CHALLENGES IN OCEAN POLICY

OCEAN STUDIES BOARD, NATIONAL RESEARCH COUNCIL

INTRODUCTION

The oceans are integral to the economy, environment, and security of the United States. It is thus no surprise that the federal government addresses a variety of coastal and oceanic issues on a daily basis. A 1998 report from the National Research Council's Ocean Studies Board, *Opportunities in Ocean Sciences: Challenges on the Horizon*, highlighted three critical research areas that "present great opportunities for advances in the ocean sciences and will lead to concrete improvements for human life on this planet." The topics identified were understanding coastal ocean processes, sustaining marine ecosystems, and predicting climate variations.

Although support for the research enterprise continues to be critical, this document provides a different emphasis. It does not focus on research, but rather calls attention to two significant ocean issues — nutrient pollution and sustainable fisheries — that

are likely to require high-level attention and policy decisions during the coming four years. Both of these issues have been addressed in some detail by in-depth reports from the Ocean Studies Board (listed under "Further Reading"). Needless to say, these are not the only important ocean issues, but they are sure to demand attention from policy makers in the near future.

NUTRIENT POLLUTION OF COASTAL WATERS

THE PROBLEM

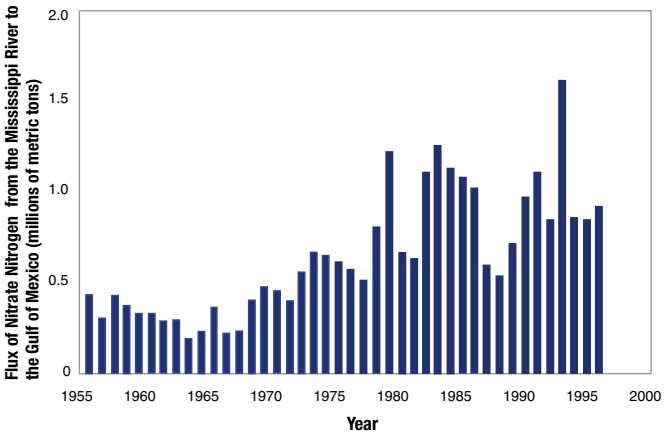
Protection of the nation's coastal areas — where a variety of commercial, subsistence, residential, and recreational activities come together — has been a priority for decades. Over the past 40 years, environmental laws have greatly reduced harmful discharges into coastal waters of the United States. This effort has focused largely on reducing industrial effluents containing toxic substances and controlling municipal wastewater. However, no comparable effort has been made to control the flows of nitrogen and phosphorus entering waterways from numerous non-point sources, such as farm fields, livestock pens, urban runoff, or air pollution. As a result, inputs of non-point pollutants, particularly nitrogen, have increased dramatically. As explained in a recent National Research Council report, *Clean Coastal Waters: Understanding and Reducing the Effects of Nutrient Pollution*, non-point pollution from nitrogen and phosphorus (also referred to as "nutrient pollution") now represents the largest pollution problem facing U.S. coastal waters.

Nutrient pollution is the common thread that links an array of problems along the nation's coastlines, including eutrophication, harmful algal blooms, "dead zones," fish kills, loss of seagrass and kelp beds, some shellfish poisonings, coral reef destruction, and marine mammal and seabird deaths. The damage from nutrient pollution goes well beyond unappealing, murky water bodies — it also threatens the suitability of water for human contact and consumption and impairs the production of useful forms of aquatic life. Nutrient pollution degrades the entire marine food web that fosters biological diversity and supports commercially valuable fish and shellfish. According to a 1999 assessment by the National Oceanic and Atmospheric Administration, the *National Estuarine Eutrophication Assessment: Effects of Nutrient Enrichment in the Nation's Estuaries*, more than 60 percent of the coastal rivers and bays along the shores of the continental U.S. are moderately to severely degraded by nutrient pollution.

FINDING SOLUTIONS

Reducing excess nutrient delivery to coastal waters will require individual, societal, and political will. *Clean Coastal Waters* recommends that, as a minimum goal, the United States should begin to reverse the effects of nutrient pollution in the most highly degraded coastal systems by 2010, and take action to assure that currently healthy coastal areas do not develop symptoms of nutrient pollution.

In some coastal systems, improved nitrogen removal during treatment of human sewage may be sufficient to reverse the detrimental effects of nutrient pollution. In most coastal systems, however, the solutions will be more complex, involving possible controls on nitrogen compounds emitted during fossil fuel combustion, attention to urban runoff, incentives to reduce overfertilization of agricultural fields, and better management of animal wastes from livestock operations.



