

**YUSUF-ODU
DHS COASTAL RESILIENCE CENTER
RESEARCH PROJECT
YEAR 3 PERFORMANCE REPORT
AND
FINAL PROJECT REPORT**

Project Title: Stakeholder/End User Engagement Support of Two CRC Projects (Former project title: A Tool to Measure Community Stress to Support Disaster Resilience Planning)

Principal Investigator Name/Institution: Wie Yusuf, School of Public Service, Strome College of Business, Old Dominion University

Co-Principal Investigators and Other Partners/Institutions:

- Larry Atkinson, Slover Professor and Eminent Scholar, Department of Ocean Earth & Atmospheric Sciences, College of Sciences, Old Dominion University
- Joshua Behr, Research Associate Professor, Virginia Modeling, Analysis, and Simulation Center (VMASC), Old Dominion University
- Michelle Covi, Assistant Professor of Practice, Department of Ocean Earth & Atmospheric Sciences, College of Sciences, Old Dominion University and Virginia Sea Grant Extension

Project Start and End Dates: 1/1/2016 – 6/30-2018

Short Project Description (“elevator speech”):

This project supported several Coastal Resilience Center (CRC) research and education projects, building on the project team’s expertise in stakeholder engagement, leveraging information already collected from initial case studies, and utilizing existing connections to stakeholders and possible end users in the Hampton Roads region. Specifically, this included (1) organizing a panel for the Maritime Risk Symposium that addresses “Integrating Maritime and Coastal Resilience;” (2) supporting stakeholder engagement and end user translation efforts of ‘*The Incorporation of Rainfall into Hazard Estimates for Improved Coastal Resiliency*’ project; (3) participating in a collaborative research project studying socio-ecological resilience with a team from Norfolk State University (NSU), a minority-serving institution, as part of the DHS Summer Research Team Program; and (4) hosting a summer research intern from Tougaloo College, a minority-serving institution. Overall, the project team engaged with the CRC and its projects by assisting with communications and engagement efforts and providing linkages between CRC research and education projects and Hampton Roads resilience initiatives.

Summary Abstract:

The objective of this project is to provide stakeholder and end user engagement in support of CRC research and education projects, building on the ODU team’s expertise in stakeholder engagement and utilizing existing connections to stakeholders and potential end-users in Hampton Roads. The project team co-organized (with the U.S. Coast Guard) the panel titled “Integrating Maritime and Coastal Resilience” held at the November 2016 Maritime Risk Symposium. This panel included Jim Redick (Director of Norfolk Emergency Management),

RADM Ann Phillips (U.S. Navy, ret.), Kit Chope (Vice President for Sustainability, Port of Virginia), and Commander, U.S. Coast Guard Sector Hampton Roads. We supported stakeholder engagement efforts of ‘The Incorporation of Rainfall into Hazard Estimates for Improved Coastal Resiliency’ project (PI: Don Resio) by hosting a Hampton Roads Adaptation Forum on the topic of Sea Level Rise and Flooding Science and a web-based hydro-surge flood modeling focus group with local government stakeholders. We participated in collaborative research on socio-ecological resilience with faculty and students from Norfolk State University (a minority serving institution) as part of the DHS Summer Research Team Program. In summer 2018 we hosted a SUMREX student from Tougaloo College. The student worked with faculty to define resilience and engaged various stakeholders and potential end-users by participating in training, workshops, and events. Across these activities, we connected CRC partners with stakeholders and end-users, including managers and planners from local governments, regional organizations, state agencies, federal and DoD agencies, and non-profits.

PROJECT NARRATIVE:

1. Research Need:

This project meets the Homeland Security needs for stakeholder and end user engagement in two CRC projects. Our efforts focused on engaging with federal, state and local government stakeholders and facilitating end user translation of project deliverables and products. In addition, our project supports building coastal resilience and enhancing homeland security in the coastal region, specifically integrating maritime and port issues with coastal resilience issues. By connecting stakeholders in maritime and port sectors with stakeholders in emergency management and resilience, our project supports Homeland Security needs related to risk and improving coastal resilience. These issues have been brought to a wider audience through our support of the Maritime Risk Symposium; the visibility of such issues and their connectivity to other related risk and resilience concerns have been advanced by this project. Through *‘The Incorporation of Rainfall into Hazard Estimates for Improved Coastal Resiliency’ project*, our engagement efforts with planning- and management-level stakeholders in Hampton Roads *addresses the Homeland Security research need related to modeling and decision making that incorporate different risks and that are more strongly connected to the needs of end-users*. Since end-users can provide input into development, such as specifying the use of modeling information or what risks to incorporate into the models, they are more invested in using the models, which through participation are better tailored to their needs. We also supported Homeland Security efforts to better involve faculty and students from minority-serving institutions in the research and practice of coastal resilience. Through the collaborative research project with faculty and students from Norfolk State University and through the SUMREX student internship, we are building an interdisciplinary community of scholars that have diverse backgrounds and perspectives.

