8 Coastal Effects

Natural "green barriers" help protect this Florida coastline and infrastructure from severe storms and floods.

Key Message 1

Coastal Economies and Property Are Already at Risk

America's trillion-dollar coastal property market and public infrastructure are threatened by the ongoing increase in the frequency, depth, and extent of tidal flooding due to sea level rise, with cascading impacts to the larger economy. Higher storm surges due to sea level rise and the increased probability of heavy precipitation events exacerbate the risk. Under a higher scenario (RCP8.5), many coastal communities will be transformed by the latter part of this century, and even under lower scenarios (RCP4.5 or RCP2.6), many individuals and communities will suffer financial impacts as chronic high tide flooding leads to higher costs and lower property values. Actions to plan for and adapt to more frequent, widespread, and severe coastal flooding would decrease direct losses and cascading economic impacts.

Key Message 2

Coastal Environments Are Already at Risk

Fisheries, tourism, human health, and public safety depend on healthy coastal ecosystems that are being transformed, degraded, or lost due in part to climate change impacts, particularly sea level rise and higher numbers of extreme weather events. Restoring and conserving coastal ecosystems and adopting natural and nature-based infrastructure solutions can enhance community and ecosystem resilience to climate change, help to ensure their health and vitality, and decrease both direct and indirect impacts of climate change.

Key Message 3

Social Challenges Intensified

As the pace and extent of coastal flooding and erosion accelerate, climate change impacts along our coasts are exacerbating preexisting social inequities, as communities face difficult questions about determining who will pay for current impacts and future adaptation and mitigation strategies and if, how, or when to relocate. In response to actual or projected climate change losses and damages, coastal communities will be among the first in the Nation to test existing climate-relevant legal frameworks and policies against these impacts and, thus, will establish precedents that will affect both coastal and non-coastal regions.

Executive Summary

The Coasts chapter of the Third National Climate Assessment, published in 2014, focused on coastal lifelines at risk, economic disruption, uneven social vulnerability, and vulnerable ecosystems. This Coastal Effects chapter of the Fourth National Climate Assessment updates those themes, with a focus on integrating the socioeconomic and environmental impacts and consequences of a changing climate. Specifically, the chapter builds on the threat of rising sea levels exacerbating tidal and storm surge flooding, the state of coastal ecosystems, and the treatment of social vulnerability by introducing the implications for social equity.

U.S. coasts are dynamic environments and economically vibrant places to live and work. As of 2013, coastal shoreline counties were home to 133.2 million people, or 42% of the population.[1] The coasts are economic engines that support jobs in defense, fishing, transportation, and tourism industries; contribute substantially to the U.S. gross domestic product;[1] and serve as hubs of commerce, with seaports connecting the country with global trading partners.[2] Coasts are home to diverse ecosystems such as beaches, intertidal zones, reefs, seagrasses, salt marshes, estuaries, and deltas[3,4,5] that support a range of important services including fisheries, recreation, and coastal storm protection. U.S. coasts span three oceans, as well as the Gulf of Mexico, the Great Lakes, and Pacific and Caribbean islands.

The social, economic, and environmental systems along the coasts are being affected by climate change. Threats from sea level rise (SLR) are exacerbated by dynamic processes such as high tide and storm surge flooding (Ch. 19: Southeast, KM 2),[6,7,8] erosion (Ch. 26: Alaska, KM 2),[9] waves and their effects,[10,11,12,13] saltwater intrusion into coastal aquifers and elevated groundwater tables (Ch. 27: Hawai‘i & Pacific Islands, KM 1; Ch. 3: Water, KM 1),[14,15,16,17] local rainfall (Ch. 3: Water, KM 1),[18] river runoff (Ch. 3: Water, KM 1),[19,20] increasing water and surface air temperatures (Ch. 9: Oceans, KM 3),[21,22] and ocean acidification (see Ch. 2: Climate, KM 3 and Ch. 9: Oceans, KM 1, 2, and 3 for more information on ocean acidification, hypoxia, and ocean warming).[23,24]

Although storms, floods, and erosion have always been hazards, in combination with rising sea levels they now threaten approximately $1 trillion in national wealth held in coastal real estate[25] and the continued viability of coastal communities that depend on coastal water, land, and other resources for economic health and cultural integrity (Ch. 15: Tribes, KM 1 and 2).

Impacts of the 2017 Hurricane Season

Quintana Perez dumps water from a cooler into floodwaters in the aftermath of Hurricane Irma in Immokalee, Florida. *From Figure 8.6 (Photo credit: AP Photo/Gerald Herbert).*