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Engaging Stakeholders in the Sea Level Rise Design Process: A Pilot Project on Maryland's Eastern Shore

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Abstract: One aspect to developing successful responses to local sea level rise requires engaging stakeholders in thinking about local adaptation and design responses. Sheppard et al. found that civic engagement in climate change led to clarifying options for adaptation and mitigation. The question of how to involve residents in this type of design process encompasses examining different approaches to public involvement in the design process for sea level rise. This paper examines the case study of a project on Maryland's eastern shore. With a projected sea level rise of 1.4 feet by 2050 and 3.7 feet by 2100, Maryland is one of the most vulnerable states to sea level rise in the United States. This case study addresses the larger question of how to involve the human dimension in developing adaptation responses to the uncertainty of sea level change. This project examines a project in Dorchester County, Maryland, a county that is predicted to lose approximately sixty percent of its landmass by 2100 due to sea level change. Different approaches were used to engage stakeholders in developing local responses to sea level change. This work is innovative because stakeholder workshops around potential responses to local climate change are relatively new. For the Dorchester project, design responses by landscape architecture were developed to visualize alternative responses to sea level change. Some of the areas of design exploration examine the potential displacement of buildings, wetland migration, and adaptation to shorelines. This project on civic engagement in climate change design and planning is used to investigate how transdisciplinary approaches may provide (1) new ways of framing the problem, (2) new collaborations and processes in solving the problem, and (3) engaging stakeholders to visualize new responses to sea level change.

Keywords: Sea Level Rise Communication, Stakeholders, Civic Engagement, Adaptation, Visualization, Design

Introduction

Shifting from large-scale climate change modeling to identifying impacts of and potential solutions to sea level rise at the city, neighborhood, and shoreline scales remains challenging for a multitude of reasons (NOAA 2010; Schroth et al. 2009). NOAA's (2010) research on local climate change planning in the context of hazard planning identified several barriers including (1) the gap between hazard-related plans and land use planning, (2) lack of available local data, and (3) lack of public support. NOAA (2010) then identified several strategic approaches to fostering behavior change around hazard planning such as (1) identifying specific hazard-related data and information needs by working directly with local planners, (2) visualization approaches/communication, and (3) preparing case studies.

Researchers note the need for integrating input from the public, and from different disciplines, into climate change planning in order to translate global and national policies to the local planning procedures and build local capacity (Schroth et al. 2011; Schroth et al. 2009; Wheeler 2008; Wheeler, London, and Randolph 2009). Working with communities to develop an understanding of the localized impacts and the design responses at the regional and site scales is critical (Schroth et al. 2009; Schroth et al. 2011). One approach to local climate change planning is to engage stakeholders through visual communication around impacts and different scenarios (Sheppard et al. 2008; Pond et al. 2010; Schroth et al. 2009; Schroth et al. 2011).

This paper first introduces a framework for stakeholder involvement in climate change planning and then discusses a project that incorporated participatory approaches to stakeholder involvement in sea level change planning and design process for a county in the United States that is projected to lose approximately sixty percent of its land mass by 2100 (Cole 2008). This article addresses the questions of how to engage stakeholders in sea level rise planning and the

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roles of graphic representation and other visual forms of communication in stakeholder involvement in planning and designing for sea level rise.

Stakeholder Involvement in Climate Change Planning and Design

Given the dual challenges at the local scale of assessing sea level change impacts and envisioning appropriate planning and design responses, involving local communities and stakeholders in this process is particularly critical. Previous research has found that stakeholder involvement through civic engagement methods improves the quality of decisions (Salter, Robinson, and Wiek 2010). Schroth et al. (2009) observe the need to engage local communities in shaping local responses to climate change. These reasons include (1) the difficulty of understanding the complexity of climate change science, (2) the climate change information given is often not pertinent to communities, (3) insufficient information on the social and economic impacts of local climate change impacts, and (4) the lack of participatory processes to engage residents (Schroth et al. 2009).

