

Regional Highlight: Hawaii and US Affiliated Islands

The US Economic Impacts of Climate Change and the Costs of Inaction

A Review and Assessment by the Center for Integrative Environmental Research (CIER) at the University of Maryland

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Background

As science continues to bring clarity to present and future global climate change, policymakers are beginning to respond and propose policies that aim to curb greenhouse gas emissions. Although these policies are gaining momentum, their importance is not fully understood by many. All too frequently, inaction is motivated by the perceived high cost of reducing greenhouse gas emissions. The costs of not taking on the challenge posed by climate change are frequently neglected and typically not calculated. Throughout the United States, individuals and communities depend on sectors and systems that are expected to be greatly affected by the impacts of continued climate change.

- The **agricultural sector** is likely to experience uneven impacts throughout the country. Initial economic gains from altered growing conditions will likely be lost as temperatures continue to rise. Regional droughts, water shortages, as well as excess precipitation, and spread of pest and diseases will negatively impact agriculture in most regions.
- Storms and sea level rise threaten extensive **coastal infrastructure** – including transportation networks, coastal developments, and water and energy supply systems.
- Current **energy** supply and demand equilibria will be disrupted as electricity consumption climbs when demand grows in peak summer months. At the same time, delivering adequate supply of electricity may become more expensive because of extreme weather events.
- Increased incidence of asthma, heat-related diseases, and other respiratory ailments may result from climate change, affecting **human health** and well-being.
- More frequent and severe **forest fires** are expected, putting ecosystems and human settlements at peril.

- The reliability of **water supply networks** may be compromised, influencing agricultural production, as well as availability of water for household and industrial uses.

Hawaii and US Affiliated Islands

Over the past century, average temperatures have increased 1°F (0.6°C) in the Caribbean and 0.4°F (0.2°C) in the Pacific. Global average sea level has risen 4–8 inches over the last century, though with significant local variation. The rate of sea level rise in the Gulf of Mexico is presently 3.9 inches per century. Coastal infrastructure will be most affected by continued climate change patterns. Although the picture is incomplete because of data limitations, a valuable glimpse of the extent to which climate change will affect these economic sectors can be gleaned from the summary below.

Coastal Infrastructure

- Climate change will likely stress already deficient infrastructure on the islands. According to the American Society of Civil Engineers, 47% of Hawaii's bridges are already structurally deficient or functionally obsolete. The state also has 77 high hazard dams, whose failure would lead to loss of life and property damage. Repairs (not including those needed due to effects of climate change) to Hawaii's drinking water infrastructure could exceed \$146 million over the next 20 years; its wastewater infrastructure, \$1.74 billion. The biggest threats to this already burdened infrastructure will be sea level rise and tropical storms.
- Increased incidence of extreme weather events will continue to stress the islands. There have been a number of destructive hurricanes to hit the US islands in recent years. Hurricane Marilyn caused as much as \$4 billion in damages in the US Virgin Islands. Hurricane damages in Hawaii from 1957–1995 topped \$2.7 billion. Hurricane Iniki, the most powerful hurricane (Category 4) to hit Hawaii, caused 7 deaths, \$2 billion in damages, and \$295 million in FEMA disaster relief in 1992.

- Hurricane Georges hit Puerto Rico in 1998, bringing 26 inches of rain in 24 hours that caused major flooding, landslides, infrastructure and agricultural damages, and left 12 people dead. Puerto Rico lost 75% of its water and sewer infrastructure. Ninety-six percent of its electrical power network, 50% of its utility poles and cables, and 33,100 homes were damaged or destroyed. Road damages exceeded \$25 million, and damage to public schools was about \$23–29 million. Its agricultural areas were also affected; 75% of the coffee crop, 95% of the plantain and banana crops, and 65% of all poultry production were temporarily lost. In total, Hurricane Georges cost Puerto Rico \$2.3 billion in damages; damages to the US mainland totaled \$6.9 billion.

- With storms and sea level rise come beach erosion, which occurs 150 times faster than the rate of sea level rise. Some Caribbean islands are already losing 9 feet of coastline each decade due to erosion and the projected rate of sea level rise would erode more than 33 feet of coastline per decade in the foreseeable future.

Other

- Climate impacts on coastal infrastructure; particularly roads, bridges, docks, water supply systems and hotels, will make **tourism** on the islands less attractive – as will impacts on local tropical forests and coral reefs. Changes in temperature and precipitation may further make some locations unattractive to visitors.

Nationwide

An assessment of the possible impacts of inaction is presented in the University of Maryland report, *The US Economic Impacts of Climate Change and the Cost of Inaction*. The range of climate changes anticipated in the United States will have real impacts on the natural environment as well as human-made infrastructure and its ability to contribute to economic activity and quality of life. The assessment suggests a need for immediate national policy to cut emissions, and a federally-funded set of region- and sector-specific studies to guide climate policy and investment.

Five key lessons from the complete report:

1. Economic impacts of climate change will occur throughout the country.
2. Economic impacts will be unevenly distributed across regions and within the economy and society.
3. Negative climate impacts will outweigh benefits for most sectors that provide essential goods and services to society.
4. Climate change impacts will place immense strains on public sector budgets.
5. Secondary effects of climate impacts can include higher prices, reduced income and job loss.

SOURCES

As documented in the full report, data sources for the Hawaii and US Affiliated Islands include:

American Society of Civil Engineers (ASCE).2005.*Report Card for America's Infrastructure*. Available online at <http://www.asce.org/files/pdf/reportcard/2005reportcardpdf.pdf>

Carter, L.M.et al.2001.*Potential Consequences of Climate Variability and Change for the US-Affiliated Islands of the Pacific and Caribbean*. Climate Change Impacts on the United States:The Potential Consequences of Climate Variability and Change.Ch.11, pp 315–349. Report for the US Global Change Research Program.Cambridge University Press, Cambridge, UK.Available online at <http://www.usgcrp.gov/usgcrp/nacc/islands.htm>.

Hamnett, M.P.and C.L.Anderson.1999.*Impact of ENSO e vents on tuna fisheries in the US-affiliated Pacific Islands*. Report of research supported by the Office of Global Programs, National Oceanic and Atmospheric Administration, Washington, D.C., October 1999.

National Oceanic and Atmospheric Administration (NOAA).1999.*Georges Pummels Caribbean, Florida Keys, and U.S. Gulf Coast*. Available online at <http://www.ncdc.noaa.gov/oa/reports/georges/georges.html>

Pielke, R.A., Jr.2001.*Extreme Weather Sourcebook: Hurricanes 1900-1999*. Center for Science and Technology Policy Research at the University of Colorado at Boulder.Available online at <http://sciencepolicy.colorado.edu/sourcebook/hurricane.html>

US Geological Survey (USGS).1999.USGS Fact Sheet 040-99: *Puerto Rico*. Available online at <http://water.usgs.gov/pubs/FS/FS-040-99/>

For the complete report, The US Economic Impacts of Climate Change and the Cost of Inaction, see: <http://www.cier.umd.edu/climateadaptation>. We thank Environmental Defense for support of this research.

