

SMITH, UNC
DHS Coastal Resilience Center
Education Project:
Annual Project Performance Report
Covers reporting period July 1, 2016 – June 30, 2017

1. Project Title:

Expanding Coastal Resilience Education at UNC

2. Principal Investigator / Institution:

Gavin Smith, Research Professor, Department of City and Regional Planning, Senior Recovery Advisor-North Carolina Division of Emergency Management; Rick Luettich, Professor, Department of Marine Sciences, University of North Carolina at Chapel Hill.

3. Other Education Participants/Partners:

UNC partners include: Departments of Marine Sciences, City and Regional Planning, Geological Sciences, Law School, Curriculum for the Environment and Ecology, Center for Public Service. North Carolina State University partners include the departments of landscape architecture and architecture in the College of Design. State partners include the North Carolina Division of Emergency Management and North Carolina Governor's Office. Federal partners include FEMA's Community Planning and Capacity Building team. Additional local partners include: local officials and residents in the towns of Princeville, Windsor, Kinston, Seven Springs, Lumberton and Fair Bluff, North Carolina (communities represent many of the most hard-hit locations following Hurricane Matthew that possess limited capacity to recover). Local governments are tied to the Hurricane Matthew Disaster Recovery and Resilience Initiative described below.

4. Short Project Description ("elevator speech"):

UNC has expanded its capabilities in Coastal Resilience by developing a graduate certificate program in Natural Hazards Resilience and by hiring a tenure track faculty member (trained in physical science and/or engineering) in the area of Coastal Natural Hazards and Climate Science. A new addition includes the Hurricane Matthew Recovery and Resilience Initiative (HMDRRI), which involves a team of faculty, students and practitioners focused on assisting the state of North Carolina and 6 hard-hit communities recover following Hurricane Matthew. This effort is expected to last until July 2018.

5. Abstract:

The 10-hour credit Natural Hazards Resilience certificate program focuses on the nexus between the threats and impacts of natural hazards and disasters on human settlements, including those exacerbated by climate change, and how individuals, organizations,

communities, and larger systems of governance prepare for, respond to, mitigate against, recover from, and adapt to these events. Emphasis is placed on the concept of disaster resilience, or “the ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse events” (National Research Council 2012). The curriculum provides students with an academic and practice-based exposure to the science underlying our understanding of natural hazards phenomena and a critical analysis of the policies, programs, and plans in place that are intended to help societies manage the effects of natural hazards and disasters, to include a discussion of those actions that effect disaster resilience. The certificate program is designed to serve enrolled graduate students and is not available to practicing professionals located outside the university.

6. End users:

Key “end users” of the program are our students. The certificate program is open to master’s and Ph.D. students from all departments at UNC-CH that have identified an advisor in their home department that is willing to work with the head of the certificate program or an advisor that is actively participating in the certificate program.

A Program Director (Gavin Smith) and Certificate Coordinating Committee - comprised of one representative from the Department of City and Regional Planning (Nikhil Kaza), the CRC (Rick Luettich); the Law School (Don Hornstein); The Department of Public Policy (Pan Jagger), the Department of Marine Sciences (to be determined), the Department of Geological Sciences (Laura Moore); Carolina Center for Public Service (Lynn Blanchard); a student representative currently enrolled in the program (to be determined on a bi-annual basis). The Program Director and Certificate Coordinating Committee are also responsible for assessing other certificate compliance issues, such as course credits, the transfer of courses from other universities (if applicable), the appropriateness of fieldwork or student internships, the possible creation of on-line courses, or other issues that may arise. Anna Schwab, CRC Program Manager and UNC Department of City and Regional Planning Student Services Coordinator, Sandra Lazo de la Vega provide key administrative support to include tracking of student progress and provision of certificates upon completion of required coursework.

DHS constituent agency representatives (e.g., FEMA, US Coast Guard) other federal agencies (e.g., NOAA, US Army Corps of Engineers, US Geological Survey), professional associations (e.g., American Planning Association, Association of State Floodplain Manager’s) and CRC Advisory Board members play an important role in the certificate program in a number of ways, including: 1) serving as invited guest speakers in courses, 2) hosting student interns as identified, 3) providing feedback on course content, and 4) notifying the Program Director of available job postings. Given the certificate’s focus on disaster recovery and hazard mitigation, a representative from FEMA Disaster Recovery - Community Planning and Capacity Building and from FEMA Hazard Mitigation – Planning Lead serve as federal agency end-user contacts. They advise the Program Director on course content, conduct class lectures, and assist in the identification of internship and job opportunities). Both have served in this capacity for the last two years prior to the official start of the certificate program in the Fall of 2015.

