

Original Report

NOAA RESPONSE TO THE LEADERSHIP IN COASTAL RESILIENCE REPORT

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TO: NOAA's Science Advisory Board

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Leadership in Coastal Resilience Report Overview

In October 2020, The NOAA Science Advisory Board selected coastal resilience as a long-term priority for the agency. As such, the SAB worked to develop a whitepaper that identifies the challenges of future decades and how NOAA can work across line offices, with other Federal agencies, and with the private sector to ensure coastal infrastructures, and those who rely on it, are resilient to both acute and chronic threats.

The Review

In April 2022, the Climate Working Group (CWG) and Ecosystem Sciences and Management Working Group (ESMWG), a sanctioned working group of NOAA's Science Advisory Board (SAB), reviewed the white paper and members of the CWG and ESMWG presented that review to the SAB Members. SAB Members accepted the recommendations and added points for NOAA's consideration; the package was forwarded to Dr. Richard Spinrad as Under Secretary of Commerce for Oceans and Atmosphere.

NOAA's response to that review follows.

Response to the Recommendations

NOAA is grateful for the SAB's recommendations and for the opportunity to provide a response. With appreciation for the SAB's review, NOAA largely concurs with the recommendations. In some instances, additional resources would be required to adequately address the recommendations.

Recommendation #1

Nature-Based Approaches to Risk Reduction. Conduct research in partnership with others to increase the understanding of tradeoffs between the performance of natural coastal habitats in mitigating current and future flood risk and the provision of other ecological functions.

NOAA Response. NOAA agrees with the SAB on the importance of multi-sector

partnerships when it comes to understanding nature-based approaches to risk reduction. NOAA works with more than 15 federal agencies, state agencies in every state, academic institutions, and the private sector as we conduct research in partnership with others to increase the understanding of tradeoffs between the performance of natural coastal habitats in mitigating current and future flood risk and the provision of other ecological functions. NOAA utilizes competitive research programs to advance our understanding of Nature-based approaches through directly supporting external scientists (i.e., [Effects of Sea Level Rise Program](#), [Adaptation Sciences Program](#), [Natural Estuarine Research Reserve System](#), [Sea Grant-funded research targeting flood resilience, along with contaminants of emerging concern and runoff pollution](#)). NOAA scientists within the National Centers for Coastal Ocean Science (NCCOS) and Office for Coastal Management (OCM) also work closely with interdisciplinary and multi-agency teams to assess the performance of nature-based solution projects.

Recommendation #2

Supporting Adaptation of Important Coastal Species. Identify and address gaps in scientific understanding that limit the ability of NOAA and its partner agencies to anticipate and effectively respond through mitigation, adaptation, restoration, or other management measures to climatologically induced threats to important coastal fisheries and other marine species.

NOAA Response: NOAA agrees with the SAB's recommendation on the need to increase the understanding of the impacts of climate change on important coastal species, including protected species and their habitats, and respond with the best management strategies to promote species resilience and adaptation. This SAB recommendation aligns well with the NOAA Climate, Ecosystems and Fisheries Initiative (CEFI), which is a priority effort to help meet some of these needs mentioned by the SAB. This initiative calls for development of an operational decision support system to provide resource managers with robust information on expected future conditions, risks and best resource management/ adaptation strategies. A key component of the CEFI system is targeted research and observations to fill key information gaps, validate models and provide continuous innovation. While there are a variety of efforts working to address these information needs (e.g., NOAA Climate and Fisheries Adaptation Program), the gaps are large given the pace, scale and scope of climate change impacts in marine and coastal ecosystems. Per the recommendation of the SAB, NOAA looks forward to addressing these gaps, spatially and temporally.

Recommendation #3

Socio-economic Inquiry. Conduct and support social science research to increase the understanding of how people (individually and collectively) understand, react to, and are affected by changing coastal conditions (both chronic and acute) including consideration of interactions among economic consequences and social and cultural changes that the loss of (or restoration of) coastal resilience can affect or engender.

