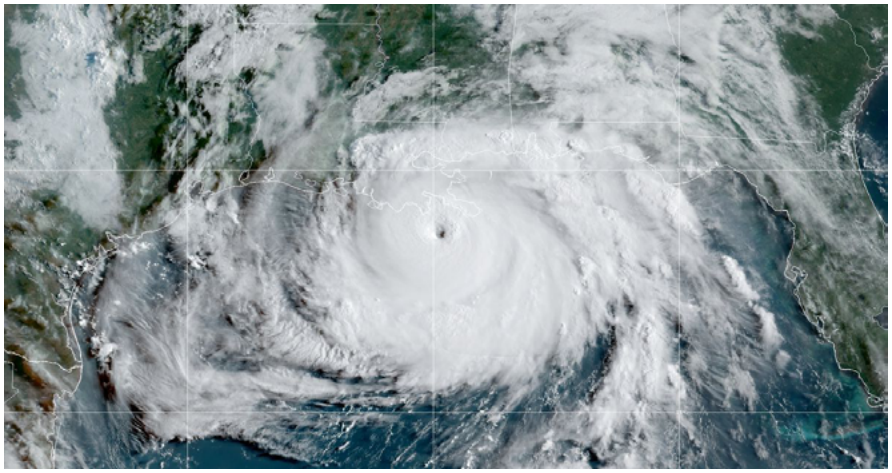
Coastal Resilience

Coastal resilience is the ability of at-risk communities to anticipate, prepare for, and respond to hazardous events, trends, or disturbances related to climate. Hazardous events include impacts of sea level rise, storm events, coastal flooding, changing Great Lakes water levels, and land subsidence ("coastal hazards").

NOAA should play a more proactive and leading role in aiding coastal states and local communities to address the threat of increased flooding and coastal erosion. NOAA should prioritize investment in coastal hydrographic data gathering and dissemination through authoritative and accessible predictions, projections, and services. Coastal hydrographic data include shoreline elevation and nearshore depth surveys as well as geodetic, tide, water level, and current observations.

According to the latest Sea Level Rise Scenarios for the United States, sea level along the U.S. coastline is projected to rise, on average, 10 to 12 inches between 2020 and 2050, which will be as much as the rise measured over the last 100 years (1920 - 2020). Sea level rise will vary regionally along U.S. coasts because of changes in both land and ocean height. Sea level rise will create a profound shift in coastal flooding over the next 30 years by causing tide and storm surge heights to increase and reach further inland. By 2050, "moderate" (typically damaging) flooding is expected to occur, on average, more than 10 times as often as it does today, and can be intensified by local factors (2022 Interagency SLR Technical Report). By 2050, high tide flooding on a national scale is expected to be between about 45 - 70 days/year on average as compared to 3 to 7 days in 2022 (State of High Tide Flooding and 2022 Outlook).

The Intergovernmental Panel on Climate Change (IPCC) has demonstrated that hurricanes have become stronger during the past four decades; multiple analyses concur that climate change is worsening hurricane impacts and costs. Through its mandate to gather and disseminate hydrographic information, NOAA is a key resource for understanding and managing the trends and impacts of coastal hazards, which pose a threat to life, property, and the economic resilience of the U.S. coastal regions.



An satellite image of Hurricane Ida in 2021. Credit: NOAA

At varying levels, the threat of sea level rise is pervasive throughout our coastal areas. Sufficiently informed and resourced communities around the coastal U.S. are adopting sea level rise adaptation plans. The plans consider options that include increasing low-lying elevations via the addition of compatible sediment (e.g., thin layer placement or marsh restoration, which are examples of nature-based solutions) or "managed retreat" as part of the solution. Many underserved coastal communities do not have the resources to develop similar adaptation plans, or to identify funding or partnerships to, for example, capture the foundational data necessary to inform such plans, such as water level data.