HMDRRI-related end users described above include the North Carolina Division of Emergency Management, North Carolina Governor's Office, FEMA's Community Planning and Capacity Building team and the 6 communities we assisting following Hurricane Matthew. Newer end-users include those tied to the International Learning Lab in Australia and Vietnam. In Australia this includes the Bushfire and Natural Hazards Resilience Centre, WHM Global (private sector firm), and emerging community partners. In Vietnam, partners include several academic planning departments and the National Planning Agency.

7. Unanticipated Problems:

No unanticipated problems.

8. Project Impact:

The study of natural hazards resilience, including those hazards exacerbated by a changing climate, and translation of these findings to practice is becoming increasingly important. Disaster losses continue to rise at an exponential rate in the United States and across the world. One of the most troubling manifestations of climate change is an increase in the extent, duration, and intensity of natural hazards and disasters. Examples include more frequent flooding, droughts, extreme heat, wildfire, and hurricane-induced damages. In addition, climate change is resulting in rising sea levels, increased flooding of low-lying lands, and subsidence in arctic environments. The effects of a changing climate are particularly devastating to coastal communities, which comprise a disproportionate amount of the world's population. In the United States, for instance, more than 50% of the nation's population lives within 50 miles of the coast.

The Department of Homeland Security's Science and Technology Directorate, Office of University Programs, the National Science Foundation, and the National Academy of Sciences have all expressed their concerns about this growing trend. A common refrain among all groups is the need to educate the next generation of natural hazards scholars and practitioners as the field is greying and is less diverse than the population as a whole. The activities also align with Quadrennial Homeland Security Report Goal 1.3 (manage risks to critical infrastructure), Mission 5 (ensuring resilience to disasters) and all of its associated goals (mitigate hazards, enhance preparedness, ensure effective emergency response, and rapid recovery). The certificate program is building important capacity by attracting and training the next generation of natural hazards scholars and practitioners. In addition, the faculty position described in the project is fully funded by UNC after the CRC's 5-year lifetime to provide a long-term programmatic contribution to the HS enterprise.

The North Carolina Division of Emergency Management and the Governor's Office has asked Dr. Gavin Smith, Director of the Coastal Resilience Center of Excellence, to serve as a Senior Recovery Advisor and Chief of the Hurricane Matthew Disaster Recovery and Resilience Initiative (HMDRRI). This role involves advising the North Carolina Division of Emergency Management, the Governor, and members of his cabinet on a range of disaster recovery policy issues. Key issues include helping the state develop a disaster recovery

housing strategy, advising the state on the allocation and coordination of funding, the identification of unmet local needs, and developing strategies focused on assisting local governments and disaster survivors recover from one of the worst disasters in the state's history.

These issues are being addressed in partnership with a team of faculty, students, and practitioners over the life of the project, which is estimated to be in place for 1 to 2 years. The idea for the HMDRRI was proposed by the Director of North Carolina Division of Emergency Management, Mike Sprayberry, and has been strongly supported by Governor Roy Cooper. In addition, it was suggested that this effort should be codified as part of a formal ongoing partnership between the North Carolina Division of Emergency Management and UNC's CRC in subsequent disasters. We are in the process of discussing how this could be formalized and linked to the certificate and the Coastal Resilience Center.

Three primary objectives of the HMDRRI include:

- 1) Serving as point of contact for UNC System faculty, students and staff, drawing on these resources to help the state address a range of policy and technical issues as identified.
- 2) Engaging with communities to assist them identify local needs and help them develop post-disaster recovery plans.
- 3) Coordinating activities with FEMA's Community Planning and Capacity Building team which strives to assist communities collect data, assess needs and facilitate recovery planning.

The State of North Carolina General Assembly (including money drawn from a UNC – based research Collaboratory as well as money drawn from a Hurricane Matthew relief fund) has provided the funding needed to support Dr. Smith and a team of recovery planning and design experts drawn from UNC and North Carolina State University (faculty and students) as well as top practitioners to assist communities develop disaster recovery plans, provide policy and design-based guidance, and advise the state and local governments on several aspects of disaster recovery (see Figure 1). The team is working most closely with heavily impacted communities, many of which have less capacity to recover due to limited staff. The teams include a mix of recovery planning experts, faculty, and students.

