Climate Change, Resilience, and Fairness

How Nonstructural Adaptation Can Protect and Empower Socially Vulnerable Communities on the Gulf Coast

By Carmen Gonzalez, Alice Kaswan, Robert Verchick, Yee Huang, Shawn Bowen, and Nowal Jamhour

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Executive Summary

Climate change is already transforming the United States in profound ways. Its landscapes are getting hotter, wetter, drier, and more prone to extreme weather. For people on the Gulf Coast, conditions are especially challenging. The storms and subsidence with which they are already familiar will accelerate on a warming planet. And their hardship will be further amplified by socio-economic vulnerabilities that have long plagued the many vibrant and historical communities that make up one of the most cherished regions of the country. Many communities have a deeply rooted connection to the unique landscape of the Gulf region, and generations of families have depended on the land for fishing, shrimping, recreational use, and tourism. The impacts of climate change, from rising sea levels to potentially stronger and more frequent extreme weather events, threaten the livelihoods and even the sense of identity for many of these communities. Residents in the Gulf are both resilient and vulnerable: They demonstrate profound care for each other and self-sufficiency and have a wealth of traditional knowledge about the natural history of their communities, but they are also often marginalized and suffer disproportionately when natural disasters strike.

Along the Gulf Coast and other coastal and riverine parts of the United States, physical and social vulnerability overlap to amplify the devastation caused by flooding, hurricanes, and other natural disasters. Vulnerable communities, whether socially, physically, economically, or otherwise, tend to be less politically enfranchised. These communities tend to live in more vulnerable locations—such as in floodplains and along coastal wetlands and inland waterways—than their wealthier counterparts. Collectively, these factors may dramatically decrease the resilience of these communities. Recovery from natural disasters is a matter of both survival and equity for those long marginalized on the basis of socio-economic and other factors.

Adapting to these impacts can take many forms, such as structural measures like levees and dams, as well as nonstructural measures such as property buyouts, elevation, and pre-disaster planning. Historical policies have favored structural measures, but federal agencies and state and local governments are increasingly turning to nonstructural measures and strategies. These strategies support mechanisms for adaptation that are flexible, that operate on a range of levels from the individual homeowner to entire communities, and that provide protection or additional protection in vulnerable areas. Implementing these strategies can help minimize the need to build large-scale, hard infrastructure such as levees or dams, protection from which may be over- or under-inclusive or fail catastrophically, as in the case of Hurricane Katrina. Some nonstructural adaptation strategies offer permanent, long-term protection against natural hazards; others significantly reduce the risk to people and property over the medium- to long-term and provide additional hazard reduction outside of areas protected by hard infrastructure. Frequently, a combination of both structural and nonstructural strategies is required.

Nonstructural adaptation is an effective means to help individuals and communities adapt to the effects of climate change and to increase resilience, or the ability to cope with the impacts of climate change. In Louisiana, the existing 2012 Coastal Master Plan and the forthcoming 2017 update both emphasize the importance of nonstructural programs "to help residents improve their resilience in the face of storms." The Plan identifies options for reducing flood risk through better design and residential elevations, as well as a limited number of voluntary acquisition measures. Nonstructural adaptation strategies provide medium- to long-term protection and risk reduction for communities along the Gulf Coast in the face of sea-level rise, changes in precipitation patterns, and sea surface temperature changes that could lead to more intense hurricanes.

However, unless these programs and funding opportunities are designed to reach socially vulnerable communities, these communities will lack the knowledge, financial resources, and legal, technical, and social support necessary to seek and apply for funding to reduce their overall risk. Non-physical, nonstructural adaptation strategies include identifying areas of risk, pre-disaster planning and risk mitigation, developing post-disaster recovery strategies, implementing floodplain regulations and obtaining flood insurance, implementing land use regulations or zoning ordinances, and educating the public about the risk from natural hazards. Physical, nonstructural adaptation

strategies inclusive flood-proofing homes through elevation and relocating homeowners to less vulnerable locations by compensating them for their property.

This white paper examines selected case studies of nonstructural adaptation strategies implemented in response to flood-related disasters in Mississippi and Louisiana, in Cedar Rapids, Iowa, and along the East Coast. It summarizes lessons learned and best practices for implementing selected strategies in vulnerable communities. The goal of this white paper is to inform the policy and advocacy discussion about how best to help vulnerable communities adapt to climate change impacts.

Summary of Best Practices

Overarching

- ✓ Be prepared for the next disaster.
- ✓ Gather preliminary data and assess community and individual needs as soon as possible after a disaster.
- ✓ Develop a targeted communication strategy for reaching out to vulnerable communities.
- ✓ Integrate non-governmental, community, or grassroots organizations into adaptation strategies.
- ✓ Tailor programs to local needs.
- ✓ Recognize and address the underlying conditions that predate the disaster.
- ✓ Ensure that disaster relief meets the present needs of applicants.
- ✓ Develop and maintain a catalogue of lessons learned and best practices about different nonstructural adaptation strategies.

Pre-Disaster Mitigation and Planning

- ✓ Protect vulnerable communities from being preyed on by unscrupulous disaster entrepreneurs and contractors.
- ✓ Ensure that safeguards against unscrupulous, predatory entrepreneurs or organizations do not produce unintended consequences for legitimate groups.
- ✓ Invest and stabilize the housing stock to create stable and cohesive communities.

Elevation

- ✓ Ensure that grant amounts sufficiently cover the cost of elevation.
- ✓ Ensure that vulnerable communities qualify for federal assistance from the outset of the program.
- ✓ Ensure that elevation height waivers for historic properties are supplemented by additional protection measures.

Voluntary Property Buyouts

- ✓ Empower communities by collaboratively and cooperatively designing voluntary buyout programs.
- ✓ Maintain discussions about a voluntary buyout program both separately from other post-disaster recovery discussions and among community members interested in participating.
- ✓ Allow flexibility to tailor buyout programs to local needs and goals.
- ✓ Provide post-buyout support.

Overarching Best Practices

Overarching best practices for implementing and administering nonstructural adaptation strategies in vulnerable communities emerged from the different case studies. For vulnerable communities, delays in receiving disaster assistance can be devastating because these individuals and communities frequently do not have independent financial resources to bide time in the interim. Minimizing the time for implementing disaster relief programs and disbursing aid is crucial.

Be Prepared for the Next Disaster

"Be prepared" is simple and fundamental imperative that requires tremendous work for state and local governments to achieve adequate preparation. Pre-disaster planning and mitigation prompts governments to assess risks from natural hazards, to identify pre-disaster actions to reduce those risks, and to assess both public and private resources before and after an event. Identifying post-disaster recovery strategies and rebuilding designs that incorporate smart planning and low-impact development in advance allows a local government to respond quickly and decisively after a disaster, saving valuable time and resources.

States should work with local governments to encourage development of pre-disaster plans. As in Louisiana, significant federal funds may be available but sit unallocated and unused if communities—especially those that would benefit the most from pre-disaster risk reduction—are unaware of funding assistance or otherwise stymied by the application process.

Gather preliminary data and assess community and individual needs as soon as possible after a disaster

In the aftermath of a disaster, chaos reigns. Public officials and private individuals are faced with myriad decisions, options, problems, and needs, sometimes without a clear strategy to address all these issues. A critical initial step is to collect information about disaster impacts and conducting needs assessments. This information is helpful for public officials to obtain a broad picture of the impacts of a disaster and its effects. The information can later be used to request federal funds and, hard data and numbers increase the likelihood of obtaining adequate funding to meet demonstrated needs. Tools such as the CDC's Social Vulnerability Mapping Index provide a basic snapshot of a community and can be accompanied by on-site observation, both pre- and post-disaster.

Develop a targeted communication strategy for reaching out to vulnerable communities

In the aftermath of a disaster, communication and outreach to the public—particularly vulnerable communities—is critical.

Socially vulnerable communities have specific communication needs because of limited access to information, logistics of accessing the information, language skills, and the disproportionate impact of delayed assistance. For these communities, poor communication may stem from a lack of access and power: The lack of ties to city officials or other sources of reliable, fully up-to-date information leads to reliance on information based on hearsay, assumption, and other informal and potentially inaccurate sources of information.

The strategies may necessarily evolve from the immediate aftermath of a disaster to the later stages of relief and recovery efforts. For example, communication may begin with one-way, top-down information dissemination in the immediate aftermath of a disaster. This strategy is effective for mass distribution of information that is widely applicable. State and local governments should maintain up-to-date websites and other social media feeds that provide a single stop for accurate information. NGOs play an important role in disseminating information through their formal and informal networks. Later, after the initial information blast, the communication strategy should evolve into a two-way dialogue in smaller and more tailored settings, working cooperatively with a community to identify needs and how to rebuild.

The communication strategy should be trauma-informed. Where perhaps handouts and mail notices might work in a normal situation, disaster victims tend to be in a heightened, fragile mental state that may require special and individualized ways to communicate. Assigning a dedicated an agency or social services caseworker is important. Interviewees in New Orleans said that the emotional toll of reliving the trauma with every phone call to inquire or obtain financial assistance caused many to give up in frustration, whereas a single caseworker could function as a one-stop place to both be heard and get information.

For vulnerable communities, the communication strategy should include logistical considerations, such as language differences, the location of the meeting, and the accessibility of the meeting. In Cedar Rapids, city officials made sure that public transportation options were available, and operating, to allow residents to attend the meetings.

Integrate non-governmental organizations into adaptation strategies

Again and again, interviewees—both government officials and representatives of community organizations—emphasized the importance of non-governmental organizations (NGOs) and praised their work. These organizations may include local branches of national organizations, local non-profits, and faith-based organizations. These organizations play a key role in disseminating information and resources, reaching out to fellow residents, and implementing disaster relief. They frequently already have ties and connections to socially vulnerable individuals and families that pre-date the disaster. Community members already trust these organizations, whereas they may fear or distrust governmental entities based on, for example, deportation concerns for undocumented immigrants or a history of negative interactions with law enforcement or other groups. They are often staffed by people who live and work in the communities they serve and are invested in the long-term success of their communities.

State and local governments should include NGOs as a fundament part of the strategy to develop and implement nonstructural adaptation strategies, providing both funding, technical, and information resources to these organizations. NGOs bring resources and agility that can help accelerate distribution of disaster relief. For example, they tend to already have networks of volunteers who can go door-to-door to provide information or gather information, for example, and tend to be more nimble and capable of responding more quickly than governmental agencies. They operate independently and nimbly and can deliver assistance in creative, flexible, and responsive ways.

Tailor programs to local needs

Nonstructural adaptation strategies, whether physical such as property buyouts and elevation or nonphysical such as pre-disaster planning, must be tailored to fit local needs and to align with local goals for rebuilding. No single nonstructural adaptation strategy will likely meet the needs of a community, and nonstructural adaptation strategies should help a community achieve its medium- and long-term goals for growth and development. Interviewees expressed frustration with the inflexible requirements of federal disaster assistance, noting that federal agencies have a national constituency to appease and national goals to achieve, which do not necessarily match the needs and desires of the local community. For example, buyout programs may save the federal National Flood Insurance Program (NFIP) from making repeated

payments to the same properties, but local communities may strongly identify with being close to the coast despite the risk. Tailoring programs to local needs is also a way to ensure local involvement and investment in the outcomes of the adaptation strategy.

Recognize and address the underlying conditions that predate the disaster

For many vulnerable communities, the impacts of a natural disaster compound underlying conditions in the community such as poverty, household instability, financial instability, substance abuse, and personal and mental health issues. Indeed, not recognizing a housing market with racial bias before Hurricane Katrina had both equity and legal ramifications in and around New Orleans. Although disaster assistance is not intended to address these conditions directly, federal agencies and local leaders should identify strategies for rebuilding and recovery with ancillary benefits of improving these underlying conditions. For example, some communities in Hurricane Sandy employed temporarily out-of-work residents in rebuilding efforts; other assistance programs promoted homeownership and provided mortgage and down-payment assistance. After floodwaters receded, many communities find themselves left with a clean slate on which to rebuild, and the goals of rebuilding should include addressing these underlying conditions to improve community resilience for future disasters.

Ensure that disaster relief meets the present needs of applicants

Disaster relief and aid programs target static conditions when in reality victims' lives and livelihoods are dynamic and fluid. Disaster responses have a tendency to focus on what happened at the time of the disaster as opposed to the conditions that inevitably evolve in the aftermath of a disaster. By the time disaster victims receive aid, it may not be needed or it may not be useful in their present, post-disaster circumstances because the aid is targeted toward restoring a status quo that no longer exists. Consequently, disaster relief needs built-in flexibility in using funds to accommodate the dynamic needs of the residents.

Maintain a catalogue of lessons learned and best practices about different nonstructural adaptation strategies

With the disaster and its immediate impacts long past, many communities compile best practices and lessons learned for future disasters and to help other communities that experience the similar events and are seeking guidance. Sometimes these practices are compiled as part of federal reporting requirements. Mandatory or not, all communities should maintain a catalogue

of lessons learned and best practices so that affected communities can learn from the real-world, on-the-ground experiences of other communities. These experiences may reveal otherwise minor details that ultimately made a significant difference in implementing or administering a given program, but those details may not appear in federal handbooks or guidance. Guidance from real-world experience may also save communities from wasting valuable time and resources. Many resources are available online, but a centralized compendium of best practices or a list of contacts specific to nonstructural adaptation strategies would help interested communities.

Pre-Disaster Planning and Mitigation

In many ways, pre-disaster planning and mitigation and post-disaster recovery and rebuilding exist on a continuum, the latter blending into the former particularly in places where natural disasters are not unexpected. Although post-disaster activities may overlook future mitigation strategies in an effort to rebuild quickly, having thoughtful, smart plans or rebuilding strategies in place that can be quickly implemented after a disaster serves as strategic planning in advance of the next disaster.

When preparing or recovering from a disaster, states and local governments often turn to nonstructural and non-physical adaptation strategies, such as preparedness plans, evacuation plans, risk and warning communication systems, land use regulations and zoning, and public education. These strategies are intended to both reduce the risk to human safety, property, and infrastructure, as well as to identify actions and resources to enable a community to respond rapidly to a disaster.

Pre-disaster mitigation and planning activities are particularly important for socially vulnerable communities because recovery after the fact is disproportionately difficult because of underlying conditions in the community and individuals' lack of personal or other resources to use for recovery. The impacts of Hurricane Katrina and the subsequent flooding in New Orleans show the need for comprehensive pre-disaster planning and strategies, especially for low-income and vulnerable communities. Better planning and identification of recovery strategies would have prevented some of the more devastating impacts from the storm and levee breach and might have helped these communities apply for and receive financial assistance in a timely manner.

Protect vulnerable communities from being preyed on by unscrupulous disaster entrepreneurs and contractors

The magnitude of impacts from flooding, the thousands of traumatized survivors, and the influx of millions of federal dollars gave rise to sometimes unscrupulous disaster entrepreneurs and organizations, such as unqualified contractors or lenders, who preyed on vulnerable communities and usurped disaster relief funds. State and local government should have in place policies to weed out predatory organizations, while bearing in mind unintended consequences of those policies. For example, costs associated with meeting certification and other requirements often put barriers in front of minority contractors, who may already face difficulties in accessing recovery work.