NOAA Response. NOAA agrees with this SAB recommendation and acknowledges how important social science research is to coastal resilience. This SAB recommendation was one of the factors that resulted in applying a portion of the Bipartisan Infrastructure Law funding for flood mapping and modeling to support social science research, including identifying and engaging users on their uses of flooding information, methods for identifying community level tradeoffs and co-benefits of flooding adaptation responses (including those related to coastal risks), and improving inclusive methods of engagement for coastal communities. NOAA has also supported research on and synthesis of research findings around risk communication, and this research has informed NOAA products. Similar, NOAA recently supported a synthesis of the literature and on-the-ground projects to identify [best practices](#) around risk communication for underserved audiences.

After Hurricane Katrina (2005), NOAA was able to support research to identify variables that contribute to coastal community vulnerability and resilience. This in turn informed products such as the Community Resilience Index that has been used widely in the Gulf of Mexico region and that continues to be used by communities to assess sources of risk and resilience. In addition, the data NOAA compiles on the coastal and marine economies inform our understanding of potential climate impacts. Additional and sustained resources directed to better understand the interactions among economic consequences and social and cultural changes would enable NOAA to make progress above and beyond what has been possible through supplemental funding. With this recommendation, NOAA will look to find different avenues, when possible, to continue supporting and integrating social science research into our service deliverables.

Recommendation #4

Enhance Observing Systems. Further refine the development and deployment of land/water and space-based observing networks that are directly useful to local entities to track and forecast a variety of coastal ocean conditions over time.

NOAA Response. NOAA agrees with the SAB’s recommendation on the importance of enhancing coastal and ocean observing systems. NOAA is continually maintaining and – when resources allow – modernizing and expanding our observation networks, including those related to coastal ocean conditions. For example, in addition to maintaining the Continuously Operating Reference Stations (CORS) network and the National Water Level Observation Network, NOAA is supporting local water level sensor networks and data management systems. Given the importance, NOAA is applying Bipartisan Infrastructure Law funding (BIL) to acquire high resolution land cover data, including an impervious surface layer that will be valuable for local governments exploring their vulnerability to flooding and potential nature-based solutions for managing excess water. BIL funding is supporting the installation of Foundational CORS stations to support the monitoring of natural and human-caused processes of coastal land motion. BIL funding is also supporting new and improved product development and assessments of water quantity (especially flooding and inundation) as well as water quality impacts in NOAA’s Satellite Service. Further, NOAA is also exploring, together with NASA and USGS, how satellite data can be used for developing "data indicators" to be used in coastal adaptation planning; such indicators would help communities know when self-identified thresholds have been reached that should trigger adaptive action. NOAA, in coordination with national and international partners, is also developing new and improved products from recent and forthcoming ocean, coastal and inland water satellite missions.

NOAA is piloting novel low-cost water level sensors in the southeast of the U.S. through the Southeast Coastal Ocean Observing Regional Association (SECOORA). The goal is to install over 200 sensors over the next five years, providing water level data to coastal communities in North Carolina, South Carolina, Georgia, and Florida that face threats from high tide flooding, storm surge, and sea level rise. The sensors will provide real-time water level data to town managers, emergency managers, and the public, via SECOORA’s online data portal. These data are vital for monitoring coastal flooding and keeping citizens informed of hazardous conditions. Once the network of sensors is established, communities can use the data when designing resilience and adaptation strategies to sea-level rise and other climate impacts.

Recommendation #5

Integrated Coastal Resilience Modeling. Establish an Integrated Coastal Resilience Modeling framework that uses existing and enhanced observing systems to provide coastal decision

makers with key insights into the cumulative effects of future physical, chemical, and ecological change at subseasonal, seasonal, and multidecadal time scales.

NOAA Response. NOAA agrees with the SAB’s recommendation and acknowledges the importance of providing reliable and accessible information to coastal decision makers. NOAA is continuously maintaining, and expanding the model domain and skill to advance forecasting and prediction capabilities. NOAA is making strides in multidisciplinary approaches to earth system and coastal modeling which are informed and enhanced by observing systems. [NOAA’s Unified Forecast System \(UFS\) strategic plan](#) includes the goal to enhance global ocean, coastal, estuarine, and Great Lakes modeling capabilities to provide improved weather, climate, hydrologic, and ecological predictions. State of the art advances, such as real time data assimilation or coupling with atmospheric and hydrologic models, are collaboratively developed and integrated into the system. The Coastal and Ocean Modeling Testbed (COMT) program, the Disaster Relief Supplemental Act (DRSA), and the Bipartisan Infrastructure Law (BIL) fund projects that advance data assimilation for coastal models. The West Coast Operational Forecast System (WCOFS) was the first NOS model that uses data assimilation, to transition to operations (2021). The COMT and DRSA programs fund projects that advance our data assimilation capabilities and the BIL funding will implement data assimilation in development of the East Coast Community Ocean Forecast System (ECCOFS) which includes the US East Coast, Caribbean, and Gulf of Mexico.

