishery is divided into eight zones, or quota markets, each with its own TAC and set of quota owners. Fisherman and fishing companies are permitted to own quota in different markets for the same species, subject to some aggregate accumulation restrictions.

Iceland has taken a different approach. The basis for its IFQ system is species but it permits intraspecies trading where the quota management system measures species quota in cod equivalence units. Cod, the most important species in Iceland, can be converted to other species but other species cannot be converted into cod. Exchange rates across species are based on measures of expected revenues, such that economic conditions do not lead owners to convert too much quota into one species thereby exceeding that species' TAC. Other ways to group species are quota baskets, in which the TAC is for the collection of species and the catch mix depends on the economic, ecological, and environmental conditions.

With climate change, the rules that prohibit trade and converting one species quota into another were devised under the assumption of a relatively stable environment and might need to be revisited, especially as species ranges change. There is already some evidence of species shifting their distributions in response to changing ocean and surface temperatures, either locally (e.g., a zonal shift of a benthic organism within a region) or across broad areas. The ability of biogeographically shifting populations to adapt to climate change depends on their spatial extent and the rate over which the changes occur. For example, species could be squeezed out, especially when the changes cause significant physiological stress on organisms adapted to a specific, often narrow, range of environmental conditions.

Accumulation limits on the quota that can be owned or fished in a given year are another design element that reduces the flexibility of quota owners to determine an economically optimal mix of inputs and limit the overall cost-effectiveness of the system. Arguments for these often revolve around the need to reduce consolidation to preserve the social fabric of coastal communities. Although these impose a cost in terms of the lost economic gains, this restriction can easily be changed over time as needed. Furthermore, as evident in the discussions of these systems in the United States, these limits have considerable value in terms of easing constituency concerns on the transition to rights-based approaches that could very well offset the efficiency costs.

Planning, Dominant Use Zones, and User Rights

Sustainable marine communities will not be achieved by allocating user rights only to commercial fishing interests. A broader policy tool that can integrate commercial fishing with other users of the marine environment, such as recreational fishers, energy, aquaculture, shipping, and nonconsumptive recreation is required. In a collection of papers, my coauthors and I discuss how the combination of marine spatial planning, allocation of dominant uses to particular locations, ecological standards for each zone, and allocation of user rights within the dominant use categories is such a tool (see Sanchirico et al. forthcoming; Eagle, Sanchirico, and Thompson 2008). The type of zoning we envision is a means of implementing ecosystem-based management principles that can help ensure resilient marine populations and communities beyond commercial fishing operations.

Under such a plan, state waters and the U.S. Exclusive Economic Zone (EEZ) would be divided into areas with prescribed dominant uses, such as recreation, energy development, commercial fishing, and conservation. With an appropriate mix of protected and active use areas, zoning can protect critical habitat as it restructures incentives in a way that discourages overuse and promotes ocean stewardship.

In particular, we envision comprehensive planning leading to a two-tier allocation process in which the first tier allocates areas to dominant uses and sets ecological standards, and the second tier (if necessary) allocates the resources within the particular use. Depending on the use, policy instruments for the second tier could be long-term concessions, leases, cooperatives, or development of other rights-based programs. For example, the resources in a commercial fishing area will be subject to a rights-based fishery management system. Without the second tier allocation, the zoning regime would reduce the scale of the tragedy of the commons rather than address it.

In the terrestrial setting, property rights enable significant private ordering, leading many to argue that zoning is not necessary. In the ocean, however, market failures arising from the lack of well-defined rights generate transaction costs that create significant barriers for users who might

otherwise seek out beneficial partnerships, negotiations, and collaborations to address conflicts. Dominant use and planning can reduce these transaction costs. For example, the certainty of allocating space to offshore aquaculture uses could reduce transaction costs that currently make negotiations with an offshore oil platform to act as an aquaculture monitoring and management facility too costly.

An advantage of reducing these transaction costs and providing various shades of ownership to certain groups in an area is the possibility that nonregulatory approaches, such as private ordering and judicial resolutions, can be used to address group conflicts. Conflicts are at the moment confined to the regulatory system and lead to inefficient, rent-seeking lobbying activities. Having other and more transparent resolutions can better align user incentives with resource stewardship and provide greater speed and flexibility in responding to changing ocean conditions.

Because the current regulatory system is based on existing environmental conditions and the number of potential uses for the marine environment is increasing, the nature and number of conflicts is likely to increase as ocean conditions change. This reinforces the need to develop a governance structure that provides users with multiple options for dealing with these challenges.

One area likely to benefit significantly from the recommended zoning regime is the management of private recreational anglers. Currently, recreational fishing is managed with bag limits and time and area closures. Given that saltwater angling is a large and growing sector, and the diversity of the anglers, recreational fishing clubs have been proposed as a way to better align the incentives of anglers with conservation (for a discussion of recreational fishing clubs, see Sutinen and Johnston 2003, 471). The club would be allocated catch that it would then distribute to its members, and the club would be responsible for monitoring and enforcing the catch rules. By creating such an umbrella organization, regulators would be able to hold the organization liable for catches in excess of its limits (e.g., withholding catch the next year). The creation of dominant use rights to areas for recreational fishing can be the catalyst to create the clubs, rather than the usual top-down planning, and can provide the clubs with better-defined access rights. The latter is critical for establishing incentives to maintain quality fishing grounds.

