SCC-PG: Enhancing Community Engagement in Flood Mitigation Using Integrated Hydrodynamic Modeling and Multi-Scale Socio-Economic Risk Assessment

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Project Overall Objective: To Empower stakeholders in flood-prone communities to better understand flood risks and engage in formulating and supporting effective flood mitigation strategies
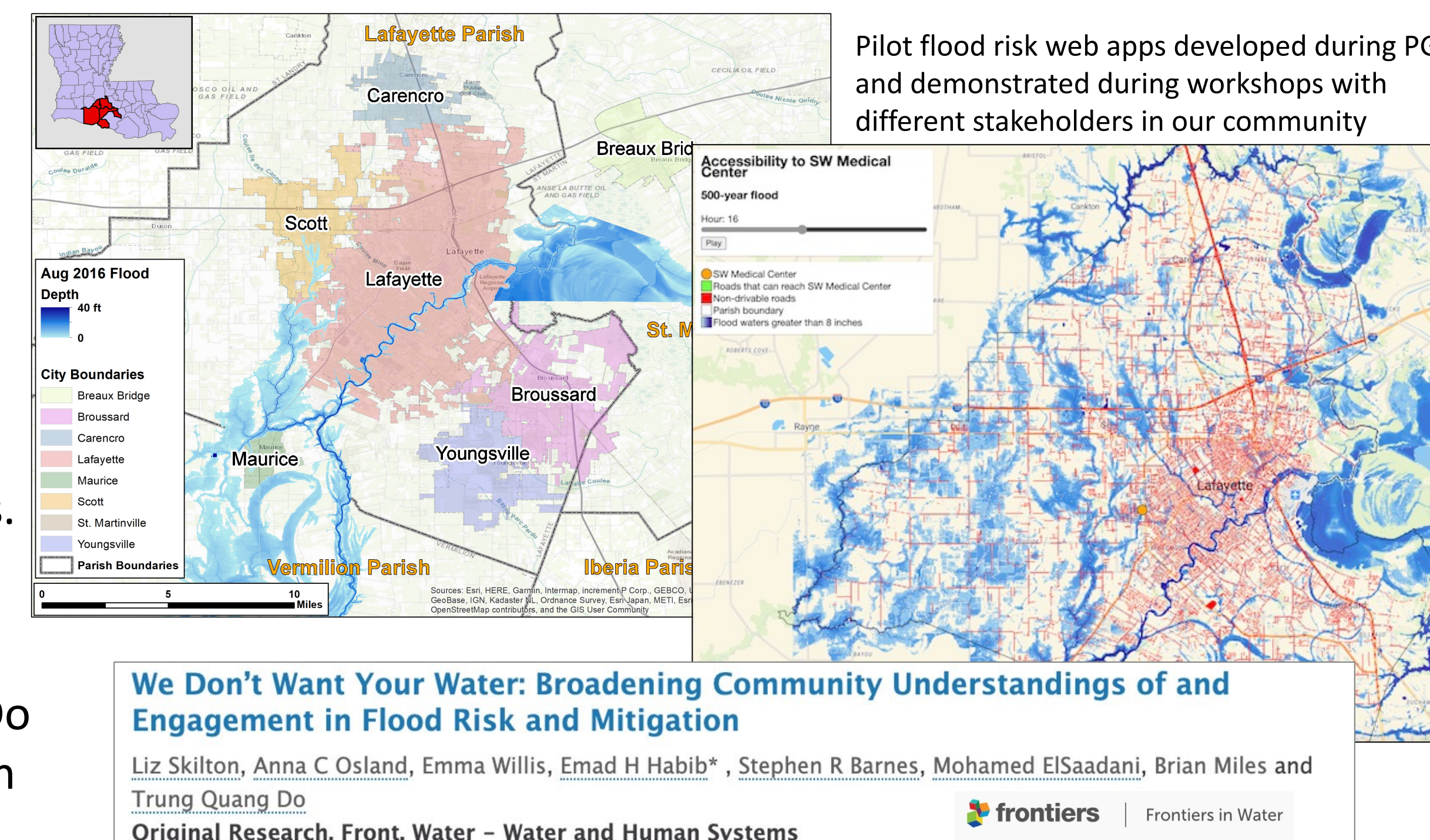
Research Hypotheses: (1) Lack of understanding of flood risk as individuals and as a community contributes to community disengagement from flood mitigation decision making, both at individual and community levels; **(2)** Uncertainties in data and model outputs on flood risk are not properly communicated and can create a gap in understanding flood risk by technical experts, policy makers, and the general public; and **(3)** Recent advances in technologies (e.g., hydrodynamic modeling, geospatial visualizations, fusion of heterogeneous data into web-based environments), when coupled with socioeconomic analysis, empower informed decision making to address flood risks, individually and as a community.