2. History:

Year 1 (January 1, 2016 – June 30, 2016)

During Year 1, this project shifted in focus to support stake holder engagement activities within the DHS Coastal Resilience Center of Excellence (CRC). The original project involved

development of a Hazards Stress Test Tool (HSTT) that supports coordinated actions in all risk management and mitigation phases involving collaboration between federal, state, local, tribal, and private sector partners. It addresses the nexus of risk assessments, land use and hazard mitigation plans under climate change. “Community stress” (CS) preconditions the capability “to prevent, protect against, mitigate, respond to, and recover from the threats and hazards that pose the greatest risk.” CS is a proxy for this capability. CS has not been systematically integrated in disaster risk assessments. Significant knowledge gaps in the probability density functions (PDF) of local sea level (LSL) rise and extreme events make rigorous assessment of costs and benefits impossible, leading planners to make decisions based on somewhat arbitrary assumptions. Interdependencies among services, infrastructure, buildings, areas, and social fabric are not always considered. The processes in the coupled natural-human system that translate hazards into disasters are not yet fully understood.

We began work on HSTT development by engaging with use case stakeholders and other potential end users of the HSTT. Beginning January 2016, the ODU project team began working with potential use case stakeholders to identify relevant use cases for the HSTT. We identified three potential groups of use case stakeholders and met with each group to discuss their planning information needs and identify appropriate use cases. We identified the following use cases:

1. **Rural use case:** Gloucester County, VA. January 27 meeting with Brian Lewis, Director of Engineering; Garrey Curry, Assistant County Manager; and Anne Ducey-Ortiz, Director of Planning and Zoning.
2. **Urban use case:** City of Norfolk, VA. February 3 meeting with Jeremy Sharpe, Long-range Planner and lead of Norfolk 2100 project; Paula Shea, Principal Planner; Katerina Oscarson, Resiliency Office; Bobby Tajan, Floodplain Manager; Pam Myers, AmeriCorps resilience intern; Justin Burns, AmeriCorps resilience intern.
3. **Regional use case:** Hampton Roads Planning District Commission (HRPDC) and the Regional Emergency Management lead on regional mitigation planning. February 4 meeting with Ben McFarlane (HRPDC planner); Erin Sutton, Emergency Management Director for the City of Virginia Beach.

We met with use case stakeholders to identify their needs, constraints, and capacity to utilize the HSTT in their planning processes. Our discussions were structured around answering the following questions:

1. What planning processes are you currently engaged in to reduce flood and/or hazards risk?
2. The hazard stress test tool is a decision support tool that provides information about how the resources, characteristics, and capacities of your community interact to affect resilience to hazards. Can you describe how this information feeds into these planning processes?
3. What factors or characteristics of communities can affect how resilient a community can be to floods and hazards?
4. What is the status and/or timeline of these planning process?

Several key themes arose from our discussion with the use case stakeholders:

1. Moving beyond hazards

- The stakeholders believe that there is existing knowledge about hazards. Most plans also rely on HAZUS to identify hazards and vulnerabilities. In many cases, use of HAZUS for planning is mandated. Additional information and models about hazards is not useful. Long-range planners want to focus on ‘opportunities’ and want to frame the issue away from hazards towards possibilities. They are interested in a tool that not only included the negatives and gaps, but also characteristics, assets, resources and capabilities that enhance or contribute to increased resilience.
 - Questions the stakeholders need help with are related to hazards but on a broader level: Where to build? If you need to rebuild, what is the best plan? How to inform a long term recovery plan? How to inform the capital budgeting process and zoning decisions. How to decide funding priorities?
2. Utility beyond planning and plans:
- The plans (floodplain management plan, hazard mitigation plan, emergency management/response plan) are perceived as end outcomes, with the outcome being to ‘check the box’ that the plans have been developed. These plans are reviewed, but various other decisions such as land use decisions (i.e. where to develop- where to bring in water and sewer, zoning and rezoning) are often made independent of these plans.
 - Taking plans to the next step requires supporting the implementation phase. Implementation requires information about how different decisions involve different trade-offs, e.g. (re)zoning decisions may involve trade-offs regarding economic activity, livability, resilience. Planners need tools to help communicate these trade-offs to officials who make the decisions. Both Gloucester and Norfolk stakeholders raised the importance of linking plans to capital budgeting. One stakeholder noted: “The usefulness is in the implementation of the plan. Not as part of the development of the plan.”
 - In terms of mitigation strategies and actions included in the plans, there is a gap in how to prioritize projects for implementation. Stakeholders do not have metrics, tools, process, or frameworks to compare different mitigation strategies or to rank them.

From the meetings with use case stakeholders, we found that the HSTT project, as originally proposed, did not meet end user needs and would not gain traction within the end user community as a decision support tool. We concluded that the project direction should be altered to produce a decision support framework that supports not only planning, but the integration of planning within a broader decision making context including implementation and funding.

Given this conclusion, remaining funding for this project was repurposed with approval from DHS to support stake holder engagement with the Coastal Resilience Center, leveraging our connections to various stakeholder groups including planners, policy makers and decision makers, non-profit and outreach organizations, and resident groups.