State and local governments should enact policies to weed out these organizations or contractors by requiring certification or other documentation verifying the qualifications to provide disaster relief. They should also establish procedures for reporting and investigating abuse and maintain updated, publicly available lists of both qualified and disqualified individuals and organizations. Local governments and trusted NGOs should also communicate the importance of ensuring contractors' qualifications, provide accessible information about reputable contractors and disqualified contractors, and provide contact numbers or hotlines for reporting fraud and abuse.

As a corollary, however, state and local governments should also be aware that some safeguards against predatory individuals or organizations may produce unintended consequences, such as limiting the number of legitimate organizations and causing further delays in distributing assistance. For example, a policy that requires an organization to show a certain number of active years may exclude new, local, event-specific organizations from helping their communities. Such a policy could deprive residents of important services from current community members, like English translation for non-English speaking communities or non-profit community healthcare services. Governments should also be aware that the costs associated with meeting certification and other requirements often put barriers in front of minority contractors, who may already face difficulties in accessing recovery work.

Invest and stabilize the housing stock to create stable and cohesive communities

Where structural and nonstructural adaptation measures can adequately protect neighborhoods and communities from future disasters, establishing homeownership and stabilizing the rental housing stock are important part of the pre-disaster planning and post-disaster recovery strategy. True recovery

creates stable and cohesive communities in areas where nonstructural adaptation strategies will provide effective protection against future hazards. For example, homeownership encourages residents to invest in structural resilience and to return to and rebuild their communities after disaster hits. In the Ninth Ward, renters had no control over whether the property would be rebuilt. Forced to move elsewhere, many renters were unable to pay the increased rent that landlords charged in order to compensate for the cost of rebuilding the property.

For example, the neighborhood of St. Roch has long been a majority of renters and not homeowners. Activists in St. Roch lobbied for a soft second mortgage program to facilitate homeownership for those making 80 percent of the area median income (AMI). New Orleans granted roughly $52.3 million to help 640 families in home purchase assistance and closing costs. A soft second mortgage bridges the affordability gap between the price of a home and the maximum amount that a homebuyer can borrow with a first mortgage. The program also provided hard financing for construction costs to assist homebuyers build new homes on land demolished by the Louisiana Land Trust and selected for redevelopment by local governments. The program is one of three government-subsidized mortgage programs in Louisiana for low- to moderate-income homeowners (LMI), first-time homebuyers in the 13 parishes affected by Hurricane Katrina. A separate $70 million in program funding was given to the state. Under the Second Mortgage program, more than 700 low-income families purchased homes.

Another important strategy to help socially vulnerable communities is to stabilize the rental housing stock and ensure rebuilt rental properties are elevated or otherwise constructed to minimize flood hazard and risk. Socially vulnerable households are characterized by a higher rate of renters, in addition to living in public housing or with assistance from Section 8 federal housing vouchers. After Hurricane Katrina, the rental and public housing stock in New Orleans changed dramatically, with a significant reduction in public housing. In 2007, the City Council voted to demolish and replace four major public housing complexes with mixed-income communities. This redevelopment shifted the proportion of voucher recipients to public housing residents, from 64 percent and 36 percent, respectively, at the time of the storm, to 91 percent and 9 percent in 2014. Although the Road Home program focused primarily on homeowners, it also included the Small Rental Property Program that has allocated $400 million to help owners of small rental units repair and rebuild

their properties. Under the Road Home program, homeowners have received $8.9 billion. To maximize the benefit of rebuilding assistance for socially vulnerable communities, the distribution of funds for homeowners and owners of rental properties should more proportionally reflect the needs of renters.

Building Up: Elevation as Flood-Proofing

For some, property elevation is an appealing nonstructural adaptation strategy because it allows homeowners to remain in their homes and communities to remain intact. At a minimum, a house is typically elevated to the base flood elevation (BFE), as determined by flood maps published by the Federal Emergency Management Agency. The BFE is the height to which floodwater is anticipated to rise during a base flood, which is a flood that has a one-percent chance of occurring for any given flood event.

For vulnerable families, elevation allows them to keep their homes, which may be their greatest asset, and to retain their networks of social support and sense of community and belonging. However, elevation may not provide the permanent, long-term benefits of property buyouts as climate change alters precipitation patterns, sea level, and even the frequency of severe flooding and weather events.

Ensure that grant amounts sufficiently cover the cost of elevation

Elevation grant programs should ensure that the grant amount is sufficient to actually achieve the elevation required. Although lump sum payments are rapidly and readily disbursed, for example, for some homeowners this amount was insufficient to cover the cost and inconvenience of elevating their home. Homeowners without other resources to pay for home elevation may understandably decide to spend the grant money for rebuilding without elevation, even if that use violates the grant agreement. Perhaps grants could combine an initial lump-sum payment with a pre-determined or pre-qualified ability to submit receipts for reimbursement, up to a set cap, to complete the project.

Local governments and communities should work with the state government and federal agencies to pool elevation funds and redesign the entire neighborhood according to smart planning and low-impact development principles. A community-level approach to elevation may be more efficient and effective at providing widespread flood-protection than an individual homeowner approach.

State and local governments should also not penalize applicants for not having homeowner's or flood insurance. Purchasing and maintaining homeowner's insurance is important, but policies that reduce grant amounts—or disqualify applicants who do not have insurance—hit the poorest residents the hardest. Moreover, federal rules credit a levee as adequate adequate flood protection, and thus homes located in the flood protection are not required to maintain federal flood insurance.

Ensure that vulnerable communities qualify for federal assistance from the outset of the program

Elevation programs should design eligibility criteria with low- to moderate-income (LMI) households in mind. The federal Community Development Block Grant requirement that 70 percent of funds to benefit LMI communities is frequently waived for disaster relief, but state officials should administer federal funds in the spirit of the waived requirement. For example, a program could prioritize funding allocation to those with a certain level of damage and income threshold, regardless of pre-storm insurance status.

In the chaos following a hurricane, immediate and responsive assistance is needed, rather than penalties for homeowners who did not have general homeowners' insurance, as in Mississippi. Insurance reform that enables LMI households to obtain insurance should be part of long-term post-disaster recovery. Delayed assistance can be particularly difficult for LMI communities, which often do not have other personal resources to rely on in the interim.

Voluntary Property Acquisitions

In a voluntary buyout, a state or local government acquires title to residential or commercial property located in a vulnerable area, such as in a floodplain.[1] The government entity then demolishes and removes all structures on the property. In most situations, the property is converted into open space in perpetuity. The property can be used for parks, greenways, or wildlife refuges, or it could be restored to natural wetlands. In doing so, they restore and enhance natural flood protection. Lives and personal property are no longer in harm's way. Occasionally, the property may be redeveloped pursuant to higher safety standards or in a way that is less vulnerable to natural hazards.

For socially vulnerable communities, the advantages and disadvantages of property buyouts may be magnified. For example, a buyout may put a homeowner in the best financial position following a disaster if the homeowner did not have flood insurance or other resources to rebuild. Some buyout

programs also provide other forms of assistance, such as temporary mortgage assistance or down-payment assistance, which can ease the transition into a new location. However, although the delays in implementing a buyout program and distributing payments are frustrating for everyone, they can prove particularly challenging for vulnerable individuals and families without access to other resources in the meantime.

Community relationships, sense of place, and social ties are often a particularly important resource and source of support. In areas such as the southern coastal areas of Louisiana, communities have a unique relationship with the land and a deeply rooted sense of place. Generations of families have made their living by fishing, shrimping, and other extractive activities. The loss of the extended family network would be traumatic, and individuals may not consider relocating without a plan to do so with their entire family.

To maximize the benefits and reduce the adverse consequences of voluntary property acquisitions, communities and policymakers should:

Empower communities by collaboratively and cooperatively designing voluntary buyout programs

Compared to other nonstructural adaptation strategies, voluntary property buyouts and acquisitions are especially controversial and personal and may create divisions among neighbors. Developing these programs with community involvement can help alleviate these strains because homeowners feel empowered to make the best decisions for themselves. The strategy is less effective without participation by similarly situated property owners; piecemeal acquisition of properties along the coast, for example, does not provide continuous buffer protection.

After Superstorm Sandy, communities in Staten Island, NY, actively sought out buyouts that the vast majority of community neighbors had previously agreed to. Participation was high because of the clear community desire for the program and the community involvement in advocating for the program. In Cedar Rapids, the process of undertaking buyouts demonstrated to the residents and business community that the city was serious about rebuilding and reinvesting in the city, so the program had an ancillary benefit of retaining residents and businesses.

Maintain discussions about a voluntary buyout program both separately from other post-disaster recovery discussions and among community members interested in participating

Because voluntary buyout programs raise many sensitive issues, a local government may find it helpful to identify interested homeowners and meet with them separately from more general public discussions of post-disaster recovery. After a series of open public meetings, city officials in Cedar Rapids began holding smaller tabling events at various locations so that those interested in buyouts could approach them. In Fox Beach, local leaders designated specific and separate meetings for homeowners interested in the buyout program so as to not conflate various issues that would invariably engender conflict and confusion.

Allow flexibility to tailor buyout programs to local needs and goals

Voluntary buyouts illustrate a tension between national goals and local values and desires. At a national level, voluntary buyout programs are beneficial because they permanently remove people and property from harm's way. However, implementation occurs at the local level and is a sensitive issue with residents who have historical and family ties to the land and water. Federal funds, which provide the bulk of funds for these programs, often have restrictions that are incompatible with local needs or desires. For example, using federal Hazard Mitigation Grant Program (HMGP) funds to acquire property requires a deed restriction to maintain the property as open space, whereas a community may want to retain development rights. Other communities may feel strongly about maintaining public access to water, fishing, and other recreational uses of bought-out coastal property. Accommodating local needs is critical in achieving participation in buyout programs and meeting those local needs or desires.

Provide post-buyout support

In the case studies examined in this white paper, the buyout programs included financial incentives to assist program participants with relocation expenses. These incentives were helpful in encouraging residents to participate. However, buyout programs should also consider non-financial support systems to help program participants who relocate to new areas or communities. For example, programs could help homeowners identify similarly priced neighborhoods with the necessary social services and support to ease the transition.

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Introduction

Climate change is already transforming the United States in profound ways. Its landscapes are getting hotter, wetter, drier, and more prone to extreme weather. For people on the Gulf Coast, conditions are especially challenging. The storms and subsidence with which they are already familiar will accelerate on a warming planet. And their hardship will be further amplified by socio-economic vulnerabilities that have long plagued the many vibrant and historical communities that make up one of the most cherished regions of the country. Many communities have a deeply rooted connection to the unique landscape of the Gulf Coast, and generations of families depend on the land for fishing, shrimping, recreational use, and tourism. The impacts of climate change, from rising sea levels to potentially stronger and more frequent extreme weather events, threaten the livelihoods and even the sense of identity for many of these communities. Residents in the Gulf are both resilient and vulnerable: They demonstrate profound care for each other and self-sufficiency and have a wealth of traditional knowledge about the natural history of their communities, but they are also often marginalized and thus suffer disproportionately when natural disasters strike.

Along the Gulf Coast and other coastal and riverine parts of the United States, physical and social vulnerability overlap to amplify the devastation caused by flooding, hurricanes, and other natural disasters. Vulnerable communities, whether socially, physically, economically, or otherwise, tend to be less politically enfranchised. These communities tend to live in more vulnerable locations—such as in floodplains and along coastal wetlands and inland waterways—than their wealthier counterparts. Collectively, these factors may dramatically decrease the resilience of these communities. Recovery from natural disasters is a matter of both survival and equity for those long marginalized on the basis of socio-economic and other factors.

Climate adaptation measures are necessary to respond to increasingly evident climate impacts. Decisionmakers and communities need additional research and new policies that address adaptation generally and the needs and interests of socially vulnerable communities specifically. Historical policy toward flood control in the United States focused on erecting large and expensive "hard" infrastructure such as dams, levees, and floodwalls. Although these structures are helpful in providing flood protection on a large scale, they eliminate the natural capacity of floodplains to absorb and dissipate floodwaters.[2] They also

encourage development in floodplains by providing an exaggerated sense of security to homeowners and businesses, yet offer limited or no benefits for communities outside the zone of protection. Hard infrastructure nevertheless remains a significant component of flood protection today.

The enactment of the National Flood Insurance Program (NFIP)—itself a nonstructural adaptation strategy—in 1968 began a nationwide recognition that hard infrastructure alone is insufficient. The NFIP provides affordable flood insurance in communities that adopt and enforce floodplain management ordinances. For communities that implement flood-management strategies above the minimum requirements, the NFIP offers additional discounts for insurance premiums. Critics of flood insurance have argued that providing flood insurance for floodplain developments has led to a disaster-and-development cycle whereby development occurs, disaster strikes, and flood insurance allows rebuilding and redevelopment, after which the cycle begins again.[3]

Disasters in the past ten years, namely Hurricanes Katrina and Superstorm Sandy, have put the NFIP in a precarious financial position, owing more than $24 billion to the U.S. Treasury.[4] In an effort to make the NFIP more fiscally sound, in 2008 the Biggert-Waters Flood Insurance Reform Act included a 25-percent annual increase in insurance premiums beginning in 2013 for certain properties and elimination of discounted rates for other properties. However, in response to the sharp increase in premium costs, Congress passed the Homeowner Flood Insurance Affordability Act in 2014, which moderated the rate increase timeline.[5] Affordability of flood insurance nevertheless remains a significant challenge for socially vulnerable communities, whose homeowners are less likely to have flood insurance and which may pay more than wealthier communities.[6]

According to the Federal Emergency Management Agency (FEMA), "non-structural mitigation includes measures that seek or serve to reduce the likelihood or consequence of risk through modifications in human action, human behavior, or natural processes."[7] These measures support mechanisms for adaptation that are flexible, that operate on a range of levels from the individual homeowner to entire communities, and that provide protection or additional protection in vulnerable areas. Implementing these strategies can help minimize the need to build large-scale, hard infrastructure such as levees or dams, protection from which may be over- or under-inclusive or fail catastrophically, as in the case of Hurricane Katrina. Some nonstructural adaptation strategies offer

permanent, long-term protection against natural hazards; others significantly reduce the risk to people and property over the medium- to long-term and provide additional hazard reduction outside of areas protected by hard infrastructure.

Non-physical, nonstructural adaptation strategies include identifying areas of risk, implementing pre-disaster planning and risk mitigation, developing post-disaster recovery strategies, implementing floodplain regulations and obtaining flood insurance, implementing land use regulations or zoning ordinances, and educating the public about the risk from natural hazards. Physical, nonstructural adaptation strategies also include flood-proofing homes through elevation and relocating homeowners to less vulnerable locations by giving them compensation for their property.

Communities can combine and tailor various nonstructural adaptation strategies to achieve local goals. Some strategies enable families to stay in their homes and communities to stay in place by adapting to future flood-related disasters. Nonstructural strategies may provide protection outside of areas protected by dams or levees, and they may provide additional protection if those hard structures fail. In some instances, nonstructural adaptation strategies provide permanent protection against natural hazards.

