

START WITH SCIENCE TO BUILD SAFER COMMUNITIES

Hurricane Sandy Science Plan—Coastal Impact Assessments

“The understanding we gain from these studies will set the stage for better models addressing future hazard scenarios and will help coastal communities be better prepared to withstand and respond to catastrophic storms.”—*Suzette Kimball, U.S. Geological Survey Acting Director*

Meeting the Science Needs of the Nation in the Wake of Hurricane Sandy—A U.S. Geological Survey Science Plan for Support of Restoration and Recovery

Hurricane Sandy devastated some of the most heavily populated eastern coastal areas of the Nation. With a storm surge peaking at more than 19 feet, the powerful landscape-altering destruction of Hurricane Sandy is a stark reminder of why the Nation must become more resilient to coastal hazards. In response to this natural disaster, the U.S. Geological Survey (USGS) received a total of \$41.2 million in supplemental appropriations from the Department of the Interior (DOI) to support response, recovery, and rebuilding efforts. These funds support a science plan (Buxton and others, 2013) that will provide critical scientific information necessary to inform management decisions for recovery of coastal communities, and aid in preparation for future natural hazards. This science plan is designed to coordinate continuing USGS activities with stakeholders and other agencies to improve data collection and analysis that will guide recovery and restoration efforts. The science plan is split into five distinct themes:

- Coastal topography and bathymetry
- Impacts to coastal beaches and barriers
- Impacts of storm surge, including disturbed estuarine and bay hydrology
- Impacts on environmental quality and persisting contaminant exposures
- Impacts to coastal ecosystems, habitats, and fish and wildlife

This fact sheet focuses on assessing impacts to coastal beaches and barriers.

Theme Stakeholders

Emergency responders and coastal managers need assessments of the potential impacts of past and future storms on coastal beaches and barriers, access to credible forecasts of the effects of recovery and mitigation actions and future development on coastal vulnerability and resilience, and knowledge to identify areas most vulnerable to impacts of storms to effectively direct response and recovery resources and guide long-term planning to enhance coastal resilience.



Oblique aerial photographs of Seaside Heights, New Jersey, before and after Hurricane Sandy impacts shows coastal change on a developed coastline.

Coastal Impact Assessment Projects

The Nation's coast is fringed by beaches, dunes, barrier islands, wetlands, and bluffs. These natural coastal barriers provide the first defense to storm impacts and are critical factors to assessing the vulnerability of adjacent lands, waters, living resources, and people. The ability of these barriers to provide critical benefits and services, and to mitigate the impacts of future storms, erosion, and sea-level rise, are critical determinants of storm impacts and should inform decisions on recovery and rebuilding.

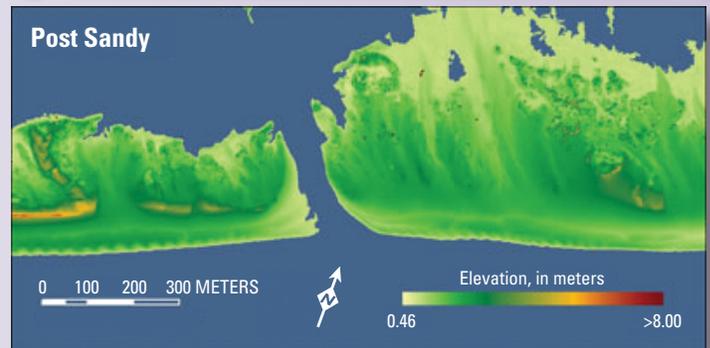
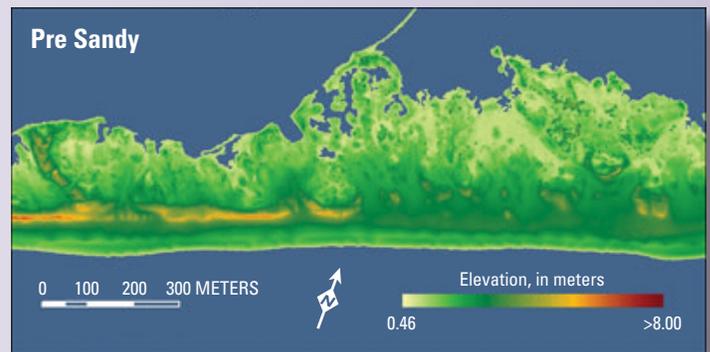
Barrier islands line about one-half the U.S. coast, including most of the region impacted by Hurricane Sandy. The evolution of these landforms is affected by natural processes, human development and other actions, natural trends such as climate change and sea-level rise, and storm events such as Hurricane Sandy. From North Carolina, through New York and Massachusetts, Sandy's waves and surge eroded and overtopped protective dunes and beaches. They transported sand (overwash) inland across roads, wetlands, and breached barrier islands, thereby isolating communities. The post-Sandy barrier system is vastly different than that which existed prior to the storm. The "new" barrier landscape that will determine our vulnerability to future storms is yet to be established and will depend largely on recovery and rebuilding actions taken in the coming months and years. The USGS has a sustained national program to understand and forecast the vulnerability of coastal beaches, wetlands, and barrier islands to storm impacts and the other factors that affect their evolution.

Coastal Mapping Products and Impact Assessments

The USGS aims to provide pre- and post-storm mapping of coastal impacts and vulnerability through the use of airborne lidar flights and photographic surveys, and will develop digital interpretive products that document coastal changes, including overwash, beach loss, habitat modification, channel migration, and elevation change. These mapping efforts can provide these interpretive products to aid response and recovery operations.

Impacts to and Vulnerability of Coastal Beaches

The USGS will evaluate, improve, and deliver coastal impact forecast models. Using these forecast models, the USGS will be able to provide critical information to identify areas vulnerable to extreme erosion during landfall. Using post-Sandy lidar elevation data and forecasts of waves and surge, the USGS will provide updated vulnerability assessments of future impacts to Northeast and mid-Atlantic beaches.



Pre- and post-storm elevation maps of Fire Island, New York.

Coastal Hazards Information and Decision Support Portal

The USGS aims to provide online access and delivery of coastal impact assessments and data. USGS scientists and software engineers will create an online portal for data and tools to assess coastal change vulnerability and apply USGS data and analyses to immediate and specific needs. The online portal will provide direct access for coastal stakeholders to assessments of potential storm and sea-level change impacts on the Nation's coasts, as well as tools to assess rates of shoreline change and probabilities of erosion during storms.

For more information:

Buxton, H.T., Andersen, M.E., Focazio, M.J., Haines, J.W., Hainly, R.A., Hippe, D.J., and Sugarbaker, L.J., 2013, Meeting the science needs of the Nation in the wake of Hurricane Sandy—A U.S. Geological Survey science plan for support of restoration and recovery: U.S. Geological Survey Circular 1390, 26 p., <http://pubs.usgs.gov/circ/1390/>.

- <http://pubs.usgs.gov/circ/1390>
- <http://coastal.er.usgs.gov/hazard-events/sandy/>

U.S. Geological Survey scientists taking an acoustic measuring flow velocity profile in new inlet formed during Hurricane Sandy on Fire Island, New York.

