

## **NOAA's Contribution to Aiding Coastal States Address Increased Flooding Due to Sea Level Rise, Subsidence and Coastal Erosion (Aug26\_2019)**

### **ISSUES**

**OCS, NGS and CO-OPS should continue to play a key role in aiding coastal states to address the threat of increased flooding and loss of habitable land area due to sea level rise, subsidence and coastal erosion.**

### **BACKGROUND**

The combined effects of sea level rise, groundwater uplift and subsidence caused by the loss of land surface elevation due to removal of subsurface support or the glacial unloading, and accelerated storm erosion all pose an existential threat to life, property, and the economic resilience of United States coastal regions. With its mandate to gather and analyze spatial information, NOAA is a key resource for understanding and managing the effects of these phenomenon. Three of NOAA's divisions, Office of Coast Survey (OCS), National Geodetic Survey (NGS), and Center for Operational Oceanographic Products and Services (CO-OPS) are especially important, as they measure the height of U.S. land masses, depth of the oceans, and the effect of the tides that join them.

### **CASE STUDY – THE CANARY IN THE FLOODWATERS**

When Hurricane Katrina made landfall in August 2005, wind, water, and waves from the storm destroyed coastal protection levees and seawalls and devastated the city of New Orleans. The American Society of Civil Engineers' root cause analysis of seawall and levee failure in New Orleans during Hurricane Katrina describes how using an incorrect vertical reference plane combined with not accounting for subsidence led to levees along the Industrial Canal and its outfall canals being ***up to 3 feet below design elevation*** when the storm struck.

As a direct result of these structures failing, almost 2,000 people died in New Orleans during or immediately after the storm. Hundreds of thousands became homeless when their houses were destroyed, and it is estimated that over 125,000 jobs were lost.

What happened in New Orleans can happen anywhere in the United States, often at different temporal and spatial rates. Thousands of miles north, several remote Alaska communities are being forced to consider relocation due to erosion and flooding caused by the loss of protection ice provided from spring storms and exacerbated by sea level rise. In many of the coastal states, "phased adaptation" can help communities make small, manageable and affordable changes in the near-term that will cumulatively result in long-term improvements. Many communities around the coastal US are planning for "managed retreat" as part of the solution. These communities must make a decision as to what to protect, what to preserve and what to abandon along a stored coastline that continues to shrink. In California, exacerbated by energetic storms and sea level rise, life and property are endangered. Townships in Alaska and Louisiana have already voted to abandon their property and move inland or to higher ground. In Hampton Roads, VA, Virginia Sea Grant, Old Dominion University and the Hampton Roads Planning District Commission plan and host quarterly meetings to bring together professionals in adaptation. With an estimated 20 years of service life remaining before sea level rise renders it inoperable, the U.S. Navy has begun planning when and how to relocate Norfolk Naval Station. The threat of sea level rise is pervasive throughout our coastal areas.

Because sea level rise, subsidence, increased rainfall, groundwater uplift, and increased storm erosion will continue, it is critically important along the coastal US to place the ground, buildings, and coastal protection walls into a single common vertical reference frame, assess the local sea level conditions against that reference, and use that information to direct policy and planning. In order for decision-making for our future to be effective, this analysis of contemporary conditions should also be accompanied by an assessment of how these factors, such as local land motion and long-term sea level trends, are projected to change.

## **RECOMMENDATIONS FOR FEDERAL ACTION**

To preserve life and property, and to support a healthy national economy, the nation must help coastal regions prepare for the existential threat of sea level rise. The entire United States, including the Pacific and Caribbean island dependencies, will be impacted by rising water and diminishing habitable land area.

The HSRP advocates that NOAA should prioritize the following areas and convey to Congress that they fully fund NOAA and partner agencies in these areas:

- **Geodetic Surveys:** Continue to provide the foundational framework to support existing elevation mapping programs and the planned transition to the new national vertical reference frame to be released in 2022;
- **Long Term Observations:** Expand funding and research programs for long-term observations such as Continually Operating Reference Stations (CORS), National Water Level Observation Network (NWLON) and Integrated Ocean Observing System/Alaska Ocean Observing System Tier 2 stations, and increase support for programs that promote the complementary linkage of these observation networks to one another.
- **Data Analysis and Models:** Coupled by atmospheric and hydrodynamic physical modeling, support NOAA's sea level modeling and prediction efforts to establish a common framework for model interoperability and to more efficiently integrate systems across disciplinary boundaries.
- **Decision Support Tools:** Develop climatological and statistical tools for federal, state, and local stakeholders to evaluate records, bringing existing coastal infrastructure into a common modern reference frame. Work with our partner federal agencies, to better define temporal and spatial changes for the future.
- **Stakeholder and Public Engagement:** Disseminate relevant and applicable information to stakeholders on a timely and routine basis, highlighting the changing risks from Sea Level Rise to stakeholders. .