RI Sea Grant, RI Coastal Resources Center and URI Landscape Architecture Department Collaborate on Resilient Coastal Greenways

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Introduction

The State of Rhode Island, the smallest of the fifty states in the United States, is 37 miles wide and 47 miles long, yet has 400 miles of coastline (CRMC, 2012). Twenty-one of its thirty-nine communities have coastal property. Like many coastal communities, this ocean state faces significant ecological, financial and safety issues due to climate change and sea level rise (CRMC, 2015a; Rodin, 2014). Various partnerships between local and federal government agencies and the private sector have arisen to help avert a disaster (Sasaki Associates, 2014).

This paper will speak to a unique newly created relationship and how that partnership has facilitated positive outcomes in greenways and coastal development. This partnership is between RI Sea Grant (RISG), the University of Rhode Island Graduate School of Oceanography's Coastal Resources Center (CRC) and the University of Rhode Island's undergraduate Landscape Architecture program. RISG is one of 33 programs under the National Sea Grant Program of the National Oceanic and Atmospheric Administration (NOAA). RISG's mission is to "support research, outreach and educational programs to foster vibrant and coastal communities and marine environments." Housed in the University of Rhode Island Graduate School of Oceanography, CRC has a global reach that plans and implements initiatives in fisheries and aquaculture, climate change, community planning and marine spatial planning. The University of Rhode Island's Landscape Architecture undergraduate department (LAR) is a small program of 60-70 students and 5 full-time faculty that plays a key role in educating the next generation of problem solvers. The graduated students find work in state and federal government, local private firms as well as international landscape architecture and interdisciplinary firms.

This document uses a spring 2014 senior LAR project as a case study to show how the collaboration of the 3 entities enriched the educational experience of the students, brought diverse professionals together and provided for an educational event and subsequent tools for the community.

Project Background and Student Research

The students were assigned the task of addressing climate change and sea level rise in Storer Park, a public park along the coast of Newport, Rhode Island that is heavily used by tourists and residents of the adjacent active marina and historic neighbourhood. They were to address two scenarios: (1) design for today's environment to reduce storm surge damage to historic sites and (2) design for future sea level rise when the projected rise is 1.5 to 2 feet (expected in 2050).

The semester started with the typical research needed for a new type of project. The students examined how New Orleans, Holland and Venice were addressing sea level rise. They read and studied how Sasaki Associates in Watertown, Massachusetts handled a competition and subsequent design tackling the New Jersey damage and increasing resilience to the Jersey Shore after Hurricane Sandy. They read the Historic District Commission and Secretary of Interior Standards and The State of Rhode Island Coastal Resources Management Program as amended. But in addition, because RISG and CRC are continuously in close contact with federal and local governmental agencies and public community organizations, the LAR students had access to local bulletins and "work in progress" studies very relevant to the project at hand. These included but are not limited to Aquidneck Island Special Area Management Plan (AI SAMP) Coastal Development Regulations (CRMC, 2009), The Green Light; 1957-2007, A History of the Point Association Bulletin, and RI Coastal Resource Management Council Shoreline Change Special Area Management Plan (Beach SAMP).

Because of LAR's partnership with RISG and CRC, the students also had access to a web-based tool called STORMTOOLS, newly created by interdisciplinary professional teams (CRMC, 2015b). It is currently available to the general public on the RI Coastal Resources Management Council (CRMC) website. Through this tool, students generated inundation maps and storm surge expectations for the area of study. These maps and information from other sources were compiled into an in-depth analysis which became the basis for a logical design (Fig. 2).

As an aside, during an internet search the students found an intriguing 1777 historical map of Newport Harbor showing that Storer Park (Fig. 1) and some of the surrounding historical neighbourhood had been under water in the 1700's indicating it had been filled in at some point. This information was an important reminder to the community and in some cases was unknown by those participating in the effort until presented by the students.

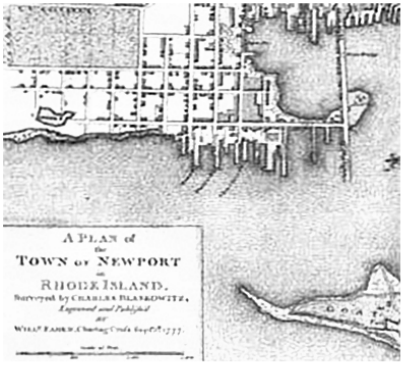

Figure 1. Map from 1777

Figure 2. Inundation map for Storer Park and neighborhood

Analysis and Conceptual Design Discourse

Again, because of URI's partnership with RISG and CRC, the class had ready access to state government staff scientists, policy experts from government agencies such as RI Coastal Resource Management Council (CRMC), municipal officials, staff and grassroots organizations, as well as to university-based ocean engineers, hydrologists and planners. Many of these individuals arrived at the class analysis and conceptual design presentation eager to engage with the students during this interim stage.