Nonstructural adaptation is an effective means to help individuals and communities adapt to the effects of climate change and to increase resilience. In Louisiana, the existing 2012 Coastal Master Plan and the forthcoming 2017 update both emphasize the importance of nonstructural programs "to help residents improve their resilience in the face of storms." The Plan identifies options for reducing flood risk through better design and residential elevations, as well as a limited number of voluntary acquisition measures. Nonstructural adaptation strategies provide medium- to long-term protection and risk reduction for communities along the Gulf Coast in the face of sea-level rise, changes in precipitation patterns, and sea surface temperature changes that could lead to more intense hurricanes.[8]

However, unless these programs and funding opportunities are designed to reach low-income and minority populations, those groups will lack the knowledge, financial resources, and legal, technical, and social support to seek and apply for funding to reduce their overall risk.

This white paper examines the lessons learned and best practices from hazard-mitigation and adaptation projects prior to and following flood-related disasters in Cedar Rapids, Iowa, the East Coast (New York and New Jersey), Mississippi, and Louisiana. It also examines how these projects have affected vulnerable communities. These case studies illustrate how these strategies differ depending on the geographic location, topography, and socio-economic circumstances, despite having the same goal of reducing risk to people and property.

The white paper begins with an overview of the case studies and federal funding for nonstructural adaptation, and then it explores the nonstructural adaptation strategies of Pre-disaster planning and mitigation, elevation, and voluntary property buyouts. It concludes with overarching lessons learned from and best practices for implementing nonstructural adaptation strategies in the future, particularly with respect to vulnerable communities.

The methodology for this white paper includes data and information collection from primary and secondary sources, such as peer-reviewed literature, law review articles, government reports, and other analyses by non-profit organizations and academic organizations. The research team also conducted interviews with both government and private individuals familiar with the nonstructural adaptation strategies studied in this white paper. A list of interviewees can be found in Appendix A, and a list of interview questions used as a guideline can be found in Appendix B.

Overview of Selected Case Studies

The selected case studies represent a range of geographic, demographic, and socio-economic conditions, but all involve flooding that caused widespread damage. In each case study, state and local governments responded with a different combination of both structural and nonstructural, post-disaster adaptation strategies. This white paper focuses on selected nonstructural adaptation strategies that could help vulnerable communities in the Gulf Coast adapt to climate change impacts.

This section will provide a brief overview of the natural disasters in each of the case studies: Hurricane Katrina in 2005 and its impacts in Louisiana and Mississippi; the 2008 Midwest floods and the impact in Cedar Rapids, Iowa; and Superstorm Sandy in 2012 and its impacts along the East Coast. It also provides a brief snapshot of the impacts on vulnerable communities in these regions, as well as a history of similar natural disasters.

Hurricane Katrina in 2005: The Gulf Coast

Between the loss of wetlands and sea level rise, the landscape and ecosystems of the Gulf Coast have always been both dynamic and fragile. When Hurricane Betsy hit the region in 1965, it was the first storm where damages exceeded one billion dollars (estimated damage of $1.42 billion at the time, or $10.8 billion in 2015), with most of the damage occurring in Louisiana. Hurricane Betsy brought a 10-foot storm surge to New Orleans, breaking levees and producing the city's worst flooding in decades.[9] Fifty years later when Hurricane Katrina hit, the memory of Hurricane Betsy and its devastation had faded. The 2005 hurricane season also included Hurricane Rita, a Category 5 hurricane that hit the Gulf Coast on September 24, 2005, and further devastated a region already reeling from Hurricane Katrina.

Map credit: ESRI, ArcMap 10.3.

On August 29, 2005, Hurricane Katrina made multiple landfalls on the Southeastern coast of Louisiana, devastating areas east of New Orleans, including Plaquemines, St. Bernard, and St. Tammany Parishes in Louisiana, as well as most of the Mississippi Gulf Coast from Bay St. Louis to Biloxi (Hancock and Harrison Counties). Much of this region is designated as a Special Flood Hazard Area, which means that it is subject to federal floodplain management regulations and residents are required to purchase flood insurance. Compared to the Gulf region generally, communities and individuals living along the coast tend to be poorer, less educated, and slightly older.[10] Many communities in the Gulf Coast measure high vulnerability on the Social Vulnerability Index (SoVI), a tool that measures variability in vulnerability based on U.S. Census data.[11]

Winds from Hurricane Katrina topped 130 mph and contributed to devastating storm surges. Storm surge levels in the eastern parishes of Louisiana reached 22 feet (excluding wave action), with rainfall levels ranging from 8 to 15 inches. The combination of rainfall and up to 16 feet of storm surge caused significant flooding to the northeastern shore of Lake Pontchartrain in St. Tammany Parish and washed away entire portions of the Interstate 10 Twin Span bridge connecting the area to New Orleans. Water breeched the levees surrounding the city more than 50 times, leaving 80 percent of New Orleans inundated with up to 15-foot deep waters.

The Mississippi Gulf Coast bore the brunt of Hurricane Katrina's powerful upper-right quadrant, with devastating storm surges between 17 and 22 feet, flooding, and high-speed winds destroying 80 miles of coastline and severely damaging or destroying 60,000 housing units. More than half of the state's counties were declared federal disaster areas.[12] In the three coastal counties, Hancock, Harrison, and Jackson, more than 33,000 homeowners experienced severe or major damage. These counties include more than 75,000 persons with disabilities. Indeed, Mississippi is the state with the highest poverty rate and the largest per capital population of people with disabilities whose incomes fall below 80 percent of the area median income.[13] Roughly one-fifth to one-quarter of minority communities in coastal Mississippi, including African Americans, Asian Americans, and Hispanics, have incomes below the federal poverty line.

Hurricane Katrina disproportionately affected renters, who tend to be poorer and live in poorer regions in the affected areas.[14] Local real estate agents and property managers described a downward spiral of hardship for renters, especially in the city. The majority of renters who lost their possessions in damaged housing did not carry rental insurance, so their losses were never compensated beyond $2,000 issued by U.S. Federal Emergency Management Agency (FEMA) to all uninsured and underinsured households for the purchase of essential goods, disaster food stamps issued by the U.S. Department of Agriculture, and smaller aid disbursements from such agencies as the Red Cross.[15] In addition, after Hurricane Katrina, most public housing projects in New Orleans were shut down.[16]

FEMA also provided temporary housing assistance for low-income renters, covering up to the entire cost of rent through May 2009.[17] By the time the temporary housing program ended, however, New Orleans began to experience a housing bubble that caused rents throughout the city to skyrocket, even in previously affordable neighborhoods. Renters seeking to return to their old neighborhoods were now priced out, forcing them to look to suburbs in Jefferson and St. Bernard parishes. However, moving to the suburbs often resulted in new challenges, particularly increased transportation costs and difficulties accessing public transportation. To add insult to injury, people of color often faced racism from their new suburban neighbors.[18]

2008 Midwest Floods: Cedar Rapids, Iowa

Located in the center of Iowa, Cedar Rapids is the second largest city in Iowa, an economic and cultural hub for the state. The Cedar River bisects the city and has

a long history of episodic flooding. The City of Cedar Rapids and other cities along the Cedar River have experienced extensive damage from flooding, resulting in myriad structural and nonstructural adaptation strategies throughout the years.[19] The June 2008 flooding was caused by an accumulation of weather events in the preceding months. A snowy winter saturated the ground and left it unable to absorb additional precipitation. Then, a series of intense precipitation events in May and early June 2008 led to localized but extremely severe flooding across the Midwest, and in particular in the Cedar River Basin.[20]

Map credit: ESRI, ArcMap 10.3.

In Cedar Rapids, the flood peak of the Cedar River was almost twice the previous 20-foot maximum flood stage recorded in June 1851.[21] The flooding was extensive, producing record flood peaks at 10 of the 41 monitoring stations with records of more than 50 years.[22] The flood crest rose to more than 31 feet, well above the 500-year flood level and above the city's levees, which stood at 22 feet. The floodwaters inundated more than nine square miles, including 1,300 city blocks, 3,894 single-family residences, and 818 commercial properties and government buildings.[23] Many property owners did not have NFIP policies because they were located well outside the 100-year floodplain where flood insurance is required.[24]

The June 2008 flood in the Midwest was the sixth largest FEMA disaster declaration, based on an estimated $848 million in federal public assistance.[25] In

Iowa alone, the governor estimated statewide damages of $10 billion. Of the state's 99 counties, the state declared 86 as state disaster areas while 80 counties were declared FEMA federal disaster areas.[26] As of May 2010, federal and state aid totaled approximately $1.3 billion. More than 39,000 individuals filed for assistance with FEMA, and the U.S. Small Business Administration approved $160.9 million in loans for homeowners and $111.5 million in loans for businesses.[27]

During the 2008 Midwest floods, the structural adaptation measures—namely dams and levees—worked largely as designed. The dams reduced the river crests and many levees held, but the floodwaters simply exceeded the height of these structures. After widespread flooding in 1993, the region undertook significant flood mitigation and adaptation investments. However, some critics charged that those structures facilitated significant commercial and industrial development and built infrastructure that was ultimately flooded in 2008, notwithstanding the additional flood control infrastructure.[28] Critics also pointed to the lack of comprehensive flood management in the greater Mississippi River Basin, which is important because upstream flood management actions can exacerbate downstream flooding, with devastating impacts for downstream communities. For example, the heavily dammed and channelized upper Mississippi River Basin reduces the sediment flowing downstream, leading to land loss that would otherwise buffer storm surges and flood waters.

The Cedar River divides Cedar Rapids into an eastern and western side, a division symbolic of the socio-economic divide in the city. Historically, working class ethnic communities flourished in the low-lying areas along the River.[29] Thus, the areas most affected by the June 2008 floods were home to the more socially and economically vulnerable communities in Cedar Rapids. In these areas along the river and in the floodplain, particularly the west bank of the River, there was a higher percentage of minorities, elderly, disabled, and female-headed households than in the entire city. The average median household income was more than $10,000 lower than the average median household income for the city, with more residents using public assistance and renting rather than owning homes.[30] In post-flood community discussions, participants emphasized the need for rebuilding plans and strategies to capture "both sides of the river."[31] However, the city noted that relocation options for these historic low-lying poor areas were limited because new development sites

are characterized by prohibitively high housing and infrastructure costs and limited transportation options.[32]

Map credit: ESRI, ArcMap 10.3.

Hurricane Sandy in 2012: New York, New Jersey, and the East Coast

When Superstorm Sandy made landfall in southern New Jersey on October 29, 2012, it was the third in a succession of extreme weather events in two years.[33] In 2011, the East Coast suffered severe damage from Hurricane Irene and Tropical Storm Lee, forcing state and local governments to reconsider how to adapt to natural hazards. Tropical-storm force winds extended 580 miles from the center of the storm. The effects were felt in 24 states, particularly in New York, New Jersey, and Connecticut, which experienced heavy rains, strong winds, and record storm surges. It also caused heavy snowfall in West Virginia and the Appalachian Mountains.

At the peak of the effects, 8.5 million people along the storm's path were without power, and at least 160 people were killed in the United States. Widespread flooding caused tens of billions of dollars in damages, including damaged or destroyed homes and flooded and blocked infrastructure (including roads, tunnels, and transportation corridors). Flooding in NYC's Metropolitan Transportation Authority system caused the worst disaster in the system's 108-year history. Floodwaters also sparked electrical fires that quickly ignited and burned down more than 80 homes in Queens. The estimated cost of property

damage along the East Coast was nearly $50 billion, in part because property values and the cost of living tend to be higher than elsewhere in the country.

Superstorm Sandy cast a wide path of destruction across the East Coast. Perhaps more so than Hurricane Katrina, the storm and its widespread destruction cast an indelible image of vulnerability to extreme weather evens, climate change, and sea level rise in the minds of many in the United States. Although the East Coast generally scores low on the SoVI, there are nevertheless pockets of high vulnerability.[34] Working class neighborhoods on Staten Island experienced severe, devastating flooding and destruction from storm surges. Even if residents' homes or property were not damaged by floodwaters, vulnerable residents still suffered from the temporary transportation closures and blockades, the lack of work or the lack of skills to work in the post-disaster recovery economy, and the temporary closure of health and other social services facilities. Dislocated residents were torn from their communities and experienced lasting psychological trauma.[35]

Federal Funding for Nonstructural Adaptation Strategies

The federal government provides the vast majority of funding for implementing nonstructural adaptation strategies. In many cases, recipients of federal funding must provide matching funding. Other sources of funding for nonstructural adaptation strategies include states, private organizations or businesses, individuals, and non-profits. This section focuses on the primary and most significant sources of federal funding.

FEMA offers an array of funding opportunities that together make up most of the federal money available to states and municipalities for disaster planning, including: 1) Hazard Mitigation Grant Program (HMGP), 2) Pre-Disaster Mitigation (PDM) program, 3) Flood Mitigation Assistance (FMA) program, 4) Repetitive Flood Claims (RFC) grant program, and 5) Severe Repetitive Loss (SRL) grant program. The HMGP and the FMA program provide much of the funding to state and local governments for mitigation activities. For each federal allocation of money for disaster relief, FEMA designates a percentage for projects to reduce future risks. The agency can contribute 15 to 20 percent of the total disaster relief funds to the HMGP. The HMGP provides grants to implement long-term hazard mitigation—including voluntary buyouts—after a major federal disaster declaration. These grants are intended for mitigation planning and mitigation projects that will "reduce or eliminate damage, loss, or suffering from future disasters."[36] Such projects must contribute to a long-term solution to an existing or anticipated hazard, and the benefit of the project must equal or surpass the cost of implementing the project over the lifetime of the project.[37] FEMA funds up to 75 percent of the project, and state and local governments must provide a 25 percent match in funds. The matching funds may be from other federal funds (except for certain federal funds), in-kind contributions, cash, or some combination thereof.

FEMA also administers the Flood Mitigation Assistance Program (FMAP), the goal of which is to reduce or eliminate NFIP claims by funding flood hazard mitigation projects and flood-related mitigation plans. HMGP and FMAP fund similar types of projects, although FMAP projects must be specifically flood-related. For example, HMGP funds apply to purchasing generators and safe room construction, whereas FMAP funds do not. FMAP funds can be used for technical assistance, such as promoting the program to communities, developing and reviewing project applications and mitigation plans, and administering FMAP grants. FMAP provides up to 75 percent of costs.[38]

Another important federal agency that provides funding is U.S. Department of Housing and Urban Development (HUD) and its Community Development Block Grant (CDBG) program.[39] It is the "[l]argest and most widely available source of financial assistance to support state and local government-directed neighborhood revitalization, housing rehabilitation, and economic development activities."[40] Funding is allocated among 1,100 entitlement communities, metropolitan cities with populations of 50,000 or more and urban counties, by formula. The formula accounts for community need, determined by the extent of poverty, the population, the extent of housing overcrowding, the age of housing, and the population growth lag relative to other metropolitan areas.[41]

Because of the nature of block-grant funds, state and local officials have discretion to determine the activities to implement, selecting among 25 categories. CDBG funds are intended to meet at least one of three primary national objectives: (1) To benefit low and moderate income persons; (2) To help in eliminating or preventing slums or blight; or (3) To meet a particularly urgent community development need because existing conditions pose a serious and immediate threat to the public.[42] For a typical CDBG, the authorizing statute requires 70 percent of funds to benefit low- and moderate-income persons, but this provision is waived to address an urgent threat to the safety of residents.