Local and state efforts will be key in many instances. Steps should be taken to provide local and state decision-makers with the tools needed to make real progress in reducing nutrient pollution. One of these tools is information. Sound management depends on accurate data to understand what the major sources of nutrients are, and to judge whether cleanup strategies are working. Federal agencies can play a useful role in developing a consistent nationwide program for monitoring nutrient pollution in coastal settings. Because a significant component of the problem involves watersheds under multiple jurisdictions, addressing these areas may require changes in the Clean Air Act, the Clean Water Act, or the Coastal Zone Management Act. Nutrient pollution is a nationwide problem — affecting water and air across state boundaries — and any solution will require federal assistance and leadership.

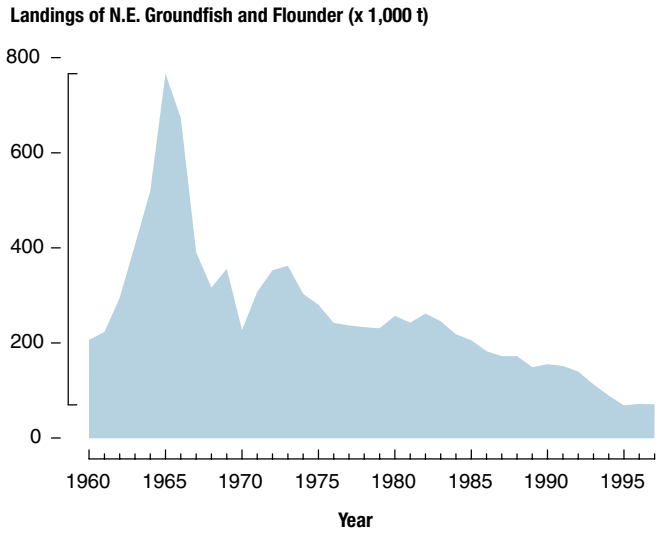
SUSTAINABLE FISHERIES MANAGEMENT

THE PROBLEM

Marine fisheries in the U.S. constitute a multi-billion dollar industry. They provide a significant source of jobs, protein for human consumption, and recreational opportunities. Fishing is also a traditional and valued way of life in many communities. As fisheries have grown, however, a number of economic and environmental problems have arisen.

Many fish stocks are overexploited and unable to support catches at a high and sustainable level. This has resulted in poor economic performance in many fisheries, including unemployment and small business failure in many coastal communities. The often significant capture of untargeted organisms (referred to as "bycatch") illustrates the inherent difficulties in controlling exactly what is caught. Fisheries productivity is diminished and valuable fish products can go to waste. Bycatch of marine mammals, birds, and reptiles can also lead to conflicts between fisheries and species conservation goals. Finally, there is a growing recognition that we need to consider the effects of fishing practices on ocean habitats and marine ecosystems, including coastal habitats, coral reefs, and the seafloor. The troubling situation in U.S. and worldwide fisheries, along with suggestions for improvement, are thoroughly discussed in the 1999 OSB report, *Sustaining Marine Fisheries*.

For any given fishery, not all of these conditions apply, but the problems are widespread over a number of species and regions and stem from a variety of underlying causes. Incomplete understanding of fish populations and limited survey data make it difficult for managers to determine sustainable catch levels. Many problems arise because of overcapacity in the industry. Existing management systems have had great difficulty establishing methods for allocating fisheries resources fairly among competing user groups. Management systems that might increase incentives for conservation and rebuilding fisheries resources, such as those that establish some form of individual or community "property rights," have not been widely implemented. Finally, a lack of funding has led to insufficient data collection and limited monitoring and enforcement of existing regulations.



FINDING SOLUTIONS

Recommendations for addressing these problems can be found in a number of the reports listed at the end of this document. Allocating fisheries resources among different communities, groups, and individuals has been extremely difficult under our current system. One major topic that faces policy makers is the current legislative prohibition on individual fishing quotas (IFQs), a system that has been proposed as one way to eliminate the "race for fish" and create incentives to rebuild depleted stocks and conserve healthy ones. A 1999 OSB report, *Sharing the Fish: Toward a National Policy on Individual Fishing Quotas*, concluded that, with careful planning, IFQs can serve as a useful tool for regional management

councils to consider on a fishery by fishery basis. A review of the appropriateness of this option will be required of the next administration.

Other changes to the Magnuson-Stevens Fishery Conservation and Management Act should also be considered in the search for solutions to the current problems. Although there is some room within the existing legal framework for the National Marine Fisheries Service and the regional councils to address these problems, more profound changes in our institutional structures may help.

The establishment of marine protected areas (MPAs), where fishing and other human activities are substantially limited, provides another promising approach for enhancing fisheries. Although promotion of marine protected areas was the subject of a recent Presidential Executive Order, this approach remains controversial. The potential benefits of creating such protected areas are discussed at length in the just-released OSB report *Marine Protected Areas: Tools for Sustaining Ocean Ecosystems*, along with recommendations for facilitating their implementation.