Year 2 (July 1, 2016 – June 30, 2017)

For Year 2, we supported two CRC projects, building on our expertise in stakeholder engagement and utilizing existing connections to stakeholders and potential end-users in Hampton Roads. First, we hosted a Hampton Roads Adaptation Forum on the topic of Sea Level Rise and Flooding Science, in support of stakeholder engagement efforts of ‘The Incorporation of Rainfall into Hazard Estimates for Improved Coastal Resiliency’ project (PI: Don Resio). Second, we co-organized a panel for the Maritime Risk Symposium that addressed “Integrating Maritime and Coastal Resilience.” For both projects, we connected our CRC partners with stakeholders and potential end-users, including managers and planners from local governments (e.g., in emergency management, coastal planning), regional organizations (e.g., Hampton Roads Planning District Commission, Hampton Roads Sanitation District), state agencies (e.g., Virginia Department of Emergency Management, Port of Virginia), federal and DoD agencies (e.g., Coast Guard, Navy, NOAA, National Weather Service), and non-profits (e.g., Chesapeake Bay Foundation, Wetlands Watch). We also conducted regular and periodic engagement events. The ODU team also represented the CRC in a collaborative project with faculty and students from Norfolk State University (NSU, a minority serving institution) as part of the DHS Summer Research Team Program. The NSU-ODU research team studied socio-ecological resilience using the case study of communities in Portsmouth, Virginia.

The July 2016 Hampton Roads Adaptation Forum focused on the topic of Sea Level Rise and Flooding Science. Dr. Don Resio presented on ‘Risk and Extreme Events’ included participation by the following end-users as presenters:

- NOAA National Ocean Service (NOS) Center for Operational Oceanographic Products and Services (CO-OPS) (x2)
- Senior Hydrologist, National Weather Service, Wakefield Office
- Coastal Hazards Specialist, NOAA Office for Coastal Management

In addition to the federal end users, over 80 state and local stakeholders and end-users attended the Hampton Roads Adaptation Forum to hear from Don Resio and ask questions about Don Resio on his presentation ‘Risk of Extreme Events.’

In October 2016, Dr. Wie Yusuf provided a lecture at Johnson C. Smith University in Charlotte, NC as part of RETALK. Her talk was titled ‘Lessons Learned the Hard Way and Tales of Engagement... 5 Things You Need to Know About Stakeholder Engagement.’

In November 2016, the ODU team hosted Dr. Rachel Davidson (Univ. of Delaware) to present a lecture as part of the Center for Coastal and Physical Oceanography (CCPO)/ODU Resilience Collaborative (ODU-RC) Seminar Series. Her seminar title was ‘An Integrated Scenario Ensemble-based Hurricane Evacuation Modeling Framework.’

In March 2017, the ODU team hosted a stakeholder from NOAA’s National Ocean Service), who gave a lecture titled ‘Trends, Patterns and Scenario-based Projections of Relative Sea Level and Tidal Flood Frequencies along the US East Coast’ as part of the CCPO/ODU-RC Seminar Series.

In April 2017, the ODU team sent Dr. Joshua Behr to present a lecture to the Disaster Research Center at the University of Delaware, titled Vulnerable Populations under Risk for Severe Storm

Events. Special emphasis in seminar meetings focused on collaborative graduate student research. The sharing of regional data and maps followed this visit.

The ODU team also represented the CRC in an interdisciplinary, multi-institution collaborative project with faculty and students from Norfolk State University (NSU, a minority serving institution) as part of the DHS Summer Research Team Program. The NSU-ODU collaborative project, titled ‘A Systems Approach: Developing Cross-Site Multiple Drivers to Understand Climate Change, Sea-level Rise and Coastal Flooding for an African American Community in Portsmouth, VA’ involved studying socio-ecological resilience using the case study of communities in Portsmouth, Virginia.

NSU team:

- Dr. Camellia Okpodu, Professor of Biology
- Dr. Bernadette Holmes, Professor of Sociology and Criminal Justice
- Raisa Barrera, Graduating Senior, Biology
- Mikel Johnson, Rising Senior, Sociology
- Bryan Clayborne, Rising Senior, Sociology

ODU team:

- Dr. Wie Yusuf, School of Public Service
- Dr. Michelle Covi, Ocean, Earth & Atmospheric Science and Virginia Sea Grant
- Dr. Joshua Behr, Virginia Modeling, Analysis and Simulation Center,
- Dr. Larry Atkinson, Ocean, Earth & Atmospheric Sciences
- Dr. Gail Nicula, School of Public Service
- Donta Council, Doctoral student, Public Administration and Policy
- Isaiah Amos, Master’s students, Ecological Sciences

Year 3 (July 1, 2017 – June 30, 2018)

Year 3 involved wrapping up the NSU-ODU collaborative research project and continuing to support stakeholder and end user engagement for ‘The Incorporation of Rainfall into Hazard Estimates for Improved Coastal Resiliency’ project (PI: Don Resio). We conducted a focus group involving staff of local governments in Hampton Roads. We also hosted a SUMREX student for 6 weeks. The student studies regional resilience under the supervision of Dr. Joshua Behr and his research team.

