

SMITH, NCSU
DHS COASTAL RESILIENCE CENTER
EDUCATION PROJECT
YEAR 5 PROGRESS REPORT
July 1, 2019 – June 30, 2020 (Updated 12/15/2020)

I. INTRODUCTION

Project Title: Expanding and Institutionalizing Disaster Resilient Policy and Design Education through National Hazard Mitigation Policy Counsel and Course Development

Principal Investigator Name/Institution: Gavin Smith, Professor, Department of Landscape Architecture, North Carolina State University

Other Partners/Institutions:

- Andy Fox, Professor, Department of Landscape Architecture, North Carolina State University.
- Travis Klondike, Research Associate with the Coastal Dynamics Design Lab and Assistant Professor of Practice, Department of Landscape Architecture, North Carolina State University.
- NCSU faculty and students as identified through an emerging university-wide focus on coastal resilience and the new Graduate Certificate in Disaster Resilient Policy, Engineering and Design.
- FEMA Mitigation Directorate, Federal Insurance & Mitigation Administration.
- State Hazard Mitigation Officers, territory, and tribal representatives (charged with leading state hazard mitigation activities across the US).
- Local government officials tasked with developing and implementing hazard mitigation plans and projects in the U.S., New Zealand and Australia.
- Dr. Wendy Saunders, GNS Science, New Zealand.
- Stephen Dredge, Meridian Urban Consulting, Australia.
- Dr. Jae Park, AECOM, Coastal Resilience Center Advisory Board member.

Short Project Description:

This project is undertaking five activities: 1) Develop a new 3-hour courses titled Disaster Resilient Policy, Engineering, and Design that will serve as one of three core courses in a new 13-credit Graduate Certificate Program of the same name titled: Disaster Resilient Policy, Engineering and Design at North Carolina State University. 2) Host a number of nationally-recognized speakers as part of the Disaster Resilient Policy, Engineering and Design Course and Speaker Series Course at North Carolina State University. Faculty from the Departments of Landscape Architecture, Architecture, Public Administration and Civil and Environmental Engineering (sponsors of the policy, engineering and design tracks in the emerging NCSU Graduate Certificate respectively) as well as some of the more than 250 faculty identified on the

NC State University campus doing work in the field of disaster resilience will provide lectures subject to their availability. The NC State faculty referenced were identified by the PI and others on campus as part of a new university-wide effort focused on coastal sustainability and resilience that has been initiated by the Provost (enhancing community resilience is one of four university-wide goals put in place by the Chancellor). 3) Work with FEMA and AECOM (FEMA contractor) to develop policy recommendations (policy briefs) tied to the development and implementation of the new Disaster Recovery Reform Act (DRRA) and associated hazard mitigation program, Building Resilient Infrastructure and Communities (BRIC) program, drawing from personal experience, research findings in the academic and practice-based literature, and the preliminary findings of a survey; 4) Conduct survey research on the role of state government in the development of local government's capacity and commitment to achieve the goals of the DRRA; 5) Conduct preliminary research on the comparative analysis of the process by which housing acquisition programs in the US, Australia and New Zealand are developed and implemented (more detailed research will be conducted in year 6 should funds be available). The findings of the survey and comparative study are being incorporated into courses associated with the new graduate certificate program, a potential textbook focused on housing acquisition and relocation programs and the preliminary identification of a consortium of researchers and practitioners who would be interested in conducting future research on this topic, drawing from the expertise identified at NCSU and others. Much of the research conducted in Year 5 has been done by 6 NCSU students pursuing the graduate certificate, which was approved by the NC State University in May, 2020.

II. PROJECT NARRATIVE

1. Project overview:

The creation of supporting courses and a larger graduate certificate in Disaster Resilient Policy, Engineering and Design helps to further interdisciplinary education focused on achieving disaster resilience. This effort has been informed, in part, by an Obama White House and DHS S&T-supported study (Year 4 project) addressing the gaps in the delivery of this type of education. Students are exposed to information through class lectures, guest speakers, case studies, classroom exercises and projects. The methods used are part of a larger focus on teaching and training students in a way that will help them become both scholars and practitioners, thereby providing them with the tools needed to pursue either career path.

