Fisheries Salvation

November 17, 2008

The "Race to Fish" has led to decline and collapse of fisheries around the world. New research shows a way to stem and even reverse that decline.

Garrett Hardin, *The Tragedy of the Commons* (1968)
As industrial-scale fishing fleets and processing ships combed the oceans in the 1970s and 80s for profitable large fish, such as sailfish, tuna, cod, halibut, and shark, fishery after fishery economically collapsed or became biologically depleted. Atlantic cod off Newfoundland and the Georges Bank stocks of cod and haddock along the United States eastern seaboard plummeted while the west coast saw abalone fisheries collapse from Alaska to southern California. One species, the white abalone, was eventually protected under the U.S. Endangered Species Act.

By 2006, a quarter of the world’s fish stocks had been overexploited or depleted, according to the United Nations Food and Agriculture Organization. Despite various management strategies in play around the planet, it looked more and more like ecologist and social philosopher Garrett Hardin’s grim predictions for a tragedy in the ocean commons was coming true.

That same year, a team of researchers from Canada, the United States, and Sweden analyzed in Science magazine how a 50-year decrease in marine biodiversity was profoundly reducing the goods and services—including food—provided to humans by ocean ecosystems. Led by marine biologist Boris Worms of Dalhousie University in Halifax, the study concluded that a “business as usual” approach would cause a global collapse of fisheries by 2048 and “sabotage” any natural capacity for recovery.

The study—two of the 14 co-authors were researchers at UCSB’s National Center for Ecological Analysis and Synthesis—and its projections were highly controversial, triggering a debate that echoes today. However, some scientists took up the challenge to demonstrate that large fisheries could be managed in ways other than the predominant open access (also known as “race to fish”) approach. This usually takes the form of an industry-wide fish stock quota, leading to the biggest, fastest boats grabbing as much as possible before the quota is reached, ending the season.

In another Science paper last September, resource economist Chris Costello and marine biologist Steve Gaines, both from UC Santa Barbara, and economist John Lynham of the University of Hawaii posed a different strategy they thought might help
save ecosystems and fisheries. In many ways, Worm’s paper motivated ours. He found a problem and we wanted to find a solution, said Costello, the lead author of Can Catch Shares Prevent Fisheries Collapse?

Though Worm’s paper reached controversial conclusions, observed Gaines, what was not controversial was the fact that things were getting worse (with commercial fish stocks). But the director of the Marine Science Institute had no desire to continue delineating problems; evaluating potential solutions was his goal. With our paper, we wanted to see if fish stocks improved dramatically when management systems changed, Gaines explained. We found there were some striking positive effects, and that’s the exciting thing.

Fishermen pose with their catch of halibut in Homer, Alaska, in the 1930s.

When Costello, a Bren School of Environmental Science and Management professor, examined the global harvest database used by Worms and his team, he found it included more than 11,100 fisheries covering all large marine ecosystems. This data showed a clear trend toward wide-scale collapse, which meant the harvest in a given year was less than 10% of the maximum recorded harvest. But it was silent on how the fish stocks were managed. We put together our own database to match the 1950-2003 catch database, with management information for each of the fisheries, he recalled. This allowed identification and comparison of 121 fisheries that were managed by catch shares, which was defined as some form of individual transferable quotas, or ITQs, though a cooperative may also hold such quotas.

Based on shared ownership of a fishery’s scientifically determined total catch, the catch share method provides each entity in the fishery a dedicated share of the catch, which can be bought and sold. Fishermen can choose to go out when the weather is good, stay as long as economical, and return without the time pressure driven by an open access system. In this model, as the fishery’s health improves, it becomes more profitable and the shares increase in value. And there are ecological benefits from a growing sense of stewardship.

When it is no longer a fishing commons, secure ownership changes fishermen’s incentives, said Gaines, it focuses them on long-term economic goals. Once you do that, profits are driven by sustainable fish populations.
Comparing ITQ-managed fisheries to the other fisheries led to the conclusion that, in Costello’s words, “the catch share group was dramatically less prone to fishery collapse, and the longer you used a catch share system, the better the results.” In fact, under certain statistical models, the study found that switching a fishery in decline to an ITQ not only stops the spiral into collapse but also could reverse it. This will depend on many factors, including habitat health. Excluded from the study were some traditional forms of local, shared fishing efforts, such as territorial user rights based on geographic boundaries, and community concessions, both of which are found among the Polynesians.

Not a new idea?the oldest catch share system for a large ecosystem in the management database was from 1975 in New Zealand?the ITQ approach has yet to be widely imitated. Despite the economic distress and cultural disruption of a collapse to fishing communities, catch shares only began taking hold in the 1980s. Today, Costello estimated, “somewhere between one and two percent of the global fisheries use catch shares.”