In July 2018, the undergraduate and graduate students involved in the NSU-ODU collaborative research project presented their research results.



(The NSU-ODU research team)

In October 2017, we hosted a Hydro-Surge Flood Modeling Focus Group to support end user engagement for Dr. Don Resio’s project. The synchronous web-based focus group was intended to discuss local government’s needs for flood modeling and to provide input and feedback to Dr. Resio’s team. Staff from local government agencies in Virginia Beach, Chesapeake, Norfolk, and Portsmouth participated in the focus group.

In February 2018, Drs. Wie Yusuf, Michelle Covi and Gail Nicula attended the Social Coast Forum and hosted a workshop based on our stakeholder engagement work to an audience that included potential end users from NOAA, Sea Grant, Association of State Floodplain Managers, EPA, FEMA, and others. In March 2018, Dr. Wie Yusuf provided the same workshop as a virtual RETALK to Johnson C. Smith University students titled ‘Applying ASERT Tools for Addressing Coastal Resilience.’



Wie Yusuf, Old Dominion University Resilience Collaborative

RETALK - Johnson C. Smith University
March 22, 2018

(RETALK Presentation by Dr. Wie Yusuf to Johnson C. Smith University students)

In April 2018 Donta Council (ODU doctoral student involved in the project) was the guest speaker at Tougaloo College's Interdisciplinary Minor Disaster Coastal Studies Research Symposium. He presented on 'Understanding Decision Making and Risk Perceptions of Sea Level Rise and Flooding.'

In summer 2018, we hosted a SUMREX student from Tougaloo College, DaChawn Kincaid, for 6 weeks (May 14, 2018 through June 22, 2018). DaChawn worked with an Dr. Joshua Behr's research team (Dr. Jose Padilla and Dr. Erika Frydenlund) from the Virginia Modeling, Analysis, and Simulation Center (VMASC) on a project focused on characterizing regional resilience.

Project description:

This project focuses on characterizing, categorizing, and measurement of the broad concept of resilience. The concept of resilience is used in our discourse in many different contexts and is necessarily far-reaching. It may refer to culture, perceptions, behavior, physical assets and infrastructure, communication protocols, and public and private delivery of services, as well as system of these systems, among others. In addition, implicit is that the considered asset or system is resilient *to* some force, whether this force is either steady or dynamic over time, or whether is it a sudden puncturing of the equilibrium of normalcy. These forces may be in the form of changing natural systems, human migration, displacement and upheaval, severe weather events, and intentional human-induced immediate shocks to an asset or system. Our understanding and treatment of resiliency has implications for public policy, shapes culture, informs engineering, enlightens homeland security, and promotes humanity.

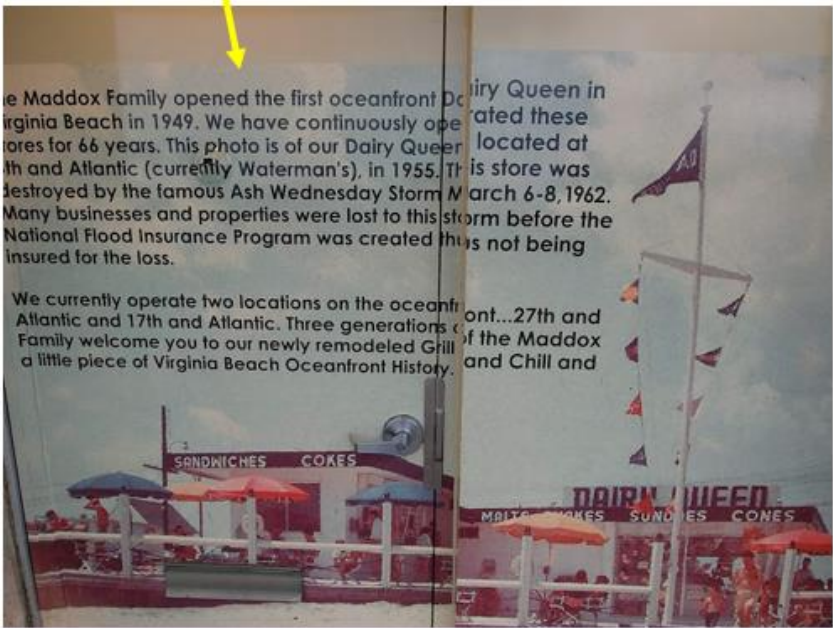
Over the 6 weeks, DaChawn worked with the VMASC project team to characterize resilience as a concept, and develop typologies of resilience. DaChawn also participated in several activities and events where he engaged with various resilience stakeholders. These experiences include:

- Observer at the Homeland Security Planners Course conducted by the Joint Forces Staff College/National Defense University and hosted by ODU
- Note taker and participant at the RISE Coastal Community Resilience Challenge (<https://riseresilience.org/rise-resilience-challenge/>) and the MIT SOLVE Coastal Communities Challenge (<https://solve.mit.edu/challenges/coastal-communities>)
- Coastal Resilience Tournament for the Lower Virginia Peninsula hosted by the Virginia Silver Jackets

DaChawn's reflections about his research experience are available on the project's website: <https://sites.wp.odu.edu/odudhscrcproject/>



(DaChawn Kincaid and Dr. Joshua Behr)



(DaChawn Kincaid during coastal shoreline visit, at location where business was destroyed by the 1962 Ash Wednesday Storm, prior to the NFIP)



(DaChawn Kincaid taking notes during the RISE Coastal Community Resilience Challenge)

3. Results:

Project outcomes:

- (a) Connections to end users
Introduced port, maritime and emergency management stakeholders and end users into CRC activities via the Maritime Risk Symposium.
Hosted live and virtual stakeholder engagement forums for Don Resio to present his research to and solicit feedback from potential end users.
- (b) Support of 2 Coastal Resilience Center projects.
Organized a panel for the Maritime Risk Symposium that addresses “Integrating Maritime and Coastal Resilience” for November 2016.
Supported stakeholder engagement and end user efforts of ‘*The Incorporation of Rainfall into Hazard Estimates for Improved Coastal Resiliency*’ project through connecting Don Resio to the Hampton Roads Adaptation Forum.
- (c) Collaborative research project on socio-ecological resilience
Participated in interdisciplinary, multi-institutional research project (NSU and ODU) that included faculty, and undergraduate and graduate students. This project built an interdisciplinary community of scholars.
- (d) Support for CRC educational projects
Participated in RETALK and hosted a SUMREX student.
- (e) Participation in Coastal Resilience Center activities and engage with CRC and projects.

4. End Users and Transition Partners:

- List the end-users who will ultimately benefit from your project

- List the organizations/agencies or other partners that participated in your project’s transition planning and implementation. Describe the role they played.
- How did you transition your results?
- Describe how end-users are using the results.

The ODU team has a long and successful track record of working closely with stakeholders in the co-design of research and the co-creation of practice-relevant knowledge. This “tried-and-true” approach was used in the project to engage stakeholders and potential end users.

Outside partners and organizations include:

- Hampton Roads Sea Level Rise Preparedness and Resilience Intergovernmental Planning Pilot Project which includes a range of federal agencies involved in a whole-of-community and whole-of-government approach to resilience. Larry Atkinson, Michelle Covi, and Wie Yusuf were actively involved in the Pilot Project and served on the Science, Citizen Engagement, and Land Use Planning working groups, respectively.
- Hampton Roads Sea Level Rise/Flooding and Adaptation Forum organized by Michelle Covi, Larry Atkinson and the HRPDC provides quarterly stakeholder forums that engage government and private sector actors from planning, emergency management, public works, etc.
- Hampton Roads Planning District Commission, the MPO-equivalent for the Hampton Roads region has strong connections with the project team.
- 17 urban and rural municipalities in the Hampton Roads region including the City of Norfolk, City of Virginia Beach, City of Portsmouth, and Gloucester County.
- Hampton Roads All Hazards Committee and local emergency management

Through the Maritime Risk Symposium, the following end-users directly participated as panelists:

- Jim Redick, Director of Emergency Management, City of Norfolk, VA.
- RADM Ann Phillips, U.S. Navy (Ret.)
- Kit Chope, Vice President, Sustainability, The Port of Virginia
- Commander, U.S. Coast Guard Sector Hampton Roads

We co-organized the panel with LCDR Blair Sweigart, Operations Research Analyst, U.S. Coast Guard.

During the panel, the end-users highlighted challenges faced by the Hampton Roads region in terms of coastal and maritime issues. They also discussed some of the Hampton Roads resilience projects they have been involved in, including the Intergovernmental Pilot Project, and the partnerships they have participated in to build coastal and maritime resilience. By connecting stakeholders in maritime and port sectors with stakeholders in emergency management and resilience, the project supported efforts to address risk and improve coastal resilience in an integrated way. By bringing these issues to a wider audience through the Maritime Risk Symposium, the project increased the visibility of such issues and their connectivity to other related risk and resilience concerns.

The July 2016 Hampton Roads Adaptation Forum on the topic of Sea Level Rise and Flooding Science included participation by the following end-users as presenters:

- NOAA National Ocean Service (NOS) Center for Operational Oceanographic Products and Services (CO-OPS) (x2)
- Senior Hydrologist, National Weather Service, Wakefield Office
- Coastal Hazards Specialist, NOAA Office for Coastal Management

Over 80 stakeholders and end-users attended the Hampton Roads Adaptation Forum to hear from Don Resio and ask questions about Don Resio on ‘Risk of Extreme Events.’

End users (and their organizations) included:

Michael	Anaya	City of Chesapeake Planning Department
Josh	Balisteri	Ecology and Environment USGS
Don	Berchoff	True Weather Solutions
Charles	Bodnar	City of Virginia Beach, DPW-Engineering
Justin	Burris	City of Norfolk
Shanda	Davenport	City of Virginia Beach
Stephen	DeVilbiss	DEQ Virginia Department of Conservation and Recreation
Gina	DiCicco	Elizabeth River Project
Robin	Dunbar	Chesapeake Bay Foundation
Christy	Everett	USACE, Norfolk District Northumberland Assoc for Progressive Stewardship
Gregory	Haugan	City of Hampton
Gayle	Hicks	James City County
John	Horne	Wetlands Watch
Shereen	Hughes	Isle of Wight County
Kim	Hummel	Clark Nexsen
Caleb	Hurst	NOAA Coastal Storms Program
Whitney	Katchmark	HRPDC
Heather	Kerkering	MARACOOS
Scott	Kudlas	DEQ
Ronald	Lovell	Hampton Roads REALTORS® Association
Tavorise	Marks	VDEM
Robert	Martz	Hampton Roads Sanitation District
Elizabeth	Mayo	Verizon Wireless
Ben	McFarlane	HRPDC
Tom	McNeilen	McNeilen and Associates US Navy
Mohammad	Shar	City of Newport News
David	She	ASCE
Mark	Slauter	VDEM

Brian	Swets	City of Portsmouth
Dave	Pryor	Clark Nexsen
Brian	Batten	Dewberry
Jenny	Reitz	HRSD
		NOAA/ Chesapeake Bay

(Note: This is not a complete list of attendees)

More information about the Hampton Roads Adaptation Forum is available here: <https://sites.wp.odu.edu/HRAdaptationForum/the-latest-in-sea-level-rise-and-flooding-science/>

In October 2017 the ODU team conducted a web-based Hydro-Surge Flood Modeling Focus Group that included the following end users in local emergency management, stormwater engineering and floodplain management:

- Greg Johnson, City of Virginia Beach
- Shanda Davenport, City of Virginia Beach
- Jim Reddick, City Norfolk
- Kyle Spencer, City of Norfolk
- Deva Borah, City of Chesapeake
- Brian Swets, City of Portsmouth
- Meg Pittenger, City of Portsmouth

The involvement of end-users in this project facilitated flood modeling that incorporates different risks and that are more strongly connected to the needs of end users.

In November 2016, the ODU team hosted Dr. Rachel Davidson (Univ. of Delaware) to present a lecture as part of the Center for Coastal and Physical Oceanography (CCPO)/ODU Resilience Collaborative (ODU-RC) Seminar Series. Her seminar title was ‘An Integrated Scenario Ensemble-based Hurricane Evacuation Modeling Framework.’

In March 2017, the ODU team hosted a stakeholder from NOAA’s National Ocean Service, who gave a lecture titled ‘Trends, Patterns and Scenario-based Projections of Relative Sea Level and Tidal Flood Frequencies along the US East Coast’ as part of the CCPO/ODU-RC Seminar Series.

End-users attending the seminars included regional planners from the Hampton Roads Planning District Commission, City of Virginia Beach, and City of Portsmouth. The seminars were open to the public and also available via WebEx. Recordings of the lectures are available here:

http://vs.odu.edu/kvs/interface/?cid=201530_CCPOSeminarSeriesVS_96096

Following the seminar by the NOS representative, we hosted a 3-hour Roundtable Discussion for end-users to have a technical discussion with NOS and the ODU research team about the needs of regional stakeholders with respect to nuisance and recurrent flooding and similar topics of interest. Representatives from the Hampton Roads

Planning District Commission, National Weather Service, and local cities participated in the Roundtable Discussion.

For the NSU-ODU collaborative research project, we connected with end-users from the City of Portsmouth (Meg Pittinger, Environmental Manager and Brian Swets, Planning Administrator) to ensure that our research is relevant to the needs of the city and the communities served.

For the SUMREX internship, the student engaged with various stakeholders including those from nonprofit organizations, businesses, local government emergency management, US Coast Guard, Navy, Customs and Border Patrol, Virginia Defense Force.

5. Project Impact:

The focus of our efforts was on engaging stakeholders and involving potential end users in CRC projects. For ‘The Incorporation of Rainfall into Hazard Estimates for Improved Coastal Resiliency’ project, the involvement of end-users facilitated flood modeling that incorporates different risks and that are more strongly connected to the needs of end users. Since end-users can provide input into development, such as by specifying how they would use modeling information or what risks they want incorporated into the models, they are more invested in using the models that they will be better tailored to their needs.

Through our panel at the Maritime Risk Symposium, we introduced port, maritime and emergency management stakeholders and end users into CRC activities. By connecting stakeholders in maritime and port sectors with stakeholders in emergency management and resilience, we were able to support efforts to address risk and improve coastal resilience in an integrated way. By bringing these issues to a wider audience through the Maritime Risk Symposium, we raised the visibility of such issues and their connectivity to other related risk and resilience concerns.