The research component of this project, including a comparative study of buyouts in the US, Australia and New Zealand helps to further cross-cultural lesson-drawing which is a major shortcoming in U.S. natural hazards policy. A national survey of state, territory and tribal governments ability to build local capacity to implement hazard mitigation grants fills a void in the study of state-level actors. In both cases, the results are being conveyed to FEMA, states, territories, and tribes and included in classroom teaching and used to inform interdisciplinary class projects, including those focused on the resettlement of hazard prone cities.

2. End users:

- Deputy Associate Administrator, Mitigation Directorate, Federal Insurance & Mitigation Administration FEMA. The Deputy Associate Administrator asked research team to conduct a national survey and do an international comparative buyout study. He and his staff provided feedback during the development of survey and had planned to introduce the survey at the EMI Hazards Workshop prior to its cancellation. The Deputy Associate Administrator serves as primary conduit for the delivery of research findings once completed. Techniques used to share information with he and his staff include regular briefings, reports, journal articles, book chapters and presentations. Once the survey is completed and the results compiled in the report, it will be presented to the Deputy Associate Administrator and his team, followed by a discussion with FEMA as to how the results may be incorporated into BRIC policy updates and how the results may inform state, territory and tribal government capacity building efforts. At the request of the Natural Hazards Center Director, the PI of this project has agreed to give a keynote presentation at the Natural Hazards Workshop in July (2020) to discuss the preliminary findings of the survey as part of a panel of FEMA, State and local officials focused on the Building Resilient Infrastructure and Communities program. If Year 6 funding is available, the research team will continue to meet with the Deputy Associate Administrator and his staff to explore further incorporating the survey findings into BRIC policy amendments that are likely to occur following the rollout and administration of the first BRIC funding tranche in 2021.
- State Hazard Mitigation Officers, territory, and tribal representatives (charged with leading state hazard mitigation activities across the US). Representatives will fill out the national on-line survey and the findings will be shared with them in the form of reports, policy recommendations and applied journal articles. Presentations will be given at national conferences and future SHMO Workshops in order to further disseminate the findings.
- Local government officials tasked with developing and implementing hazard mitigation plans and projects in the U.S., New Zealand and Australia. Local officials in the US and New Zealand were interviewed in person and via Zoom and the results inform the comparative buyout study, including its recommendations. Comparative buyout study findings and the national survey of state officials are being presented to local officials through national conference presentations, reports and connections with relevant professional associations.
- Dr. Jae Park, AECOM. Dr Park provided feedback on the development of survey questions and kept the research team up to date on evolving BRIC policy. The PI of this study has agreed to work with AECOM as part of a national team of consultants to advise FEMA over the next several years should the contract be approved.
- Ashton Rohmer, AECOM and former student/recipient of Natural Hazards Resilience Certificate from UNC-CH. Assisted research team with survey logistics and feedback on survey questions.
- Olivia Vila, AECOM summer intern and current PhD student at NC State University pursuing the emerging certificate in Disaster Resilient Policy, Engineering and Design. Worked with the research team in the Spring and summer to help develop, administer,

and analyze the findings. She included some questions in the survey that will be used in her dissertation research. She is assisting the research team write journal articles and reports, to include leading one paper focused on her dissertation research. Continues to lead the HazNerds student group that serves as a vehicle to inform current and prospective certificate participants.

- Margaret Keener, AECOM and former student/recipient of Natural Hazards Resilience Certificate from UNC-CH. Assisted with the review of the national survey.
- Practitioners and academics whose work emphasizes disaster resilient design that are invited to speak in the certificate classes.
- Members of the NCSU student group, the Haznerds continues to share information about existing literature, job and public service opportunities, campus lectures and other information that may be of interest to the group, including those pursuing the Graduate Certificate in Disaster Resilient Policy, Engineering and Design.
- Dr. Wendy Saunders, GNS Science, New Zealand is working with the PI to conduct a comparative study of buyouts in the US and New Zealand and to write up the findings in reports and journal articles. She is currently advising the New Zealand government on evolving national buyback policy, to include drawing on our work to inform the emerging policy dialogue. The PI of this study gave a presentation at GNS Science in December discussing our research and exploring continued research and engagement opportunities in the U.S. and New Zealand, including continued cross-cultural work focused on natural hazards policy learning.
- Stephen Dredge, Meridian Urban Consulting, Australia worked with the PI to assist the research team identify key local government informants to interview that have engaged in buyouts in Australia, to include communities that he has worked with following a number of disasters in the State of Queensland (Mr. Dredge was a former employee of the Queensland Reconstruction Authority and now advises them and other governmental agencies on disaster resilience-related topics). Results of the U.S., New Zealand and Australia study will be shared with the Queensland Reconstruction Authority and potentially incorporated into national, state and local policy documents as part of joint efforts we are engaged in together, including the rollout of several emerging Queensland Reconstruction Authority's resilience efforts (funded through a non-DHS/CRC grant).

