Information and Communications Technology within Coastal Resilience Frameworks: A Multi-Phase Model to guide Cross-Sector Planning

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Policy Problem and Background

- Climate change exacerbates coastal hazards
- Sea level rise, nuisance flooding, harsher storms and hurricanes
- Coastal vulnerability is a 'wicked problem'
- ICT is a part of the solution through communication and connectivity, information sharing, sensors and gauges, and energy efficient systems
- Multilevel efforts like Resilient Hampton, NOAA, Resilient Islands, UN SDGs, and World Resources Institute
- ICTs have limitations and challenges such as cost, privacy, digital divide, and equity concerns
- Costal resilience requires an informed community and expert planners

Research Question

- What are best practices for collaborative and proactive ICT-driven coastal resilience planning across sectors?

Methods and Analysis

- Social constructivist research paradigm
- Phenomenology – direct experience of planners and stakeholders
- Semi-structured interviews (face-to-face/virtual) of planners and stakeholders
- Systematic literature review of over 100 reports, policy papers articles, and workshop publications in coastal Virginia and Jamaica
- Field participatory observations as resiliency specialist and graduate researcher
- Colaizzi-Style method of comparative analysis – skim, cluster, meanings
- Triangulated method for reliability and validity

Findings: Cross-Sector Resources and Needs

Table 1 Illustrating stakeholders, tools, and gaps to be addressed for cross-sector ICT-driven coastal resilience planning and policymaking

Stakeholder	Resources	Needs
Government (varies by federal, state, city and local)	Funding, legislation, codes and ordinances, rule books, technology interface	Inclusivity, proactive policy, coordination with community and nonprofits, community insights, and trust
Community	Volunteers, agenda, BIMBY, experts, coordination, insights and raw data	Funding, government support, time, credible information, training, community projects
Nonprofits	Funding, paid and unpaid team, research, voice, trust of the people, platform,	Human resource, political will, assessment methods, metrics and long-term assessment

Key Themes

- Cross-sector collaboration is necessary to streamline action, minimize duplicity, and optimize use of stakeholders' skills and knowledge
- Challenges with ICTs require multi-level action to apply tailored solutions across coastal areas
- Proactive policy is necessary; reactive policy is common
- Communicate at all stages and levels

Key ICT Tools

Phenomenological case studies of community flood disasters in the Caribbean, Coastal Virginia and other coastal areas underscore the use of technology to bolster community resilience against natural disasters locally, regionally, and globally. Studies underscore how online and digital systems reach their peak during natural disasters and bolster community resilience in all cases. This peak in technology usage was evident during Covid-19 and the Atlantic hurricane seasons.

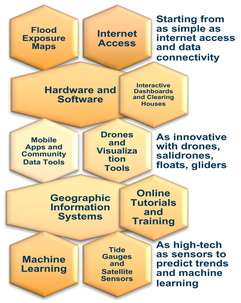

Figure 1 Highlighting key ICT tools used in coastal resilience planning to guide policymaking

Image 1 Illustrating stakeholders actively addressing cross-sector ICT-driven coastal resilience planning and policymaking (NOAA, 2021)

Coastal Resilience ICT Multi-Phase Model for Cross-Sector Planning

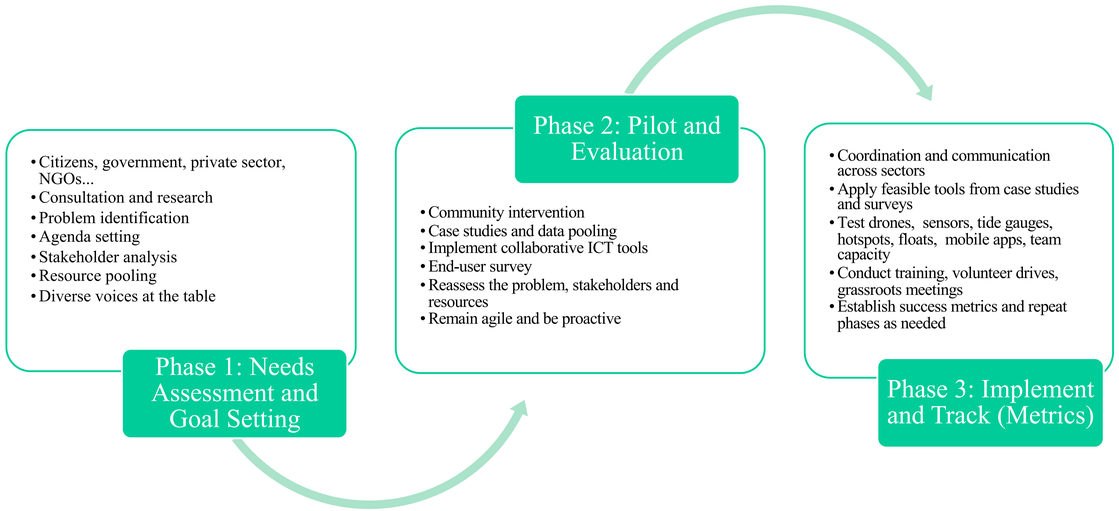

Figure 2 Framework describing critical components and linkages used for defining and understanding ICT-driven collaborative coastal resilience planning and policymaking

Implications for Practice and Next Steps

- Why is this study useful? This research examines multiple sectors and stakeholders for multilevel and multi-layered analysis
- Key coastal resilience planners' experiences provide in-depth assessments for action
- While studies focus on emergency preparedness, response, and recovery, very few explore the role of technology in coastal resilience efforts such as the challenges, critiques, concerns, and attempt to hurdle those challenges with best practices
- Coastal resilience planning requires strategic focus grounded in whole-of-community and multidisciplinary coordination, collaboration, and communication
- Evidence-based and equitable policies from diverse voices and multiple players
- My goal is to expand this dissertation research to include various case studies and follow-up with advanced fieldwork and collaborations

Conclusions

- ICT-driven coastal resilience frameworks aren't perfect, but, they bolster low and high-tech solutions for sustained outcomes
- Effective communication is one of the single most important aspects of coastal resilience planning across sectors
- Human and technical components interact at various collaboration levels
- Cycle of reinvention, innovation, and assessment needed to guide policy and praxis

Acknowledgements