



# Solutions

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## The Future of Marine Governance

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Sea turtles caught in Australia's Fitzroy River in 1935.

attachment to place. In particular, many human activities on land revolve around systems of property rights and restricted access to resources. By the Middle Ages in Europe, for example, hunting deer became the provenance of nobility as the forests were cleared to make way for agriculture, and offenders were likely to be hung and quartered. In the sea, in contrast, we still hunt and chase after our food, and the tragedy of the commons prevails. Governance of the sea lags far behind terrestrial systems. Increasingly, however, many nation states are experimenting with new legal frameworks and institutional arrangements to confront overfishing and the degradation of marine ecosystems.

Political scientists refer to "roving bandits" to highlight the importance of developing effective governance that is linked to location, while at the same time aligning human self-interest with the sustainability of local resources. The concept is exemplified by the hapless serf in the Middle Ages, who was better off when ruled by a local despot (who needed to keep him alive and working) than when terrorized by hordes of mobile bandits (who raped and pillaged before moving on). Today, modern-day roving banditry in the sea adds to the dilemma of the commons because novel markets can develop so rapidly that the speed of resource exploitation often overwhelms the ability of local institutions to respond. New fisheries for distant markets can emerge, boom, and crash before laws and regulations are developed, with the fishery simply moving elsewhere once it has run its course locally. Examples include the live fish trade, from coral reefs in the Indo-Pacific Ocean to restaurants in China, and the global sourcing of sea urchin roe for Japanese sushi.<sup>3</sup> Solutions to these problems include enforcing local property rights and licensing laws, closing areas to fishing, reforming markets, and using flexible management approaches that can adapt quickly to change. In the longer term, protecting marine ecosystems will also require extensive education and behavioral change among consumers.

Open access to coastal resources changed nearshore ecosystems surprisingly early in human history.<sup>4</sup> For example, archaeological middens around the world show a rapid depletion of megafauna, often followed by sequential fishing down the food chain from larger to smaller species. Even the relatively intact Great Barrier Reef has seen rapid declines in sharks, turtles, and dugongs due to hunting and accidental bycatch. In contrast, many of the great fisheries of the world, such as the Atlantic cod, were persistent for centuries because there was always somewhere too far offshore, too deep, too dangerous, or too expensive to fish. Today there is nowhere to hide from modern fishing technologies, and roving bandits scour the world's oceans for dwindling supplies of food for consumption by humans and livestock and for aquaculture. On the other hand, global positioning technology has greatly enhanced the capacity to divide the ocean into patches with different management regimes. We can artificially restore refuges from overfishing by establishing appropriately scaled no-take reserves.

In the last four years, global ocean protection has made significant strides. The low-lying fruit are offshore locations that still have reasonably intact ecosystems because of their relative isolation and where the paucity of people simplifies the social costs of establishing no-take marine reserves. In 2006, U.S. president George W. Bush established Papahānaumokuākea Marine National Monument (360,000 km<sup>2</sup>) in the northwestern Hawaiian Islands. In the same year, the president of the Republic of Kiribati announced the Phoenix Islands Protected Area (184,700 km<sup>2</sup>). In 2010,

A remarkably simple lesson has emerged from recent research into preserving marine resources around the world: concerted human planning and effort are effective in preventing further decline of marine ecosystems. Fundamentally, the deterioration of marine ecosystems signals a crisis of governance, and the widespread degradation of our environment is a symptom of inadequate, dysfunctional, or missing institutions.<sup>1</sup> Currently, most coastal and almost all oceanic fisheries lack effective property rights, leading to widespread depletion of stocks, while globalized markets pressure people to fish even harder. However, management of common-pool resources within the nearshore territorial waters of some countries has markedly improved in recent years, and some improvement has also been achieved at larger scales within the Exclusive Economic Zones (generally up to 200 nautical miles from the coast) of progressive nations. For example, Australia's rezoning of the Great Barrier Reef<sup>2</sup> and its designation of the adjoining Coral Sea as a new conservation zone represent a marked improvement in that country's marine governance and management. The major challenge globally, to overcome rampant free riding on the high seas, is to design new international agreements that reward cooperation and sanction violations.