The Department of Homeland Security (DHS) Science and Technology Directorate has also provided funding that is closely aligned with the objectives of the HMDRRI. In 2014, at the request of the Federal Emergency Management Agency (FEMA) administrator, DHS created the Flood Apex Program. This program brings together new and emerging technologies designed to increase communities' resilience to flood disasters and provide flood predictive analytic tools. The Flood Apex program has provided funding to the CRC to assess the degree to which hazard mitigation and disaster recovery actions taken following Hurricane Floyd (the state's worst disaster to date, which struck in 1999), influenced the impacts and consequences of Hurricane Matthew in 2016. This study will assess both state and local actions in order to better understand the important, but currently understudied interplay

between these two levels of government in the context of disaster resilience. This will enable the HMDRRI team to improve our understanding of state and local level hazard mitigation and disaster recovery decisions, activities, and investments intended to enhance community resiliency and reduce flood fatalities and losses.

The HMDRRI serves as the first part of a larger International Learning Lab. The other partner nations include Vietnam and Australia. In Vietnam, the foreign collaborators are the dean and department head of the School of Architecture of planning at National University of Civil Engineering (NUCE) in Hanoi, Vietnam. Since 1966, NUCE has trained more than 60,000 technical experts, including engineers, architects, and urban planners in Vietnam. This work is supported by the Vietnamese national government through the Ministry of Construction. This support from both the university and national government is critically important for conducting research in a socialist government because it will provide access to secondary data sources, connections to key stakeholders, and will offer local knowledge that would otherwise be impossible to acquire. In Australia, the foreign collaborators work at Bushfire & Natural Hazards Cooperative Research Center (BNHCRC), a public not-for-profit and WHM Global Consulting, a private consulting firm. The BNHCRC draws together all of Australia and New Zealand's fire and emergency service authorities, land management agencies, non-government organizations, and leading experts across a range of scientific fields to explore the causes, consequences, and mitigation of natural disasters. The BNHCRC is funded by the Australian Government as well as partnering agencies, government organizations, and research institutions in Australia and New Zealand. Dr. Smith has agreed to serve on the BNHCRC research board, providing a close inter-institutional bond between the Australian center and the US-based Coastal Resilience Center of Excellence. Our collaboration with WHM Global Consulting provides us with a prospective from the private sector, which is important because they often serve as the planners and risk assessors in the field who can provide a street-level view of what works and what does not. Furthermore, governments often contract with private sector firms to assess risk, develop plans, and implement plans. Therefore, having the varied sectors and stakeholders involved in this collaboration will enhance the learning opportunities tremendously. WHM Global is based in Australia and the US, and as a result, can provide a comparative perspective.

This collaborative research will enable the ability to conduct comparative analyses between the U.S., Australia, and Vietnam on the topic of sustainable and resilient coastal development and planning. The lack of evidenced-based international lesson drawing represents a significant gap spanning both research and practice in the U.S. and this relationship aims to help fill this gap. This collaboration allows the P.I.'s to leverage additional research and teaching funding through a variety of sources, including the Vietnamese national government, funders in Australia through connections with Bushfire and Natural Hazards CRC, and WHM Global Consulting.

9. Education Activity and Milestone Progress:

Education Activities and Milestones: Progress to Date

Reporting Period 7/1/16 – 6/30/17			
Education Activity	Proposed Completion Date	% Complete	Explanation of why activity / milestone was not reached, and when completion is expected
Teach certificate program courses	May 2017	100%	
Provide students with the knowledge and experience to actively contribute to the study and/or practice of natural hazards and disasters	June 2017	100%	
Recruit students into certificate program	June 2017	100%	
Attract and engage additional UNC faculty to coastal resilience to include developing new coursework (in addition to core courses already created and taught) that is closely aligned with the certificate and CRC's mission	June 2017	100%	
Education Milestone			
Deliver 3 core courses per year that support the certificate program	May 2017	100%	
Track student performance (including graduates).	June 2017	100%	
Two students admitted to certificate program	June 2017	100%	
Develop one new elective course to be taught by UNC faculty (beyond the three core courses already developed)	June 2017	100%	

10. Transition Activity and Milestone Progress:

Transition Activities and Milestones: Progress to Date

Reporting Period 7/1/16 – 6/30/17			
Transition Activity	Proposed Completion Date	% Complete	Explanation of why activity / milestone was not reached, and when completion is expected
Promote internship opportunities for students/recruit end users to host students	January 2017	100%	
Promote certificate program graduates to potential employers	June 2017	100%	
Transition Milestone			
Establish a list of potential employers and secure commitments from them to support internships	June 2017	100%	

11. Interactions with research projects:

Researchers from across CRC have been invited to speak in each of the three core courses in the graduate certificate program. This has provided an opportunity for PI’s to discuss their CRC-funded research and its connectivity to classroom materials. PI’s have also served on guest panels that serve to review student presentations and group projects. It is estimated that at least one CRC-affiliated PI or student will speak in each of the three certificate program classes in a given year. The Lecture Series course has will also provide an opportunity for invited speakers to deliver lectures to students enrolled in the class, as well as the larger UNC-CH community.