3. **Unanticipated Problems:**

Primary problems encountered stem from Covid-19, to include the later release of the national survey, which affects the timing of a report to FEMA and journal article delivery. The outbreak resulted in the cancellation of the National SHMO Workshop that was to be held at the Emergency Management Institute, a venue where we had worked with FEMA to deliver the survey to all SHMO's, territory and tribal representatives at one time. The Deputy Associate Administrator and his staff were to work with us at the event to discuss the survey and its merits and with all respondents located at one venue, this was likely to result in a high response rate. The survey will be delivered on-line, starting June 3rd.

Covid-19 also disrupted the personal interview schedule of US and Australian respondents tied to the international comparative study of buyouts. The interviews with remaining communities will be conducted via Zoom. Interviews with US/NC participants (Charlotte, Lumberton, and Seven Springs, NC) were originally scheduled during the Fall (when Dr. Saunders was scheduled to be in the US). Instead, a Zoom interview was conducted with Charlotte/Mecklenburg County officials in May. Interviews are being scheduled with Lumberton and Seven Springs officials in the June/July timeframe.

The research team is working hard to make up for lost time by completing the elements of journal articles and reports that do not require the results of the survey of interviews with respondents, including the writing of introductions, methods, literature reviews, etc.

Covid-19 affected the delivery of certificate classes and the physical attendance of guest speakers. As required by NC State all faculty were required to develop an on-line teaching strategy. The PI of this study did so, to include shifting the Speaker Series and Disaster Resilient Policy, Engineering and Design courses on-line during Spring Break. Both classes were delivered using Zoom. This included inviting guest speakers (including Dr. Wendy Saunders from New Zealand, who was originally scheduled to be in NC to deliver lectures, conduct field interviews, provide in-person crits of student team projects) to present remotely and to conduct my 3-credit hour course lectures, student team reviews on-line. Final student projects were reviewed via Zoom by a team consisting of Dr. Jessica Whitehead (Chief Resilience Officer-NC); Jeff Carney, Architecture Professor, University of Florida; Adam Stein, Resilience Coordinator NOAA; and Holly White, Principal Planner, Nags Head, North Carolina.

An additional problem involved the late release of the funding, which arrived after FEMA had completed much of the Building Resilient Infrastructure and Communities (BRIC) policies, thereby limiting the direct involvement in policy counsel and the writing of associated policy briefs. It is believed that the findings of the comparative study of buyouts and the national survey can still be incorporated into BRIC policy updates in the future.

4. **Students and recent graduates**

- a. Number of undergraduates, graduates, working professionals
LAR 554 Disaster Resilient Policy, Engineering and Design - 14 Graduate Students.
LAR 553 Natural Hazards, Disasters and Climate Change
Adaptation Lecture Series - 19 Graduate Students, 1 Undergraduate Student.
LAR 552 Survey of Natural Hazards and Disasters - 13 Graduate Students, 2 Undergraduate Students.
- b. Percentage minority students
Estimate – 5 %
- c. Number of students graduated
NA-certificate was approved in May, 2020.

- d. Number of former students employed in resilience-related fields
In Year 5 – 0; Total Year 1-5: estimate – 20
- e. Number of former students who went on to enroll in graduate-level programs
Year 5: Most students enrolled in courses are graduate students.