A grantee must encourage and provide opportunities for public participation, especially participation by low- or moderate-income persons living in areas where CDBG funds will be used. The process for public participation includes reasonable and timely access to local meetings; an opportunity to review proposed activities and program performance; a timely process for filing complaints and receiving responses; and meeting the needs of non-English speaking residents if a significant number of non-English speaking citizens are expected to participate.[43]

CDBG funds are frequently used to respond to disasters, whether natural or manmade. Congress has provided flexibility and additional funds to help communities recover from a disaster, following a federal declaration of disaster. Disaster relief can be short-term, such as funds to fill gaps in FEMA and Small Business Administration relief funds, or long-term, such as funds for business loans and infrastructure improvements. CDBG funds can also be used for mitigation activities, such as constructing physical infrastructure for protection—such as levees or earthquake-adapted buildings—and for voluntary

buyouts. The mitigation activities may occur at any time: before a disaster, during an emergency, or after a disaster.

Nonstructural Adaptation: Pre-Disaster Planning and Mitigation

This section examines planning and pre-disaster mitigation as nonstructural adaptation strategies. It focuses on New Orleans and the surrounding parishes, prior to and after Hurricane Katrina. Overall, the nonstructural adaptation strategies and pre-disaster mitigation plans were incompletely conceptualized by state and local governments and local communities and incompletely implemented. The effects of poor planning in these communities compounded the havoc left in the path of Hurricane Katrina and subsequent disasters in the Gulf Coast region.

This section explains why these communities did not take advantage of funding available to develop pre-disaster plans. Using the example of neighborhoods in New Orleans and nearby parishes in Louisiana, this section will identify, explain, and illustrate some of the obstacles to planning and pre-disaster mitigation strategies. It will also propose strategies to improve results. The case study provides important lessons about hazard mitigation and offers general insights on disaster recovery in vulnerable communities.

Introduction to Pre-Disaster Planning and Mitigation

In many ways, pre-disaster planning and mitigation and post-disaster recovery and rebuilding exist on a continuum, the latter blending into the former particularly in places where natural disasters are not unexpected. Although post-disaster activities may overlook future mitigation strategies in an effort to rebuild quickly, having thoughtful, smart plans or rebuilding strategies in place that can be quickly implemented after a disaster serves as strategic planning in advance of the next disaster.

State and local governments often turn to nonstructural and non-physical adaptation strategies to prepare for a disaster, such as preparedness plans, evacuation plans, risk and warning communication systems, land use regulations and zoning, and public education. These strategies are intended to both reduce the risk to human safety, property, and infrastructure, as well as to identify actions and resources to critical to emergency response. But the plans of many communities fall short. In some cases, state and local officials do not take full advantage of federal funds to improve planning or have sparse plans and limited staffing to work on planning, limiting the benefits of pre-disaster planning as an adaptation strategy.

Federal Funding

To reinforce the importance of pre-hazard mitigation planning, Congress amended the Stafford Act with the Disaster Mitigation Act of 2000 (DMA).[44] The DMA emphasizes the need for pre-hazard mitigation and the need for state, local, and Tribal governments to coordinate closely on mitigation activities. To implement the DMA, FEMA later promulgated regulations that require a state to have a State Mitigation Plan that is updated every three years, as a precondition for receiving certain types of federal disaster assistance. Local government are required to prepare and adopt a natural hazard mitigation plan that is updated every five years, as a condition to receiving federal post-disaster funds for hazard mitigation.[45] State and local mitigation plans must demonstrate that mitigating actions were developed through a sound planning process that accounts for risk to and capabilities of the community.[46]

FEMA grant programs provide funds for annual hazard mitigation planning and projects, both prior to and following a disaster. The goal of the programs is to reduce overall risk to the population and structures from future hazard events and simultaneously reduce reliance on federal funding for future disasters. The funds are awarded on a nationwide, competitive basis. Because these programs rely on annual appropriations from Congress, funding is not guaranteed.[47]

Planning and Pre-Disaster Mitigation in Louisiana: Best Intentions Unrealized

Although pre-disaster mitigation grants were available in Louisiana before Hurricane Katrina, local communities typically did not take advantage of these grants or were unaware of them, even though those communities would have benefitted the most from pre-disaster planning. The reasons are varied: a lack of awareness of these program, the lack of need for these programs in certain communities, the impracticality of implementing certain strategies, general complacency, and other priorities that required attention.

Lack of Awareness

In neighborhoods where planning and pre-disaster mitigation actions were necessary or that could have benefitted the most, not many neighborhoods groups knew about pre-disaster mitigation programs and they were thus unable to pass along that information to the community.[48] Before Hurricane Katrina, residents of the low-lying, largely Vietnamese neighborhood of Village de l'Est were only aware of the levee system as a means of flood protection and were unaware of other forms of federal assistance. After Hurricane Katrina and after learning about some of the post-disaster funds available for recovery assistance

and post-disaster planning, community groups educated the community about these funds.[49] In the decade since Hurricane Katrina, parishes and local communities seem to be taking advantage of mitigation resources.

Independent Financial Resources and Lower Risk Areas

Residents with some idea of pre-disaster mitigation programs did not necessarily need these programs because they lived on higher ground and had personal resources to mitigate flood risk. Although the entire city of New Orleans could rightly be considered at risk for flooding, some neighborhoods had a slightly diminished risk because of their historical development. They were perched in either the original settlement or within the natural embankments of the Mississippi River. Moreover, they generally were located in more affluent parts of New Orleans, where residents had greater access to political power and higher levels of education. These residents generally had independent financial means to help prepare for and recover from disasters, such as personal savings or insurance; they are also more likely to have personal and professional connections to access information quickly and directly and to avoid the long bureaucratic processes of applying for assistance. Many people in those areas could afford to and did renovate long before Hurricane Katrina, independent of the risk of natural hazards. Serendipitously, many of their renovations were consistent with good disaster mitigation practices.

Although many wealthier areas simply did not flood, those that did or experienced types of damage tended to recover more quickly. For example, the neighborhood of Algiers Point abuts the Mississippi River. The neighborhood is built on a former plantation, nestled in the River embankment. The annual median income (AMI) for the neighborhood, which is 87 percent white, was nearly $85,000 in 2012—roughly $15,000 greater than the AMI in all of Orleans Parish. In the wake of Katrina, Algiers Point saw a few downed trees and lost fences, but it never suffered from standing water as a result of the topography. As a result, residents were able to return to the neighborhood with relative ease and speed, often drawing on personal resources and personal connections to the political system to repair damaged structures. Although they were elected after Hurricane Katrina, both City Council representatives for the surrounding district lived in Algiers Point, which likely made rebuilding efforts and services quick in coming. For example, the heavy presence of law enforcement protected the area from looting in the days after Hurricane Katrina. Other wealthier neighborhoods, such as Lakeview, experienced extensive flooding but recovered quickly due to insurance coverage and personal resources.

Map credit: ESRI, ArcMap 10.3.

Median Income by Census Block[50]

- $2,4999 - $30,000
- $30,000 - $45,000
- $45,000 - $65,000
- $65,000 - $92,500
- $92,500 - $200,625

In contrast to Algiers Point, the Ninth Ward lacks protection from natural topography and differs vastly in demographics. It is located on low-lying land, and residents do not have the same personal resources to draw from during a disaster. The Ninth Ward is in the easternmost downriver portion of the city, an area that naturally collects and holds water. Historically, the Ninth Ward was a combination of farmland and fishing camps. The topographic contours of the Ninth Ward encourage periodic and sometimes severe flooding, including the Hurricane of 1915 and Hurricanes Flossy in 1956, Betsy in 1965, and Katrina in 2005. Nevertheless, as the population of New Orleans grew, the Ninth Ward became dotted with affordable homes, expanding homeownership to African Americans. Without independent financial means or social and political connections, this working class neighborhood was hit hard by the storm and the delayed recovery process that followed. Many residents never returned. Prior to Katrina, there were nearly 5,000 households in the Lower Ninth Ward with an annual median income of less than $38,000.[51] That number sharply dropped to

just over 1,000 households by 2010, with an annual median income of around $33,500.[52]

Impractical Strategies

Some pre-disaster mitigation programs were ignored because the required actions were impractical to implement or at odds with local values, such as elevating historic properties. To illustrate, federal funds for elevation require raising properties to the base flood elevation. For the the historic homes that dot New Orleans, the current elevation is typically a slight lift of two to three feet. Compliance with floodplain elevation plans would require raising these historic homes to visually jarring heights, up to nine or ten feet in some areas. Inside the city limit, a house on stilts is a peculiarity that many neighborhoods are unlikely to accept, especially those neighborhoods in a historic district zone where there are prohibitions on any alterations to the façade of the homes.

Complacency and Other Priorities

Finally, interviewees suggested that complacency and other day-to-day concerns took precedence over disaster preparation. This phenomenon is not unique to Louisiana. New Orleans had dodged the hurricane bullet for more than fifty years, lulling citizens and federal, state, and local governments into complacency. During this time, the population of the city also grew significantly, and newcomers often had no experience with disastrous flooding or hurricanes.

Longtime New Orleanians will attest to the popular disaster preparation plan: Track the hurricane with a favorite local meteorologist; fill the bathtub with water for drinking or, in recent years, stock up on bottled water; and cook everything in the freezer before the power fails and the meat and milk spoil. To be sure, some city residents would evacuate, some out of genuine concern and others for a "hurri-cation."[53] But, in general, many New Orleanians preferred to stay put. Others, short on cash or without a car, had no choice but to stay.

Rather than engaging in nonstructural preparations like land use planning, warning systems, or evacuation plans, government officials and residents relied almost exclusively on the levee system for protection against catastrophic flooding. Following Hurricane Katrina, Louisiana and New Orleans undertook extensive planning and preparation processes to mitigate damages from future storms by developing improved evacuation plans and working collaboratively with public and private organizations.[54] However, some critics charge that these processes benefit the interests of the more affluent, at the expense of LMI and vulnerable communities.[55] Nevertheless, post-Hurricane Katrina storms such as

Hurricane Gustav in 2008 show vast improvements in the disaster preparedness plans.[56] For example, the city designated 17 pick-up points for mandatory evacuations for those who cannot self-evacuate, and state developed a contraflow plan to allow drivers to use both sides of a highway to evacuate.[57]

Allocated but Unspent: Federal Pre-Disaster Funds

In contrast to the other federal mitigation programs, the HMGP provides post-disaster funding for hazard mitigation. In Louisiana, a wide gap exists between the amount of federally allocated mitigation funds and the amount of funds actually disbursed and used. In September 2014, the U.S. Department of Homeland Security's Office of the Inspector General published results of an audit of the HMGP in Louisiana. The audit found that of $2.16 billion in authorized mitigation funds, approximately $812 million remained unobligated, indicating "missed or delayed opportunities" for funding of mitigation programs throughout the state.[58]

According to the report, funding delays were attributed to three factors. First, local officials failed to submit FEMA-approved hazard mitigation plans, which are required in order to become eligible for grants. Second, after Hurricane Katrina, FEMA failed to enforce its own application deadlines, which would have allowed it to de-allocate funds for proposed projects that never came to fruition. Finally, FEMA allowed Louisiana officials to submit incomplete "placeholder" applications for proposed projects, rather than complete applications. These placeholder applications increased the number of applications for projects that never progressed beyond the proposal phase.[59]

Although the DHS audit report does not explicitly address factors behind the failure of local governments to comply with application requirements, it does allude to two possibilities: difficulty completing the application process and lack of local funds to meet the matching requirements.[60] The DHS audit concluded that, after Hurricanes Katrina and Rita, FEMA and Louisiana needed more than a year to build adequate capability to address the anticipated workload for the grant applications. Moreover, according to a FEMA official, at the time of Hurricane Katrina only three of the 64 Louisiana parishes had approved mitigation plans required for applicants to receive HMGP funding. Thus, these jurisdictions faced the challenge of preparing the mitigation plans as well as preparing proposals for projects that could receive the HMGP funding. The other likely factor is that local governments, already facing high recovery costs and decreased revenue due to smaller post-hurricane populations, were

required to provide a 25-percent funding match of the cost of each HMGP-funded project.

Communication and Outreach

As noted above, a significant problem was the lack of awareness about pre-disaster grant programs. For example, residents and neighborhood leaders from the Fauburg Delachaise neighborhood noted that after Hurricane Katrina people became far more aware of available disaster services. City council members and representatives of the Mayor assumed a larger role in communicating information directly to communities. They attended neighborhood meetings to provide accurate information to residents, who could then advocate for funds through governmental entities. One possible explanation for increased communication between the local government and the community is that a former community organizer, Latoya Cantrell, became a Councilwoman in 2012.

In addition, the political activists in the neighborhood put pressure on City Hall to direct funds toward this particular community. They sought funds to renovate the existing recreation center to ensure children returning to the area had a viable outlet for activities while their families were working on rebuilding and throughout ongoing recovery. Residents say the post-Katrina rebuilding period was the prime opportunity to revamp an old and deteriorating structure for the betterment of the neighborhood. As a result of local government initiatives and pressure from local activists, the efforts were successful.

Lessons Learned and Best Practices

The impacts of Hurricane Katrina and the subsequent flooding in New Orleans show the need for comprehensive pre-disaster planning and strategies, especially for low-income and vulnerable communities. Better planning and identification of recovery strategies would have prevented some of the more devastating impacts from the storm and levee breach and might have helped these communities apply for and receive financial assistance in a timely manner. Post-disaster, better planning would have allowed New Orleans and nearby parishes to implement smart pre-existing plans to help mitigate damages from future disasters instead of scrambling quickly to rebuild without improvements.

An important lesson from Louisiana is the mismatch between the conditions addressed by disaster funds and the present conditions of recipients. Disaster relief and aid programs target static conditions when in reality victims' lives and livelihoods are dynamic and fluid. Responses to disasters have a tendency to focus on what happened at the time of the disaster as opposed to the conditions

that inevitably evolve pending the actual distribution of funds. By the time disaster victims receive aid, it may not be needed or it may not be useful in their present, post-disaster circumstances because the aid is targeted toward restoring a status quo that no longer exists. Consequently, disaster relief needs to be able to evolve in response to the dynamic needs of the residents.

For instance, prior to Hurricane Katrina, the East was a mixture of people of color, African-American and Asian. It was a largely self-employed community of low- to middle-class working people who relied heavily on the Gulf of Mexico through shrimping and fishing. After Hurricane Katrina, the U.S. Army Corps of Engineers reclassified this area as wetlands, restricting the homeowners' ability to sell the property.[61] Any modification to the property—such as rebuilding or renovating the home with federal disaster funds—could reasonably garner fines under the Clean Water Act, preventing homeowners from rebuilding even if they had already received funds to do so.

A similar mismatch of static aid for a dynamic situation arose with jobs in the region. When the BP Deepwater Horizon Oil Spill of 2010 occurred, its economic repercussions set back the delicate progress in this already vulnerable community. The legal wrangling over economic damages and claims filed under the Clean Water Act, Oil Pollution Act of 1990, and other federal laws were not settled until 2015, when BP agreed to a more than $20 billion settlement.[62] Unfortunately during those five years of legal wrangling, many businesses and the economic livelihoods of many shrimpers and fishermen folded or disappeared. By the time the settlement money arrived, they were already employed elsewhere with different—but still desperately needed—assistance needs. Disaster relief should recognize the changes in livelihoods and needs following a disaster and allow funds to be used in the present situation.

Best practices for pre-disaster mitigation and planning follow.