On land, most human societies long ago made the transition from roaming hunter-gatherer to farmer or city dweller. Societal rules and norms have changed over many centuries to reflect this increased

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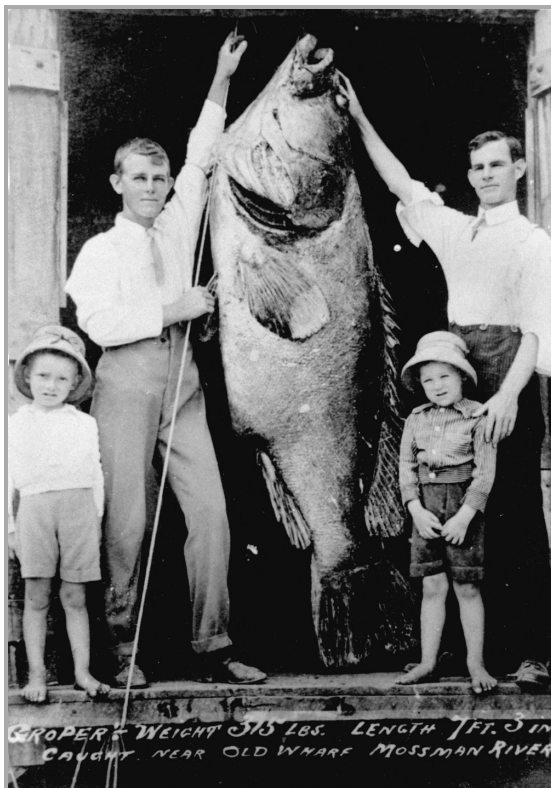
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former UK foreign secretary David Miliband established the Chagos Marine Reserve in the tropical Indian Ocean (covering 545,000 km<sup>2</sup>). The Chagos Reserve alone doubled the area of the world's oceans under protection.

Nearshore governance has also improved in many countries. For example, in the Philippines, legal frameworks have emerged that encourage partnerships between local fisher communities, local municipalities, and NGOs, leading to co-management of coastal coral reefs.<sup>5</sup> This emerging system devolves marine management responsibility from the central government to coastal communities, with greater authority allocated to local governments up to 15 kilometers from shore. Similarly, in Chile, a new property-rights system has allocated exclusive use of areas of the coastal seafloor to cooperatives of artisanal fishers, requiring commercial operators to work offshore.<sup>6</sup> Each cooperative that chooses to join the system pays rent and is allocated a catch quota for up to four species each year, based on an annual stock assessment. Other commercial species are left unharvested, creating an effective system of no-take zones for most of the ecosystem. Chile's most lucrative benthic fishery is the gastropod loco (*Concholepas concholepas*), which resembles an abalone and is harvested by divers. Prior to the new management regime, stocks of loco had collapsed, and conflict between migrating divers was high. Today, harvesting is more sustainable, conflict has been reduced, surveillance by local cooperatives has curtailed poaching, and earnings have increased.<sup>6</sup>



This grouper caught circa 1917 in the Mossman River in Australia weighed in at 315 pounds and was 7 feet and 3 inches long.  
State Library of Queensland

The Great Barrier Reef Marine Park is another hopeful example of adaptive governance in the face of human impacts such as overfishing, pollution, and climate change.<sup>2,7</sup> The park is divided into seven color-coded zones that allow for different activities by different users. For example, fishing and collecting is prohibited in green zones, but tourism and research are allowed. Recreational fishing is permitted in yellow zones, but commercial operators are excluded. There is clear evidence of widespread recovery of fish stocks in newly created green (no-fishing) zones, while the establishment of yellow zones has reduced conflict between commercial and recreational fishers. However, zones are ineffective for coping with land-based pollution runoff or depletion of highly mobile megafauna. These issues, and the impacts of climate change, remain major challenges for the Great Barrier Reef.

These examples of transformative governance from the Philippines, Chile, and Australia all illustrate the importance of new scientific information and of testing policy options prior to full-scale implementation.<sup>5-7</sup> In each case, small groups of researchers worked with local fishers to explore the feasibility of different management regimes, and local support and communication among multiple stakeholders was critical in gaining political support for new initiatives. In a rapidly changing world, static governance is doomed to failure, and learning how to adapt to new information and shifting circumstances is key to achieving desirable outcomes. Of course, many attempts at ecosystem management have been unsuccessful. Determining why some such efforts fail while others succeed is certainly a major challenge going forward.

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