For example, Jon Boothroyd, the RI state geologist, advised the students that there is a line of fetch across Newport Harbor that hits the shoreline. This knowledge is not obvious from existing maps. It was sobering for the students to realize that the surrounding neighborhoods were more vulnerable to storm surge than initially thought. Grover Fugate, executive director of CRMC asked the students to expand their thinking beyond the park and neighborhood out to the whole harbor walkway, which is 50% of the commercial area of Newport. He also indicated that he wanted creative ideas and didn't want them constrained by current thinking of how to handle the issues.

The magnitude of the challenge that these and other professionals shared during this interim exchange sent many of the students scurrying back to the drawing board. Some were overwhelmed but some were energized with new ideas and possibilities.

The Final Presentation Dialogue

On the day of the final presentation the students were prepared to present their findings and ideas to a diverse group of policy makers, scientists, professors and community organizations with the characteristic self-confidence of twenty year olds. This section of the paper will discuss the dialogue that took place during and after the presentation of three of those students.

In order to protect the historic Point Neighborhood from inevitable increasing storm surges, this student (student #1) designed protective berms and provided space for flexibility. This flexible area would allow for flooding at lunar and king tides and be dry at other times. The ecology of these spaces would change but still have functional use. His greenways used native material and had a major focus on water filtration and habitat (Fig. 3). This particular design did not have much pushback because it was doable and manageable. He was commended because his design went beyond the project limits and the CRMC setback requirements by connecting to the central business district. He not only looked at the project area but had created a safe and inviting pedestrian connection between Storer Park, the Newport Gateway Visitor Center and the activity of downtown. He suggested educational signage discussing the importance of green infrastructure and the flexibility of greenways as important elements of coastal design.

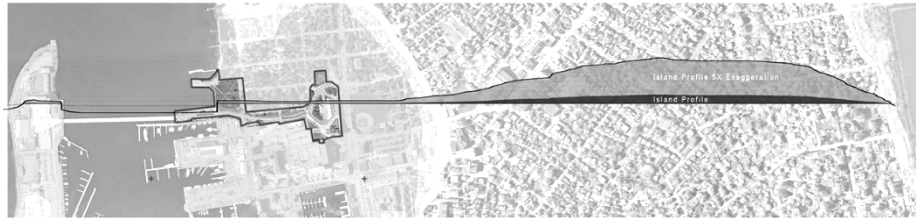

Figure 3. Section of Newport neighborhood and Storer Park by David Johnson (student #1)

It was not until he presented a finding with a startling implication, that the discussion became intense. Since there were no baffles on the outgoing storm drainage system, contaminated sea water would back up through the drainage pipes and empty sea water into the neighbourhood during a major storm surge. In other words, with this type of event, water would come from three directions: directly from the ocean overtopping the coastal features, from the storm drain pipes and from storm surface runoff from the town. The student had numbers and rough calculations to back up his findings. The geologists were intrigued by his runoff numbers. The coastal engineers then addressed the students and the audience articulating what would not have been heard a short

time before. There would be an infinite amount of water generated by the ocean and no amount of protection in the form of berms or dikes would keep it out. The design would be a bandaid until more advanced technology was available. The ending statement was that the magnitude of storms would eventually make the design obsolete. There was an ominous silence in the room. And then we went to the next student design.

The next student (student #2) had researched and contemplated deeply in preparation for the final presentation. She understood the goals of the project well and considered a design for today's environment that would transition to the future when the sea would be 2 feet higher. She was careful that her work would be appealing to residents, tourists and businesses. She not only focused on coastal history in marinas, fishing and ecology but also emphasized the historic charm of the city. She held the rapt attention of the audience. Her graphics were extremely pleasing and spoke to the romantic illusions of a coastal environment. Her design captivated members of the Newport Historical Society. These members had already known that elevated buildings would change the character of the historic site, but her design, influenced by Kathryn Gustafson and Neil Porter's Bay East Gardens in Singapore, brought insight that the greenway itself would be altered through time and serve as a visual interpretation of historical preservation (Fig. 4). This student's greenways would transition as the climate changed and the sea level rose. Habitats and ecosystems in and next to these greenways would change at a significant rate. Key species and vegetation would disappear while new ones would show up over time. More side conversations took place about how interesting it was that the intricacy of species and habitats could be thought provoking elements of design. The general consensus in the room was that her design represented a believable scenario of how the neighbourhood could change over time.

Figure 4. By: Amanda Gaal

But this student had one more surprise for this group of scientists, policy makers and community members. She drew their attention to the four beams of light that projected into the sky from the ground. Those lights, influenced by

the 911 Tribute in Light, represented 4 historical house sites that will be taken over by the sea. An audible gasp could barely be heard.

This student (student #3) explored design solutions for a 1 foot, 3 foot and 5 foot sea level rise (Fig. 5-8). He, like some of his classmates, looked at ecological changes in the greenways over time but he also adapted the greenways to uncharacteristic activities for the historic Point Neighbourhood in Newport. For example, at a 1 foot rise he added wind turbines and suggested raised islands for vegetative growth and food production. At a 3 foot rise, he suggested hunting and fishing lodges, oyster and algae farms and parks for camping and exploring. At a 5 foot rise the area is basically an amphibious landscape. He encouraged the relocation of buildings from this historic neighbourhood. In his own words he advised "deconstruction in order to reconstruct an ecologically functioning shoreline."

