

# Attitudes towards relocation following Hurricane Sandy: should we stay or should we go?

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*This study explores the dilemma of whether to rebuild or relocate from the areas devastated by Hurricane Sandy in 2012. Since disasters represent the discernible manifestation of other complex coastal hazards, they offer a window of opportunity to engage residents in the dialogue on relocation as sometimes the most effective risk reduction strategy. The following research evaluates attitudes towards relocation and willingness to consider buyout among 46 surveyed households located in highly-affected communities five months after Sandy. It also gauges perceptions of coastal risks and recovery concerns as drivers of relocation, the level of support for different adaptation strategies, and preferences related to the relocation process itself on how and where to relocate and with what type of assistance. Responses indicate that, even though residents prefer structural solutions to address coastal hazards, they are not fully opposed to the possibility of relocation mostly for personal health and safety reasons.*

**Keywords:** adaptation, coastal, displacement, migration, relocation, retreat

## Introduction

Coastal communities are progressively being exposed to coastal hazards and sea-level rise (Yohe et al., 1996; Kumar, 2006; Nicholls et al., 2007a; Karl, Melillo, and Peterson, 2009; Holland and Bruyère, 2013). This augmented risk is already evident from the increase in tropical cyclone activity, manifesting as more intense, longer-lasting, and wetter hurricane episodes (Emanuel, 2005; Trenberth, 2005). In combination with chronic problems such as erosion, land subsidence, and gradual but permanent sea-level rise, tropical storms can degrade natural storm surge buffers such as barrier islands, dunes, marshes, and wetlands, and lead to more frequent and prolonged tidal inundation (Nicholls et al., 2007b; Karim and Mimura, 2008; Yin et al., 2013). This inherent vulnerability stems not only from high geophysical risks (Titus et al., 2009), but also from the extensive history of unsustainable land use and development, fostering high population densities and urban growth close to shorelines (NCADAC, 2013).

Episodic events, including hurricanes and tropical storms, as well as chronic gradual disturbances such as sea-level rise and tidal inundation, can have a significant negative effect on the quality of life and the socioeconomic stability of coastal communities, leading to psychological consequences, physical damage, and population

displacement (Collini, 2008). They can further diminish resilience and exacerbate vulnerabilities in some coastal locations, thereby augmenting adaptation costs and the extent and complexity of needed response interventions. The National Coastal Population Report (NOAA, 2013) concludes that increasing population growth and density in coastal urban centres, as well as the proliferation of economic activities and geopolitical significance, puts more people and assets at risk. The concentration of wealth along coasts may have dual implications for successful adaptation: it may generate more resources for structural protections, but also lead to distorted perceptions of the actual risk and the ability to recover and withstand repetitive damages, further generating a false sense of security.

Coastal communities already have a number of mechanisms in place to address coastal risks, namely those proposed as a part of the Coastal Zone Management Act of 1972, such as community cohesiveness, cultural preservation, hazard mitigation, land use planning, and resource protection (Collini, 2008). Grannis (2011) proposes various planning, regulatory, and financial tools to address sea-level rise, including acquisition/buyout programmes, building codes, floodplain regulations, setbacks, tax incentives, and zoning. Adoption of these instruments often is not legally required or enforced, but rather constitutes a framework of financial and technical support for coastal states and tribes participating voluntarily in various programmes (EPA, n.d.). A number of local and regional efforts address more specific concerns through coastal management, community development, and emergency response. For instance, some communities have developed individual adaptation plans, technical guidance, or toolkits, such as the *Sea Level Rise Response Strategy* for Worcester County, Maryland (CSA International, Inc., 2008), to deal with hazards unique to their geographic location.

Effective coastal adaptation should include the integrated selection of policy options for protection from the rising sea and land subsidence through innovative land use planning involving development controls, emergency management, and selective relocation (Nicholls et al., 2007b). In response to accelerated climate change, three frequently cited responses are protection, accommodation, and retreat or relocation (Klein et al., 2001; Nicholls and Tol, 2006; Karl, Melillo, and Peterson, 2009), each of which contains a portfolio of various measures with distinctive benefits and shortcomings (Dronkers, 1990). The Third National Climate Assessment report (Moser et al., 2014, p. 591) states that, '[a]s sea level rises 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'. Decision-makers, therefore, should discuss the possibility of relocation as an adaptation strategy for high-risk communities in conjunction with in situ measures (Martin, 2010) and explore how it can complement other efforts at the local and regional level (Laczko and Aghazarm, 2009). They should also re-examine traditional management and policy mechanisms to address population displacement in response to both gradual and sudden climate change impacts (Leighton, Shen, and Warner, 2011).

The gradual but permanent inundation may slowly diminish quality of life, causing persistent stress and recurrent socioeconomic losses, eventually driving residents out of their homes with no promise of return and recovery. This phenomenon has been observed already in coastal communities such as Dorchester County, Maryland, in the United States, where almost 60 per cent of the county is located within the 100-year floodplain and 50 per cent below an elevation of 4.9 feet above sea level (Carlisle, Conn, and Fabijanski, 2006). Cole (2008, p. 10) observes that: 'Many property owners cannot afford the expense to repair, replace, relocate, or otherwise accommodate the impacts of sea-level rise. They will be faced with a choice of taking on debt they cannot afford for a property that will still have inundation issues, or abandon the property and start over'. Gibbons and Nicholls (2006), meanwhile, discuss the regional abandonment of islands in Chesapeake Bay estuary (located inland from the US Atlantic Ocean), providing a historic example of Holland Island in Maryland, where sea-level rise and tidal inundation steadily reduced its size, and, in combination with social changes, led to its depopulation and eventually full abandonment in 1918. In more recent times, inundation of low-lying areas of Chesapeake Bay has led to the intrusion of saltwater on properties and septic tank failures, resulting in the abandonment of homes (Titus and Richman, 2001).