Finally, policy makers will need to wrestle with the issue of funding for fisheries management. As explained in *Improving the Collection, Management, and Use of Marine Fisheries Data*, sound management relies on the kind of detailed information gained from adequate monitoring, data collection, and research, but these are all costly endeavors.

CONCLUSION

The two broad ocean issues described above — nutrient pollution and sustainable fisheries — will undoubtedly be the subjects of vigorous policy debates over the next four years. Decision makers within the White House, Congress, and the federal agencies would do well to recognize these problems, learn more about them, and formulate plans for actively addressing them before they get worse.

An improved understanding of natural processes will certainly play a role in helping the nation cope with these problems, and relevant research should be actively pursued. However, it is interesting to note two other themes common to both issues:

1. the need to coordinate multiple decision making bodies at many levels of government and

2. a requirement for more and better information to support sound management decisions.

Management of both nutrients and fisheries are characterized by complex and overlapping geographic and congressional jurisdictions. These competing authorities can hinder effective action. In many instances, solutions have been limited more by the decision-making process than by lack of basic understanding. The newly mandated Commission on Ocean Policy will be examining questions of coastal and ocean management in the United States, and the National Research Council looks forward to working with that body when it is established.

All management decisions depend on the availability of adequate, reliable information to design sound policies, assess their performance, and fine tune them to maximize results. In the areas of fisheries and coastal protection, data are collected by many entities, including private individuals, scientists, and local, state, federal, and international bodies. In order to maximize the utility of all this information, there is a growing need to develop more uniform data collection protocols so that information can be made widely accessible and be aggregated to achieve a more complete picture. In some areas, however, the needed information is simply not being collected. Because sustained, high-quality monitoring requires an ongoing commitment of funds and human resources, an appropriate observing system should be carefully designed to maximize cost-effectiveness.

A range of scientific and political opinion exists about how to deal with the problems described in this document. Many of the specifics are addressed in detail in the reports listed below. Whatever course is followed, responsible, coordinated decisions, informed by objective, sound knowledge, will be needed. The actions taken — or deferred — during the coming four years will affect the nation for generations.

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FURTHER READING

NUTRIENT POLLUTION

Clean Coastal Waters: Understanding and Reducing the Effects of Nutrient Pollution.
National Research Council. National Academy Press, 2000.
From Monsoons to Microbes: Understanding the Ocean's Role in Human Health.
National Research Council. National Academy Press, 1999.
Science, Policy, and the Coast: Improving Decisionmaking.
National Research Council. National Academy Press, 1995.

SUSTAINABLE FISHERIES MANAGEMENT

Improving the Collection, Management, and Use of Marine Fisheries Data.
National Research Council. National Academy Press, 2000.
Improving Fish Stock Assessments.
National Research Council. National Academy Press, 1998.
Marine Protected Areas: Tools for Sustaining Ocean Ecosystems.
National Research Council. National Academy Press, 2000.
Sharing the Fish: Toward a National Policy on Individual Fishing Quotas.
National Research Council. National Academy Press, 1999.
Sustaining Marine Fisheries.
National Research Council. National Academy Press, 1999.

GENERAL

Bridging Boundaries Through Regional Marine Research.
National Research Council. National Academy Press, 2000.
The Global Ocean Observing System: Users, Benefits, and Priorities.
National Research Council. National Academy Press, 1997.
Opportunities in Ocean Sciences: Challenges on the Horizon.
National Research Council. Ocean Studies Board, 1998.

All of the reports listed above can be read and ordered online at www.nap.edu, or call *1-800-624-6242.*

THE NATIONAL RESEARCH COUNCIL was organized by the National Academy of Sciences in 1916 to associate the broad community of science and technology with the Academy's purposes of furthering knowledge and advising the federal government. Functioning in accordance with general policies determined by the Academy, the Council has become the principal operating agency of both the National Academy of Sciences and the National Academy of Engineering in providing services to the government, the public, and the scientific and engineering communities. The Council is administered jointly by both Academies and the Institute of Medicine. Dr. Bruce M. Alberts and Dr. William A. Wulf are chairman and vice chairman, respectively, of the National Research Council.

THE OCEAN STUDIES BOARD is a unit of the National Research Council created to advise the federal government on issues of ocean science, engineering, and policy. In addition to exercising leadership within the ocean community, the Board undertakes studies at the request of federal agencies, Congress, or other sponsors, or upon its own initiative. The Board explores the science, policies, and infrastructure needed to understand, use, and protect coastal and marine environments and resources.

In recent years, the Board has conducted studies in the following areas:

- the status of marine and coastal environments;
- the ocean's role in the global climate system;
- technology and infrastructure needs;
- ocean-related aspects of national security;
- fisheries science, management, and policy;
- living and non-living marine resources;
- reviews of specific agency programs;
- ocean education; and
- the future of the field in the United States and abroad.

FOR FURTHER INFORMATION CONTACT:

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