Applying this expanding complexity of climate change science and adaptation strategies to the regional and local scales requires the involvement of design disciplines such as landscape architecture and architecture to engage stakeholders and envision design responses. Landscape architectural designs may play an important role in creatively exploring design responses to sea level rise with stakeholders. Sheppard et al. (2008) found that participatory processes to visualize, spatialize, and localize climate change implications led to increased community awareness and sense of urgency and to clarifying for the first time options for adaptation and mitigation.

Stakeholder engagement is important for communicating the science and developing an understanding of the localized impacts (Schroth et al. 2009). Researchers note the need for integrating input from the public and from different disciplines into climate change planning to translate global and national policies to the local planning procedures and build local capacity (Schroth et al. 2009; Wheeler 2008; Wheeler, London, and Randolph 2009). Larsen and Gunnarsson-Östling (2009) highlight the need to work with experts to develop targets for mitigation and adaptation. Other research demonstrates that multiple perspectives of inquiry from different disciplines lead to expanded knowledge and envisioning creative solutions (Sutton and Kemp 2006).

Applying this expanding complexity of climate change science and adaptation strategies to the regional and local scales requires the involvement of design fields to engage stakeholders and envision design responses. One approach to addressing the gap includes involving stakeholders and residents in transdisciplinary participatory processes around visualizing climate change and hazard planning (Sheppard et al. 2011; Pond et al. 2010; Schroth et al. 2009). The growing demand for knowledge-based solutions to the growing complexities of such issues as climate change adaptation and mitigation strategies require transdisciplinary approaches to issues such as climate change and sustainability (Russell 2000; Thering and Chanse 2011).

Visuals for Communication of Sea Level Change Risk and Resiliency

Stakeholder involvement in local climate change approaches requires visuals for several reasons: (1) to translate complex climate change data into a clearly communicated examination of potential impacts at the local scale; (2) to examine the different possible trajectories at the local coastal level such as retreat or protect the shoreline by building up (Sheppard et al. 2011); (3) to incorporate different information ranging from social, ecological, and economic components; and (4) to engage stakeholders in exploring a range of possible design responses. Different types of images and maps at different scales inform different stages of the process and different types of involvement.

The selection of visual images used in exploring sea level change impacts and potential responses plays a critical role in public involvement. Research demonstrates the effectiveness of using local images rather than remote ones (Shaw et al. 2009; Sheppard 2012). Sheppard et al. (2011) highlight the need to frame local climate change scenarios to clarify how different decisions lead to short-term and long-term impacts. Research demonstrates that multiple perspectives of inquiry from different disciplines lead to expanded knowledge and envisioning creative solutions (Sutton and Kemp 2006). Applying this expanding complexity of climate change science and adaptation strategies to the regional and local scales requires the involvement of design fields to engage stakeholders and envision design responses. The need for the design disciplines as an element of stakeholder involvement is necessary given not only the uncertainty of climate change at the local scale but also because of the new planning and design responses needed "on the ground" to grapple with the challenge of climate change and sea level change.

Exploring Sea Level Rise on Maryland's Eastern Shore

Dorchester County, MD Context

Dorchester is characterized by wetlands, farms, and its rural character with approximately 32,000 residents residing in the county. The Chesapeake Bay bounds the western portion of the county, Cambridge to the north, the town of Vienna to the east, and Blackwater National Wildlife Refuge to the south. Dorchester County has been identified as the county in Maryland most susceptible to sea level rise (Titus 1998 and Titus and Richman 2000, cited in Carlisle, Conn, and Fabijanski 2006). In fact, Dorchester County, Maryland, has been identified as one of the two largest populated regions "outside the states of Louisiana, Florida, North Carolina, and Texas" (Johnson 2000, cited in Cole 2008, 3). Cole (2008) observes that the county's average one-hundred-year floodplain elevation is +6 feet, most of which is located west of the city of Cambridge and Horns Point and south of US 50 (Cole 2008). The estimates for sea level rise within the county vary from roughly one foot to three or more feet by 2100 (Carlisle, Conn, and Fabijanski 2006).

