

# CHAPTER 1

# INTRODUCTION



## OVERVIEW

The climate is changing, affecting global temperatures, extreme weather patterns, precipitation, and the oceans. The effects of climate change are already being observed. These impacts are expected to increase in scale and scope over time. Scientists report that at least half of the increases in temperature observed since 1951 are likely attributable to human activity, primarily emission of heat-trapping or “greenhouse” gases (CCSP 2008c). Because of the influence of greenhouse gas emissions on climate change, humans may be able to reduce the rate and severity of climate

change by reducing the rate at which carbon and other heat-trapping gases are added to the atmosphere. Some states are already addressing how they can mitigate climate change, primarily by reducing greenhouse gas emissions. However, how successful these efforts will be is unknown, and some level of climate change is inevitable based on past emissions (Solomon et al. 2009). So, while federal, state, and local governments continue to attend to climate change mitigation, they must also develop strategies for adapting to the impacts of climate change they will not be able to avoid.

The following definitions are from the Intergovernmental Panel on Climate Change Fourth Assessment Report and will be used in this guide (IPCC 2007a). While this guide focuses on adaptation, it is important to understand the role of mitigation in addressing climate change and, ultimately, what it means for adaptation.

**Adaptation**—Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.<sup>1</sup>

**Mitigation**—An anthropogenic intervention to reduce the anthropogenic forcing of the climate system; it includes strategies to reduce greenhouse gas sources and emissions and enhancing greenhouse gas sinks.

The purpose of this guide is to help U.S. state and territorial (state) coastal managers develop and implement adaptation plans to reduce the impacts and consequences of climate change and climate variability (climate change) in their purview.<sup>2</sup> It was written in response to a request from state coastal managers for guidance from the National Oceanic and Atmospheric Administration (NOAA) on adaptation planning in the coastal zone. It is intended as an aid, not as a prescriptive directive, and a state may choose to use individual steps or chapters or the entire guide, depending on where they are in their planning process.

A climate change adaptation plan identifies and assesses the impacts that are likely to affect the planning area, develops goals and actions to best minimize these impacts, and establishes a process to implement those actions. While an adaptation plan for the coast or the larger state may stand alone, planning to adapt to climate change should be incorporated to varying degrees in all statewide planning efforts (as well as regional and local planning efforts). However you choose to move forward, the ultimate goal is coastal states and communities that are organized to take action, have the tools to take action, and are taking action to plan for and adapt to the impacts of climate change.

As illustrated by its mission goals to “protect, restore, and manage the use of coastal and ocean resources

through an ecosystem approach to management” and “understand climate variability and change to enhance society’s ability to plan and respond,” NOAA is committed to helping coastal communities prepare for and respond to climate change (NOAA 2008). This includes protecting and managing coastal resources to meet social, environmental, and economic needs.

NOAA’s Office of Ocean and Coastal Resource Management (OCRM), part of the National Ocean Service, provides national leadership, strategic direction, and guidance to state coastal management programs. OCRM has a particular interest in climate change because of its role in administering the Coastal Zone Management Act of 1972 as amended. The act, which finds that “because global warming may result in a substantial sea level rise with serious adverse effects in the coastal zone, coastal states must anticipate and plan for such an occurrence,” declares it national policy to “preserve, protect, develop, and, where possible, restore and enhance the resources of the Nation’s coastal zone for this and succeeding generations” (16 U.S.C. 1451, et seq.). Specifically, it calls for states to protect natural resources and manage coastal development to minimize the loss of life and property caused by improper development in hazardous areas as well as those areas likely to be affected by sea level rise and other impacts of climate change.

<sup>1</sup> While some coastal communities may experience benefits from a changing climate change, adapting to and capitalizing on these benefits is outside the scope of this document.

<sup>2</sup> This guide is only one of a number of guides to adaptation planning. It is not intended to be definitive, and NOAA encourages states to explore and use other guides and frameworks as they see fit to best meet their individual needs.



*Coastal inundation resulting from sea level rise or storm surge, as illustrated here, is one of the likely impacts of climate change on U.S. coasts.*

Coastal managers have been asking NOAA and other federal agencies to provide increased and improved information about how climate change will affect their human and natural communities (e.g., regional impacts, site-specific data) and what can be done to prevent or adapt to the negative impacts. In 2008, the Coastal States Organization surveyed states to help inform members of Congress, federal agencies, and others about the anticipated costs and needs of the coastal states in regard to the impacts of climate change (Climate Change Work Group 2008). The survey found that several states have begun to take action on climate change adaptation (as many of the examples in this guide illustrate) and that lack of data, or uncoordinated data collection, was a limiting factor. Nevertheless, despite the data limitations and the uncertainty of climate change, managers should be planning for climate change now.