Use disaster funds to address underlying conditions in vulnerable communities

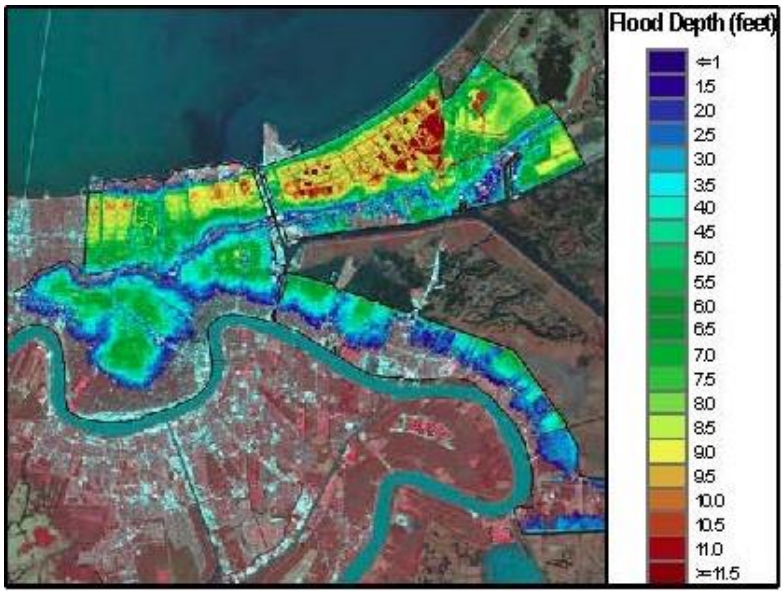
Underlying conditions in vulnerable communities that pre-date a disaster can be significant impediments to recovery after a disaster. However, disasters provide the opportunity to rebuild in a thoughtful, intentional process that can simultaneously address some of the underlying conditions in vulnerable communities.

The relationship between a disaster and the conditions caused or exacerbated by a disaster is complicated: Pre-disaster conditions in vulnerable communities

are exacerbated by the impacts from a disaster, which causes new impacts as well; together the old and new impacts can be further exacerbated by delays in recovery assistance, whether waiting for programs to be rolled out or administrative and processing delays in applying for and receiving assistance. Even after receiving assistance, the underlying conditions in vulnerable communities, such as poverty, household instability, mental illnesses, substance abuse, health, and financial insecurity, may not be addressed. Unless addressed, these conditions simply accrue until the next disaster, when the cycle repeats itself.

Hurricane Katrina forced the evacuation of 1.2 million people, and standing water prevented reentry for weeks. During that time, improperly boarded houses took on more unsavory elements than were ever expected: Rats, flies, mosquitoes, and feral animals bred at an alarming rate. Already substandard housing fell into further disrepair. Pre-existing blighted homes fell into further decay, shifting backwards the baseline from which many neighborhoods still struggle to recover. In the post-Katrina environment, unoccupied houses invite drug dealers to take up residence, leaving the neighbors to deal with undesirable inhabitants and what neighborhood leaders consider narco-tourism.

To help address underlying conditions, pre-disaster planning programs should encourage homeownership, job creation, support for small businesses, public transit, education, and community spaces, as well as access to social services and health facilities within communities. Post-disaster planning should consider how to employ local communities members in the recovery effort and ensure that transportation, public services, and other means of stabilizing communities remain available. Post-disaster building should incorporate low-impact development design principles.



Map credit: U.S. Geological Survey[63]

Protect vulnerable communities from being preyed on by unscrupulous disaster entrepreneurs and organizations

The magnitude of impacts from flooding, the thousands of traumatized survivors, and the influx of millions of federal dollars gave rise to sometimes unscrupulous disaster entrepreneurs and organizations, such as unqualified contractors or lenders, who preyed on vulnerable communities and usurped disaster relief funds. State and local government should have in place policies to weed out predatory organizations, while bearing in mind unintended consequences of those policies. For example, costs associated with meeting certification and other requirements often put barriers in front of minority contractors, who may already face difficulties in accessing recovery work.

The low-lying and predominantly African American neighborhood of Hollygrove suffered tremendous flood losses and faced dishonest and unscrupulous contractors. Neighborhood leaders noted that many residents relied on the city for evacuation, which sent the evacuees via one-way tickets to far-flung places such as Utah, Minnesota, and North Dakota. Many did not have the means to return, and those who did came back to find their homes flooded. They recalled the devastation of seeing their homes submerged and the wet rot permeating floors, walls, ceilings, and all of their belongings.

Upon returning, their trauma and devastation was compounded by dealings with unscrupulous contractors. Returnees recounted instances of having to pay contractors a third of the total cost up front for them to get materials and begin

work, only to have their money stolen and no work completed. Even families that shared a single contractor were not safe from the plundering. Their accounts tell of repair jobs started but not completed because the contractor received a better offer elsewhere and disappeared with their money.

State and local governments should enact policies to weed out these organizations or contractors by requiring certification or other documentation verifying the qualifications to provide disaster relief. They should also establish procedures for reporting and investigating abuse; maintain updated, publicly available lists of both qualified and disqualified individuals and organizations; and provide public education about the available resources to verify contractors and report abuse.

Ensure that safeguards against unscrupulous, predatory entrepreneurs or organizations do not produce unintended consequences for legitimate groups

Policies were rightly in place to counteract ill-intended individuals and organizations. However, some policies to minimize the unscrupulous activities by hastily formed and short-lived organizations, like requirements that organizations have already been in operations for a period of time, had the unintended consequence of undermining the efforts of earnest, community-based groups. As a corollary, however, state and local governments should also be aware that some safeguards against predatory individuals or organizations may produce unintended consequences, such as limiting the number of legitimate organizations and causing further delays in distributing assistance.

Neighborhood associations and non-profits formed to assist their communities directly in the wake of disasters were excluded by these very policies. The minimum years necessary to be active in order to participate in post-disaster recovery efforts effectively eliminated the ability of community groups to respond to the disaster for their communities. In one instance, a non-profit healthcare organization in New Orleans waited five years after the storm to receive assistance and could not provide much of the needed healthcare in the community because it was formed in the immediate aftermath of the storm and thus ineligible for immediate funds.[64]

Other grassroots organizations with second-language capabilities were needed to assist the people who did not speak English and who needed help to apply for and receive available federal assistance. However, newly formed groups could not get permission to advocate for their own people because they did not meet the minimum years as active organizations requirement. As a result, these

groups were unable to provide language services in their communities, such as Village de l'Est in New Orleans East. People of Asian descent, largely Vietnamese, made up 37.1 percent of that neighborhood's population in 2000, compared to 2.3 percent of the entire city's population.[65] More than ten percent of de l'Est residents did not speak English well, if at all.

Invest and stabilize the housing stock to create stable and cohesive communities

Where structural and nonstructural adaptation measures can adequately protect neighborhoods and communities from future disasters, establishing homeownership and stabilizing the rental housing stock are important part of the pre-disaster planning and post-disaster recovery strategy. True recovery creates stable and cohesive communities in areas where nonstructural adaptation strategies will provide effective protection against future hazards. For example, homeownership encourages residents to invest in structural resilience and to return to and rebuild their communities after disaster hits. In the Ninth Ward, renters had no control over whether the property would be rebuilt. Forced to move elsewhere, many renters were unable to pay the increased rent that landlords charged in order to compensate for the cost of rebuilding the property.

For example, the neighborhood of St. Roch has long been a majority of renters and not homeowners. Activists in St. Roch lobbied for a soft second mortgage program to facilitate homeownership for those making 80 percent of the AMI. New Orleans granted roughly $52.3 million to help 640 families in home purchase assistance and closing costs. A soft second mortgage bridges the affordability gap between the price of a home and the maximum amount that a homebuyer can borrow with a first mortgage.[66] The program also provided hard financing for construction costs to assist homebuyers build new homes on land demolished by the Louisiana Land Trust and selected for redevelopment by local governments.[67] The program is one of three government-subsidized mortgage programs in Louisiana for LMI, first-time homebuyers in the 13 parishes affected by Hurricane Katrina. A separate $70 million in program funding was given to the state. Under the Second Mortgage program, more than 700 low-income families purchased homes.[68]

Another important strategy to help socially vulnerable communities is to invest stabilizing the rental housing stock and ensuring rebuilt rental properties are elevated or otherwise constructed to minimize flood hazard and risk. Post-flood disaster programs in Mississippi and Louisiana focused primarily on

homeowners. However, socially vulnerable households are characterized by a higher rate of renters, in addition to living in public housing or with assistance from Section 8 federal housing vouchers. After Hurricane Katrina, the rental and public housing stock in New Orleans changed dramatically, with a significant reduction in public housing.[69] In 2007, the City Council voted to demolish and replace four major public housing complexes with mixed-income communities. This redevelopment shifted the proportion of voucher recipients to public housing residents, from 64 percent and 36 percent, respectively, at the time of the storm, to 91 percent and 9 percent in 2014.[70] Although the Road Home program focused primarily on homeowners, it also included the Small Rental Property Program that has allocated $400 million to help owners of small rental units repair and rebuild their properties.[71] Under the Road Home program, homeowners have received $8.9 billion.[72] To maximize the benefit of rebuilding assistance for socially vulnerable communities, the distribution of funds for homeowners and owners of rental properties should more proportionally reflect the needs of renters.

Nonstructural Adaptation: Elevation as Flood-Proofing

Flood-proofing residential structures by elevation is another nonstructural adaptation strategy. This section will first give an overview of elevation, noting its benefits as well as some of the considerations it raises. This section then examines and contrasts the elevation programs in Mississippi and Louisiana following Hurricane Katrina, noting the particular impact of these programs on vulnerable communities. This section concludes with lessons learned from and best practices for implementing this strategy.

Introduction to Elevation Programs

Elevation involves physically lifting an existing home that is located in a low-lying area and building a new, elevated foundation, or extending an existing foundation. It could also involve leaving the house at the existing level and instead building an elevated floor or adding a new upper story. Elevation works well for housing originally built on a basement, crawlspace, or open foundations. HUD has embraced elevation as part of the agency's Climate Action Plan, noting that the strategy promotes "sound, sustainable, long-term planning informed by a more accurate elevation that takes into account possible sea level rise."[73]

At a minimum, a house is typically elevated to the base flood elevation (BFE), as determined by FEMA flood maps. The BFE is the height to which floodwater is

anticipated to rise during a base flood, which is a flood that has a one-percent chance of occurring for any given flood event.[74] The BFE is the national standard used in the National Flood Insurance Program and by federal agencies for regulating new development in flood-prone regions.[75] Where BFEs are being updated or official Flood Insurance Rate Maps (FIRMs) are not finalized, FEMA will issue Advisory Base Flood Elevations (ABFE). Across the country, some local ordinances require an elevation higher than the BFE, which reflects both an extra measure of precaution and foresight into the impacts of climate change on precipitation patterns. Climate scientists are researching how climate change impacts on precipitation, coupled with sea level rise, could increase the frequency of the base flood.[76]

Elevation may appeal to homeowners and local governments because the express purpose is to keep homeowners in their homes and to allow communities to remain in place. By physically lifting homes and moving property off the ground, elevation reduces the risk and magnitude of flood losses and minimizes the impact of floods on human safety, health, and welfare. In addition, elevating a property may lead to reduced insurance premiums, or may be a prerequisite for participating in some flood insurance programs. For low-income and vulnerable communities, public assistance for home elevation and other flood-proofing measures could help them stay safely in their homes in light of increasing premiums for both homeowners' and flood insurance.

Prior to elevating a home, a homeowner must consider several practical and logistical factors, such as the amount of elevation and the feasibility of achieving that height; potential new vertical and horizontal pressures at the elevated height; maintaining access, particularly for homeowners with disabilities or the elderly; and the shape, size, and design of the house.[77] These factors all affect the cost of an elevation project, which may or may not be covered by flood insurance and post-disaster financial relief. Historic properties require special consideration, particularly where elevation would have a significant impact on the aesthetics of the property.

Federal Funding

FEMA's Hazard Grant Mitigation Program and HUD's Community Development Block Grant provide federal funding for elevation. As noted earlier, HMGP funds are available for projects that are long-term solutions to reducing or eliminating losses from future disasters. HMGP funds used for elevation require the house to be elevated to the BFE for that location. Similarly, HUD CDBG funds may also

be used for elevation projects. The mandatory elevation height is also the BFE. However, for Hurricane Sandy recovery efforts, HUD changed the standard to the stricter of one-foot above the BFE or the local standard.[78]

Case Study: Mississippi's Homeowner Assistance Program

To rebuild from the devastation from Hurricane Katrina, the Mississippi Development Authority established the Homeowner Assistance Program (HAP), using CDBG funds. In Phase I, homeowners could receive up to $150,000 for rebuilding to the BFE; all grantees were required to maintain National Flood Insurance Program (NFIP) coverage in perpetuity. Eligible homeowners include those who suffered damage but did not have flood insurance because their properties were located outside of the federally mapped flood insurance boundaries. However, homeowners were required to have general homeowners' insurance.

Phase II of the HAP was similar to Phase I, but homeowners were limited to grants of $100,000. Phase II targeted assistance for low- to moderate-income families, defined as 120 percent below the area median income. Eligible homeowners were not required to have any pre-storm homeowners insurance (general or flood) and could be located inside or outside of the floodplain.[79]

For Phases I and II grant recipients, the HAP also included an additional $30,000 to help homeowners elevate properties required as a condition of the grant and according to FEMA's BFE standards. A homeowner could take one of three actions: (1) Elevate a single-family home on the existing footprint; (2) Elevate a SFH on an expanded or different footprint; or (3) Replace a SFH with a newly constructed or elevated residence elsewhere on the same property.[80]

All elevations are required to comply with applicable environmental reviews and Section 106 of the National Historic Preservation Act of 1966.[81] In coastal Mississippi, although the vast majority of damaged properties were not historic, many historic homes were nevertheless destroyed or could not be salvaged. For example, the Edgewater Historic District in Biloxi, Mississippi, lost six percent of its historic properties (13 of 137 structures); the East Central Historic District, also in Biloxi, lost 95 percent of its historic properties (28 of 31 structures).[82] In January 2008, Mississippi entered into a Programmatic Agreement with HUD to negotiate and modify the elevation height for historic buildings, so that they did not have to be elevated all the way up to the BFE. This modification would retain "the characteristics of individual historic homes and concentrations of

historic residences within local historic districts" and ensure that "these buildings continue to be recognized as historic properties."[83]

Overall, the MDA awarded 98 percent of the HAP grants through Phases I and II.[84] The average amount of each grant was $72,500.[85] As of June 30, 2015, the MDA has received more than 9,500 applications for the elevation grants, of which more than 2,300 have been approved and more than 1,900 have been closed. The total amount disbursed is a little over $30 million for 1,002 fully paid grants. More than 620 grants have been paid to low- and moderate-income applicants.[86]

The effectiveness of the elevation grants is unclear. In 2010, HUD conducted a survey of selected HAP recipients by viewing the properties from the street. From this sample, HUD extrapolated that in Mississippi, 14 percent of rebuilt homes were not elevated; 59 percent were elevated less than three feet; 22 percent were elevated between three and five feet; and 5 percent were elevated to five feet or higher.[87] The observed properties included HAP recipients, including those who did and did not receive specific elevation grants. A different observer noted that the general public resisted elevating their homes at first as many rushed to repair their houses before FEMA published updated flood maps, in order to avoid the cost and inconvenience of an elevated house.