Besides New Zealand, catch shares have been employed in Australia, Iceland, and increasingly Canada and the U.S., particularly Alaska. The red snapper fishery went to catch shares in 2007, and Pacific groundfish fishery managers, who oversee 80 species, are scheduled to decide in November (2008) if they will move to a catch share system. However, Costello noted, of the “hundreds of fisheries in the U.S., only seven or eight are currently catch shares. They are just not widely adopted yet.”

“When it is no longer a fishing commons, secure ownership changes fishermen’s incentives,” said Gaines, “it focuses them on long-term economic goals. Once you do that, profits are driven by sustainable fish populations.”

There are understandable reasons fishermen, who have invested hugely in the race to fish, remain leery of what they frequently see as another regulatory change in their usual way of doing business. Even if they are willing, or forced, to try something new, conflicts arise over who gets how big a share of the catch and on what basis. Capping shares to avoid consolidation is another obstacle. More striking has been the resistance
of many environmental groups to the catch share system.

"Until now, there has been only sparse, anecdotal evidence of the ecological effects," said Costello. "So the global environmental community, with a few notable exceptions, has been somewhat skeptical. They've described catch shares as "privatizing the oceans," rather than providing fishermen with incentives for stewardship. However, the economist does sense them shifting toward catch shares, depending on how the system is defined.

One model of catch shares cannot fit all ecological, economic, and social conditions, the researchers argued in their paper. The point is to establish long-term incentives for fishermen, and there are hundreds of ways to do that from all over the world," said Costello. Customizing a system to fit the needs of ecosystems and fishers makes catch share fisheries "more likely to not only be adopted, but to be successful."

The success of many forms of species management depends on collecting and consistently updating specific ecological information on the fishery and the habitat. The collaboration of fishermen, who increasingly assert their stake in decisions that affect their livelihoods, can make a difference. At UCSB, a group of researchers has recently joined with local fishermen to create CALobster, a community-based research effort to promote the best-possible management practices for California spiny lobster while maintaining a working harbor. The collaboration is an outgrowth of the establishment of 13 Marine Reserves in state and federal waters off the Santa Barbara Channel Islands over the past five years, but it could lead to an ITQ.

Bren researcher Hunter Lenihan co-leads, with Matt Kay, the UCSB part of the endeavor while fisherman Chris Miller has organized the lobstermen. Following creation of the reserves, it was evident that better data was needed to track their impact on local commercial species, such as lobster and rockfish, according to Lenihan. "We wanted to develop spatially specific data for management, and the fishermen have organized themselves into geographically diverse zones (in the Channel)," he said. The data is now being collected with tagged lobsters and fish.

The lobstermen were interested in what benefits, if any, they might see spilling into their fishing zones from the reserves where they could no longer trap the crustaceans. CALobster gives them access to research results and a voice in designing research objectives. "We wanted to create more of a balance between the old, top-down management and a bottom-up approach," said Lenihan. "I believe this is critical to a sustainable fishery," he added. "The empirical data being collected can provide management and the fishermen with new models, such as a cost share system."

Despite the benefits well-designed ITQs can bring to the ocean's fisheries and
fishermen, they are not panaceas for every problem afflicting the seas, warn the
study? s authors. Marine Protected Areas, Marine Reserves, and Territorial User Rights
Fisheries as well as the various forms of cost share fisheries can all be appropriately
employed to enhance, rather than degrade, human use of the sea.

?What this study shows,? said Gaines, ?is that we need a toolbox, a wide variety of
different approaches. Part of the mix is having ITQs and MPAs, but another part is fixing
the problems that lead to mismanagement of fisheries. The human impacts on the
oceans are gigantic,? particularly pollution and the effects of climate change.

?Some of these problems are going to be very hard to fix, others we should fix as soon
as we can,? he added. ?The last thing you want is to have 15 things simultaneously
hitting these ecosystems and their populations.? 

Relevant links:

- Garrett Hardin? s The Tragedy of the Commons [2]
- CALobster [3]
- Christopher Costello? s Home Page [5]
- The Economist [6]

Latest Issues

Tag Cloud

health 3-D ubinquinone pancreas stem cells virus photonics solid state lighting Ethernet
Allosphere flu telescope PICO CSG MOMA microscopes microRNA CSMD ocean acidification
distributed systems Lincoln Johnson Computer Science Alzheimer's bio optics
disease diagnostics GIS detection macular degeneration biomedical robotics
Mechanical Engineering
Source URL: http://convergence.ucsb.edu/article/fisheries-salvation

Links: