

## Enhancing Coastal Resilience through Trans-disciplinary Collaboration

C. Reid Nichols

*Southeastern Universities Research Association, Washington, D.C.*

L. Donelson Wright

*Southeastern Universities Research Association*

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# Enhancing Coastal Resilience through Trans-disciplinary Collaboration

C. Reid Nichols\* and L. Donelson Wright  
 Southeastern Universities Research Association, Washington, DC  
 \*Corresponding author: [rnichols@sura.org](mailto:rnichols@sura.org)

## Introduction

SURA has initiated a workshop series to integrate social and natural sciences to assist planning and risk assessment of coastal communities threatened by both long-term and event-driven (e.g. by severe storms) inundation, land loss, water quality degradation and resulting economic declines in industries such as tourism, fisheries and shipping.

During the October 29 & 30, 2014 workshop, attendees identified critical issues in assessing future risks, vulnerabilities and resilience of complex coastal systems that involve interdependent social, legal, biogeophysical and biogeochemical factors. The desired outcomes included: 1) Creation of a SURA Consortium for Coastal and Environmental Resilience, 2) Establishment of a major new multi-institutional program, 3) Submission of a competitive funding proposal by a multi-institutional team, and 4) Defining and establishing a user group base that will benefit from products. The final report can be accessed online (see [http://scholarworks.uno.edu/resilience/SURA\\_final\\_report.pdf](http://scholarworks.uno.edu/resilience/SURA_final_report.pdf)).

SURA workshops provide an opportunity for in-depth discussion on all aspects of coastal resilience.

## Initial Progress

SURA continues to engage with and provide federal relations support for multi-institutional endeavors that are consistent with its mission. Example accomplishments follow:

- A scenario-based workshop was planned with Broward County Government in response to findings from SURA's October 29 & 30, 2014 coastal resilience workshop .
- Two trans-disciplinary proposals were submitted to the NOAA 2015 Regional Coastal Resilience Grant Program.
- SURA has received new funding to advance the Coastal and Ocean Modeling Testbed to evaluate the readiness of coastal and marine forecasts of low dissolved oxygen, flooding from storm surge and wave conditions.

## References

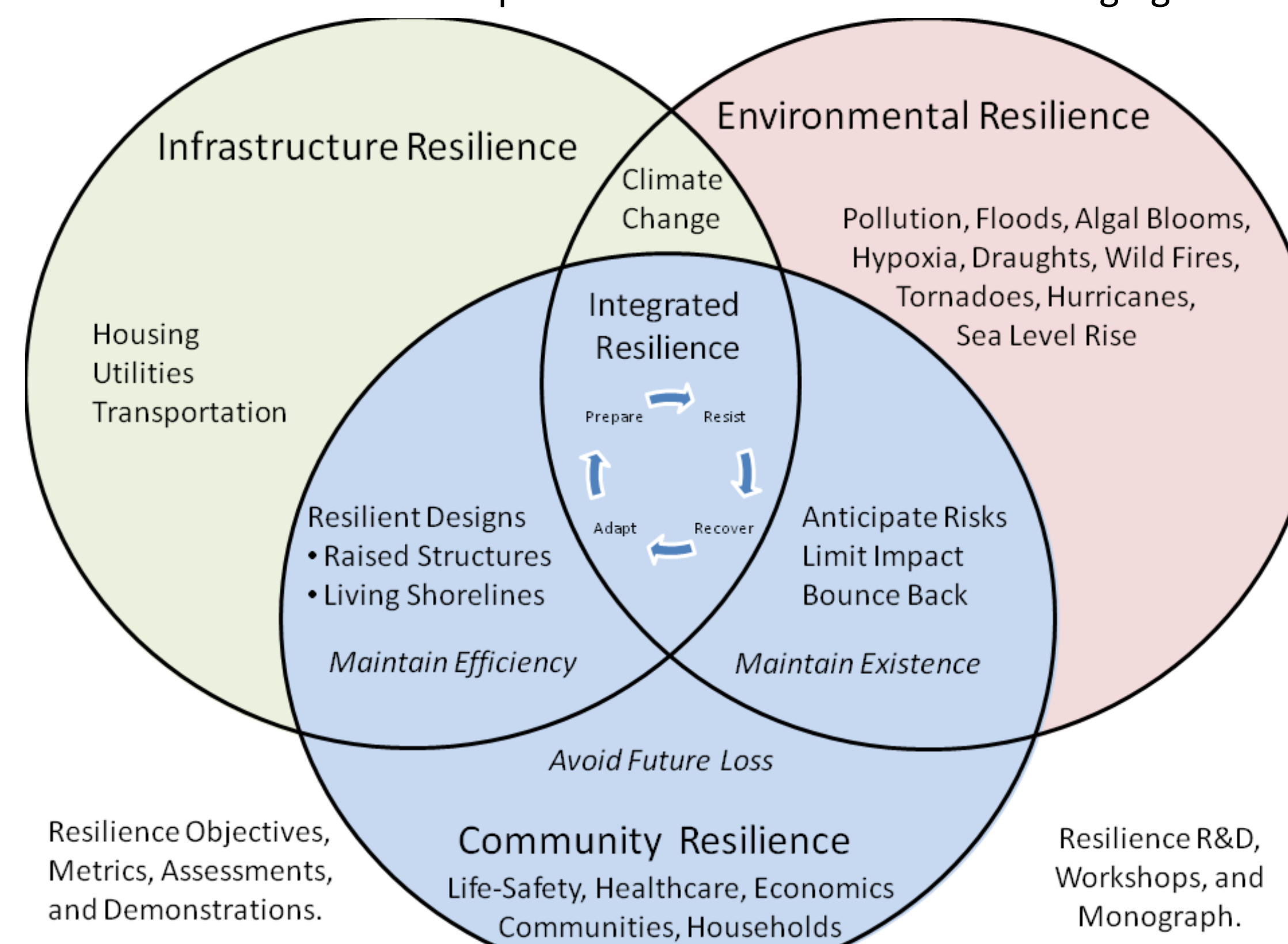
- [1] Haidvogel, D. B., E. Turner, E. N. Curchister, and E. E. Hoffmann. 2013. Looking Forward: Transdisciplinary Environmental Forecasting and Management. *Oceanography* 26(4), 128-135
- [2] National Academies. 2012. *Disaster Resilience: A National Imperative*. Washington, D.C., The National Academies Press.

## Functional Elements

SURA is working to implement coastal resilience research to design resilient systems, to improve or restore ecosystems, and to decrease the vulnerability of communities to extreme weather. Research is being guided through a Scientific Requirements and Advisory Committee, a coastal resilience workshop series, and the publication of a coastal resilience monograph.

## Scientific Requirements and Advisory Committee

The Scientific Requirements and Advisory Committee (SRAC) was formed to examine coastal resilience research activities (See Fig. 1), provide guidance and recommendations for future work, and to render its professional judgment about the quality and importance of trans-disciplinary coastal resilience research contributions. The SRAC meets approximately twice per year to plan workshops (see Table 1) and review all resilience scientific activities during the preceding period. Results of this work ensure applicable workshops and the outline and publication of a coastal resilience monograph. The Chairman will provide a Biannual Report to the members of the SRAC prior to the meetings to document milestones and major achievements, positive actions taken in response to prior SRAC recommendations, personnel changes, upcoming workshops, and any changes in the coastal resilience monograph. The SRAC will report its evaluations of the current state of coastal resilience research, and its recommendations to the NOAA Regional Coastal Resilience program. The SRAC includes nationally recognized scientists and engineers from universities. Future members of the SRAC will be nominated by the SURA Coastal and Environmental Research Committee. The SURA SRAC membership is determined in consultation with the representatives of the federal funding agencies.



**Figure 1. Coastal resilience research includes infrastructure (engineering), the environment (ecosystems), and community.**

## Coastal Resilience Monograph

A collection of articles describing a wide range of coastal resilience applications. The goal is the sharing of recent research, results from the SURA workshop series, and foundational concepts. It is expected that the authors will be using images and figures from previously published papers.

**Table 1. SURA Coastal Resilience Workshop Series. Planned workshops cover environmental factors common to the Mid-Atlantic Bight, Gulf of Mexico, and South Atlantic Bight.**

University Lead	Coastal Characteristics
Old Dominion University (2016)	Low lying barrier islands, low-lying coastal plains, estuaries, and cusped forelands fronted by wide, low gradient continental shelf and subject to rising sea levels, tropical and extra-tropical storms, high storm surges and frequent beach erosion.
Louisiana State University (2017)	Deltaic coastal regions include coastal zones from Vermillion Bay on the west, to the Chandeleur Islands in the Gulf of Mexico on the southeastern coast of Louisiana. The coast experiences a diurnal microtidal regime and relatively low wave energy except during episodic storms and hurricanes.
Skidaway Institute of Oceanography (2018)	Low lying barrier islands, low-lying coastal plains, estuaries, and tidal marshlands subject to a mesotidal regime, rising sea levels, tropical and extra-tropical storms, high storm surges and frequent beach erosion.

## Conclusions

SURA coastal resilience projects support the development of effective federal, state, and local government approaches to planning, leverages available resources through collaborative science, and applies science-based evaluation measures to better understand viable approaches.

With funding from the U.S. Integrated Ocean Observing System Program (IOOS<sup>®</sup>) of the National Oceanic and Atmospheric Administration (NOAA), SURA has facilitated strategic collaborations to build and guide the Coastal and Ocean Modeling Testbed (COMT). The initial, \$4 million grant to support the vision of distributed, open-access, community science was awarded in 2010, with renewal funding ever since. The resulting COMT is now one of 11 official NOAA testbeds. The overarching goal of the COMT is to accelerate the transfer of research results to improve operational coastal ocean modeling and forecasting skill. SURA has advanced the COMT to evaluate the readiness of coastal and marine forecasts of low dissolved oxygen, flooding from storm surge and wave conditions.

Numerous investigators ([1], [2], [3], and [4]) have highlighted the importance of including the social sciences in future environmental forecasting programs. Coastal resilience emphasizes the mutual interdependence of human (i.e., socioeconomic) and natural systems (e.g., ecosystems, biophysical and biogeochemical systems). The SURA resilience workshop series are the first step in developing a "Coastal Resilience Enterprise" and SURA institutions as well as other institutions could become a part of this "Enterprise". Attendees from the October 2014 resilience workshop expressed the need for a the creation of a Consortium (or "Collaboratorium") for coastal resilience.

The foundation for the Consortium rests in ongoing workshops focused on the various types of natural and man-made coastal features. A coastal resilience monograph is needed identify metrics and viable approaches to resilience.

## Further information

SURA is involved with the planning and execution of annual coastal resilience workshops to showcase innovation and to support transition of research results to operations (see <http://www3.sura.org/~suraorg/>).

## Acknowledgments

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- [3] National Research Council, 2014b. *Convergence: Facilitating Transdisciplinary Integration of Life Sciences, Physical Sciences, Engineering, and Beyond*. Washington, DC, The National Academies Press
- [4] Stockholm Resilience Centre, Stockholm University, "What is resilience?" Available online. URL: <http://www.stockholmresilience.org/>. Accessed on August 23, 2015.