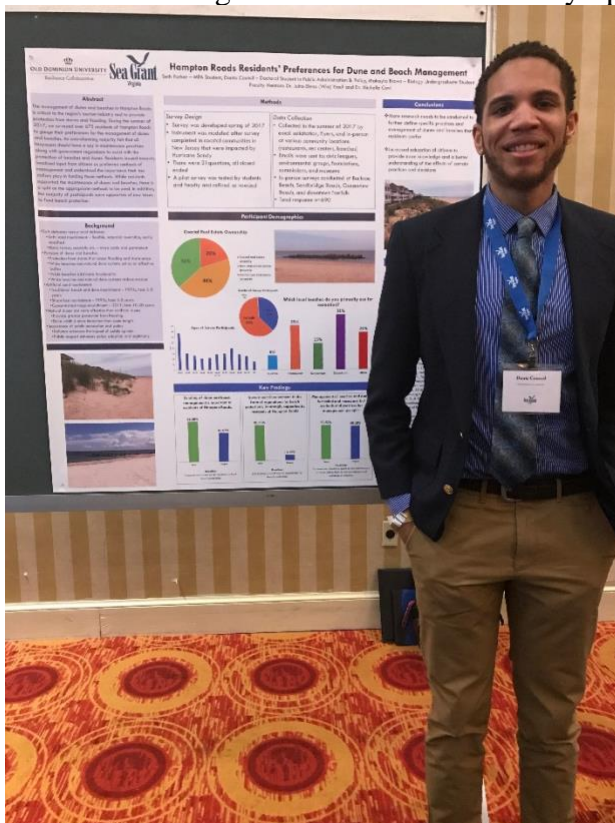
Through the NSU-ODU collaborative research project and the SUMREX student internship, we involved faculty and students from minority-serving institutions in the research and practice of coastal resilience. As a result, we built an interdisciplinary community of scholars that have diverse backgrounds and perspectives.

6. Student involvement and awards:

- Three NSU undergraduate students participated in the NSU-ODU collaborative research project. The students presented their research on July 28, 2017. A recording of the complete presentation is available at:
http://vs.odu.edu/kvs/interface/?cid=201620_ResilienceCollaborativeVS_90690
- Individual student presentations:
 - Raisa Barrera (<http://www.kaltura.com/tiny/mulfo>)
 - Bryan Clayborne (<http://www.kaltura.com/tiny/ofk1f>)
 - Mikel Johnson (<http://www.kaltura.com/tiny/lgl7g>)

- Two ODU graduate students participated in the NSU-ODU collaborative research project. The students presented their research on July 28, 2017.
 - Donta Council, Doctoral student, Public Administration and Policy – ‘Sea Level Rise, Perceptions, and Adaption Responses of Residents in Portsmouth, VA’ (<http://www.kaltura.com/tiny/ld4jv>)
 - Isaiah Amos, Master’s student, Ecological Sciences – ‘Micropropagation of Salt Tolerant Ornamentals and Grasses in Flood Prone Locales’ (<http://www.kaltura.com/tiny/pzsid>)

Donta Council is a BAF Fellow (associated with the William Averette Anderson Fund) and is program chair of the BAF Fellows Executive Committee. He is also an SREB Scholar. Donta presented his research on ‘Hampton Roads’ Residents Preferences for Dune and Beach Management’ at the Virginia Sea Grant Graduate Symposium in February 2018.



(Donta Council presented his poster at the Virginia Sea Grant Graduate Symposium)

One undergraduate student from Tougaloo College, DaChawn Kincaid, participated in the SUMREX program at ODU. DaChawn, a rising junior, is majoring in Sociology and plans to minor in Disaster Coastal Studies. DaChawn’s reflections on his summer experience is available at: <https://sites.wp.odu.edu/odudhscrcproject/2018/06/27/sumrex9/>

7. Interactions with education projects:

- Dr. Wie Yusuf gave RETALK presentations for Johnson C. Smith University students titled ‘Lessons Learned the Hard Way and Tales of Engagement... 5 Things

You Need to Know About Stakeholder Engagement’ (October 2016) and ‘Applying ASERT Tools for Addressing Coastal Resilience’ (March 2018).

- Graduate student Donta Council was guest speaker at Tougaloo College’s Interdisciplinary Minor Disaster Coastal Studies Research Symposium. His presentation was on ‘Understanding Decision Making and Risk Perceptions of Sea Level Rise and Flooding.’
- From May 14, 2018 through June 22, 2018 we hosted a SUMREX student from Tougaloo College.