5. Project Impact:

The graduate certificate courses and larger certificate rely on a range of techniques to convey information, including presentations by nationally and internationally-recognized scholars and practitioners, emphasizing speaker / student interactions inside and outside the classroom through the Speaker Series course, staying abreast of the latest literature, research and engagement techniques by attending and participating in national conferences, deep community engagement efforts, and conducting research that is incorporated into classroom lectures, class assignments and interdisciplinary projects. For instance, the current research focus on buyouts in New Zealand was presented to students in my Disaster Resilient Policy, Engineering and Design class to help inform possible policy options they might consider in a class project involving the resettlement of parts of Boston, Charleston and the Outer Banks. A scheduled field trip to Charlotte was intended to show students how readings and class lectures are applied on the ground and could inform the final class project. Unfortunately, the field trip had to be cancelled due to Covid-19.

6. Institutionalization:

a. Sources of post-CRC support

Post-CRC support included obtaining a position as a Professor in the Department of Landscape Architecture which allows me to teach all classes and lead the certificate as part of my expected roles in the university. The Graduate Certificate in Disaster Resilient Policy, Engineering and Design was approved by the NCSU Curriculum Committee and the Graduate School in May 2020.

b. Maintenance of project products:

The administration of the certificate is housed in the Department of Landscape Architecture with tracks in policy, engineering and design led by the Departments of Public Administration, Civil, Construction and Environmental Engineering, and the Department of Landscape Architecture, respectively.

c. Planning for institutionalization:

Dr. Gavin Smith led the overall effort. Other faculty involved in the institutionalization effort included Dr. Christopher Galik, Department of Public Administration and Dr Sankar Arumugam, Department of Civil, Construction and Environmental Engineering. Courses were refined and approved as permanent courses in partnership with the College of Design Curriculum Committee (of which I am a member). Courses that fulfill the 6 elective credits are drawn from courses from across the university and the varied faculty that teach the

courses are aware of the program. The Graduate School provided guidance on the steps required for approval, and the College of Design Curriculum Committee assisted in the creation of course syllabi and certificate prior to submittal to the Graduate School for approval.

7. Interactions with research projects:

The Year five project blended research and education as the emerging findings of the comparative study of buyouts in New Zealand were presented in my new class Disaster Resilient Policy, Engineering and Design and used to inform the final class project, which focused on the potential resettlement of Boston, Charleston and the Outer Banks of North Carolina. My colleague, Dr. Wendy Saunders provided a guest lecture in the Speaker Series course and provided expert feedback to student teams in the Disaster Resilient Policy, Engineering and Design course who were tasked large-scale resettlement challenges as part of their final class project. In addition, CRC research partner Dr. Casey Dietrich, a CRC Researcher provided a lecture in my Speaker Series class. I provided a lecture at the University of Puerto Rico at Mayaguez as part of the SUMREX program. A student team (with oversight provided by me) has submitted an abstract to the Journal of Environmental Studies and Sciences (JESS). The Special Issue is titled Perspectives on managed retreat: Environmental justice and beyond. The proposed journal article focuses on a description of the Spring course Disaster Resilient Policy, Engineering and Design and its final class project which involved interdisciplinary teams of students developing a proposed strategy to relocate parts of Boston, Charleston and the Outer Banks of North Carolina.

III. EDUCATION ACTIVITIES AND TRANSITION MILESTONES

1. Year 5 Education Activities and Milestone Achievements:

Education Activities and Milestones: Status as of 6/30/2020			
<u>Education Activities</u>	<u>Proposed Completion Date</u>	<u>% Complete</u>	<u>Explanation of why activity/milestone was not completed</u>
Collect best practice case studies in disaster resilient design and incorporate into new course curriculum.	08/2019	100%	
Incorporate findings of DRRA/BRIC study and initial findings of comparative buyout study into new graduate certificate course curriculum and interdisciplinary class exercises and projects.	06/2020	<u>100%</u>	
<u>Education Milestones</u>			
Develop disaster resilient policy, engineering, and design course.	12/2019	100%	

Teach disaster resilient policy, engineering, and design course in the Spring of 2020.	04/2020	100%	
Approve Graduate Certificate in Disaster Resilient Policy, Engineering and Design.	05/2020	100%	