Climate Change Design Workshop

Engaging stakeholders in the sea level rise design process consisted of the project team's leading a two-day workshop with stakeholders. Key components to this workshop included developing communication materials and other visuals as well as interactive exercises to identify priority issues and "ground-truth" some of the initial areas identified as critical within the county. The team led the kickoff event (Figure 1). This kickoff event on the first evening contained an overview of the potential impacts at the county scale of current conditions, 2050, and 2100 time frames (Figure 2).

Figure 1: Kickoff Event

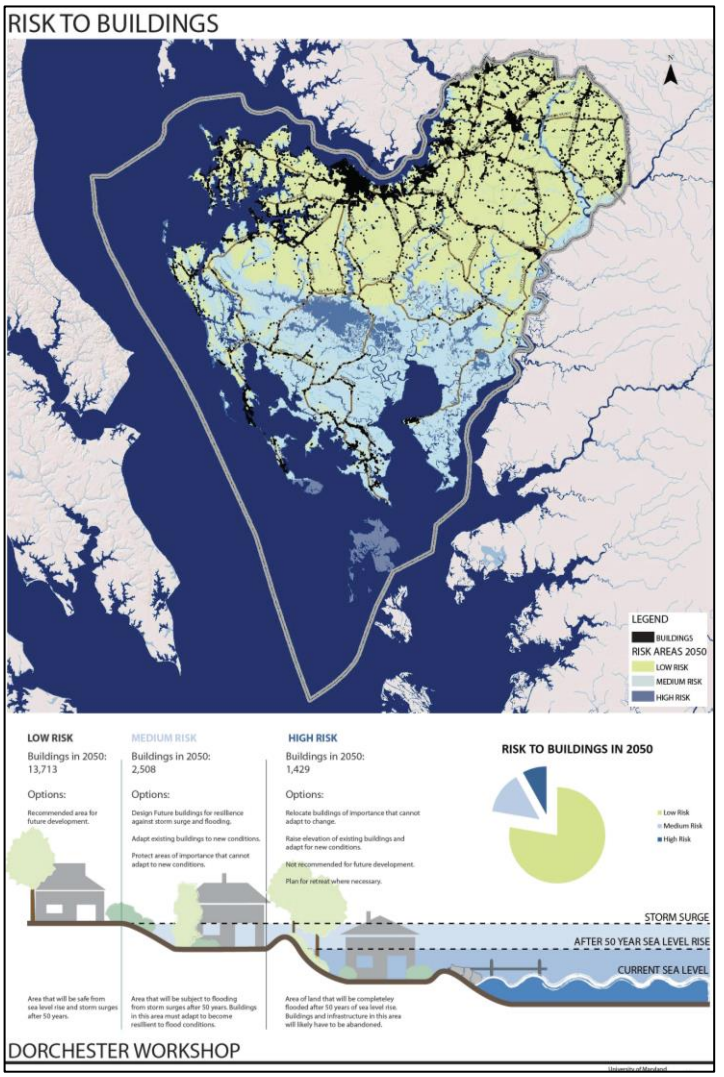

Figure 2: Level of Risk to Buildings Poster. Image created by Rosamaria Mora, Michael Boeck, and Matt Sickle.

The participatory team developed seven stations for the both days. Although the first day began with a kickoff orientation event, both days were structured for participants to drop by when convenient during open hours (Figure 3). The first station included an activity designed to identify where in (or out of) the county participants lived and spent time. The second activity asked people to identify their ideal community. The third activity included a visual preferences station with four types of preferences—environmental interventions, built form (rural vs. village vs. urban, etc.), natural features in terms of prioritizing features to be protected, and preferences for flooding. The fourth activity asked participants to identify which of several selected statements were most important. This activity included statements in terms of environmental, economic, housing, and community development.