8. Publications: n/a

9. Tables:

Table 1: Documenting CRC Research Project Product Delivery

Product Name	Product Type (e.g., software, guidance document)	Delivery Date	Recipient or End User
N/A			

Table 2A: Documenting External Funding

Title	PI	Total Amount	Source
Assessing Current and Future Risk Posed to Structural Assets at Norfolk International Terminal South Stemming from Sea Level Rise and Severe Storm Inundation	Behr	\$68,000	Commonwealth of Virginia (Port of Virginia)
Assessment of Tourism Industry Resilience	Yusuf & Covi	\$30,000	Commonwealth Center for Recurrent Flooding Resiliency
Hampton Roads Adaptation Forum	Covi	\$15,000	NOAA

Virginia Sea Grant Climate Adaptation and Resilience Program	Covi & Yusuf	\$113,228	Virginia Sea Grant
Community Engagement in Virginia Beach	Covi & Yusuf	\$32,760	City of Virginia Beach
Tourism Resilience Workshops	Covi & Yusuf	\$28,235	Commonwealth Center for Recurrent Flooding Resiliency
Flooding Risk Communications Best Practices and Demonstration Project	Covi & Yusuf	\$39,000	Commonwealth Center for Recurrent Flooding Resiliency
Factors that Influence Flood Mitigation Behaviors in Portsmouth, VA	Covi & Yusuf	\$6,000	Virginia Environmental Endowment

Table 2B: Documenting Leveraged Support

Description (e.g., free office space; portion of university indirects returned to project; university-provided student support)	Estimated Total Value
Office and meeting space, telecommunication services	\$7,000
Guest speakers and engagement events (CCPO/ODU-RC Speaker Series, Roundtable discussions)	\$4,500
Hampton Roads Adaptation Forum corporate support	\$3,000
Outreach support through Virginia Sea Grant Climate Adaptation and Resilience Program	\$6,000
Student hours	\$3,000

Table 3: Performance Metrics:**YUSUF PERFORMANCE METRICS**

Metric	Year 1 (1/1/16 – 6/30/16)	Year 2 (7/1/16 – 6/30/17)	Year 3 (7/1/17- 6/30/18)
HS-related internships (number)	0	0	0
Undergraduates provided tuition/fee support (number)	0	0	0
Undergraduate students provided stipends (number)	0	0	0
Graduate students provided tuition/fee support (number)	0	0	0
Graduate students provided stipends (number)	0	2	0
Undergraduates who received HS-related degrees (number)	0	0	0
Graduate students who received HS-related degrees (number)	0	0	0
Graduates who obtained HS-related employment (number)	0	0	0
SUMREX program students hosted (number)	0	0	1
Lectures/presentations/seminars at Center partners (number)	0	1	1
DHS MSI Summer Research Teams hosted (number)	0	2	0
Journal articles submitted (number)	0	0	0
Journal articles published (number)	0	0	0
Conference presentations made (number)	0	0	1
Other presentations, interviews, etc. (number)	0	0	1
Patent applications filed (number)	0	0	0
Patents awarded (number)	0	0	0
Trademarks/copyrights filed (number)	0	0	0
Requests for assistance/advice from DHS agencies (number)	0	1	0
Requests for assistance/advice from other agencies or governments (number)		5	5
Total milestones for reporting period (number)	0	17	13
Accomplished fully (number)	0	15	11
Accomplished partially (number)		2	2
Not accomplished (number)		0	0

10. Year 3 Research Activity and Milestone Achievement:

Research Activities and Milestones: Final Status as of 2018
Reporting Period 7/1/2017 – 6/30/2018

Research Activities	Proposed Completion Date	% Completed	Explanation of why activity/ milestone was not reached
Continued participation in CRC activities	June 2018	100%	
Participate in CRC annual meeting	February 2018	100%	
Summer Research Team (SRT) for Minority Serving Institutions			
Present research findings to ODU and NSU community, and end-users	July 2017	100%	
Conclude multi-institutional research project with Norfolk State University (NSU)	July 2017	100%	
Research report to ORNL, CRC	September 2017	100%	
Present and publish research results	June 2018	0%	NSU team awarded follow on funding to complete the project. Presentations and publications are on hold until the follow on research is completed.
SUMREX Student			
Arrange SUMREX experience with Tougaloo College PI Dr. Laiju	April 2018	100%	
Identify research project and faculty mentor for SUMREX student	April 2018	100%	
Arrange travel and housing logistics for SUMREX student	April 2018	100%	
Research Milestones			
Host SUMREX student	July 2018	100%	
Conclude SRT research collaboration and reporting	September 2017	100%	

11. Year 3 Transition Activity and Milestone Status:

**Transition Activities and Milestones: Final Status as of 2018
Reporting Period 7/1/2017 – 6/30/2018**

Transition Activities	Proposed completion date	% completed	Explanation of why activity / milestone was not reached
<u>Stakeholder engagement and end user translation efforts of ‘The Incorporation of Rainfall into Hazard Estimates for Improved Coastal Resiliency’ project.</u>			
Organize and host stakeholder and end user forums for model utility and application	January 2018	100%	
Develop template of vulnerability analysis	April 2018	0%	Activity put on hold pending DHS review and waiting on information from PI Don Resio
Organize and host stakeholder and end user forums for feedback on vulnerability analysis template	May 2018	0%	Activity put on hold pending DHS review and waiting on information from PI Don Resio
Transition Milestones			
Host stakeholder and end user forums for ‘The Incorporation of Rainfall into Hazard Estimates for Improved Coastal Resiliency’ project	July 2018	50%	Only one forum was hosted. Additional forum put on hold pending DHS review and information from PI Don Resio