Some presentations have involved serving on a panel with other PI’s, members of our Advisory Board, and DHS component agency officials. This is intended to expose students to the issues and connections that span research and practice (a key theme of the certificate program).

Student internships are encouraged and serve as an elective in the certificate program. The CRC Director has actively solicited internship opportunities with research partners and practicing professionals working closely with the student to ascertain their interests. In addition, the Director regularly assesses the needs of potential employers.

12. Publications:

Smith, Gavin. “The Role of States in Disaster Recovery: An Analysis of Engagement,

Collaboration, Leadership, and Capacity Building.” 2017. In *Building Community Resilience to Disasters: The Handbook of Planning for Disaster Resilience*, Routledge Press. (published)

Smith, Gavin. “Pre- and Post-Disaster Conditions, their Implications, and the Role of Planning for Housing Recovery.” 2017. In *Coming Home After Disaster: Multiple Dimensions of Housing Recovery*, Eds. Ann-Margaret Esnard and Alka Sapat. Boca Raton, Florida” CRC Press. (published)

Smith, Gavin, Amanda Martin and Dennis Wenger. “Disaster Recovery in an Era of Climate Change: The Unrealized Promise of Institutional Resilience.” 2017. In *Handbook of Disaster Research*, Second Edition, Eds. Havidan Rodriguez, Joseph Trainor and William Donner. New York: Springer. (accepted/submitted)

Smith, Gavin. 2016. Remembrances of the Past, Concerns for the Future, and the Potential Resilience of a Small Coastal Town, Southern Cultures. Summer: 64-87. (published)

13. Tables:

Table 1: Documenting CRC Education Project Courses and Enrollments

Courses Developed and Taught by University of North Carolina under Project Expanding Coastal Resilience Education at UNC						
<u>Course</u>		<u>Developed (D), Revised (R), and/or Taught (T), by Project Year</u>				
<u>Number</u>	<u>Title</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
PLAN 755	Planning for Natural Hazards and Climate Change Adaptation	T	T			
	Offering: Elective (E), Concentration (C), Minor (M)	C	C			
	Enrollment	8	21			
PLAN 754	Speaker Series	T	T			
	Offering: Elective (E), Concentration (C), Minor (M)	C	C			
	Enrollment	14	33			
PLAN 756	SURVEY of Natural Hazards and Disasters	T	T			
	Offering: Elective (E), Concentration (C), Minor (M)	C	C			
	Enrollment	9	15			

Table 2: Documenting External Funding and Leveraged Support

<u>External Funding</u>			
<u>Title</u>	<u>PI</u>	<u>Total Amount</u>	<u>Source</u>

Hurricane Matthew Disaster Recovery and Resilience Initiative	Smith	\$340,602	University of North Carolina at Chapel Hill
Hurricane Matthew Disaster Recovery and Resilience Initiative	Smith	\$274,364	North Carolina Division of Emergency Management
<u>Leveraged Support</u>			
<u>Description</u>			<u>Estimated Annual Value</u>
Free office space in Hurricane Matthew Joint Field Office (4 offices x 1 year)			\$10,000

14. Metrics:

<u>Metric</u>	<u>Year 1</u> (1/1/16 – 6/30/16)	<u>Year 2</u> (7/1/16 – 6/30/17)
HS-related internships (number)	2	14
Undergraduates provided tuition/fee support (number)		
Undergraduate students provided stipends (number)		1
Graduate students provided tuition/fee support (number)	2	2
Graduate students provided stipends (number)		13
Undergraduates who received HS-related degrees (number)		
Graduate students who received HS-related degrees (number)		3
Certificates awarded (number)	1	3
Graduates who obtained HS-related employment (number)	1	3
Lectures/presentations/seminars at Center partners (number)		3
DHS MSI Summer Research Teams hosted (number)		
Journal articles submitted (number)	1	1
Journal articles published (number)		2
Conference presentations made (number)	6	12
Other presentations, interviews , etc. (number)		11
Trademarks/copyrights filed (number)		
Requests for assistance/advice from DHS agencies (number)		1
Requests for assistance/advice from other agencies or governments (number)		
Total milestones for reporting period (number)	10	11
Accomplished fully (number)	9	11
Accomplished partially (number)	1	
Not accomplished (number)		