Figure 3: Second Day of Workshop with Value and Preference Drop-in Exercises

Station 5 identified preferred recreational activities. Station 6 asked participants to examine the potential areas of concern initially identified by the team members prior to the meeting. Station 7 asked participants to identify their favorite place and their areas of concern pertaining to sea level change. In addition, the different team members circulated around the participants in order to discuss concerns, priorities, and other issues in depth. Some of the issues identified in this workshop included concern over roads near home becoming unusable as the biggest issue, concern about the quality of wells and septic systems as the next important, with flooding as third, and concern over property valued as important but also identified as less important than the other three issues.

Lessons Learned

The lessons learned from the Dorchester Project included lessons around scenarios and different visual approaches for the actual stakeholder workshops and also developed a logical method for responding to a significant change in the landscape due to sea level rise. With regards to the stakeholder workshop, the first lesson learned addressed the time frame and scale(s) used in the workshop (Figure 1).[1] Incorporating visuals of potential impacts at different scales that included the county scale and the scale of particular areas within the county during the same time frames compared existing conditions to 2050 and 2100. Although these selected time frames proved useful for discussion with stakeholders, the fifty-year and hundred-year time frames were less useful to residents and other stakeholders. This is because more immediate time frames have a greater impact on residences and other buildings. One proposal was to examine potential impacts

[1] Design Team: Rosamaria Mora, Michael Boeck, and Matt Sickle

and design solutions that would be more pertinent such as using the life span of a home mortgage with fifteen- to thirty-year timeline horizons. With regards to the scale(s) used in the workshop, beginning at the countywide scale and then shifting to regional and site scale was helpful although challenging given the short time frame of four months.

The second lesson was the usefulness of providing a series of scenarios of adaptation responses that ranged from defending, retreat, or other forms of adaptation for stakeholder workshops. These different trajectories allowed discussion to emphasize (a) identifying and prioritizing areas and issues of concern and (b) discussing the different possibilities. Although this workshop had one particular visual around this possibility that was more general, this graphic was tied not to a particular location (Figure 2).[2] Generalizing approaches in this case was useful in the discussion given that it avoided politics around a particular place while exploring possible responses. This is particularly pertinent given sense of loss in addressing sea level change in Dorchester County.

The final lesson addressed the analysis and design investigations that students developed following the two-day workshop (Chanse and Quiros 2013). Some of the areas of design exploration examine the potential displacement of buildings, wetland migration, and adaptation to shorelines. This third lesson illustrated the important need for planners and designers to have a clearly articulated methodology for their planning and design decisions in response to sea level change. One workshop leader had a visual expressing the number of buildings lost according to areas of low, medium, and high risk within the entire county. Another designer developed a practical approach to the issues of wetland mitigation for Blackwater National Wildlife Refuge that first examined this from a number of overlays and important sites and then was able to choose an particular area for shifting the refuge due to the potential loss and subsequent wetland migration (Figures 4, 5, and 6). Developing the planning and design methodology for site selection and what to preserve versus build, etc., clarified the rationale for large-scale planning responses such as incorporating wetland migration by moving Blackwater National Wildlife Refuge in order to keep versus lose this source of valuable habitats, recreational opportunities, and visitor destinations.

Conclusions

The Dorchester project contributes to a better understanding of the role of civic engagement in assessing and developing design exploration as one key component of working with coastal communities in order to address sea level change. In the face of such a large variation, determining the values, preferences, and areas of concerns to local communities and determining potential design responses as well as how they look on the ground play a critical role in the human dimension in coastal areas. Despite the apparent “fuzziness” of design investigations and climate change visualizations, these interactive and visual approaches provide an important component to raising to the challenge of confronting and adapting to the uncertainty of sea level change at the local level and at the site scales. With growing communities beginning to develop climate change plans (Wheeler 2008), shifting from large-scale climate change models to working with local communities to uncover how to address the very real sense of impending loss is as important as beginning to develop responses. Although civic engagement around local climate change planning is new, repeated investigation of participatory approaches to climate change planning should lead to overcoming some of the barriers to implementing climate change planning.

[2] Designer: Rosamaria Mora

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