

St. John's Telegram (Newfoundland)

May 6, 2001 Sunday Final Edition

Giving wild fish a break: More than wildlife parks, marine reserves help turn around whole fishing areas

SOURCE: Special to The Christian Science Monitor

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SECTION: Science; Pg. 22

LENGTH: 1199 words

Oceanographer Jane Lubchenco has an upbeat take on the world's declining fisheries: Establish a system of strategically placed "no-catch" zones, and you can have your fish and eat them, too.

Her advice reflects a new understanding of the power of protected marine reserves to replenish life within their borders and revitalize surrounding fisheries. It's based on what the Oregon State University marine zoologist calls the "startling and timely results" of a comprehensive three-year international effort to learn how such conservation zones fit into the ecology of the sea.

Scientists who took part in the study, which was organized by the National Centre for Ecological Analysis and Synthesis at the University of California in Santa Barbara, say they will never again look on marine reserves as merely wildlife parks in the ocean. Nature reserves on land protect what's within their borders. They do little for surrounding farm land. But marine reserves interact freely with surrounding waters.

Ecologist Robert Warner at the Santa Barbara campus notes that currents transport larvae of many species. And fish and other mobile species roam widely.

Warner explains that "because of their intense production," fully protected marine reserves seed their own biodiversity, and, to some extent, seed surrounding areas.

"They work for all stakeholders" in a fishing area, including the fishers, he says.

Scientists confident of success

According to a news release, Warner and other project scientists believe their analysis of existing marine reserves has provided "the scientific

evidence necessary to establish additional reserves that scientists can be confident will work."

They believe that marine reserves have as much to do with wise management of fisheries as with traditional conservation. They are so convinced that this management strategy can save endangered fisheries that 150 of them have signed a "consensus statement" outlining

the scientific conclusions that underlie their confidence. Having released this during the annual meeting of the American Association for the Advancement of Science in San Francisco in February, they now are peddling it to fisheries around the world.

They are driven partly by a sense of urgency. As Lubchenco put it, the "oceans are more valuable and more vulnerable than generally realized."

At the same time, she said, scientists now know that, not only are marine reserves "a powerful and underutilized tool," but they work quickly.

'Startling' results

What Warner calls "a pretty thorough study" of more than 100 existing reserves shows that, once a reserve is established in a depleted fishery, surviving organisms crank up production. Biological responses tend to reach typical high values within one or two years. Then, they remain stable for decades. He notes that population densities inside the reserves were 91 per cent higher, on average, than outside the reserves or before the reserves were established.

Overall biomass was 192 per cent higher, average organism size was 31 per cent higher, and species diversity higher within the reserves.

These are some of the "startling" results to which Lubchenco referred. Study scientists were equally impressed by benefits outside the reserves.

Callum Roberts from the University of York, England, currently visiting at Harvard University, has three examples that he says "gives us renewed confidence" in such benefits.

The Leigh Marine Reserve at the northern tip of New Zealand's North Island -- one of the world's first fully protected zones -- was established in 1977. Although it's only 5.2 square kilometres, Roberts says it has "a dramatic impact." Within a few years, fishers noticed rapid increases in the abundance of species they were catching outside the reserve.

Roberts says the spectacular recovery inside the reserve, including the return of a kelp forest, "opened people's eyes to the degree to which fishing could modify marine ecosystems." Together with the positive effects on fishing, this encouraged New Zealand to begin a national network of protected areas.

Soufriere Marine Management Area on St. Lucia's southwestern coast in the Caribbean has been called a "dramatic success." Four fully protected zones interspersed with fishing areas were established in 1995. Within three years, commercially important fish stocks tripled in the protected zones and doubled in the fishable areas. New jobs also opened to support growing tourism.

Roberts also points to the benefits of closing fishing for groundfish and scallops at Georges Bank in the Gulf of Maine in 1995. This is not a fully protected area -- other fish are still caught here. But Roberts says it gives insights into how a large fully protected reserve would work.

The density of legal-size scallops in severely depleted scallop beds has rebounded nine- to 14-fold. Fishers reap rich harvests as currents carry young scallops out of the protected zone.

Details to be worked out

In spite of the scientists' confidence in the value of marine reserves, Harvard University biologist Stephen Palumbi says, "Big questions remain."

How big do you make a reserve? Where do you put it? Experience with land reserves is no guide; the biological systems are different.

Theory suggests that networks of relatively small protected reserves interspersed with fishable areas give stability and resilience. The reserve areas then need to be spaced to take advantage of their interaction. They may exchange larvae, for example.

The theory has to be tested. It also raises political issues. A network that makes sense ecologically may extend beyond national boundaries.

As traditional fisheries fail, the fishing industry needs a new management strategy. Fish farming, which was supposed to relieve pressure on wild stocks, has not been entirely successful. Fat farmed shrimp or luscious farmed salmon in the supermarket probably fed on ground up herring, mackerel, sardine, or other wild sea fish.

Economist Rosamond Naylor at Stanford University's Institute for International Studies in California estimates it takes almost two pounds of wild fish to raise a pound of farmed fish for carnivorous species, including shrimp.

Daniel Pauly at the University of British Columbia, who has made a global study of aquaculture, puts the wild fish toll even higher. He estimates it takes up to five pounds of wild fish per pound of farmed salmon, tuna, cod or shrimp.

Aquaculture is contributing to total world food supply and brings new income to many poor regions. Yet, as now practiced, it often pollutes the sea and trashes natural fish breeding grounds as well as further depletes wild marine stocks. Aquaculture can clean up its act. It can emphasize vegetarian species such as shellfish and carp. It can find less destructive ways to feed carnivorous species.

This is one more reason why ecologists such as Callum Roberts think fisheries management organized around protected marine reserves is the best game in town.

He warns: "As the marine crisis in the oceans increases, we are running out of time. We have the most powerful tool we can wield at this time."

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