The benefits of Mississippi's HAP for LMI individuals and vulnerable communities have manifested over time, from little to nothing at the beginning to more concrete assistance after years of advocacy by community groups. Some observers noted that the state did not direct rebuilding assistance toward LMI residents for the first three years after the storm.[88] Phase I of HAP based eligibility in part on an applicant having maintained homeowner's insurance, but not flood insurance, prior to the storm. However, this requirement excluded LMI applicants who were statistically less likely to have maintained homeowner's insurance, which is typically not a financial priority for households struggling to pay for food, medicine, utilities, and other necessities.[89] Governor Haley Barbour established the homeowner's insurance requirement because he feared that, if people knew they could get disaster assistance with or without insurance, they might have less incentive to purchase homeowners insurance.[90] This attitude toward homeowners without homeowner's insurance is illustrated by the description of Phase I in an official state report on recovery efforts. The report notes that Phase I was "created to assist homeowners who made responsible insurance decisions, yet still suffered uncompensated housing

losses."[91] The report further emphasized that "these homeowners relied to their detriment on federal government policy that their homes did not need NFIP coverage."[92]

In response to advocacy from community groups, the state later expanded the HAP, in Phase II, to LMI households and vulnerable communities that did not have homeowner's insurance. That expansion was facilitated by the availability of funds, since Phase I served fewer applicants and dispersed less money than initially predicted. However, advocates such as the Mississippi Center for Justice point out that the state's disaster spending did not reflect the needs of these for LMI households and vulnerable communities. State officials sought and obtained multiple waivers from HUD to depart from federal LMI allocation requirements. One of the more egregious waivers was a HUD-approved $600 million diversion from affordable housing to finance the expansion of the Port of Gulfport.[93] Advocacy groups filed a lawsuit, ultimately reaching a settlement to reallocate $132 million to address the unmet housing needs of low-income homeowners and renters.[94]

These diversions reflected the culture and philosophy of the state government: A neoliberalism that favors economic development and higher-income households to the detriment of housing opportunities and other forms of socio-economic assistance for lower-income households.[95] This philosophy is also apparent in Governor Barbour's testimony before a U.S. Senate subcommittee, when he stated:

> We are committed to rebuilding whole communities, not just those areas with a high proportion of low and moderate incomes. Because we designed our programs to serve entire communities, and most often to serve the entire Mississippi Gulf Coast, these programs naturally did not always meet CDBG low and moderate income requirements.[96]

Ultimately, an assortment of non-governmental organizations filled the needs of LMI households and vulnerable communities, particularly until the state expanded the HAP. Some researchers credit the many volunteers, foundations, nonprofits, faith-based organizations, and recovery workers as the "true engine of recovery for people in most communities."[97] Financial assistance was delivered through various smaller streams, such as insurance, faith-based organizations, the Red Cross and other national relief NGOs, private companies and businesses, and even celebrities. Case managers, working prior to and

through the HAP expansion, were able to piece together various funding sources to help people rebuild elevated homes.

One interviewee noted that these smaller streams of assistance were very effective, if piecemeal and time-consuming to string together. Ironically, when the public assistance finally arrived, it came with many restrictions and administrative requirements that made it difficult to disburse. Some applicants were disqualified wholly from the program, whereas the smaller streams of assistance were more flexible and could be patched together even if an applicant did not qualify for one particular source. However, by that time, the smaller streams of assistance were no longer available to fill the gaps.

For LMI households and other vulnerable communities, community based social services organizations were extremely important in coordinating various streams of public and private disaster relief for individuals and helping them navigate the application process. They were frequently staffed by local residents who lived and worked in the community and were therefore personally committed to the community. Case managers in these organizations were particularly heroic, constantly demonstrating great patience, compassion, and determination despite clients who were sometimes difficult to work with for various personal, health, or other reasons.

Case Study: Louisiana's Elevation Grants

In Louisiana, homeowners interested in elevating their properties could obtain financial assistance through three programs: the Road Home program, the HMGP, and the NFIP Increased Cost of Compliance program. The Road Home offered up-front, flat-rate grants to elevate a home to the height adopted by the parish government. The owner of a single-family home could receive up to $30,000, and the owner of a mobile home could receive up to $20,000. However, the U.S. Congress capped the total amount of financial assistance from the Road Home program at $150,000 to a single homeowner. The homeowner was required to sign a binding agreement to elevate the property and reoccupy the home as the primary residence within three years of signing the agreement.[98]

With HMGP funding for elevations, a homeowner could receive up to $100,000 in reimbursements in addition to the $150,000 Road Home funds cap set by Congress. The house must be elevated to comply with the required FEMA minimum elevation level; and an inspection is required prior to reimbursement.[99] Other eligibility requirements included: The homeowner kept the home or acquired it along with an assignment of rights[100]; the home was

located in a FEMA designated ABFE or the elevation was deemed cost-beneficial per FEMA guidelines. The homeowner must also meet additional inspection requirements, such as an environmental and historic preservation review and cost effectiveness review.[101]

A third source of funding for elevations was the NFIP Increased Cost of Compliance (ICC) program, which granted up to $30,000 for eligible policyholders who suffered 50 percent or more damage to insured properties. Damaged homes in zones subject to certain building requirements upon repairing or rebuilding are eligible for assistance to cover the costs of elevation, relocation, demolition, and flood-proofing.[102]

Louisiana's elevation grants were also of questionable effectiveness. A HUD audit of the elevation grants found high levels of non-compliance with the elevation requirements.[103] Investigators found that $30,000 was not enough to cover the cost of elevating many properties. Thousands of homeowners spent their elevation grants to repair or rebuild their homes that did not include elevating the structure.[104] In response, Louisiana agreed to provide homeowners with construction management services for locating qualified contractors and for project management. These management services were aimed at helping homeowners complete the elevation, eliminate contractor fraud, and ensure reasonable costs.[105] In 2015, HUD announced changes to the grant program that broadened the rules, and then allowed homeowners who were not compliant with the earlier, narrower, rules to obtain grant forgiveness by demonstrating compliance with the broader rules. Homeowners could also apply for additional funds to complete the work on their homes.[106]

Another lawsuit brought against HUD and the State of Louisiana alleged a discriminatory impact on thousands of African American homeowners because of the formula used to calculate grant amounts. Data from the Road Home program showed that these homeowners were more likely to have their grant amount based on the pre-storm value of their home, rather than the actual cost of the damage. In one instances, a homeowner received only $1,400 based on the pre-storm value, whereas she would have received $150,000 if the calculation had been based on the actual cost of the damage.[107]

In general, homeowners and potential applicants complained that there were frequent rule changes and other administrative changes to the various Road Home grants. Homeowners had difficulty predicting or forecasting payments, leaving them in limbo about how to proceed. The broad eligibility criteria

benefitted many residents who suffered property damage from Hurricane Katrina, but the state did not devote sufficient resources to processing the applications, leading to lag times and delays in processing many thousands of claims. Finally, the program implemented an exit penalty for those who decided to leave Louisiana after the storm instead of staying in the state to rebuild.[108] This penalty assumed that rebuilding was the best option, even in places particularly vulnerable to repetitive flooding, committing homeowners who elected to stay for a higher payout to a cycle of rebuilding in response to future disasters.[109]

Communication and Outreach

In both states, the strategy to communicate information about the elevation programs was fairly standard. Interested applicants received information through government press releases and news media, through personal connections if they had any, and at intake centers and public meetings. In Mississippi, the work of advocacy groups like the Mississippi Center for Justice and the Steps Coalition, as well as many other local community-based organizations, to expand the HAP Phase I to assist LMI households was well publicized. By the time Phase II began, community groups were well informed about the expansion and new, broadened eligibility criteria. Caseworkers also disseminated crucial information about funding opportunities as they worked to help clients find any and all sources of funding.

Neighboring States, Different Experiences

Comparisons between the post-disaster elevation programs in Mississippi and Louisiana begin with the contrasting narratives of Hurricane Katrina in each state. In Mississippi, Hurricane Katrina was a natural disaster in the traditional sense. Damage was caused by the forces of the hurricane, namely by unprecedented storm-surges and hurricane-force winds. In Louisiana, the damage, destruction, and death largely resulted from the levee failures.[110] Thus, in Louisiana the narrative is about government negligence and failed systems of protection, which morphs into distrust of the government, anger and frustration, and pervasive feeling of injustice. These narratives frame and color how residents interpret the same storm.

Although the goals of elevation in both Mississippi and Louisiana were similar, the design, eligibility criteria, and administration of the programs differed. Mississippi gave a one-time, lump-sum payment to homeowners, regardless of a homeowner's decision to rebuild or stay in the state. This simplified program

structure helped Mississippi to avoid the administrative challenges and delays in fund distribution that Louisiana experienced.[111] Louisiana's Road Home program and payment structure was designed for rebuilding and retaining residents in the state. Thus, homeowners who elected Road Home assistance under Options 2 and 3 were not eligible for elevation grants through the Road Home program.[112]

Other program differences between the states included the eligibility criteria and the number of applicants: Mississippi had strict eligibility criteria, initially limited to homeowners outside the floodplain without flood insurance and later expanded to homeowners inside the floodplain. In contrast, Louisiana had both a significantly greater number affected homeowners and broad eligibility criteria that resulted in more than six times as many applicants as in Mississippi. The sheer number of applicants in Louisiana compounded the processing time for applications and thus delayed payments.[113]

In Louisiana, residents expressed frustration with frequent rule and eligibility changes.[114] Interviews with residents and neighborhood leaders in the Ninth Ward provide tales of continued unequal treatment and unequal payments and frustration over ever-changing policies to receive state and federal funds intended to help them rebuild and resettle.

The state attempted to employ both rehabilitation and compensation strategies, which trigger different federal requirements. The state also tried to combine streams of HUD and FEMA funding, which also had different legal and programmatic requirements between them.[115] "Multiple misunderstandings" between Louisiana and HUD led to multiple iterations of Road Home, causing confusion and frustration for applicants and delays for homeowners waiting for relief assistance. The GAO partly attributed the lower than expected homeowner demand for elevation projects to the length of time taken to develop and implement the program.[116] Other researchers noted that policy changes to the elevation program in Mississippi were "neither as frequent nor as comprehensive as those within Road Home."[117] Because Mississippi had concrete and measurable intent and scope for the elevation program, the MDA had "less difficulty revising and dealing with vagaries as they arose."[118]

Under both states' programs, reduced grants for uninsured homeowners harmed lower-income and minority households. These households were disproportionately uninsured at the time of the storm. In Louisiana, the lack of insurance meant a 30 percent penalty, deducted from the total grant amount. In

Mississippi, only homeowners with insurance (but not flood insurance) were eligible for Phase I assistance. Even though Phase II expanded eligibility, those without homeowner's insurance were also penalized with a 30 percent reduction, except for those earning less than 60 percent of the AMI. These penalties meant that funds were rarely sufficient to accomplish the needed work. As one study concluded, "Recovery in low-lying predominantly minority communities has lagged because the reduced grant award fell far short of the actual cost increases in labor, materials, homeowner's insurance, and foundations elevated to new FEMA flood zone requirements."[119] The disparities between minority communities and non-minority communities are both a matter of unfairness but also of legality.

Lessons Learned and Best Practices

For some, property elevation is an appealing nonstructural adaptation strategy because it allows homeowners to remain in their homes and communities to remain intact. For vulnerable families, elevation allows them to keep their homes, which may be their greatest asset, and to retain their networks of social support and sense of community and belonging.

However, elevation is an expensive and time-consuming project, on top of potential delays in applying for and receiving other types of assistance from disaster-recovery programs. In the aftermath of a disaster, grant and financial assistance requirements and eligibility may change, leading to homeowners' confusion with grant requirements.[120] An interested homeowner may have difficulties finding a reliable and certified contractor to undertake the project, as occurred in Louisiana following Hurricane Katrina.[121] An audit of grantees for the elevation program in Louisiana found that 79 percent of properties had not been elevated and were non-compliant at the time of inspection.[122]

However, the elevation grant programs in Mississippi and Louisiana offer important lessons for extending the greatest benefits of the strategy to vulnerable communities. To provide the greatest benefit for LMI households, grant elevation programs should:

Ensure that grant amounts sufficiently cover the cost of elevation

Elevation grant programs should ensure that the grant amount is sufficient to actually achieve the elevation required. Although the $30,000 lump sum payment in both Mississippi and Louisiana could be rapidly and readily disbursed, homeowners without other resources to pay for home elevation may understandably decide to spend the grant money for rebuilding without

elevation, even if that use violates the grant agreement. Perhaps grants could combine an initial lump-sum payment with a pre-determined or pre-qualified ability to submit receipts for reimbursement, up to a set cap, to complete the project.

Local governments and communities should work with the state government and federal agencies to pool elevation funds and redesign the entire neighborhood according to smart planning and low-impact development principles. A community-level approach to elevation may be more efficient and effective at providing widespread flood-protection than an individual homeowner approach.

State and local governments should also not penalize applicants for not having homeowner's or flood insurance. Purchasing and maintaining homeowner's insurance is important, but policies that reduce grant amounts—or disqualify applicants who do not have insurance—hit the poorest residents the hardest. Moreover, federal rules credit a levee as adequate adequate flood protection, and thus homes located in the flood protection are not required to maintain federal flood insurance.

Ensure that vulnerable communities qualify for federal assistance from the outset of the program

Elevation programs should design eligibility criteria with LMI households in mind. The CDBG requirement for 70 percent of funds to benefit LMI communities is frequently waived for disaster relief, but state officials should administer federal funds in the spirit of the waived requirement. For example, a program could prioritize funding allocation to those with a certain level of damage and income threshold, regardless of pre-storm insurance status.

In the chaos following a hurricane, immediate and responsive assistance is needed, rather than penalties for homeowners who did not have general homeowners' insurance, as in Mississippi. Insurance reform that enables LMI households to obtain insurance should be part of long-term post-disaster recovery. Delayed assistance can be particularly difficult for LMI communities, which often do not have other personal resources to rely on in the interim.

Ensure that elevation height waivers for historic properties are supplemented by additional protection measures

To retain the aesthetic of designated historic properties, HUD allowed some states to waive elevation height requirements. However, a waiver diminishes

the benefit of elevation as a nonstructural adaptation strategy. Communities should implement additional nonstructural protection measures such as berms or landscaped floodwalls that maintain the architecture but help compensate for the decreased height.

Nonstructural Adaptation Strategy: Voluntary Property Buyouts and Acquisitions

Voluntary property buyouts permanently remove people and property from high risk and vulnerable areas and thus provide long-term protection against flooding, storm surges, and sea level rise. Although voluntary buyouts may serve national and regional goals, they may not align with local communities' visions of growth or residents' desires to stay in their homes. Because buyouts usually break up existing neighborhoods, social networks—a core feature of community resilience—are also lost. Even as communities are looking toward or even using the strategy, it remains controversial and highly sensitive.

This section examines voluntary property buyouts and acquisitions as a nonstructural adaptation strategy. It begins with an overview of the strategy and examines the buyout and acquisition programs implemented after the 2008 floods in Cedar Rapids and Superstorm Sandy. It identifies the benefits of this strategy for vulnerable communities, as well as some of the challenges in implementing buyouts. This section concludes with lessons learned and best practices related to voluntary property acquisition.