Relocation is being recognised as a more long-term and cost-effective option than the available in situ adaptation strategies (ACCAP, 2009; Cronin and Guthrie, 2011). Some communities are already considering the possibility of relocation and are developing tangible relocation plans and implementation strategies based on locale-specific conditions and vulnerabilities (Alaska Climate Change Sub-Cabinet, 2010; CAKE, 2011). Campbell, Goldsmith, and Kosh (2005) suggest that, before proceeding with relocation, a community should reach consensus on the decision to relocate, identify alternative destinations, calculate the economic, social, and cultural costs of relocation, obtain resources, and determine the time and sequence of retreat. Perry and Lindell (1997) underline that, for successful relocation, a community should be organised, all participants should be engaged in the decision-making process and informed of the complexities and multi-organisation context of relocation, social and personal needs should be addressed individually, and social networks should be preserved. It is equally important to designate a responsible agency or institution with the authority to lead and coordinate migration and resettlement with different policy, planning, and disaster mitigation agencies and to combine these initiatives with other regional planning objectives (Leighton, Shen, and Warner, 2011).

Despite the growing interest in relocation as a risk reduction strategy, the more widespread implementation of this option is facing a number of barriers. Residents may oppose it owing to distorted risk perceptions, a lack of responsibility with regard to the true costs of living in high-risk coastal areas, and sociocultural values. The dearth of institutional, policy, and planning frameworks can further hinder consideration of the relocation process. Currently, there is not a single government agency that has the authority to administer a relocation programme even if people want it, there is no funding designated for this process, no criteria for the identification of

relocation destinations, and no mechanisms for public participation (IAWG, 2009). Finally, often there is an absence of political will to pursue relocation because of concerns about public opinion, the tax base, investment, and long-term development goals. As visible manifestations of gradual and persistent conditions, coastal disasters can increase pressure on decision-makers and communities to engage in a more realistic dialogue on long-term adaptation and relocation. Few, Brown, and Tompkins (2006) argue that visible impacts post disaster are more likely to instigate a public response and engagement in adaptation than the mere anticipation of future damage. Yet, in many instances, affected communities and residents still prefer to reconstruct to the same pre-disaster condition and maintain the status quo (Smith and Wenger, 2007).

This paper explores the aforementioned issue in the context of Hurricane Sandy of 2012 and, more specifically, the debate as to whether communities should invest in recovery and reconstruction and continue habitation in high-risk areas or simply relocate. The Sandy disaster led to extensive loss of housing and property damage (FEMA, 2013), disruption in transportation and commercial operations, a lack of electricity, a shortage of food, medicine, and gasoline, sewage overflows, and population displacement (White House, 2012; Kenward, Yawitz, and Raja, 2013). After such an event, communities have three options:

- restore structures and land use patterns to the same pre-disaster condition;
- reconstruct with hazard mitigation and adaptation adjustments; or
- abandon/repurpose the destruction zone and relocate.

In relation to Hurricane Sandy, the third (or last) option attracted a significant amount of interest. In its aftermath, for instance, New York Governor Andrew Cuomo proposed a buyout programme, offering pre-storm market value compensation to homeowners and a five per cent bonus if they relocated within the same jurisdiction or 10 per cent if they relocated collectively as a residential block (Kaplan, 2013). In some communities this programme was well received: the Fox Beach neighbourhood of Staten Island, New York City, for example, agreed to move 80 per cent of existing homes in response to Sandy and repetitive flooding and brush fires (Fox Beach 165, n.d.).

Post-disaster decision-making on whether to return or stay has been explored among hurricane evacuees (Smith and McCarty, 1996; Elliott and Pais, 2006; Landry et al., 2007; Groen and Polivka, 2010). In the context of Hurricane Katrina, Elliott and Pais (2006) found that homeownership and household income represent the most important determinants of willingness to return, with low-income residents and homeowners being more likely to go back owing to their mortgage commitment and/or a lack of resources to re-establish their livelihoods elsewhere. After studying return migration post Katrina, Groen and Polivka (2006) identified evacuees' age, income, and severity of damage as affecting the return decision. In the aftermath

of Hurricanes Katrina and Rita of 2005, displaced residents were ‘understandably confused and hesitant’ about the right course of action, but ultimately were rational in relocation decision-making, basing it on many interconnected factors and values (Henry, 2013, p. 294). Even though these studies provide an indication of the factors important in the decision on whether to return or stay in an alternative location, they differ from this project, which explores the willingness to relocate among people who have already returned but face a high risk of future flooding and have the opportunity to make this decision under non-emergency circumstances.

This paper thus evaluates the attitudes of Hurricane Sandy-affected residents about coastal hazards, risk reduction options, recovery concerns, willingness to consider relocation, and perceptions of the relocation process and assistance needs. As such, it provides a bottom-up perspective on people’s preferences and concerns regarding the decision as to whether or not to relocate from hazard-prone areas and informs the development of more effective policy and planning programmes to support this process. Furthermore, it contributes to research on relocation that is fairly limited, case-specific, contextual, and rarely placed in the sphere of contemporary coastal concerns in the US. This is important, moreover, given that decision-makers will increasingly have to accommodate climate-induced population shifts, respond to the growing demand for assistance, and offer institutional and financial support for the transfer of property and infrastructure (Martin, 2010).

