

CHARTING THE COURSE FOR OCEAN SCIENCE FOR THE UNITED STATES FOR THE NEXT DECADE: AN OCEAN RESEARCH PRIORITIES PLAN AND IMPLEMENTATION STRATEGY

Charting the Course for Ocean Science in the United States for the Next Decade: An Ocean Research Priorities Plan and Implementation Strategy describes national ocean research efforts that must be pursued over the next ten years. Developed with extensive ocean community involvement, this document represents the first national effort to identify research priorities that address key interactions between society and the ocean. This document will serve to guide research efforts for the ocean community, including the federal agencies, for the next decade.

The ocean, consisting of the open ocean, coasts, coastal watersheds, and Great Lakes, provides food and recreation, contributes to the nation's economic engine, is an element of national security, and is a major factor influencing in the global climate system. Despite its vast extent, the ocean is finite and cannot indefinitely absorb all the stresses being placed on it; thus, the United States must commit to protecting the ocean through responsible stewardship and sensible management. This document takes a fresh approach in considering the ocean as a dynamic system rather than attempting to identify research needs based on historical academic disciplines or independent activities such as resource distributions, fisheries assessments or ocean currents. This document is also unique in that it recognizes the important relationship between society and the ocean, and therefore, places a high emphasis on understanding the interactions between humans and ocean ecosystems – the human dimension of ocean issues.

Three critical elements of science and technology will provide the United States with the scientific and technical means to redefine its relationship with the ocean for the better.

- Developing the **understanding and capability to forecast ocean processes and phenomena** will change how society takes action in the future, much like weather forecasts do today.
- Providing **scientific support for ecosystem-based management** will allow resources to be managed in ways that recognize and account for the complex interactions between those resources and other parts of the marine environment – including humans.
- **Deploying of an ocean observing system** that can describe the actual state of the ocean will revolutionize the access to and view of the ocean, coasts, coastal watersheds, and Great Lakes, increase the pace, efficiency, and scope of ocean research, and enable the promise of ocean forecasting and ecosystem-based management.

The focus on ocean forecasting, scientific support for ecosystem-based management, and ocean observing capabilities was born out of a comprehensive community effort to define ocean research priorities for the United States for the next decade. Aspects of these three central elements are evident throughout the twenty (20) national ocean research priorities, oriented around the most compelling issues in key areas of interaction between society and the ocean:

- **Stewardship of Natural and Cultural Ocean Resources**-includes efforts involving sustainable resources, such as fisheries and alternative energy sources, and non-renewable resources, such as fossil fuels and minerals.
- **Increasing Resilience to Natural Hazards**-includes research into causes and impacts of natural physical hazards, such as hurricanes and tsunamis, community and ecosystem vulnerability, and hazard mitigation.
- **Enabling Marine Operations**-includes efforts to determine the impacts of marine operations, including transportation, energy exploration and development, and

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aquaculture, on the environment; and the impacts of the environment on marine operations.

- **The Ocean's Role in Climate**-examines regions of the ocean, including the Arctic and Southern Ocean, and their role in climate change and variability, changes and impacts to ecosystems, and efforts to predict ocean-climate processes and changes.
- **Improving Ecosystem Health**-examines natural and human-induced changes and impacts to ecosystems and methods to monitor impacts.
- **Enhancing Human Health**-includes efforts to identify and assess ocean-related risks to human health and identify and develop ocean products for human well-being.

Four near-term priorities, reflecting efforts to be pursued over the next 2-5 years, were developed to initiate rapid progress towards the 20 ocean research priorities: *Forecasting the Response of Coastal Ecosystems to Persistent Forcing and Extreme Events*; *Comparative Analysis of Marine Ecosystem Organization*; *Sensors for Marine Ecosystems*; *Assessing Meridional Overturning Variability: Implications for Rapid Climate Change*.

Common among the societal themes is the need to develop the tools necessary to pursue research and to effectively translate the results of that research in ways that are useful to resource managers, policy-makers, and the general public. Society's ability to fully develop the understanding needed to address key ocean-related societal issues and to apply existing understanding to support meaningful decision-making and ocean literacy depends on technology and intellectual innovation.

Integral to the successful pursuit of these research efforts is the participation of the many sectors of the ocean community. No one group or sector, including the federal agencies, is expected to address the priorities alone, thus, engagement of multiple entities and partnerships between them is a critical component of the implementation strategy. These efforts will also help ensure that national priorities are appropriately addressed at a variety of scales (global to local) and tailored to account for differences in geographic regions, as well as different ocean uses, interactions, and phenomena within these areas. The research efforts outlined in this document will help ensure the health and sustainability of our ocean ecosystem for years to come.