Introduction: Voluntary Property Acquisition

In a voluntary buyout, a state or local government acquires title to residential or commercial property located in a vulnerable area, such as in a floodplain.[123] The government entity then demolishes and removes all structures on the property. In most situations, the property is converted into open space in perpetuity. The property can be used for parks, greenways, or wildlife refuges, or it could be restored to natural wetlands. In doing so, they restore and enhance natural flood protection. Lives and personal property are no longer in harm's way. Occasionally, the property may be redeveloped pursuant to higher safety standards or in a way that is less vulnerable to natural hazards.

The key feature of a buyout—emphasized repeatedly by state and local governments—is its voluntary nature.[124] Typically, the state or local government publishes a map of properties eligible for buyouts or establishes criteria for a buyout program. Homeowners are given the opportunity to submit an application to begin the buyout process. The voluntary nature makes the strategy politically palatable and avoids infringing on private property rights. Buyout programs generally offer homeowners the pre-disaster fair market value of their property, and occasionally incentives for relocating nearby or within the

community or for down payments are added to bring the offered price above fair market value and to facilitate relocation.

Buyouts have demonstrated economic benefits. Local governments save costs related to emergency rescue, infrastructure repair, debris removal, and emergency shelters for residents who live in flood-prone areas. More significantly, federal and state governments save money from not having to pay for properties that are repeatedly flooded. Overall, property buyouts reduce or even eliminate future flood damage and flood-related disruptions. For example, following floods in the mid-1990s in the Midwest, Missouri and FEMA invested millions of dollars to purchase more than 4000 repetitive-loss properties across the state. Between 1999 and 2008, Missouri experienced 14 federal disaster declarations, and the buyouts saved nearly $97 million in losses compared with the initial investment of $44 million.[125] A study in Iowa demonstrated that the positive benefit cost ratio of buyouts to losses avoided was 2.19.[126] Similar cost-savings have occurred around the country.[127]

However, property buyouts may have negative financial and social impacts and are not suitable for all flood-prone or coastal regions. For example, some properties that are located in flood-prone areas are also high-value properties, such as beachfront properties, which increase the cost of acquisition and limit the number of properties that can be purchased. In addition, some fear that buyouts decrease the local tax base because participating properties are removed from the tax roll.[128] Moreover, the local government must pay for program administration and attendant property administration. In the short- to medium-term, less costly measures such as elevating properties or other flood-proof measures may be more appealing than permanent property acquisition.

Because buyouts are extremely personal, many individuals and communities will simply not consider property buyouts. Socially vulnerable communities may feel targeted or further marginalized when property buyout discussions arise, and they may be left feeling pushed out to make room for new, wealthier residents. For an individual, the buyout payment may compensate homeowners for the value of their property but not for the replacement value of a home. For example, participating homeowners may face higher housing costs in locations that are less flood-prone, as housing on higher grounds tends to be more desirable and more expensive. In addition, the waiting and processing times for buyout applications may prove too long or painful, prompting homeowners to seek alternatives to a buyout.

The social ties and community structure of flood-prone communities inevitably suffer as a result of buyouts. Buyouts disrupt or erase neighborhood ties and social networks, particularly where residents disperse across state lines. Moving to a community with less cohesion may increase risk on the social vulnerability side, even as it decreases risk on the physical vulnerability side.[129] Finally, regardless of the price offered or additional incentives, not all residents will participate in buyout programs for sentimental or other personal reasons. Uneven participation reduces the options for creating contiguous open space and obligates the local government to maintain services for those residents—few in number as they may be—who decline to participate.

For low- to moderate-income or socially vulnerable communities, the advantages and disadvantages of property buyouts may be magnified. For example, a buyout may put a homeowner in the best financial position following a disaster if the homeowner did not have flood insurance or other resources to rebuild. Some buyout programs also provide other forms of assistance, such as temporary mortgage assistance or down-payment assistance, which can ease the transition into a new location. However, although the delays in implementing a buyout program and distributing payments are frustrating for everyone, they can prove particularly challenging for vulnerable individuals and families without access to other resources in the meantime.

Community relationships, sense of place, and social ties are often a particularly important resource and source of support. In areas such as the southern coastal areas of Louisiana, communities have a unique relationship with the land and a deeply rooted sense of place. Generations of families have made their living by fishing, shrimping, and other extractive activities. The loss of the extended family network would be traumatic, and individuals may not consider relocating without a plan to do so with their entire family. One survey in post-flood disaster communities reported that residents found it difficult to leave their community and family ties but also looked forward to the opportunity to relocate out of neglected neighborhoods or neighborhoods in decline.[130]

Federal Funding

The majority of funding for voluntary buyouts comes from federal sources, namely FEMA and HUD. The remainder is supplemented by state and sometimes private or nonprofit funding. FEMA's HMGP grants may be used for voluntary buyouts, but the acquired properties are required to be maintained as open space, and federal funding for future disaster relief on acquired properties

is prohibited. A state must submit an application for funding within 12 months of a federally declared disaster. Beforeapproving the application, FEMA must evaluate projects under the National Environmental Policy Act, the Endangered Species Act, planning and preservation laws, and White House Executive Orders on floodplain development and environmental justice. After approval, the state manages the grants through required Administrative Plans. The plans detail the state's processes and procedures for how it will staff and provide resources to manage an HMGP grant; how it will solicit and process applications and forward them to FEMA; and how it will manage projects.

FEMA also provides funding for voluntary buyouts through the Flood Mitigation Assistance Program (FMAP).[131] FMAP funds can also be used for property acquisitions, specifically severe repetitive loss properties (SRLP) and repetitive loss properties (RLP) that have NFIP insurance coverage. An SRLP is defined under two conditions: (1) Where four or more separate claim payments have been made under NFIP insurance coverage (each claim exceeding $5,000, and a total amount exceeding $20,000, (2) Where two separate claims that together exceed the market value of the insured structure. A RLP is defined where flood-related damage on two occasions caused the cost of repair, on average, to equal or exceed 25 percent of the market value at the structure; and by the second occasion, the contract for flood insurance contains coverage for increased cost of compliance (ICC). To acquire SRLP, FMAP provides 100 percent of all eligible costs. To acquire RLP, FMAP provides up to 90 percent of all eligible costs.

HUD's CDBG funds are also an important source of funding. Unlike HMGP funds, CDBG funds are not deed restricted, meaning that purchase property can be redeveloped.

Case Study: Cedar Rapids, Iowa

Cedar Rapids' Voluntary Property Acquisition program was established after the 2008 Flood, in partnership with the U.S. Army Corps of Engineers, the Iowa State Homeland Security and Emergency Management, U.S. Federal Emergency Management Agency, and the River Corridor Redevelopment Plan consultant group.[132] The program was open to anyone who owned residential or commercial property in three areas, based on location, land use, and funding availability.[133] The city outlined three primary goals of the property buyout program: to give affected homeowners the financial support to move on, to move people and property out of harm's way, and to build the flood control system. The proposed system will consist of a mix of concrete floodwalls,

earthen levees, removable floodwalls, wall openings to maintain neighborhood connections, and a levee greenway between flood control structures and the river.[134]

Map credit: ESRI, ArcMap 10.3.

At the time the buyout program was established, the city estimated that approximately 1,300 houses would be eligible for the buyout process and were divided into three areas:

- The Greenway Acquisition Area consists of the unprotected area between Cedar River and the proposed structural flood management system. There were 192 eligible properties, funded via FEMA's Hazard Mitigation Grant Program. Accepted properties must remain open space indefinitely.
- The Construction/Study Area consists of the area for potential construction of structural flood management measures, including floodwalls and levees. There were 554 eligible properties, funded by HUD's Community Development Block Grant Program.
- The Neighborhood Revitalization Area includes all flood-damaged neighborhoods. Eligible properties were those beyond reasonable repair, i.e., where it was not financially

feasible to rebuild. Of the 6,400 flood-damaged properties, 600 properties were eligible through the CDBG Program.

In total, the city completed 1,302 buyouts and demolished 1,181 structures and 539 accessory structures, relying on CDBG funding.[135] Residents expressed frustration at the slowness of the voluntary buyout program and other city recovery strategies.[136] While waiting for a buyout decision or new flood mapping, residents cannot move forward with plans to rebuild or relocate until they have a final determination on the status of their property. Low-income communities that rely on public assistance for post-disaster recovery are most affected by this period of limbo.[137] Residents also expressed frustration at the poor communication from officials and official agencies, including different answers from different officials to the same questions and having to ask multiple agencies for information instead of a one-stop shop approach to information and answers.[138] Finally, some residents expressed frustration with perceived favoritism toward the downtown area and businesses over homeowners and renters.[139] The overall post-flood recovery effort gave rise to feelings of cronyism, perpetual ill-treatment of certain areas, and long-standing neglect of poorer neighborhoods.[140]

The nonprofit Matthew 25 undertook its own property acquisition and rebuilding program, using private sources of funding. The organization saw that the public buyout program would take a long time, and community members perceived recovery efforts as primarily a top-down strategy without community-based leadership or involvement.[141] The organization focused on the vulnerable neighborhoods of Taylor and Time Check, whose residents are working class and low- to moderate-income. The neighborhoods were badly affected by the flood, but certain parts were located outside the construction zone for the proposed flood protection system and thus not a priority for the city's acquisition program. Matthew 25's Block-by-Block program worked by contacting residents on a targeted block and achieving participation from at least 60 percent of the residents. The organization assessed the damaged homes and residents' desire to stay or relocate. If a house could be rehabilitated, then Matthew 25 undertook the rehabilitation to allow residents to stay. Otherwise the organization offered a buyout to the homeowner. The program began with eight targeted blocks and eventually expanded to 25 blocks and more than 300 homes.

Case Study: New York and New Jersey

In the aftermath of Hurricane Irene, Tropical Storm Lee, and Superstorm Sandy,[142] the neighboring states of New York and New Jersey took different approaches to disaster recovery. Although both states implemented voluntary buyout programs, New Jersey's policies favored rebuilding and remaining on coastal lands while New York's policies favored voluntarily moving away from vulnerable areas.[143]

Under the New York Rising Buyout Program, owners of one- and two-unit dwellings in disaster-declared counties were eligible for voluntary buyouts by the state, using CDBG funds.[144] Although the 70 percent allocation to low- and moderate-income (LMI) communities was adjusted to 50 percent for this program, it still maintained funding priorities for LMI persons. These priorities included those with a household income of 80 percent or less than the area median income; elderly persons who are 62-years-old or older; persons with disabilities; persons receiving rental assistance through the Disaster Housing Assistance Program; persons with limited English proficiency; and persons suffering substantially damaged property (damage equals 50 percent or more of the property's fair market value).[145]

The NY Rising Buyout Program consists of both voluntary buyouts and voluntary acquisitions. Homeowners are eligible for standard voluntary buyouts for substantially damaged properties in certain high-risk areas along the water. The principal buyout criteria are areas with the highest risk of flood damages, the greatest vulnerability to future disasters, and the highest risk to people and property. If the property is located in an "enhanced buyout area," pre-designated and targeted buyout areas that meet the buyout criteria, the homeowner may receive incentive payments in addition to the standard buyout. The property must have substantial damage.

Homeowners who participate in a voluntary buyout are eligible to receive 100 percent of pre-storm fair market value, plus any available incentives of up to 15 percent. A 10 percent incentive is granted automatically if the homeowner is located in a targeted area, and a homeowner may receive an additional 5 percent if s/he relocates within the same county or within New York City.[146] The 5 percent incentive is intended to preserve the social networks and relationships of communities in vulnerable areas.[147] The buyout program also includes vacant or undeveloped land in the enhanced buyout areas. All properties are

maintained in perpetuity as coastal buffer zones or for non-residential or non-commercial uses.

The NY Rising Acquisition Program also includes voluntary acquisitions for properties located inside the 500-year floodplain but outside the areas of highest risk. These property owners receive 100 percent of *post*-storm fair market value, and they may also receive a state supplement with a resettlement incentive that equals at a maximum the difference between pre-storm and post-storm fair market value. The resettlement incentive allows homeowners to relocate to safer areas and recognizes, "the uncertainty of post-storm values of storm-damaged homes, relative to the high costs associated with relocation, therefore affording homeowners the maximum amount of assistance necessary to make this life-altering change."[148] Unlike buyout properties, private developers may subsequently purchase acquired properties and redevelop that property in a resilient manner according to stringent building codes.

Map credit: ESRI, ArcMap 10.3.

As of 2014, the NY Rising Buyout and Acquisitions program reports 505 properties participating, with $212 million disbursed for buyout and acquisition payments.[149] On Long Island (including Nassau and Suffolk counties), 226 properties have been acquired for a median payment of more than $395,000, 150 of which the state auctioned in May 2015. For buyouts, 90 properties in Suffolk county have been purchased for a total of $34 million.[150] On Staten Island, the State has purchased 170 properties for approximately $70 million

and, as of April 2014, was awaiting HUD review to proceed with an additional 130 properties.[151] One key to the success of the NY Rising Buyout and Acquisition program was the cooperation of individual homeowners and county and local governments.[152] On Staten Island, three communities—Fox Beach, Ocean Breeze, and Grand View—appealed directly to the state government for buyouts. For example, nearly 99 percent of residents in Fox Beach have participated in the buyout program. Historically, the area consisted of wetlands and salt marsh and a bowl-like topography that collected water even during routine storms. Nevertheless, the area was eventually paved over and slotted for development. In the middle of the twentieth century, neighborhoods for public housing and low-to-middle income housing were developed on Staten Island to provide affordable housing, albeit in the frequently flooded and polluted edges of New York City.[153]

After the devastation from Hurricane Sandy, local real estate developer and leader Joe Tirone serendipitously came across information about buyout programs elsewhere around the country and researched them. Eventually he brought these programs to the attention of local residents and helped organize a committee devoted exclusively to implementing a buyout program in Fox Beach. For local residents, one obstacle to participation was the potential that the acquired properties would be redeveloped as luxury condos rather than dedicated as open space. After it became clear that the ultimate purpose of the buyouts was to forever banish development and restore the natural functions of the coastal land, reluctant homeowners became interested in participating.[154]

New Jersey implemented a voluntary buyout program as well, called the Superstorm Sandy Blue Acres Program.[155] The program allocated $300 million for approximately 1,300 homes, including 1,000 properties in tidal areas affected by Superstorm Sandy and 300 properties in other towns that flood repeatedly. The buyouts target clusters of homes or entire neighborhoods, and the acquired properties are maintained as open space. The Blue Acres program was originally established in 1995, and the Superstorm Sandy program was launched in May 2013. Through November 2014, the program acquired more than 200 homes and made more than 500 offers.[156] Critics raised concerns that this program ignored vulnerable coastal properties subject to repetitive flooding, focusing instead on riverine communities.[157] Unlike the buyout programs for communities in Staten Island, New York, coastal communities in New Jersey were unwilling to participate collectively in the buyout program, reducing the overall benefit of buyouts to create permanent shoreline buffers.[158]

Communication and Outreach

After the 2008 flood in Cedar Rapids, the city immediately began reaching out to affected communities to assess damage and needs. The outreach strategy evolved: Initially, the city held large public forums but soon switched to smaller events where they set up a table alongside other disaster relief organizations. According to interviewees, the public forums were not effective because residents needed to tell their story and be heard; although the flood was common to the city, each individual had a different experience. The tabling events, along with individual outreach, allowed residents to be heard on an individual basis and allowed residents who were interested in buyouts to approach city officials for information. Eventually, communication about the program was further facilitated by assigning a case manager to each case.

