

Evaluating drivers of coastal relocation in Hurricane Sandy affected communities



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ABSTRACT

The future viability of some coastal communities has been severely challenged by the recent major disasters, as well as other episodic and chronic coastal hazards. These events also instigated a dialogue on their long-term resilience, adaptation options, and the possibility of permanent relocation from high risk areas. Little is known how exposure to disaster, in combination with other contemporary coastal challenges, affects willingness to consider relocation on a household level in the highly-developed urban settlements. The main objective of this paper is to provide a bottom-up perspective on this dilemma via identification of demographic determinants and other disaster-related concerns that may influence support for relocation. More specifically, this study takes an interdisciplinary approach to examine the effects of pre-disaster socio-economic household characteristics, level of preparedness, disaster exposure, experience with recovery, community embeddedness, and resource loss on relocation decision-making. The findings hereby reveal that the willingness to consider relocation is primarily influenced by the age of respondents, disaster exposure, level of experienced stress related to recovery, personal financial recovery concerns, future cost of living in high-risk area, concerns with increase in crime and future flooding, and disaster-induced resource loss.

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1. Introduction

Coastal communities are increasingly exposed to impacts of accelerated climate change such as more intense, longer-lasting, and wetter hurricanes [16,17,36,59,60] and sea-level rise (SLR) [34,46,47,63,29,11,48]. In combination with persistent coastal problems like erosion and land subsidence [8], the chronic and episodic nature of these events can degrade natural inundation buffers such as barrier islands, dunes, and wetlands, eventually leading to a more frequent and prolonged tidal flooding [33,46,62]. Long histories of unsustainable coastal land use and development patterns that foster high population densities and urban growth further contribute to the overall complexity of coastal issues [45]. The aforementioned conditions can exert a significant stress on social, legal, environmental, and economic sectors in coastal urban areas [3] and cause an extensive damage to infrastructure, public and private property, and productive agricultural land, potentially displacing millions of people [49,45]. In response to emerging

climate change impacts and based on the value of structures, adaptation costs, socio-cultural significance, resources, and overall vulnerability, communities have three main options: do nothing, protect themselves, or relocate to a safer location [1].

In the recently published 3rd National Climate Assessment report [21], the authors state, “As sea level raises faster and coastal storms, erosion, and inundation cause more frequent or widespread threats, *relocation* (also called (un)managed retreat or realignment), while not a new strategy in dynamic coastal environments, may become a more pressing option”. The report further notes that “up to 50% of the areas with high social vulnerability face the prospect of unplanned displacement under the 1–4 foot range of projected sea level rise” due to financial inability to afford structural protection, difficulty to justify public expense, and lack of social and political support for more orderly retreat. Although relocation may represent the most effective long-term adaptation strategy for some coastal communities, this option is still largely considered outside the range of acceptable options due to political, institutional, socio-cultural, and economic considerations. However, a direct exposure to disaster as a discernable and amplified manifestation of other more gradual but chronic hazards in inherently vulnerable coastal locations can serve as a catalyst for a debate focused on questions surrounding relocation vs.

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reconstruction [26]. Even though structural interventions and flood-proofing have been preferred coping strategies among Hurricane Sandy-affected residents [9], the reality is that we simply cannot protect everything [52] and, at some point, will have to consider retreat.

This paper explores factors that may affect perceptions and consideration of relocation as a response strategy to contemporary coastal hazards. More specifically, it presents results from a survey targeting households recently exposed to a major hurricane event under the assumption that such experience may heighten people's awareness of coastal risks and advance their thinking of possible solutions. The analysis evaluates a broad range of contextual coastal factors as possible drivers of relocation decision-making (Fig. 1), from the household level socio-economic indicators to various other disaster-related stressors like psychosocial and physical impacts, post-disaster recovery concerns, and relocation assistance support needs. Disasters like Sandy offer a unique window of opportunity for the reexamination of community capacity to withstand episodic and chronic hazards, for the adjustment of policy and planning frameworks to better match the risks, and for the effective change of land use patterns to move critical facilities, assets, and people out of the harm's way. The results presented herein provide an indication of varying preferences and concerns that drive consideration to relocate among disaster-affected coastal residents and as such provide the vital information on circumstances that may generate a greater support for this adaptation option.