The intent of this document is to help guide coastal managers at the state level in their initial and ongoing climate change adaptation planning efforts. Planning is not a one-time event, and as the science and tools to understand and address climate change evolve, so should the associated plans and strategies.

## Methodology

Information in this guide is based on needs assessments and a wide variety of resources specific to climate change, sustainability, resilience, general hazard mitigation, and natural resource management. This information is synthesized so it is specific to state coastal managers, their responsibilities, and the impacts and consequences of climate change on our nation's coasts. Key resources include:

- *Global Climate Change Impacts in the U.S.* (2009) (and associated reports, 2006-2009)—U.S. Global Change Research Program (formerly the U.S. Climate Change Science Program)
- *Intergovernmental Panel on Climate Change Fourth Assessment Report* (2007)
- The Federal Emergency Management Agency's Mitigation Planning "How-To" Guides (2001-2008)
- *Preparing for Climate Change: A Guidebook for Local, Regional, and State Governments* (2007)—ICLEI—Local Governments for Sustainability
- *Synthesis of Adaptation Options for Coastal Areas* (2008)—U.S. Environmental Protection Agency, Climate Ready Estuaries Program
- *Coastal No Adverse Impact Handbook* (2007)—Association of State Floodplain

"The high degree of uncertainty inherent in assessments of climate change impacts can make it difficult for a manager to translate results from those assessments into practical management action. However, uncertainty is not the same thing as ignorance or lack of information—it simply means that there is more than one outcome possible as a result of climate change" (CCSP 2008b).



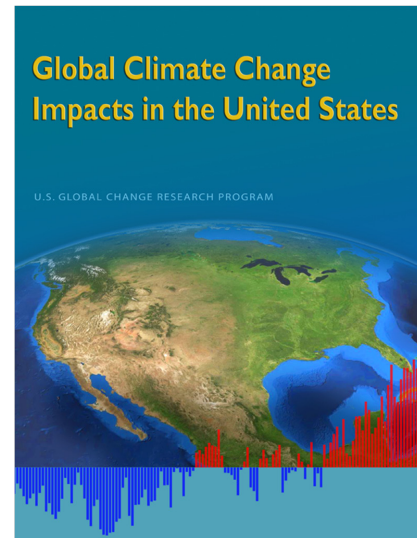
Managers and the NOAA Coastal Services Center

- *Adapting to Coastal Climate Change: A Guidebook for Development Planners* (2009)—U.S. Agency for International Development

## Structure

This document is structured to help guide managers through the planning process from establishing the planning team to implementing the plan. This chapter, Chapter 1, introduced the guide, its purpose, intended audience, methodology, and structure. The remainder of the guide is organized as follows:

- **Chapter 2 Climate Change and the Coast** provides a brief and general overview of the value of our coasts and how they may be affected by climate change to establish the importance of adaptation planning.
- **Chapter 3 Planning Process** describes the steps to take to create a plan and bring it to life.
- **Chapter 4 Vulnerability Assessment** explains the elements involved in a vulnerability assessment for the purposes of guiding adaptation efforts.
- **Chapter 5 Adaptation Strategy** discusses how to establish goals and identify actions that may be able to reduce the negative impacts associated with climate change and introduces a framework to help users choose and prioritize actions that will aid them in achieving their goals.
- **Chapter 6 Plan Implementation and Maintenance** suggests ways to implement a plan; track, evaluate, and communicate its progress; and update it to reflect completed



*Global Climate Change Impacts in the United States is the most comprehensive and authoritative report on the current and future impacts of climate change on the United States.*

- actions, changing circumstances, and new science, data, tools, and techniques.
- **Appendix A Potential Federal Funding Sources** provides information about some of the existing programs, which may not target climate change specifically, that may provide funding for climate change adaptation planning or project implementation.
- **Appendix B Federal Laws and Executive Orders Relevant to Climate Change on the Coast** lists some of the federal laws and executive orders that support climate change adaptation.
- **Appendix C Regional Climate Summaries** provides brief summaries of how climate change may affect the different regions of the United States.

Key Resources are noted at the end of each chapter. Additional resources can be found on the NOAA Coastal Services Center Coastal Climate Adaptation web site at <http://collaborate.csc.noaa.gov/climateadaptation/> and on NOAA's Climate Portal at [www.climate.gov/](http://www.climate.gov/).