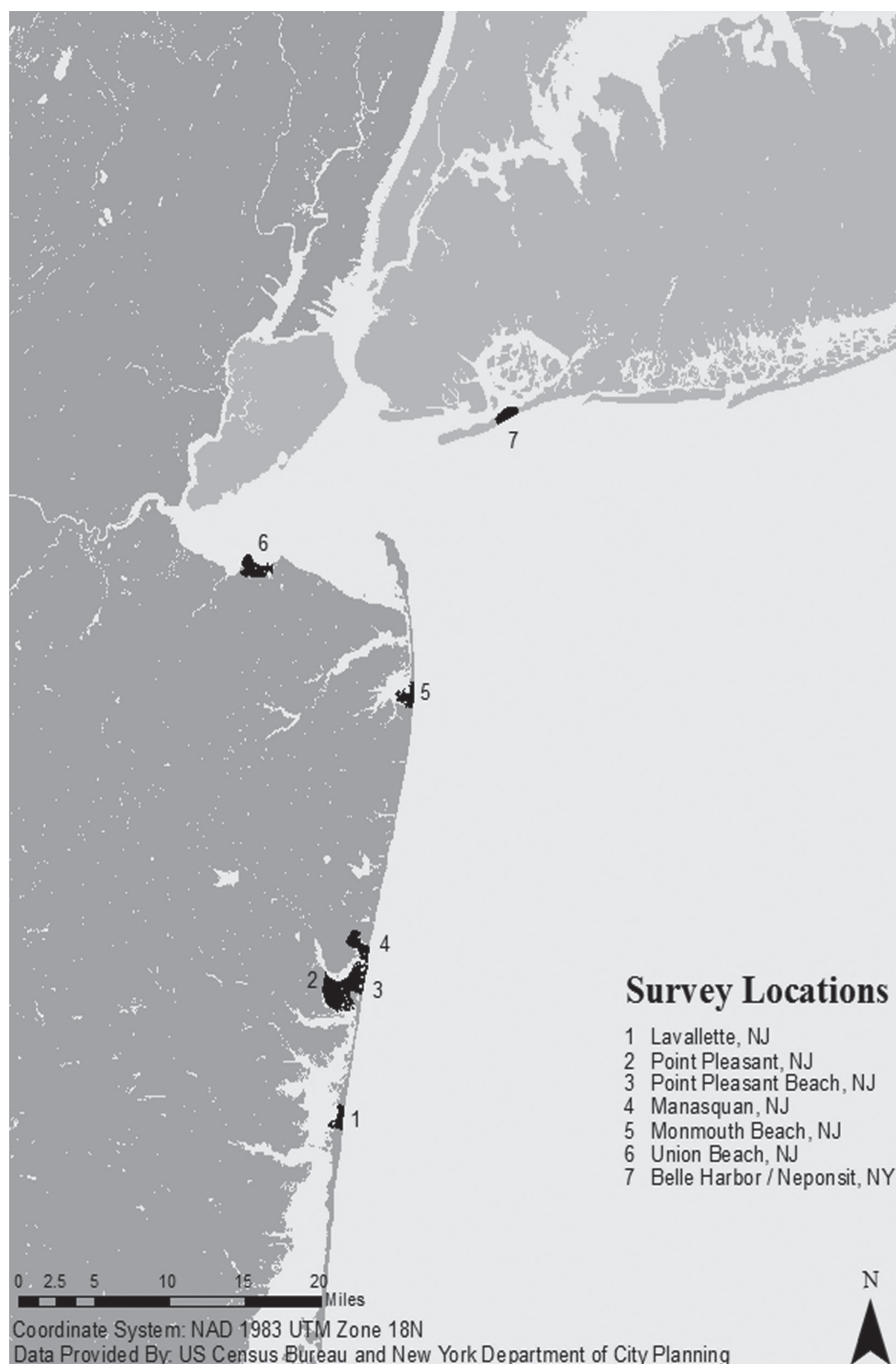
## Methodology

A household survey was conducted in Hurricane Sandy-affected areas five months after the disaster event (7–14 March 2013). The survey sites were identified using the Federal Emergency Management Agency (FEMA)’s Remotely-Sensed Damage Assessment data, which was used to generate a map of Sandy’s high-impact zone along the northeast coast of the US. Within this range, the following communities that sustained the most extensive structural damage were randomly selected as study locations (see Figure 1):

- Belle Harbor, NY;
- Lavallette, NJ;
- Manasquan, NJ;
- Monmouth Beach, NJ;
- Neponsit, NY;
- Point Pleasant, NJ;
- Point Pleasant Beach, NJ; and
- Union Beach, NJ.

Within these communities, a nonprobability purposive sampling strategy was utilised to identify single-family households located in the densely-populated residential

**Figure 1.** Survey locations in Hurricane Sandy-affected area



Source: authors.

neighbourhoods most affected by Hurricane Sandy within one mile of the shoreline. Demographic and socioeconomic information was not considered during the site selection or data analysis owing to budgetary, logistical, and technical constraints (for instance, duration and timing of data collection, inclement weather, and Institutional Review Board guidelines). US Census Bureau data on the surveyed locations revealed that most boroughs or counties have prevalently white population (such as: Monmouth County = 84.9 per cent; Point Pleasant Borough = 84.9 per cent; Union County = 68.7 per cent; Manasquan Borough = 96.1 per cent) and higher homeownership rate (such as: Monmouth County = 75.6 per cent; Union County = 61.3 per cent; Point Pleasant = 66.2 per cent; and Manasquan Borough = 74.6 per cent). The majority of residents are upper-middle class with a median household income ranging between USD 69,347 (Union County) and USD 85,781 (Manasquan Borough) and a poverty level of between 2.5 per cent (Manasquan Borough) and 10.4 per cent (Union County).

A total of 46 surveys were procured over the six-day period during daylight hours, with each data collection session typically lasting between 10 and 30 minutes. Any household resident willing to complete the survey (IRB #11-725) participated in the study and completed a two-page paper questionnaire. All occupied households in randomly selected blocks within targeted communities were approached and year-round residents in attendance older than 18 years were asked to fill out the questionnaire personally. Four respondents were just visiting to inspect and/or repair the damage to their rental property and/or summer house. However, because they either owned the property or planned to retire there, they were included in the survey. The approximate response rate was 90 per cent. Monmouth Beach Mayor Susan Howard happened to live in one of the surveyed neighbourhoods and provided additional verbal thoughts on Sandy's impacts and recovery in her community, which were documented and included in the study. Data collection was complicated by poor weather, as well as by the difficulty in finding residential neighbourhoods with a dense occupancy rate, as some residential blocks were composed primarily of summer rental properties that were closed for the winter season. Some areas also had entry restrictions (curfews) owing to concerns about crime and trespassing, as well as recurrent flooding due to residual Sandy-related consequences such as displacement of sand masses, erosion of protective dunes, the filling of previously-dredged sound channels, and over-wash.

The survey consisted of 10 questions: six with a Rank Order Scale ('1' being the most preferred and '5' the least preferred selection); two had a multiple-choice format; and the final two were open-ended. A quantitative data analysis of responses to individual survey questions was performed using Fisher's Exact Test (see Table 1). The Wilcoxon Rank Signed nonparametric test was applied to determine whether a difference existed between three distinct response categories reflecting respondents' willingness to consider participation in buyout programmes ('yes', 'no', 'maybe in the future') in a pairwise fashion ('yes and no', 'yes and maybe', 'no and maybe'). Statistically significant responses were then analysed using Fisher's Exact Test (see Table 2).