Recommendation #6

Predicting Human-Natural System Feedbacks. Build on socio-economic research and modeling of biogeophysical change to develop tools that encompass feedbacks between human and natural systems to support exploration of future social, economic, and environmental conditions on saltwater and freshwater coasts at a variety of scales.

NOAA Response. NOAA agrees with the SAB’s recommendation on the importance of studying both human and natural systems. In an effort to build upon this connection and reflect on the SAB’s recommendation, we have allocated funds from the Bipartisan Infrastructure Law (BIL) to re support the societal data insights initiative (SDII), which seeks to integrate social and physical data to better understand their interactions in the past with respect to flooding. Through efforts like high resolution land cover mapping, there is a foundation to monitor, at least in part, biogeophysical changes over time. Even these data-focused efforts are supported via supplemental rather than base funding and

NOAA is likely a decade away from truly having any predictive capability in this realm. Therefore, we will need to continue our efforts in order to make progress in addressing this recommendation.

Recommendation #7

From Stakeholder Engagement to Co-production and Co-design. Build new partnerships to engage in the co-production and co-design of knowledge and action to generate new knowledge, capacities, networks, and actions that are more inclusive, relevant, and impactful.

NOAA Response. NOAA concurs with this recommendation. Thus, in response to the SAB recommendation, NOAA is building upon the successful implementation of the [NOAA Service Delivery Framework](#) to foster and sustain the equitable relationships that enable co-development of products and services.

For example, Bipartisan Infrastructure Law (BIL) funding will support the development of a national community of practice around resilience to coastal inundation, co-led by NOAA's Office for Coastal Management and the National Sea Grant Office. Members will inform NOAA's flood modeling and mapping work under BIL. Combined, these efforts will help NOAA build new partnerships and ensure equitable outcomes as per recommendation of the SAB.

Recommendation #8

Facilitating Social Learning. Develop, evaluate, and refine interactive approaches that enable a variety of coastal audiences to access and interpret outputs from the Integrated Coastal Resilience Modeling framework and human-natural systems modeling and understand the varied potential consequences of action/inaction on their interests, including timelines for change and adaptation and costs and benefits to people and businesses.

NOAA Response. NOAA agrees with SAB recommendation 7 to facilitate social learning. This SAB recommendation encourages NOAA to implement the [NOAA Service Delivery Framework](#), where continuous stakeholder interaction is implied throughout product development lifecycles. With this recommendation, the tools and products that are built for coastal audiences will be more informed and useful for solving adaptation issues.

Recommendation #9

Support for Implementation. Enhance and expand the network capacity and efficacy of NOAA and partner engagements at local and community scales to help communities and community decision makers identify and implement solutions that build coastal resilience.

NOAA Response. NOAA agrees with the SAB that efficient and effective use of data, tools, information, and interpretation is necessary for communities to implement coastal resilience initiatives. These initiatives are best accomplished through direct and sustained engagement with partners. However, NOAA's internal capacity to provide engagement and local technical assistance is resource limited. Despite these challenges, considerable progress has been made through national partnership networks (e.g., Digital Coast; National Sea Grant College Program) and the expansion of regionally-based staff. Bipartisan Infrastructure Law (BIL) funding and possible Inflation Reduction Act (IRA) funding will enable a meaningful advancement in NOAA's ability to support equitable coastal climate adaptation and resilience efforts at local and regional scales. For example, BIL funding will enable NOAA's Office for Coastal Management and the National Sea Grant Office to develop a national community of practice around resilience to coastal inundation. Members will advance inundation data and tools, as well as resilience solutions, via peer-to-peer sharing, and will integrate local knowledge and understanding with additional research findings and resilience approaches they can bring back to their communities. With this recommendation we will be able to create better solutions for building coastal resilience.