Community-Identified Problem: This planning grant aims to empower diverse stakeholders in flood-prone communities to understand flood risks and engage in flood mitigation efforts. The community of interest is Lafayette Parish in Louisiana, USA, that faces increasing flood risks due to climate and land-use changes. We address the disparate levels of risk perception that can impact a community's ability to function cohesively and how economic and social linkages can amplify individual risks. Communities' understanding of the potential benefits of mitigation projects, which are often presented as deterministic without accounting for climate variability or projected land use changes, can also create unrealistic expectations of risk reduction.

Intellectual Merit: Our approach is grounded in research on how changes in stakeholder mental models can be achieved through a process that facilitates social learning and harnesses non-expert knowledge. We expect to produce a conceptual framework for designing hydroinformatics technologies to improve understanding of flood risk at different scales and enhance engagement in flood mitigation measures. Our project will help identify traits that influence a community's use of technology to develop consensus. By understanding these traits, our study will pave the way to transferable and customizable technological tools for other communities facing rapidly changing flood risk and gradually shifting perceptions. We expect to contribute to the current body of knowledge on flood risk mitigation using advances in information and communication technologies and develop an interdisciplinary mindset in approaching a future SCC grant.

Project Activities

1. Focus Groups: Conducted 8 focus groups (~7-15 attendees/group) with diverse groups in our community (citizens, government officials, flood planners and engineers).

2. Pilot Web Apps: Developed pilot web apps to illustrate the potential impacts of flooding at different scales with different physical and social metrics.

3. Workshops: Hosted 5 workshops with various community stakeholders to introduce them to the project, demo the pilot apps, and gather their insights and feedback on technology-based solutions.

4. Community Partnerships: Developed partnerships with several organizations in our community (e.g., local government, water districts, citizen organizations) to shape our future IRG proposal.

5. Journal Paper: Skilton, L., A. Osland, E. Willis, E. Habib, S. Barnes, M. ElSaadani, B. Miles, and T. Do (2022). "We Don't Want Your Water: Broadening Community Understandings of and Engagement in Flood Risk and Mitigation". Frontiers in Water – Water and Human Systems. In Press.

Pilot flood risk web apps developed during PG and demonstrated during workshops with different stakeholders in our community

We Don't Want Your Water: Broadening Community Understandings of and Engagement in Flood Risk and Mitigation

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Broader Impact (Immediate Impact on Society)

The study will benefit the community by solving flood risk problems and will have additional education and partnership-building benefits. The technology tools will help stakeholders understand flood risk, the complexity in overcoming flooding problems, alleviate the existing disconnect within the community, and help them reach consensual solutions that can improve the social, economic, and environmental well-being of citizens. Flood managers and community leaders will find our results useful for framing how they address and communicate flood mitigation in their community.

Broader Impact (Sustainability)

• Improve the social capital at the inter-personal and community scales by providing access to comprehensible information and customized tools to engage in decision making and discover alignment or resolve conflicts with other stakeholders.

• Support diverse groups and identify their current knowledge gaps and preferences to provide the right tools that help them exchange knowledge with decision makers.

• Identify types of risk data and metrics that resonate best with various stakeholder groups and how to most effectively communicate complex risk information at multiple scales.

Next Steps

We plan to focus on developing a full proposal for an IRG project. Based on our results from the PG, we are currently refining our research hypotheses and methodologies to reflect what we learned from our community engagement during the focus groups and workshops. We are working on formalizing our community partnerships and specifying their collaborative roles for the next IRG phase. We are expanding our research team by adding communication expertise, both from the academic and professional sides. We are also writing a second manuscript for a journal paper to document our PG results.