2. Year 5 Transition Activities and Milestone Achievements:

Year 5 Transition Activities and Milestones: Status as of 6/30/2020			
<u>Transition Activity</u>	<u>Proposed Completion Date</u>	<u>% Complete</u>	<u>Explanation of why activity/milestone was not completed</u>
Develop disaster resilient policy, engineering and design course (deliverables: syllabus, best practices and interdisciplinary class project guidance).	12/2019	100%	
Identify and host speakers for Graduate Certificate Program.	04/2020	<u>100%</u>	
Create policy recommendations based on the findings of the survey and comparative assessment of housing acquisition programs. Policy briefs 2-3 pages in length.	03/2020	100%	Delivery of completed survey delayed at the request of FEMA. Initial plan to deliver survey at the Emergency Management Institute SHMO Workshop was discontinued after workshop was cancelled due to Covid-19. FEMA asked our team to wait to release the survey until June. Survey will be delivered on-line, beginning June 4, 2020 with final return date of the surveys June 30 th . A detailed report describing the survey findings has been completed and will be shared with FEMA officials along with a journal article in January 2021.
Develop survey instrument assessing state hazard mitigation capacity and commitment.	12/2019	100%	
Collect preliminary information on New Zealand and Australia Cases	05/2020	50%	Information collected for 3 New Zealand cities as part of a trip in December (2019). Trip to Australia cancelled due to Covid-19.

			Plans are underway to collect information on Australian communities remotely via Zoom in the summer of 2020. Australian data collection was delayed due to COVID-19. Data will be collected in the Spring of 2021 as officials have stated that they are willing to work with us at this time.
Conduct survey; compile and analyze data.	04-05/ 2020	100%	<p>Survey developed; to be administered in June; analysis completed in July. Survey conducted, data compiled and analyzed. Journal article and FEMA report completed.</p> <p>In addition, survey published for use by other researchers as part of NSF CONVERGE project. Citation - Smith, G., Vila, O., Caverly, G. 2020. "A National Evaluation of State Roles in Hazard Mitigation: Building Local Capacity to Implement FEMA Hazard Mitigation Assistance Grants." DesignSafe-CI. https://doi.org/10.17603/ds2-sjbv-eg87.</p>
Write role of the state in building local capacity policy report (2 – 3 pages).	06/2020	100%	Report pending survey results in July. Report should be finalized in the summer of 2020. Report complete, submitted to FEMA in January 2021.
Write role of the state in building local hazard mitigation capacity journal article (submitted to journal for review) / incorporate findings into certificate courses and interdisciplinary class exercises.	06/2020	100%	Journal article and incorporation of findings into courses pending completion of survey, analysis of data and writing paper. Survey should be completed in July, findings analyzed and article written by August. Journal article complete and published by journal <i>Sustainability</i> in December 2020. Findings

			<p>incorporated into courses taught in the Fall 2020 and Spring 2021 courses.</p> <p>Citation - Smith, Gavin, Olivia Vila. 2020. A National Evaluation of State and Territory Roles in Hazard Mitigation: Building Local Capacity to Implement FEMA Hazard Mitigation Assistance Grants. Sustainability 12(10013): 1-18. doi:10.3390/su122310013.</p>
<u>Transition Milestone</u>			
Complete class syllabus.	12/2019	100%	
Include disaster resilient policy, engineering and design class in regular teaching schedule as part of Certificate Program (permanent course number assigned in Fall 2020).	06/2020	100%	
Write journal article on role of the state / incorporate findings into certificate courses.	06/2020	100%	<p>Journal article and incorporation of findings into courses pending completion of survey, analyzing data, and writing paper. Survey should be completed July 1, findings will be analyzed and article written by end of August. Students have begun conducting literature review this summer prior to distribution of survey and analysis of results. Introduction and methods section of article will be completed in June. Draft article should be completed by August and submitted for publication to a journal. Journal article published in December 2020 and incorporated into Fall 2020 and Spring 2021 courses.</p>
Write role of the state in building local capacity policy report / provide to FEMA.	06/2020	100%	<p>Role of the state in building local capacity policy report is delayed pending the completion of survey and writing up findings. Survey</p>

