

## Oceans and Climate Change

Increasing awareness of climate change has elevated the need for action to mitigate its causes and to prepare and adapt to its anticipated economic and environmental impacts. At continental, regional, and ocean basin scales, numerous long-term changes in climate have been observed. These include changes in arctic temperatures and ice, ocean salinity, wind patterns, the quantity of precipitation, and various aspects of extreme weather.<sup>1</sup> As Congress moves forward in developing climate change policies, the legislative response to climate change should recognize the fundamental role oceans play in governing climate change and Earth-related processes.

### Oceans Play a Critical Role in Climate Change

Climate change involves complex and dynamic interactions of the atmosphere, ocean, land, their related ecosystems, and human activities. Water holds approximately 1,000 times the amount of heat as air, and the interaction between ocean circulation and the global distribution of heat is the primary driver of climatic patterns. Additionally, oceans are a major carbon sink and have absorbed fully half of all fossil carbon released to the atmosphere since the beginning of the Industrial Revolution.<sup>2</sup> In addition, our seas and watersheds suffer from the harmful affects of climate change. The absorption of carbon has resulted in increasing ocean acidification, impacting the health of marine ecosystems and species, including, but not limited to, those with carbonate-based skeletons (such as coral), as well as influencing the important role ocean plays in the global cycling of carbon. Furthermore, sea levels rose 7 inches during the 20<sup>th</sup> century and nearly 1.5 inches between 1993 and 2003 alone.<sup>2</sup>

### Governance Reform Needed to Address Oceans and Climate Change

The complexity and breadth of issues associated with efforts to understand, mitigate, and adapt to climate change, the scale of its impacts from the local to the global level, and the need to understand the relationship between natural variability and climate change make it essential that the nation have a coherent and comprehensive strategy to address this challenge. Congress should create a Climate Change Response Office to design and implement a strategy that balances the need to conduct basic and applied research, monitoring, analysis, modeling, and forecasting, with the goal of translating data into useful information that can help develop sound climate change policies. An integrated assessment evaluating the collective effort of federal programs and activities would provide a baseline from which to measure progress and would help ensure the nation is maximizing the use of available data and information to improve the health of the oceans.

### Ocean Science Critical to National Response Strategy

Ocean science and management must be recognized as key elements of a national climate change response strategy. In order to incorporate the oceans into climate change policy, the Joint Initiative recommends the following:

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<sup>1</sup> Intergovernmental Panel on Climate Change. 2007. Report of Working Group I *The Physical Science Basis*.

<sup>2</sup> Doney, Scott. 2006. *The Dangers of Ocean Acidification*. Scientific American (March).

- Request prioritization of and provide funding to implement the Bush Administration’s Ocean Research Priorities Plan and Implementation Strategy, with a focus on developing a science enterprise that is responsive to societal and environmental concerns.
- Enact legislation authorizing the implementation of an Integrated Ocean Observing System, incorporating both coastal and global components.
- Fund major ocean observing research and monitoring infrastructure systems and supporting science and data management programs, such as Integrated Ocean Observing System, the Ocean Observatories Initiative, research vessels, and remote sensing programs.
- Enhance funding support for transitioning ocean and atmospheric data collection and synthesis programs from research to operational status, with ongoing engagement of the ocean science community in the operation, evaluation, and evolution of the programs.
- Support research to evaluate the impact of greenhouse gas mitigation policies on coastal and ocean processes and ecosystem health (e.g., oceanic carbon sequestration, biofuel production).

The existing interagency coordination process operating under the White House Committee on Ocean Policy should be codified and charged with supporting the effort to institutionalize a broader National Climate Change Response Strategy. An additional action needed to strengthen the federal government’s capacity to respond to climate change is to codify and strengthen the National Oceanic and Atmospheric Administration (NOAA). As a key provider of climate-related services and ocean management information, and as one of the principle agencies investigating the ocean’s role in climate variability, NOAA plays a lead role in matters related to climate change. However, an outdated organizational structure and the lack of resources have limited NOAA’s ability to fulfill its multiple mandates. Strengthening NOAA and realigning its functions would greatly enhance its capacity to provide climate-related services and facilitate the implementation of proactive management measures to mitigate anticipated impacts on coastal economies and ecosystems.

**See Also:**

National Ocean Policy Reform

Regional and State Ocean Leadership

Ocean Science, Research, and Education

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