Other important dynamics arising from the creation of a broader set of rights or a group ownership ethic are the development of a co-management regime and a much needed reassessment of the focus and scope of the regulatory institutions involved in ocean management. Both changes will help usher in a new era in ocean governance regime characterized by ownership groups working closely with each other, national, state, and local governments to develop sustainable rules within each zone.

The concept of creating a mosaic of dominant use zones to improve the ability of coastal communities and marine species to adapt to changing ocean conditions is admittedly not

intuitive. This is especially true given the fluidity of the marine environment, the likelihood for shifts in species ranges, and the potential change in the productivity of areas caused by acidification and alterations in upwelling events.

To skeptics of the potential merit of this approach, we provide a number of reasons we think it is more likely to be successful than our current system and more top-down ocean zoning proposals currently on the table. First, the system we envision provides flexibility to the groups managing the uses in the zones by permitting groups to negotiate with other zones. For example, a private NGO running a conservation area could negotiate with recreational fishing club to permit fishing within the area for greater conservation in the club's zone. Although these agreements need to be monitored to ensure that they are not putting the ecological health of the system at greater risk, the flexibility to work together outside the regulatory process is critical. Coming at the problem from multiple fronts and creating a system under which creativity and ingenuity can flourish will improve a coastal community's ability for self-adaptation.

Second, climate change is unlikely to turn productive areas into wastelands. The current set of biological resources will likely be replaced with a new set of species and with it new economic opportunities—opportunities best left to be discovered by a nimble set of users with a direct stake in the outcome. For the other set of users, such as wave and wind energy, oil and natural gas, and aquaculture operations, climate change is less likely to have a significant impact on their ability to operate in a particular location. Of course, the delivery of these goods and services can be affected by sea level rise and the resulting impacts on coastal infrastructure. Changes in the PH and temperature might also have an impact on the productivity of aquaculture operations, but with the technological advances in offshore operations, these changes might be lower than predicted. On the other hand, if aquaculture is significantly affected in their zone, they could negotiate to operate in another zone where the burden of proof would be on the owners of the aquaculture facility to show that it would not have an adverse impact on the dominant use designated for that zone.

Third, significant ad hoc and incomplete zoning efforts are already under way in the United States that focus mainly on creating areas off limits to commercial and recreational fishing (marine reserves). In some cases, regulators are also prescribing other permitted uses, such as pelagic trolling for migratory species. The conservation value of these programs, of course, is subject to the same climatic forces as the proposed more comprehensive ocean zoning regime. The difference is that the more comprehensive approach develops a larger and more flexible toolbox than the limited approach, which depends on regulation.

Finally, the allocation of dominant uses and group rights will also improve the accountability of users, because they can be held responsible for changes in the ecological health of their zone. Accountability, in turn, creates incentives for the groups to work together to ensure that they are

in compliance with the ecological standards set for the zone. In this sense, the openness of the marine environment will increase the incentive to work together, especially if activities in one zone are negatively affecting the ecology in other zones.

Conclusion: Moving the Adaptation Agenda Forward

Although predicting all possible permutations on how environmental change will affect the livelihoods of coastal communities over the next 10 years is difficult, it should not slow efforts to create the necessary conditions for autonomous adaptation to events further off in time. These conditions include healthy ecological and economic communities, where the latter is an important precursor to the former. Starting now is necessary because in many cases the marine species will take decades to rebuild and coastal communities are beginning to make long-lived capital investments in infrastructure to address climate change. A method to improve economic conditions requires granting rights and responsibilities to those who use the ocean, because it develops a constituency whose wealth and well-being are directly connected with the environment.

Over the past year, the current administration and NOAA, the lead agency in charge of ocean governance, are taking steps consistent with the proposals just presented. First is a stated goal to increase the number of fisheries with rights-based programs.[4] An issue, however, that could impede success is the current logjam stemming from disputes over initial allocation of quota. To remove the logjam, NOAA should develop a set of rules for the initial allocation process to be the default nationwide. Councils could deviate from the allocation but the onus would be on them to argue why. For example, in every fishery, 70 percent is allocated based on a vessel's average share of the total allowable catch over the last seven years, 15 percent is auctioned off, and 15 percent is reserved for innovative community-based projects. The latter would include allocations to port and harbor masters as a way to maintain economically viable ports and coastal communities.

Another noteworthy effort is on ocean governance and includes a presidential memorandum dated June 12, 2009, that created an Interagency Ocean Policy task force. Its charge is to develop a framework for a national ocean policy and for marine spatial planning. With respect to spatial planning, the memorandum states that[5]

> within 180 days from the date of this memorandum, the Task Force shall develop, with appropriate public input, a recommended framework for effective coastal and marine spatial planning. This framework should be a comprehensive, integrated, ecosystem-based approach that addresses

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[4] For more information on NOAA's efforts, see http://www.nmfs.noaa.gov/sfa/domes_fish/catchshare/ .

[5] The memorandum is available at www.whitehouse.gov/oceans (last accessed on Nov. 15, 2009).

> conservation, economic activity, user conflict, and sustainable use of ocean, coastal, and Great Lakes resources consistent with international law, including customary international law as reflected in the 1982 United Nations Convention on the Law of the Sea.

Although the need for marine spatial planning effort is consistent with ideas just presented, it is not immediately clear that the framework will encompass more than planning. Planning, however, needs to be combined with a designation of dominant use zones, a set of ecological standards for each zone, and user rights arrangements within the zones. We need an ocean governance seascape that rewards innovation, permits contract negotiations, trades, and cooperative regimes and does not require regulation to solve every use conflict that exists or will exist.

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