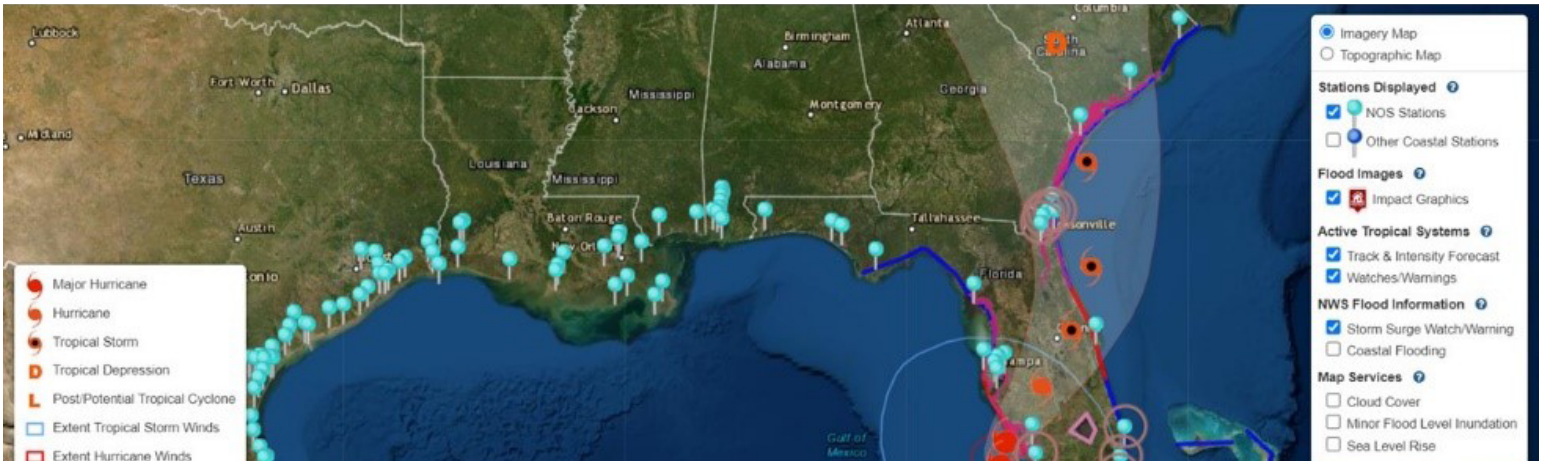
It is critically important to engage and assist community planners, particularly those in vulnerable and historically marginalized and overburdened communities, through consistent data dissemination and where appropriate, streamlined decision support tools. For example, the use of a common and consistent vertical reference frame (datum) for the ground, buildings, and coastal protection features will help decision makers assess local sea level conditions, including tides, against that reference and use that information to inform policy and planning. In addition, local decision makers face challenges when federal and/or non-federal decision support tools are not coordinated and may recommend differing or conflicting resilience strategies.

Continuously tracking how and why sea level is changing, and how coastal landforms and communities are adjusting, is an important part of informing plans for adaptation. Our ability to monitor and understand the individual factors that contribute to sea level rise allows us to track changes ways that have never been possible (e.g., aligning satellites and in-situ data to track global ocean levels and ice sheet thickness). Ongoing and expanded monitoring in the coastal zone (e.g., topobathymetric lidar, vessel and satellite derived bathymetry) will be critical as sea levels continue to rise or glacial ice at the coast retreats. To maximize the applicability and accessibility of these data, they must be combinable in time and space for incorporation into useful tools for researchers (e.g., digital twin and integration into BlueTopo™) and decision makers (e.g., for coastal flood modeling and forecasts of long-term coastal change).

Recommendations for NOAA Action:

Working with its federal, state and industry partners, NOAA should prioritize the following:

- Sustain and expand long-term observation programs, such as the National Water Level Observation Network and the Physical Oceanographic Real-Time System, fill gaps and leverage existing, and support new, hydrographic data gathering efforts with partners. Incorporate both data sources into authoritative decision support tools.
- Continue to fund and better coordinate coastal elevation and shoreline mapping, ground deformation and subsidence surveys, at a 5-year cycle through the nation's coastal zone. Use location-appropriate technologies for efficiency and coverage (e.g. lidar, acoustic survey), and ensure data supports multiple applications.
- Support NOAA's Coastal Inundation Dashboard (see image below) and other efforts that consolidate, clarify, and make accessible tools to disseminate data and communicate risk from coastal hazards to decision makers.
- Increase collaboration with local communities, taking advantage of established networks, both internal (e.g., NOAA's navigation managers) and external (e.g., NGOs) to NOAA.
- Continue support for modernizing the National Spatial Reference System and for precise height determination surveys through leveling techniques around coastal communities.
- Coupled by atmospheric and hydrodynamic physical modeling, support water level modeling, validation and prediction efforts to establish a common framework for model interoperability and more efficiently integrate systems across disciplinary boundaries.



An image showing a screen capture of NOAA's Coastal Inundation Dashboard. Credit: NOAA

In October 2003, Secretary of Commerce Don Evans established the HSRP as directed by the Hydrographic Services Improvement Act of 2002, Public Law 107-372. Panel members, appointed by the NOAA Administrator, include a diverse field of experts.

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