			should be completed in July, findings analyzed and report written and submitted to FEMA by August. Report complete. Submitted to FEMA in January 2021.
Write preliminary report on the comparative analysis of US, Australian and New Zealand housing acquisition programs, to include lessons derived from this study.	06/2020	75%	<p>Two documents have been completed: 1) A Book Chapter, titled <i>A Comparative Review of Hazard-Prone Housing Acquisition Laws, Policies and Programs in the United States and Aotearoa New Zealand: Implications for Improved Practice</i> (Smith and Saunders). The draft chapter (which includes lessons and associated policy recommendations) was submitted to the publishers (Cambridge Press) on June 1, 2020 for initial review and comment. The title of the text is <i>Cambridge Handbook of Disaster Law: Risk, Recovery and Redevelopment</i>. Book chapter in press.</p> <p>2) A report co-authored with my Colleague Dr. Wendy Saunders, focuses on the results of the New Zealand-based case studies. Report completed and published.</p> <p>Citation - Saunders, W.S.A, and G. Smith. 2020. Spend to Save: Investigating the property acquisition process for risk reduction in Aotearoa New Zealand. Lower Hutt (NZ): GNS Science.</p> <p>65 p. (GNS Science report; 2020/23). doi:10.21420/6GR9-EE44.</p> <p>An additional journal article has been initiated by Saunders and Smith that is focused on the development of a set of global guiding</p>

		<p>principles for the acquisition of hazard-prone housing. Draft expected to be completed in July. Article under development.</p> <p>The collection of the Australian case study information has been delayed due to Covid-19, which required the cancellation of a June trip (June 1-12) to Australia. Tasks to be completed in Australia included: a presentation at the Australasian Hazards Conference in Brisbane, Australia on June 1st and interviews with Grantham, Australia officials. Interviews with Australian officials will be conducted via Zoom this summer. Australian data collection was delayed due to COVID-19. Data will be collected in the Spring of 2021 as officials have stated that they are willing to work with us at this time.</p> <p>Abstract submitted (June 1) to the Journal of Environmental Studies and Sciences (JESS). The Special Issue is titled Perspectives on managed retreat: Environmental justice and beyond. The proposed article is titled <i>A Comparative Analysis of Hazard-Prone Housing Acquisition Programs in the United States and New Zealand</i>. To date we have conducted key informant interviews with 4 of 6 communities (3 in NZ, 1 in US-Charlotte, NC), written introduction, methods and literature review sections of article.</p> <p>Article complete; in press. Graduate students involved in writing and cited below.</p>
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			<p>Smith, Gavin, Wendy Saunders, Olivia Vila, Samata Gyawali, Samiksha Bhattarai, and Eliza</p> <p>Lawdley. 2020. A Comparative Analysis of Hazard-Prone Housing Acquisition</p> <p>Programs in United States and New Zealand Communities. Special Issue on Managed</p> <p>Retreat and Environmental Justice. Journal of Environmental Studies and Sciences. Perspectives on Managed Retreat: Environmental Justice and Beyond. A.R. Siders and Jola Ajibade, Editors. (to be published).</p> <p>Reached tentative agreement with Springer Press to publish textbook focused on an international assessment of buyouts, to include authors drawn from around the world. Start date likely to be the Fall of 2020. Delayed due to COVID and focus on catching up with FEMA reports and journal articles.</p>
<p>Include speaker series class in regularly teaching schedule as part of Certificate Program. Permanent course number assigned in Spring 2020 (speaker series class taught as a “special topics class” at NCSU for the first time in the Spring of 2019).</p>	<p>06/2020</p>	<p>100%</p>	