Overall, the literature demonstrates that socio-economic factors play an important role in risk perceptions and relocation-related decision-making. For example, [5] found that natural disaster-induced displacement is influenced by factors such as race/ethnicity, wealth, homeownership, education, age, and gender. Landry et al. [38] also established that the return migration of Hurricane Katrina evacuees was affected by household income, age, education level, employment, marital and homeownership status, albeit with some variation in responses among different population groups. Thus, the measurement of socio-economic characteristics can serve as a useful predictor of willingness to relocate, as it relates to the concept of social vulnerability developed in the context of natural hazards and disasters. According to Cutter et al. [14] and Adger [2], such characteristics may

modulate individual and community responses to disaster and include, for example, age, gender, ethnicity, employment, and affluence. They can also reflect varying ability of people to engage in preparedness, response, and recovery from different hazards [18], potentially affecting willingness to consider relocation. To account for the importance of diverse range of personal and situational factors in adaptation and disaster risk reduction decision-making, this study evaluates a comprehensive portfolio of contemporary contextual considerations as potential relocation drivers, such as extent and duration of disaster exposure, socio-economic circumstances, post-disaster community disruption and satisfaction with recovery process, as well as risk perceptions. Disasters frequently reintroduce dilemma whether to rebuild in high-risk locations or relocate, both among the officials and affected residents. This issue whether to return from evacuation or stay in host community has been previously explored in the context of coastal disasters – Hurricanes Katrina, Andrew, and Sandy [15,24,38,57]. However, it likely differs from the anticipatory decision-making on relocation that should preferably take place under non-emergency circumstances when the immediate sustenance needs, priorities, and concerns are addressed.

The need for inclusion of relocation in the portfolio of climate change adaptation strategies has been increasingly recognized by decision-makers and other stakeholders. This is evidenced by, for example, establishment of acquisition or buyout programs post Hurricane Sandy aimed at purchasing damaged properties located in high-risk areas. The New York State Governor Andrew Cuomo established a buyout program to incentivize relocation by compensating participating homeowners the pre-storm market value of their home and offering additional 5 percent bonus to those who stay locally or 10 percent to groups who sell collectively [32]. Generally, these programs have very low participation rates [6], perhaps due to their simplistic design solely based on financial exchange with disregard of the diverse household contexts and needs. Another reason for limited participation in buyouts may be the unsuccessful effort to effectively engage stakeholders in participatory dialogue on the actual risks and realistic response options.

Understanding the complexity and needs associated with contemporary coastal population movement requires an integrative, transdisciplinary approach that builds upon existing research on migration and displacement at different levels of analysis [10,22,39,41,53,7] and also accounts for the new emerging aspects of this issue. Even though research on environmental displacement, resettlement, and migration is well established, it often depicts partially or fully reversible conditions and still rarely reflects the scope of environmental changes that are likely to occur due to accelerated climate change. According to Kniveton [35], a number of predicted climate change outcomes are likely to be of a magnitude and variability rarely experienced by the communities in the past, further limiting the applicability of existing statistical models, scenarios, and historical analogs to extrapolate future population shifts induced by climate change. Considering individual households likely have dissimilar needs and preferences for relocation assistance, the ideal relocation programs would include flexible, incentivized, and customized features, rather than standardized assistance packages, strict deadlines, and equal participation requirements. Webber [4] states that the fewer choices people have for moving, it is more likely that the outcomes of that movement will be negative. Strategies that allow people to select between diverse choices, such as solely financial assistance/compensation, social services, alternative housing, new employment, or any combination of these, may represent a more appealing incentive to potential relocatees. To explore which of these incentives in relocation programs are the most useful to coastal residents, this survey includes a few items proposing different

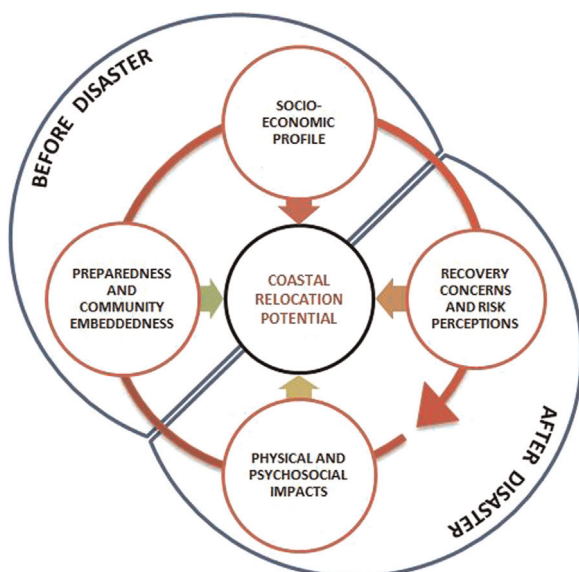


Fig. 1. Conceptual framework of research design.

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