**Table 1.** Relocation attitudes of residents of Hurricane Sandy-affected communities

Variable	Most preferred	Somewhat preferred	Neutral	Somewhat less preferred	Least preferred
<b>1. Which of these broader impacts would prompt you to consider permanent relocation? n=41</b>					
Storms, hurricanes, and related flooding	13 (32%)*	11 (27%)	7 (17%)	3 (7%)*	7 (17%)
Sea-level rise	6 (15%)	18 (44%)*	9 (22%)	7 (17%)	1 (2%)*
Unreliable transportation, blackouts, unsafe drinking water	11 (27%)	5 (12%)	13 (32%)*	7 (17%)	5 (12%)
Slow economic growth and recovery in the community	5 (12%)	4 (10%)	10 (24%)	15 (37%)*	7 (17%)
Neighbors, friends, and family already moved somewhere else	6 (15%)	3 (7%)*	2 (5%)*	9 (22%)	21 (51%)*
<b>2. Which of these options would be the best to prevent future impacts from storm surges and sea level-rise in your coastal location? n=40</b>					
Levees and seawalls	19 (48%)*	10 (25%)	8 (20%)	2 (5%)*	1 (3%)*
Natural protective barriers (wetlands, sand dunes, vegetation)	9 (23%)	16 (40%)*	10 (25%)	5 (13%)	0 (0%)*
Relocation to safer area	3 (8%)*	1 (3%)*	4 (10%)	25 (63%)*	7 (18%)
Housing elevation and flood-proofing	7 (18%)	11 (28%)	17 (43%)*	3 (8%)*	2 (5%)*
Nothing, the event like this will not happen again anytime soon	2 (5%)*	2 (5%)*	1 (3%)*	5 (13%)	30 (75%)*
<b>3. Which of these factors would prompt you to relocate to a new safer location? n=41</b>					
The health and safety of myself and/or my family	30 (73%)*	5 (12%)	2 (5%)*	3 (7%)*	1 (2%)*
My property is severely damaged	4 (10%)	10 (24%)	10 (24%)	11 (27%)	6 (15%)
Neighborhood, friends, and/or family decide to leave the area	0 (0%)*	5 (12%)	2 (5%)*	9 (22%)	25 (61%)*
Cost of staying becomes too high (higher taxes, flood insurance)	3 (7%)*	12 (29%)	13 (32%)*	8 (20%)	5 (12%)
Severe weather events become too frequent and destructive	4 (10%)	9 (22%)	14 (34%)*	10 (24%)	4 (10%)
<b>4. What type of assistance should government offer to support relocation? n=40</b>					
Find alternative housing	6 (15%)	8 (20%)	7 (18%)	13 (33%)*	6 (15%)
Find alternative employment	1 (3%)*	4 (10%)	7 (18%)	6 (15%)	22 (55%)*
Help financially to buy new home (tax breaks, low interest rates)	11 (28%)	15 (38%)*	4 (10%)	8 (20%)	2 (5%)*
Offer multiple alternative relocation destinations to choose from	3 (8%)*	9 (23%)	12 (30%)	11 (28%)	5 (13%)
Offer to purchase home at pre-storm value, I do the rest	19 (48%)*	4 (10%)	10 (25%)	2 (5%)*	5 (13%)



Variables	Most preferred	Somewhat preferred	Neutral	Somewhat less preferred	Least preferred
<b>5. Which of these factors would be important in your decision where to relocate? n=41</b>					
Plenty of job opportunities	12 (29%)	8 (20%)	5 (12%)	6 (15%)	10 (24%)
Plenty of affordable housing	3 (7%)*	10 (24%)	8 (20%)	13 (32%)*	7 (17%)
Good education and numerous services	5 (12%)	8 (20%)	14 (34%)*	5 (12%)	9 (22%)
Vicinity to family/friends	10 (24%)	8 (20%)	8 (20%)	11 (27%)	4 (10%)
Staying as locally as possible – near the old location	11 (27%)	7 (17%)	6 (15%)	6 (15%)	11 (27%)
<b>6. Which of these options would prompt you to consider relocation? n=38</b>					
Perceived possibility of recurrent or repetitive events	13 (34%)*	14 (37%)*	6 (16%)	4 (11%)	1 (3%)*
Recommendations from the local government	1 (3%)*	0 (0%)*	7 (18%)	11 (29%)	19 (50%)*
Predictions from climate change scientists	2 (5%)*	8 (21%)	7 (18%)	12 (32%)	9 (24%)
Homeowners pay for property damage at their own cost	16 (42%)*	6 (16%)	7 (18%)	6 (16%)	2 (8%)*
Stress/emotional trauma experienced from Hurricane Sandy	6 (16%)*	10 (26%)	11 (29%)	5 (13%)	6 (16%)

**Note:** \* Statistically significant values ( $p < 0.05$ ) calculated using the Fisher's Exact Test.

**Source:** authors.

**Table 2.** Responses to survey questions 7 and 8 in counts and percentages (n=39)

<b>7. If you would consider relocation, which of these options would you prefer?</b>		
Moving together as a community	3	8%
Moving together with selected few friends	7	18%
Moving together with others in the same interest group (church, ethnic . . .)	0	0%
Moving independently – on my own	27	69%
Other	2	5%
<b>8. Would you currently consider a buyout program to move somewhere else?</b>		
Yes	11	28%
No	18	46%
Cannot decide	2	5%
Maybe in the future	8	21%
Other	0	0%

**Source:** authors.

## Results and discussion

Table 1 shows responses to survey questions in order of preference, with '1' being the most preferred reply and '5' being the least. The first question explores residents' concerns about coastal risks and their indirect impacts to determine which are perceived as more significant in the decision to consider permanent relocation. The most frequently selected concerns that would prompt them to contemplate relocation include storms, hurricanes, and related flooding, followed by sea-level rise. The majority of respondents are impartial towards unreliable transportation, blackouts, and unsafe drinking water, even though this was ranked as the 'most preferred' concern after storms, hurricanes, and related flooding. This suggests that people are almost as concerned about secondary disaster impacts leading to a disruption in services, daily routine, and quality of life, as they are about the actual incidence of severe weather and flooding.

'Slow economic growth and recovery in the community' is the most frequently selected 'somewhat less preferred' concern, while the loss of neighbours, friends, and family from the community represents the 'least preferred' concern for the majority of respondents (51 per cent). This indicates that, in surveyed communities, a change in social fabric and support networks owing to the departure of some members would not be vital in their decision to relocate or to stay in place. This finding probably varies between different communities, depending, for example, on their urban dynamics, sociodemographic parameters, level of mobility (in- and out-migration), rates of homeownership, and community embeddedness. Similarly, in this highly technological society, it may be possible to maintain valuable social networks and support regardless of physical distance, thereby minimising the importance of this outcome in the decision to relocate. The relative lack of concern with the choices and decisions that other members of the community are making reflects individualistic and autonomous perspectives of risk and recovery. When aggregating the 'most' and 'somewhat preferred' values, 'sea-level rise' and 'storms, hurricanes, and related flooding' elicit an equivalent level of concern (24 per cent), suggesting that, although participants primarily view disasters as drivers of relocation, they also recognise the importance of gradual but permanent coastal hazards in this consideration.

The second question probes which response option is preferred to address the future impacts of storm surge and sea-level rise. A significant number of respondents prefer engineering solutions such as levees and seawalls, followed by natural barriers (wetlands, sand dunes, vegetation) in the 'somewhat preferred' category. Most are impartial in their relative preference for housing elevation and flood-proofing as a preventive option. The majority of respondents (75 per cent) think that doing 'nothing' is not an option as it is probable that an event like Sandy will occur again. As for relocation to a safer area, the majority of respondents (63 per cent) rank the option as 'somewhat less preferred', while a marginal number rank this possibility as 'most' or 'somewhat preferred'. This suggests that most have a strong commitment to stay in place and first explore in situ adaptation and hazard mitigation strategies before considering

relocation. The observed preference for engineering and technical solutions may represent a significant challenge for effective coastal planning and the selection of realistic and appropriate interventions aligned with all potential risks and their synergistic outcomes in different geographic locations. Even though structural solutions may receive the most public support, they may be expensive, have legal and liability implications, and have secondary adverse consequences, such as environmental damage, drainage, and sewage overflows, for universal implementation (Ruppert, 2013).

Such a disconnect between preferred and feasible options can be seen in the example of seawalls, which would cost the City of Punta Gorda, Florida, up to USD 1.5 billion or USD 22,000 per person for a population of 17,000 residents, without even accounting for needed modifications to existing drainage systems (Ruppert, 2013). It may also indicate an unwillingness on the part of coastal residents to assume personal responsibility for living in high-risk locations and instead a hope that government will step in to construct structural protections while communities continue with business as usual behind the barriers. This trend of growing pressure for government intervention reflects a lack of awareness of actual expenditure by taxpayers on disaster mitigation owing to an absence of transparency, accountability, and coordination vis-à-vis spending and allocation of disaster appropriations (Israel, 2013). The Biggert-Waters National Flood Insurance Program Reform Act of 2012 was designed to address this issue and provide a financial disincentive to living in flood-prone areas by increasing flood insurance rates and shifting more responsibility to homeowners. However, in March 2014, the US Senate passed a bill to halt these flood insurance reforms and to prevent a rise in flood insurance premiums. Overall, all levels of government, from federal to local, are hesitant to pursue more strict and mandatory regulations to shift this responsibility to constituents, reflecting a worrying dearth of political will to tackle this issue properly (Delogu, 2014). Curiously, the response to survey question 6 shows that 42 per cent of respondents selected 'homeowners pay for property damage at their own cost' as the first most preferred concern prompting them to relocate, demonstrating that financial considerations play an important part in risk reduction decision-making.

In the third question, respondents were asked to rank personal-level factors that would motivate them to relocate. A majority selected 'the health and safety of myself and/or my family' as the 'most preferred' option (73 per cent). A significant number of people chose 'neighborhood, friends and/or family decide to leave the area' as the 'least' (61 per cent) and 'somewhat less' (22 per cent) preferred options guiding their decision to relocate. This finding corroborates a similar observation from question 1, suggesting that personal risk assessment and the perceptions of individual residents and their nuclear family are a more influential determinant of willingness to relocate than signals from the community. The other responses, such as 'cost of staying becomes too high', 'my property is severely damaged', and 'severe weather events become too frequent and destructive', either evoke neutral ranking or do not appear significantly more important across other preference categories. The financial costs of disaster impacts and recovery, as well as the looming financial burden on homeowners

and local budgets associated with ‘building back stronger’ and retrofitting the build environment and infrastructure with hazard mitigation improvements, generally represent a significant concern, potentially contributing to the decision to relocate. In this study, though, they appear less relevant, probably because of the unique socio-economic characteristics of the surveyed areas.

The fourth question reveals preferred types of government assistance to support relocation. A majority of respondents’ ‘most preferred’ option is ‘offer to purchase home at pre-storm value, I do the rest’ (48 per cent). As the ‘somewhat preferred’ option, a significant number of people selected ‘help financially to buy new home’ (such as low interest rates and tax breaks). The options of ‘find alternative housing’ and ‘find alternative employment’ and ‘offer multiple alternative relocation destinations to choose from’ are of the least interest to respondents, clearly demonstrating their desire to be the primary decision-makers in the relocation process. Cumulatively, 66 per cent of respondents selected ‘help financially to buy new home’ as the ‘most’ or ‘somewhat’ preferred option. Even though a majority of respondents seem to be satisfied with only monetary compensation and incentives, current acquisition/buyout programmes established for this purpose and operating on the same principle generally have very low levels of participation. In Chesapeake Bay, for instance, only five owners of 383 repetitively flooded properties decided to sell their home,<sup>1</sup> while officials estimate 10–15 per cent participation among eligible households in Governor Cuomo’s buyout programme (Kaplan, 2013).

There is minor variation among responses on the relative importance of factors influencing the decision on to where to relocate (question 5). The only notable difference is observed for the option of ‘plenty of affordable housing’, which was least frequently selected as the ‘most preferred’ and most frequently selected as the ‘somewhat less preferred’ option, suggesting that the availability of affordable housing in receiving or host locations is not of significant concern. ‘Vicinity to family/friends’ and ‘staying as locally as possible’ do not play a major role in the decision on to where to relocate. The lack of statistically meaningful variation among the most options offered for this question indicates a discrepancy in perspectives on this issue and limited attention given to assessment and preferences associated with the relocation destination.

The sixth question assesses the relationship between willingness to relocate and factors pertaining to risk perception, communication, and exposure. A majority of respondents would consider relocation if ‘homeowners pay for property damage at their own cost’ (42 per cent), followed by the ‘perceived possibility of recurrent or repetitive events’ (34 per cent). Recommendations from the local government are the least frequently selected ‘most’ and ‘somewhat preferred’ options and prevalently chosen as the ‘least preferred’ response. ‘Predictions from climate change scientists’ fares somewhat better, with at least more respondents selecting it as the ‘somewhat preferred’ option albeit with no statistical significance. In the open-ended questions, some residents expressed dissatisfaction with the government’s response and role in the recovery process, a complaint that probably relates to this outcome. Cumulatively, 71 per cent of respondents selected ‘perceived possibility of recurrent or repetitive

events' as the 'most' and 'somewhat preferred' option, indicating that risk perception of possible multiple events would be sufficient to prompt them to consider relocation.

The seventh question evaluated how respondents envision the relocation process. A majority (69 per cent) would prefer to move independently, on their own, followed by 18 per cent who would prefer to move together with selected few friends, and 8 per cent who would prefer to move together as a community. No surveyed individuals were interested in moving together with others in the same interest groups, reaffirming the individualistic and independent character of the relocation process already observed in responses to the other questions. This finding contrasts with the argument that people would oppose relocation because of strong community ties and embeddedness, and, as such, indicates limits to the theory of community resilience, where social cohesion and capital are vital components of resilient communities and post-disaster recovery (Aldrich, 2012). This observed perspective on the relocation process and the willingness to endorse it are most certainly locale-specific and depend on other community and household socioeconomic and cultural characteristics.

When asked whether they would currently consider enrolling in a buyout programme to move somewhere else (question 8), a majority of respondents (46 per cent) selected 'no', 28 per cent 'yes', and 21 per cent 'maybe in the future'. Cumulatively, 49 per cent are not opposed to the buyout programme, suggesting that they are cognisant of coastal risks and adaptation/hazard mitigation trade-offs.

The sample was separated into three categories to analyse the differences between those who responded 'no', 'yes', and 'maybe in the future' to the question on whether or not they would consider the buyout programme. Table 3 shows statistically significant differences between selected responses among these three groups. To question 1 on preference for different preventive measures to address storm surge and sea-level rise, a smaller proportion of people from the 'no buyout' group selected the option of 'nothing, the event [Hurricane Sandy] like this will not happen again anytime soon' when compared to the two other groups. This indicates a disconnect in the risk perception between groups rejecting or supporting the possibility of relocation, with all respondents in the 'yes buyout' and 86 per cent in the 'maybe in the future' designations selecting this option.

The group opposing buyout prevalently selected 'the health and safety of myself and my family' as the 'most preferred' option (83 per cent), followed by the 'yes buyout' group (60 per cent), whereas a significant proportion of the responses of the 'maybe in the future' group were in the 'somewhat less preferred' category for this option. This may indicate an increased concern with other factors, such as a rise in taxes and insurance rates, which could prompt them to relocate in the future.

The 'yes' group more frequently selected the 'cost of staying becomes too high' option as the 'most preferred' concern than the 'no' and 'maybe' groups, which are less concerned with this possibility. This could mean that they are more cognizant of the costs of living in a high-risk area and are less willing to pay extra for the benefits of residing on the shore. Another notable difference is observed when the 'most' and 'somewhat preferred' values are aggregated, revealing that only 20 per cent of

Table 3. Variation among responses grouped by willingness to consider the buyout programme

Variable	Most preferred	Somewhat preferred	Neutral	Somewhat less preferred	Least preferred
<b>Which of these options would be the best to prevent future impacts from storm surges and sea level-rise in your coastal area?</b>					
Nothing, the event like this will not happen again anytime soon					
Yes	0 (0%)	0 (0%)	0 (0%)	0 (0%)	10 (100%)
No	2 (11%)	0 (0%)	1 (6%)	4 (22%)	11 (61%)*
Maybe in the future	0 (0%)	0 (0%)	0 (0%)	1 (14%)	6 (86%)
<b>Which of these factors would prompt you to relocate to a new safer location?</b>					
The health and safety of myself and/or my family					
Yes	6 (60%)	3 (30%)	0 (0%)	0 (0%)	1 (10%)
No	15 (83%)	2 (11%)	1 (6%)	0 (0%)	0 (0%)
Maybe in the future	4 (50%)	0 (0%)	1 (13%)	3 (38%)**	0 (0%)
Cost of staying becomes too high (higher taxes, insurance)					
Yes	3 (30%)*	3 (30%)	3 (30%)	0 (0%)	1 (10%)
No	0 (0%)	3 (17%)	5 (28%)	6 (33%)	4 (22%)
Maybe in the future	0 (0%)	3 (38%)	3 (38%)	2 (25%)	0 (0%)
<b>What type of assistance should government offer to support relocation?</b>					
Offer multiple alternative relocation destinations					
Yes	1 (10%)	4 (40%)	1 (10%)	3 (30%)	1 (10%)
No	1 (6%)	2 (11%)	9 (50%)**	4 (22%)	2 (11%)
Maybe in the future	1 (14%)	2 (29%)	0 (0%)	3 (43%)	1 (14%)

Variable	Most preferred	Somewhat preferred	Neutral	Somewhat less preferred	Least preferred
Offer to purchase home at pre-storm value, I do the rest					
Yes	7 (70%)	1 (10%)	1 (10%)	0 (0%)	1 (10%)
No	9 (50%)	2 (11%)	3 (17%)	0 (0%)	4 (22%)
Maybe in the future	2 (29%)	0 (0%)	4 (57%)**	1 (14%)	0 (0%)
Which of these factors would be important in your decision WHERE to relocate?					
Vicinity to family/friends					
Yes	1 (10%)	2 (20%)	1 (10%)	2 (20%)	4 (40%)**
No	5 (28%)	3 (17%)	4 (22%)	6 (33%)	0 (0%)
Maybe in the future	2 (25%)	2 (25%)	1 (13%)	3 (38%)	0 (0%)
Which of these options would prompt you to consider relocation?					
Predictions from climate change scientists					
Yes	1 (10%)	3 (30%)	0 (0%)	3 (30%)	3 (30%)
No	1 (6%)	1 (6%)*	6 (33%)*	7 (39%)	3 (17%)
Maybe in the future	0 (0%)	4 (50%)	0 (0%)	2 (25%)	2 (25%)
Stress and emotional trauma experienced from Hurricane Sandy					
Yes	2 (20%)	0 (0%)*	4 (40%)	1 (10%)	3 (30%)
No	3 (17%)	8 (44%)	5 (28%)	1 (6%)	1 (6%)
Maybe in the future	1 (13%)	2 (25%)	2 (25%)	1 (13%)	2 (25%)

Notes: \* Significant at the 95 per cent confidence level. \*\* Significant at the 99 per cent confidence level.

Analysis performed using Fisher's Exact Test.

Source: authors.



people currently interested in buyout would relocate owing to more severe and destructive weather occurrences, as compared to 34 per cent of those who would not participate and 50 per cent who would do it 'maybe in the future'. This signifies that the survey respondents interested in buyout now are not doing so because of heightened awareness and a concern with coastal risks, community ties, or the extent of experienced damage per se, but rather due to other factors such as progress with economic growth and recovery and secondary impacts affecting wellbeing and lifestyle, including unreliable transportation, blackouts, and unsafe drinking water. Moreover, it points up that disaster experience can split communities into different factions with distinctively varying views on risk, tolerance level, and willingness to sacrifice to remain in an affected high-risk area. Consequently, relocation is likely to occur in multiple waves and reflect a dynamic process that would evolve according to myriad community, household, and external factors, such as funding and technical support.

As for government support for relocation, residents willing to relocate less frequently selected finding alternative housing as the 'most' and 'somewhat preferred' options than the 'no' and 'maybe' groups. Both the 'yes' and 'maybe' groups are more likely to select on aggregate 'offer multiple alternative relocation destinations' as the 'most' and 'more preferred' choice than the 'no' group, indicating a willingness to explore new possibilities and opportunities for relocation. The majority of residents currently willing to sign up to a buyout programme (80 per cent) would 'most' and 'somewhat prefer' 'offer to purchase home at pre-storm value, I do the rest'. The other two groups are less interested in this type of assistance. Preference for affordable housing does not appear to be an important factor in attitudes on relocation among these three subgroups.

In the context of factors relevant to relocation destination, a significant number of residents currently interested in a buyout programme prevalently selected 'vicinity to friends/family' as the 'least preferred' option, as compared to the two other groups, both of which accorded more importance to this consideration. Preference for 'plenty of affordable housing', 'employment opportunities', and 'amenities', as well as 'good education' and 'staying as locally as possible' do not appear to be important factors in attitudes on relocation among these three groups. Significantly fewer 'no' supporters of a buyout programme 'most' and 'somewhat prefer' 'predictions from climate change scientists' (12 per cent) than the two other groups ('yes' = 40 per cent and 'maybe in the future' = 50 per cent).

This observation points to a high level of distrust of scientific information among residents who are not considering buyout, shaping their personal risk perceptions and decisions to relocate or stay in the coastal area. It also indicates the need for improved participatory learning and communication efforts, involving creative and innovative tools and approaches, such as scenario planning and interactive visualisation. When the 'most' and 'somewhat preferred' options were aggregated, respondents who are not considering buyout are three times more likely to select 'stress and emotional trauma experienced from Hurricane Sandy' as a relocation trigger than

the 'yes' group and almost twice as likely as the 'maybe in the future' group. Based on this evidence, it appears that people disinterested in buyout also have very different concerns and perspectives of risk, recovery, and factors associated with relocation than those considering it, either now or in the future.

In addition, the survey included two open-ended questions. The first was: 'what do you think is the benefit of staying and rebuilding in the current location?'. Of 46 responses, 16 refer to the sense of community, such as 'love this neighbourhood' and 'strong sense of community', and 9 mention social aspects including the 'spirit of people'. Furthermore, many respondents cited location as an important incentive to stay—six talked about the ocean/beach and eight about the vicinity to the big city/financial centres and work opportunities. Another three residents gave economic reasons for investing in reconstruction, such as 'Rockaway is booming/investors are coming/economic ties exist', while a further three said that 'real estate will bounce back'. Another common thread in responses is the duration of time respondents have spent in this community—eight stated that 'we lived here our whole lives', 'neighborhood that we called home for over 35 years', and 'living here since 1979'. Some long-term residents also underlined that they 'do not like change', 'staying where you grow up is important', and 'staying in familiar surroundings is preferred'. Lastly, there was some sense of optimism about rebuilding, including 'I do not believe it will happen again in my lifetime'.

The second open-ended question examined respondents' thinking on the benefits of relocating or moving somewhere else. Among the replies, the most common were repetitive exposure/recurring event/anticipated next flood ( $n=13$ ) and avoiding stress/trauma ( $n=10$ ). Eleven respondents said that there are no benefits to relocation, at least for now, and that relocation would be the option of last resort (for instance, if the area becomes uninhabitable). As explanations for the lack of concerns that could instigate relocation, respondents mentioned: 'every place has its own type of disaster'; 'we are guaranteed to be impacted by some sort of natural disaster no matter where you live'; 'wherever you go anything can happen weather-wise'; 'no place is completely safe'; and 'it is a gamble wherever you go'. These comments reveal efforts to engage autonomously in risk assessment by equating it to natural hazards elsewhere, although actual risks may be much higher and have cumulative effects in coastal areas. As for other benefits of relocation, four people cited safety, four financial perils, and three physical loss following Sandy. Five noted the following incentives or opportunities that would influence their decision to consider relocation: relocation of job as well; cheaper taxes; lower insurance rates, mortgage payments, and cost of living; retirement; suburban lifestyle; and better job opportunities.

Many of the responses to the open-ended questions contradict those to the preference-order questions. For example, respondents frequently gave the importance of community as a reason for remaining in their coastal locality, but afforded a very low preference to the importance of neighbours, friends, and family as a component of relocation decision-making. Similarly, respondents often said 'a great community' was one of the primary reasons for rebuilding and staying in the area after Hurricane

Sandy, while they expressed little interest in moving together as a community or with other interest groups in the multiple-choice questions.