3. Annual Courses and Enrollments

Annual Courses and Enrollments

Courses Developed and Taught at University of North Carolina under Project Expanding Coastal Resilience Education at UNC (Years 1-4)						
PLAN 755	<u>Course Title:</u> Planning for Natural Hazards and Climate Change Adaptation	<u>YR 1</u>	<u>YR 2</u>	<u>YR 3</u>	<u>YR 4</u>	<u>YR 5</u>
	Status: Developed (D), Revised (R), and/or Taught (T)	T	T	T	T	NA
	Offering: Elective (E), Concentration (C), Minor (M)	C	C	C	C	NA
	Enrollment	8	20	40	26	NA
PLAN 754	<u>Course Title:</u> Speaker Series	<u>YR 1</u>	<u>YR 2</u>	<u>YR 3</u>	<u>YR 4</u>	<u>YR 5</u>
	Status: Developed (D), Revised (R), and/or Taught (T)	T	T	T	T	NA
	Offering: Elective (E), Concentration (C), Minor (M)	C	C	C	C	NA
	Enrollment	14	31	28	32 (UNC CH); 22 (NCS U)	NA
PLAN 756	<u>Course Title:</u> Survey of Natural Hazards and Disasters	<u>YR 1</u>	<u>YR 2</u>	<u>YR 3</u>	<u>YR 4</u>	<u>YR 5</u>
	Status: Developed (D), Revised (R), and/or Taught (T)	T	T	T	NA	NA
	Offering: Elective (E), Concentration (C), Minor (M)	C	C	C	NA	NA
	Enrollment	9	15	26	NA	NA

Courses Developed and Taught by University of North Carolina State University under Project Expanding and Institutionalizing Disaster Resilient Policy and Design Education through National Hazard Mitigation Policy Counsel and Course Development at NCSU (Year 5)						
LAR 554	<u>Course Title:</u> Disaster Resilient Policy, Engineering and Design	<u>YR 1</u>	<u>YR 2</u>	<u>YR 3</u>	<u>YR 4</u>	<u>YR 5</u>
	Status: Developed (D), Revised (R), and/or Taught (T)	NA	NA	NA	NA	T
	Offering: Elective (E), Concentration (C), Minor (M)	NA	NA	NA	NA	C
	Enrollment	NA	NA	NA	NA	14
LAR 553	<u>Course Title:</u> Natural Hazards, Disasters and Climate Change Adaptation Lecture Series	<u>YR 1</u>	<u>YR 2</u>	<u>YR 3</u>	<u>YR 4</u>	<u>YR 5</u>
	Status: Developed (D), Revised (R), and/or Taught (T)	NA	NA	NA	NA	T
	Offering: Elective (E), Concentration (C), Minor (M)	NA	NA	NA	NA	C
	Enrollment	NA	NA	NA	NA	20
LAR 552	<u>Course Title:</u> Survey of Natural Hazards and Disasters	<u>YR 1</u>	<u>YR 2</u>	<u>YR 3</u>	<u>YR 4</u>	<u>YR 5</u>
	Status: Developed (D), Revised (R), and/or Taught (T)	NA	NA	NA	NA	T
	Offering: Elective (E), Concentration (C), Minor (M)	NA	NA	NA	NA	C
	Enrollment	NA	NA	NA	NA	15