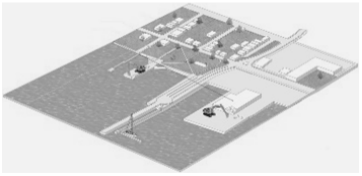

Figure 5. 0 ft sea level rise and existing conditions. By Ramon Ibarlucea (student #3)

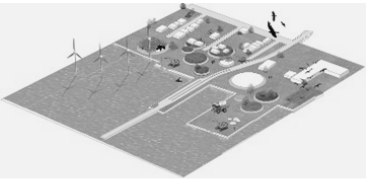

Figure 6. 1 ft sea level rise and site preparation. By Ramon Ibarlucea (student #3)

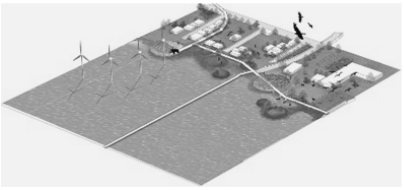

Figure 7. 3 ft sea level rise and adaptation to advancing waters. By Ramon Ibarlucea (student #3)

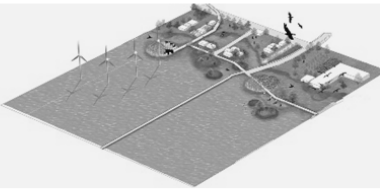

Figure 8. 5 ft sea level rise and an amphibious landscape. By Ramon Ibarlucea (student #3)

His design was new, fresh and creative compared to his classmates. It had an artistic flair as he sculpted the area. The marine scientists used his ideas to initiate a lively discussion about how Rhode Island's current two ecosystems will be replaced over time with one ecosystem. They emphasized the importance of being prepared for the change in the native food production.

But no amount of imagination or freshness could convince the Newport Historical Association to take the design seriously. It was too contemporary and out of place for them. They did engage in a discussion about moving historic buildings out of the neighbourhood even though it is against their existing policy. At a later meeting, Friends of the Waterfront, another Newport organization indicated that some of the historic houses in the neighbourhood had already been moved once or twice in the past.

Conclusion

With diverse viewpoints and expertise available during this process, intense discussion and exchange of ideas materialized. It is continuing today with a greater understanding by the community that climate change is real with serious consequences in their lifetime, and doing nothing is in itself a decision. Policy makers are recognizing that current regulations can be constraining creative problem solving and could be one of the core reasons designers from multiple disciplines are hindered. We observed that not only did the students learn from the professionals and the community, but that the community and the professionals valued the newly known facts and ideas from the students. The executive director of CRMC noted that students are particularly advantageous with a project that impacts multiple organizations because they explore fresh and innovative solutions without being vested in a particular outcome. He applauded the students for their alternative solutions and experimentation.

The LAR department has had this relationship with RISG and CRC for the past 3 years. As a team we have generated six public outreach projects that, in addition to generating powerful debate were used as educational tools for the general public as well as a starting point for professional design and implementation. We are confident that this type of model could be applied to more coastal states in the United States as well as be applied internationally with their appropriate organizations.

In conclusion, this paper does not suggest the student work is of professional quality. But what it does suggest is that when diverse scientific, professional and community input is provided to a group of energetic unbiased students, and their resolutions are presented in a comprehensible visual manner in a non-threatening environment, it can be a powerful catalyst for social change.

Acknowledgements

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References

CRMC (Rhode Island Coastal Resources Management Council). (2009). *Aquidneck Island Special Area Management Plan for Portsmouth, Middletown, and Newport*. Retrieved from Rhode Island: http://www.crmc.ri.gov/regulations/SAMP_AquidneckIsland.pdf

CRMC (Rhode Island Coastal Resources Management Council). (2012). *Rhode Island Coastal Resource Management Program, As Ammended*. Retrieved from Rhode Island: http://www.crmc.ri.gov/regulations/RICRMP.pdf

CRMC (Rhode Island Coastal Resources Management Council). (2015a). *RI Coastal Resource Management Council Shoreline Change Special Area Management Plan*. Retrieved from http://www.beachsamp.org/samp/

CRMC (Rhode Island Coastal Resources Management Council). (2015b). Storm Tools. Retrieved from http://www.beachsamp.org/resources/stormtools/

Rodin, J. (2014). *The resilience dividend: being strong in a world where things go wrong*. New York, New York: PublicAffairs.

Sasaki Associates. (2014). SASAKI PRESENTS FINAL REBUILD BY DESIGN PROPOSAL. Retrieved from http://www.sasaki.com/blog/view/443/

The Point Association. (2008). *The Green Light, 1957-2007: A History of the Point Association*. Newport, RI: The Point Association.