

Ocean Science, Research, and Education

The best available science and technology are necessary to properly inform ocean policy decisions and provide a foundation for new legislation. However, there is no coherent approach for studying ocean ecosystems and their interrelations with the land and atmosphere, with a coordinated mechanism for disseminating information to decision makers and the public. As a result, important public policy decisions are based on inadequate and incomplete information. This deficiency in knowledge concerning the changes in physical and biological ocean processes and their associated socioeconomic impacts is a significant deterrent to implementing an effective national ocean policy.

Guiding Principles for New Ocean Science Programs

The United States must address the chronic underfunding of ocean science, research, and education. In order to encourage increased funding, our political leadership and the public must recognize the important role of the oceans in global climate change. The Joint Ocean Commission Initiative identifies four key principles for bolstering the ocean science programs and the incorporation of new technology and research into ocean and coastal policy and implementation:

- ***Best Available Science and Information.*** Ocean policy decisions should be based on the best available understanding of the natural, social, and economic processes that affect ocean and coastal environments. Decision makers should be able to obtain and understand quality science and information in a way that supports informed management of ocean and coastal resources.
- ***Ecosystem-based Management.*** U.S. ocean and coastal resources should be managed to reflect the relationships among all ecosystem components, including humans and nonhuman species and the environments in which they live. Applying this principle will require defining relevant geographic management areas based on ecosystem, rather than political boundaries.
- ***Ocean–Land–Atmosphere Connections.*** Ocean and coastal policies should be based on the recognition that the oceans, land, and atmosphere are inextricably intertwined and the actions that affect one Earth system component are likely to affect another.
- ***Stewardship.*** The principle of stewardship applies to the government and to every citizen. The U.S. government holds ocean and coastal resources in the public trust—a special responsibility that necessitates balancing different uses of those resources for the continued benefit of all Americans. Just as important, every member of the public should recognize the value of the oceans and coasts, supporting appropriate policies and acting responsibly while minimizing negative environmental impacts.

Proposed Congressional Actions

Congress has the ability to rehabilitate our nation’s lagging ocean research effort by providing increased funding and prioritizing key technological programs. The Joint Initiative calls for a robust

exploration program that coordinates, enhances, and strengthens activities across federal agencies. The oceans remain a relatively unexplored frontier, as only 5 percent of the ocean floor has been investigated. Put into context, more than 1,500 people have climbed Mount Everest, more than 300 have journeyed into space, 12 have walked on the moon, but only 2 people have descended and returned in a single dive to the deepest part of the ocean.

Congress has still not been able to implement an Integrated Ocean Observing System (IOOS), which would provide the infrastructure and tools essential to translate science into products and services needed by decision makers. IOOS supports the hardware, software, data management, synthesis, and modeling activities that integrate the data and information generated by the research community. The United States should establish an Ecosystem Research Initiative as well. This program would foster scientific cooperation and integration by rewarding interagency and multidisciplinary research that addresses ecosystem questions. Finally, an enhanced National Ocean Exploration Program is necessary to support greater investigation of deep water habitats and resources. A robust exploration program that coordinates, enhances, and strengthens activities across federal agencies is a missing link in a national strategy to better understand the global environment.

There are a few promising signs of action both by the executive and legislative branches. The current administration has outlined national ocean research efforts that should be pursued over the next ten years in its *Ocean Research Priorities Plan and Implementation Strategy*. The plan outlines three critical elements that align with the Joint Initiative's policy priorities: capacity to forecast ocean processes and phenomena, scientific support for ecosystem-based management, and deployment of an ocean observing system.

Congress has taken steps to rectify the lack of funding for ocean science, research, and education. It recently passed legislation based on the innovation and competitiveness initiative advocated by the National Academies report, *Rising Above the Gathering Storm*. America COMPETES, a bill recently signed into law, makes specific provisions for the coordination of an ocean and atmospheric science and research program. Additionally, the legislation calls for a NOAA Science Education Plan to establish and monitor the implementation of an ocean science curriculum. Other bills introduced in the 110th U.S. Congress would enhance efforts in ocean exploration, observing, and research.

Ocean Science Informing Climate Change Policy

Credible and timely scientific information will be essential as the nation begins the process of responding to the challenges associated with climate change. Better science, when linked with improved risk management and adaptive management strategies, will help guide a process that must deal with the relatively high levels of uncertainty related to mitigation alternatives and the range of impacts associated with climate change and variability. A much more comprehensive and robust science enterprise that incorporates a better understanding of the ocean's role in climate change is required to forecast more accurately the magnitude and intensity of this change at multiple scales, as well as to evaluate options for mitigation and adaptation. This process must also include strengthening capacity in the social sciences, whose contributions will influence risk and adaptive management

strategies significantly given the immense economic impact climate change will have on coastal communities.

See Also:

National Ocean Policy Reform

Regional and State Ocean Leadership

Oceans and Climate Change

New Funding for Ocean Policy and Programs

Law of the Sea Convention

For Further Information:

Oceans and Climate Change Concept Paper

From Sea to Shining Sea: Priorities for Ocean Policy Reform