A conversation on 11 March 2013 with Susan Howard, the Mayor of Monmouth Beach, NJ, who happened to reside in the surveyed area, revealed additional socio-demographic trends in her community that can help to shape the development of suitable relocation policy and planning interventions. She said that local officials anticipate a socioeconomic shift towards a more affluent and wealthy populace as those who left the area were close to retirement and those who will move in will have to invest more resources to meet the new building codes and requirements. She also noted that, even when FEMA proclaims a home structurally sound, 'some folks are packing their bags as they just don't want to deal with it all, and are checking out other options'. Another concern that residents are facing is the cost of recovery: FEMA assistance will not be sufficient to recover the full value of their recently appraised homes and some may experience losses of USD 90–150,000. Howard added that many homes have split-level designs that are difficult to elevate and may result in a loss of living space. Moreover, Monmouth Beach Borough is experiencing daily tidal flooding in low-lying areas, something that happened rarely before the storm. Apparently this is probably a result of lack of regular dredging and the significant amount of sand deposited in the inlet during Sandy. Since this area does not have any large commercial activity, the US Corps of Engineers cannot justify the cost of dredging just to support tourism and pleasure boaters.

Howard also emphasised that her community is worried about insurance and the new FEMA Advisory Base Flood Elevation Maps accounting for storm-related high velocity wave action. Even when presented as a useful mechanism to communicate realistic risks of flooding, the updated flood maps may have some undesirable effects. Wilkins (2011) suggests, for instance, that the ability to delineate more accurately hazard risk zones may have significant legal implications: local governments could be held accountable and liable for knowingly allowing development in these areas via planning and zoning decisions and failing to inform potential homeowners of the risks. With sea-level rise exerting additional pressure on existing coastal management programmes and initiatives, local governments may have to take more aggressive action to discourage development along the shoreline, and hence may face many legal challenges (Craig, 2011). Punchard (2013) suggests, as the most important Sandy-related lesson for other coastal communities, the need to include effectively natural hazard risks in local planning and community development decisions, and to improve communication and education efforts. He also points out that most plans pursue regulatory compliance vis-à-vis implementation of structural and other disaster mitigation measures without adequately considering what truly represents a sustainable, lasting, and cost-effective solution, such as hazard avoidance through land-use planning. Similarly, Hallegatte et al. (2013) stress that physical interventions can only achieve limited protection, leaving residents and their assets vulnerable to possible breaches and failures of defence structures that often are designed to address only predictable and less severe events than extreme disasters.

## Conclusion

Coastal hazards, such as sea-level rise and storm surge caused by severe weather events, are expected to intensify in their extent, duration, and frequency over the coming decades, slowly shifting from sporadic to frequent and from reversible to permanent character. Milder, but repetitive impacts also can place a chronic strain on some communities, preventing them from accruing sufficient resources to recover fully before the next incident occurs, and with every instance further undermining their adaptive capacity and resilience. For some communities, structural solutions to achieving full protection from these hazards may not be feasible in the long run, prompting them to consider a more difficult, albeit effective, option like relocation. Martin (2010) argues that governments should develop, endorse, and implement relocation plans, identify and expand policy and planning frameworks to guide relocation planning processes, and devise detailed approaches for how this protection can be accomplished under various climate change scenarios. The inclusion of this response strategy in policy and planning frameworks may be difficult as it has to perform simultaneously a dual purpose of reversing decades-old unsustainable development along the shoreline by increasing push factors, while incentivising and guiding relocation to new communities by creating pull factors. However, hesitation to integrate these proposals into meaningful implementation mechanisms reflects trepidation among decision-makers to acknowledge relocation as a viable adaptation option and engage host communities in relocation schemes. Moreover, reticence to discuss relocation in the context of possible benefits for regional growth and development may result in missed opportunities to conduct this process in an equitable and participatory manner and achieve positive relocation outcomes.

Coastal disasters, as discernible manifestations of less visible chronic risks, can present an opportunity to increase community awareness of hazards and short- and long-term options to mediate these problems, and introduce the concept and possibility of relocation as potentially the most effective and safest option. To achieve adequate participation and successful outcomes, local decision-makers need to establish a dialogue with residents and stakeholders from highly vulnerable locations and explore their perspectives, concerns, and preferences in a bottom-up fashion. This would help in identifying barriers to realistic comprehension of coastal risks, adaptation, and hazard mitigation options, paving the way for effective participatory learning and improved coastal risk management and decision-making. Even though natural hazard management agencies, and FEMA in particular, have developed mechanisms for acquisitions/buyout, they are designed to deal with small-scale or individual cases of repetitively damaged properties and do not have policy framework or financial mechanisms to support extensive implementation, and especially the purchase of high-value homes. To ensure successful implementation mechanisms, therefore, steps to address this issue will have to be creative and reflect local conditions and people's preferences.

This study represents a preliminary investigation of relocation potential among residents in communities affected by Hurricane Sandy and reveals their concerns,

attitudes, and perspectives with regard to risks and options to deal with them. The survey demonstrates that respondents are aware of the full extent of coastal risks and acknowledge that extreme weather and sea-level rise are most likely to prompt them to consider relocation. Moreover, contradictory to the sentiments expressed in the open-ended questions on the importance of community in the recovery process and the decision to stay, the rank-by-preference inquiries reveal that a majority of participants would make the decision independently, regardless of what their neighbours, friends, and/or family are doing. This suggests that, to understand the circumstances under which residents would be willing to consider relocation, decision-makers need to look at communities on a case-by-case basis and account for the distinct cultural, historical, institutional, and socioeconomic dimensions of each coastal locality, as well as for additional influences such as levels of mobility and repetitive exposure to coastal hazards. Such a holistic and integrated assessment will aid the development of appropriate policy mechanisms to support the transition to new settings and lead to successful relocation outcomes, with benefits both at sending and receiving locations.

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## Endnotes

<sup>1</sup> Personal telephone communication with Rob Braidwood, Emergency Planner, Office of Emergency Management, Chesapeake, VA, 26 September 2013.

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