IV. PUBLICATIONS AND METRICS

1. Publications:

a) Publications

- **Smith, Gavin** and Wendy Saunders. 2020. A Comparative Study of Hazard-Prone Housing Acquisition Programs in the United States and New Zealand. Special Issue on Managed Retreat and Environmental Justice. Journal of Environmental Studies and Sciences. Perspectives on Managed Retreat: Environmental Justice and Beyond. A.R. Siders and Jola Ajibade, Editors. (in press).
- McGovern, Shannon, Ryan Scott, Gretchen Caverly, **Gavin Smith**. 2020. Disaster Resilient Policy, Engineering and Design Class Project: The Resettlement of three Hazard-Prone Communities. Special Issue on Managed Retreat and Environmental Justice. Journal of Environmental Studies and Sciences. Perspectives on Managed Retreat: Environmental Justice and Beyond (under development-not accepted for publication).
- **Smith, Gavin**. April, 2020. Best Practices and Lessons (Learned and Not Learned) in the United States Regarding the Role of States in Fostering Disaster Resilience at the Local Level through Program Design and Implementation. Report for the Queensland Reconstruction Authority and the Regional Resilience Strategies (Statewide Rollout) Project. Brisbane, Australia: Queensland Reconstruction Authority.
- **Smith, Gavin**, Allison Anderson and David Perkes. New Urbanism and the H-Transect: Improving the Integration of Disaster Resilience and Design (final revisions accepted-scheduled for publication in Spring).
- Saunders, Wendy and **Gavin Smith**. Global Principles Guiding the Acquisition of Hazard-Prone Housing. (under development).
- Nguyen, Mai and **Gavin Smith**. Resilient Design Education in the United States (submitted for review).
- **Smith, Gavin**, Hurricane Matthew Disaster Recovery and Resilience Initiative: Achieving Rural Resilience through Research, Teaching and Engagement? (submitted for review).
- **Smith, Gavin** and Wendy Saunders. A Comparative Review of Hazard-Prone Housing Acquisition Laws, Policies and Programs in the United States and Aotearoa New Zealand: Implications for Improved Practice. In the Cambridge Handbook of Disaster Law: Risk, Recovery and Redevelopment. Susan Kuo, John Travis Marshall, and Ryan M. Rowberry eds. (forthcoming Cambridge, 2021).
- Saunders, W.S.A, and **G. Smith**. 2020. Spend to Save: reducing natural hazard risks through property acquisition in Aotearoa New Zealand. Lower Hutt (NZ): GNS Science.
- **Horney, Jennifer**, Carolina Dwyer, Bhagath Chirra, Kerry McCarthy, Jennifer Shafer and **Gavin Smith**. 2018. [Measuring Successful Disaster Recovery](#). International Journal of Mass Emergencies and Disasters 36(1): 1-22.
- **Gavin Smith**, Lea Sabbag and Ashton Rohmer. A Comparative Analysis of the Roles Governors Play in Disaster Recovery. Risk, Hazards & Crisis in Public Policy. 9(2): 205-243. DOI: [10.1002/rhc3.12133](https://doi.org/10.1002/rhc3.12133).
- **Horney, J.**, Dwyer, C., Aminto, M., **Berke, P.**, & **Smith, G.** (2017). Developing indicators to measure post-disaster community recovery in the United States. Disasters, 41, 124-149. DOI: [1111/disa.12190](https://doi.org/10.1111/disa.12190)

- **Smith, Gavin.** The Role of States in Disaster Recovery: An Analysis of Engagement, Collaboration, and Capacity Building. 2019. In Building Community Resilience to Disasters: The Handbook of Planning for Disaster Resilience, Routledge Press.
- **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.
- **Smith, Gavin.** Pre- and Post-Disaster Conditions, their Implications, and the Role of Planning for Housing Recovery. 2017. Chapter 18, pp. 277-292. In Coming Home After Disaster: Multiple Dimensions of Housing Recovery, Eds. Ann-Margaret Esnard and Alka Sapat. Boca Raton, Florida” CRC Press.
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Smith: Performance Metrics:

<u>Metric</u>	<u>Year 1</u> (1/1/16 – 6/30/16)	<u>Year 2</u> (7/1/16 – 6/30/17)	<u>Year 3</u> (7/1/17- 6/30/18)	<u>Year 4</u> (7/1/18- 6/30/19)	<u>Year 5</u> (7/1/19- 6/30/20)
HS-related internships (number)	2	14		4	2
Undergraduates provided tuition/fee support (number)					
Undergraduate students provided stipends (number)		1			
Graduate students provided tuition/fee support (number)	2	2	2		3
Graduate students provided stipends (number)		13	23		6
Undergraduates who received HS-related degrees (number)					
Graduate students who received HS-related degrees (number)		3	5	4	
Certificates awarded (number)	1	3	5	4	
Graduates who obtained HS-related employment (number)	1	3	5	4	
Lectures/presentations/seminars at Center partners (number)	3	3	4	3	
DHS MSI Summer Research Teams hosted (number)				1	1
Journal articles submitted (number)	1	1	2	3	3
Journal articles published (number)		2	2		2
Conference presentations made (number)	6	12	29	22	15
Other presentations, interviews, etc. (number)		11	14	17	10
Trademarks/copyrights filed (number)					
Requests for assistance/advice from DHS agencies (number)		1	5	2	2
Requests for assistance/advice from other agencies or governments (number)		4	2	6	7
Dollar amount of external funding	--	\$614,966	\$1,204,387	\$54,329	\$67,298
Total milestones for reporting period (number)	10	11	11	3	9
Accomplished fully (number)	9	11	11	3	6
Accomplished partially (number)	1				2
Not accomplished (number)					1