For the residents in Fox Beach who appealed to the state of New York for property buyouts, communication about the program began at the community level.[159] Community leaders then formed a committee dedicated solely to property buyouts, building on data and information gathered as a result of past disaster events. Community leaders drew on personal connections to city and state officials to appeal for the pilot buyout program.[160]

Later, as the program expanded, residents in other parts of the state expressed some frustration with the communication of the NY Rising programs. Some interviewees observed that information and resources were haphazardly disseminated to LMI communities.[161] They noted that community organizations were vital in distributing information, which the organizations obtained through personal connections to agency officials or other sources of official information. For example, one interviewee cited the role of community organizations in notifying citizens about the deadline for filing an application for a buyout. The state called on NGOs to let people know about the deadline. NGOs in one community distributed 1,000 lawn signs and knocked on doors to help spread the information, providing literal boots on the ground to communicate critical information.[162]

Lessons Learned and Best Practices

The voluntary buyout programs in Cedar Rapids and along the East Coast, in addition to others that have taken place around the country, are necessarily different in origins, process, and goals. Buyouts are a long-term, nonstructural adaptation strategy for climate change impacts—namely, the increased likelihood of flooding from severe weather events or sea level rise—but the

appeal may align more with regional, state, or national goals rather than local or individual goals. For example, buyouts will save federal and state dollars by eliminating periodic payments to repetitively flooded properties, but local governments or officials may protest the loss of part of the tax base or development opportunities, and local citizens will resist the inevitable loss of community. Although every disaster is unique, common lessons and best practices are instructive.

For homeowners, various factors motivate participation in voluntary buyout programs, including repeated or extreme disasters, adequacy of buyout compensation, participation and control in decision-making, and individual financial circumstances. For example, communities in Staten Island had experienced a series of successive disasters, including flooding from major storms and nor'easters and dangers from brushfires, before reaching the point of buyouts. On the other hand, homeowners in Cedar Rapids experienced one disaster that was extremely devastating and unexpected (although the city has flooded in the past), motivating the city to develop new flood protection plans that required purchasing flooded properties.

Another important factor is participants' perceived adequacy of the buyout compensation, including any additional incentives that may be available. Buyout programs tend to offer the pre-disaster fair market value for the property, but participants must also factor the costs of relocation and existing financial obligations on the property. For example, in both Cedar Rapids and New York, homeowners who owed more on the mortgage than the fair market value for the property would likely not receive enough to pay off the mortgage. Other homeowners did not have flood insurance, so they participated in the buyout because it was the best financial offer they could have received. In both regions, the buyout programs included incentives or additional funding for relocation or down-payment assistance or for relocating within certain boundaries.

The buyout program must also meet specific local needs and desires. Local leaders in Fox Beach organized neighborhood residents who, as a group, expressly wanted the state to buyout their properties. Some of these residents had lived in the same houses since childhood and had extended families nearby but nevertheless agreed that the future risk was not worth it.[163] Of the 185 houses in the area, more than 180 participated in the buyout program that was community-initiated and community-led. Participation in Matthew 25's Block by

Block program was similarly high, in part because the program built from community leadership and responded to community needs. In both these situations, the buyout programs were embraced first by the affected property owners who felt ownership in and responsibility for the program.

Finally, regardless of the compensation or likelihood of future disasters, some homeowners will always want to stay and will not participate in buyout programs. Here, too, the reasons are numerous: sentimental or personal reasons, financial reasons, a lack of trust in the government, or frustration or impatience with the process. Local government officials may be hesitant to support buyout programs because they relinquish existing development and the opportunity for future development, or otherwise do not want to retreat from coastal or riparian areas.[164]

In both Cedar Rapids and New York, interviewees expressed the need for rapid and immediate financial assistance that comes in tandem with decision-making support and clear rules and regulations. Immediately after a disaster, prolonged delays can create secondary disasters as individuals wait for assistance and remain in limbo about how to proceed. However, even when disaster money is distributed quickly, state and local governments must also provide technical assistance on how to spend the money within the applicable rules so that applicants are not later disqualified from other funding assistance by duplication of benefits rules.[165] In Cedar Rapids, for example, interviewees praised the relatively rapid response from federal officials but noted that the rules about how to spend the first-round of funds were unclear. Some community members spent their funds on ineligible items, or failed to keep receipts or other paperwork, which resulted in decreased funds or hampered efforts to get additional relief funds later as part of the buyout process. In both places, interviewees noted that, particularly in low-income communities, buyout payments represented a year's worth of salary or a sizable amount of money, and some residents would have benefitted from help with managing that money and decision-making in compliance with federal requirement to prevent disqualification from future funding.

Another lesson learned from the voluntary buyout programs is the importance of leadership, both from within the community and from outside the community. Interviewees in Cedar Rapids cited the local city government leadership as key. At the time of the 2008 Flood, the city had recently changed forms of government, ushering in leaders who were willing to make bold policy

decisions after the flood. Fortunately, those decisions paid off, paving the way for other bold and brave decisions. On Staten Island, community leaders who organized the buyout effort benefitted from great mentorship and advice from other communities that had experienced flooding and buyouts. In addition, the NY Rising program brought in experienced colleagues from Cedar Rapids to help structure and advise the implementation of buyout programs in New York. These personal connections, as well as personal relationships with other government officials, were extremely important.

Finally, one interviewee noted that in some ways LMI individuals are quite resilient. Certainly flooding disasters are great equalizers, but those who have more access to resources tend to fare better and recover more quickly than those without. However, LMI individuals have often experienced a lifetime of hardships and tragedies and may, in some instances, be better equipped to move on from a natural disaster like flooding.

From these lessons, the following best practices are important to keep in mind:

Empower communities by collaboratively and cooperatively designing voluntary buyout programs

Compared to other nonstructural adaptation strategies, voluntary property buyouts and acquisitions are especially controversial and personal and may create divisions among neighbors. Developing these programs with community involvement can help alleviate these strains because homeowners feel empowered to make the best decisions for themselves. The strategy is less effective without participation by similarly situated property owners; piecemeal acquisition of properties along the coast, for example, does not provide continuous buffer protection.

After Superstorm Sandy, communities in Staten Island, NY, actively sought out buyouts that the vast majority of community neighbors had previously agreed to. Participation was high because of the clear community desire for the program and the community involvement in advocating for the program. In Cedar Rapids, the process of undertaking buyouts demonstrated to the residents and business community that the city was serious about rebuilding and reinvesting in the city, so the program had an ancillary benefit of retaining residents and businesses.

Although this white paper does not discuss buyout programs in Louisiana, one example is helps illustrate the tensions that arise without community

involvement: After Hurricane Katrina, unofficial maps produced by non-governmental organizations showed low-lying residential areas converted to wetlands or green space. These maps were published prior to the introduction of the Road Home program, which included buyouts and relocating in or out of state as part of Options 2 and 3, respectively. However, the affected and neighboring communities perceived the plans depicted in the maps as outright denying the residents the right to return, without consulting them, and as decreasing the value of surrounding residential property.[166] Accusations arose that alleged efforts to dispossess landowners in favor of industrial development or green space.[167] Buyout programs in Louisiana have been met with great resistance from communities who perceive buyout attempts as efforts to further gentrify primarily low-income neighborhoods and marginalize socially vulnerable communities.[168]

Maintain discussions about a voluntary buyout program both separately from other post-disaster recovery discussions and among community members interested in participating

Because voluntary buyout programs raise many sensitive issues, a local government may find it helpful to identify interested homeowners and meet with them separately from more general public discussions of post-disaster recovery. After a series of open public meetings, city officials in Cedar Rapids began holding smaller tabling events at various locations so that those interested in buyouts could approach them. In Fox Beach, local leaders designated specific and separate meetings for homeowners interested in the buyout program so as to not conflate various issues that would invariably engender conflict and confusion.

Allow flexibility to tailor buyout programs to local needs and goals

Voluntary buyouts illustrate a tension between national goals and local values and desires. At a national level, voluntary buyout programs are beneficial because they permanently remove people and property from harm's way. However, implementation occurs at the local level and is a sensitive issue with residents who have historical and family ties to the land and water. Federal funds, which provide the bulk of funds for these programs, often have restrictions that are incompatible with local needs or desires. For example, using HMGP funds to acquire property requires a deed restriction to maintain the property as open space, whereas a community may want to retain development rights. Other communities may feel strongly about maintaining public access to water, fishing, and other recreational uses of bought-out coastal property.

Accommodating local needs is critical in achieving participation in buyout programs and meeting those local needs or desires.

Provide post-buyout support

In both case studies, the buyout programs included financial incentives to assist program participants with relocation expenses. These incentives were helpful in encouraging residents to participate. However, buyout programs should also consider non-financial support systems to help program participants who relocate to new areas or communities. For example, programs could help homeowners identify similarly priced neighborhoods with the necessary social services and support to ease the transition.

Best Practices for Implementing Nonstructural Adaptation Strategies in Vulnerable Communities

Despite the differences in geography and demographics, the case studies have common, overarching best practices for implementing nonstructural adaptation strategies in vulnerable communities. These communities often exist at the fringes of a more affluent, educated, and connected population. Although flood damage occurs regardless of socio-economic status, recovery from and resilience to flooding is closely tied to socio-economic status. In all three case studies, regardless of the nonstructural adaptation strategy implemented, those with independent financial resources and social or political connection fared better in nearly all aspects of recovery. Public disaster assistance programs should recognize this inequality in designing and implementing disaster relief.

Overarching best practices for implementing and administering nonstructural adaptation strategies in vulnerable communities emerged from the different case studies. For vulnerable communities, delays in receiving disaster assistance can be devastating because these individuals and communities frequently do not have independent financial resources to bide time in the interim. Minimizing the time for implementing disaster relief programs and disbursing aid is crucial.

Be Prepared for the Next Disaster

"Be prepared" is simple and fundamental imperative that requires tremendous work for state and local governments to achieve adequate preparation. Pre-disaster planning and mitigation prompts governments to assess risks from natural hazards, to identify pre-disaster actions to reduce those risks, and to assess both public and private resources before and after an event. Identifying post-disaster recovery strategies and rebuilding designs that incorporate smart planning and low-impact development in advance allows a local government to respond quickly and decisively after a disaster, saving valuable time and resources.

States should work with local governments to encourage development of pre-disaster plans. As in Louisiana, significant federal funds may be available but sit unallocated and unused if communities—especially those that would benefit the most from pre-disaster risk reduction—are unaware or otherwise stymied by the application process.

For voluntary buyout programs, being prepared means considering this strategy prior to the next disaster and gathering information about different

communities' experiences and federal funding requirements and restrictions. Even identifying voluntary buyouts as a potential adaptation strategy and understanding what a buyout program would mean would be a good start.

Gather preliminary data and assess community and individual needs as soon as possible after a disaster

In the aftermath of a disaster, chaos reigns. Public officials and private individuals are faced with myriad decisions, options, problems, and needs, sometimes without a clear strategy to address all these issues. What can always be done, however, is collecting information about disaster impacts and conducting needs assessments. This information is helpful for public officials to obtain a broad picture of the impacts of a disaster and its effects. The information can later be used to request federal funds and, hard data and numbers increase the likelihood of obtaining adequate funding to meet demonstrated needs. Tools such as the CDC's Social Vulnerability Mapping Index provide a basic snapshot of a community and can be accompanied by on-site observation, both pre- and post-disaster.

Develop a targeted communication strategy for reaching out to vulnerable communities

In the aftermath of a disaster, communication and outreach to the public—particularly vulnerable communities—is critical. The strategies may necessarily evolve from the immediate aftermath of a disaster to the later stages of relief and recovery efforts. Information about voluntary property acquisitions is complex, and flood victims may be operating in a heightened or traumatized mental state immediately following a disaster. Thus, state and local governments should focus on clearly communicating critical information. NGOs and other organizations may play an important role in disseminating information as well. For vulnerable communities, poor communication may stem from a lack of access and power: The lack of ties to city officials or other sources of reliable, fully up-to-date information leads to reliance on information based on hearsay, assumption, and other informal and potentially inaccurate sources of information.[169]

Socially vulnerable communities have specific communication needs because of limited access to information, logistics of accessing the information, language skills, and the disproportionate impact of delayed assistance. The communication strategy from governmental agencies may evolve, beginning with one-way, top-down information dissemination in the immediate aftermath

of a disaster. This strategy is effective for mass distribution of information that is widely applicable. State and local governments should maintain up-to-date websites and other social media feeds that provide a single stop for accurate information. NGOs play an important role in disseminating information through their formal and informal networks. Later, after the initial information blast, the communication strategy should evolve into a two-way dialogue in smaller settings, working cooperatively with a community to identify needs and how to rebuild. At best, the community already has pre-existing, pre-disaster plans that can now be implemented.

The communication strategy should be trauma-informed. Where perhaps handouts and mail notices might work in a normal situation, disaster victims tend to be in a heightened, fragile mental state that may require special and individualized ways to communicate. Assigning a dedicated caseworker is important. Interviewees in New Orleans said that the emotional toll of reliving the trauma with every phone call to inquire or obtain financial assistance caused many to give up in frustration, whereas a single caseworker could function as a one-stop place to both be heard and get information.

For vulnerable communities, the communication strategy should include logistical considerations, such as language differences, the location of the meeting, and the accessibility of the meeting. In Cedar Rapids, city officials made sure that public transportation options were available, and operating, to allow residents to attend the meetings.

Integrate non-governmental organizations into adaptation strategies

Again and again, interviewees—both government officials and representatives of community organizations—emphasized the importance of non-governmental organizations (NGOs) and praised their work. These organizations may include local branches of national organizations, local non-profits, and faith-based organizations. These organizations play a key role in disseminating information and resources, reaching out to fellow residents, and implementing disaster relief. They frequently already have ties and connections to socially vulnerable individuals and families that pre-date the disaster. Community members already trust these organizations, whereas they may fear or distrust governmental entities based on, for example, deportation concerns for undocumented immigrants or a history of negative interactions with law enforcement or other groups. They are often staffed by people who live and

work in the communities they serve and are invested in the long-term success of their communities.

State and local governments should include NGOs as a fundament part of the strategy to develop and implement nonstructural adaptation strategies, providing both funding, technical, and information resources to these organizations. NGOs bring resources and agility that can help accelerate distribution of disaster relief. For example, they tend to already have networks of volunteers who can go door-to-door to provide information or gather information, for example, and tend to be more nimble and capable of responding more quickly than governmental agencies. They operate independently and nimbly and can deliver assistance in creative, flexible, and responsive ways.

Tailor programs to local needs

Nonstructural adaptation strategies, whether physical such as property buyouts and elevation or nonphysical such as pre-disaster planning, must be tailored to fit local needs and to align with local goals for rebuilding. No single nonstructural adaptation strategy will likely meet the needs of a community, and nonstructural adaptation strategies should help a community achieve its medium- and long-term goals for growth and development. Interviewees expressed frustration with the inflexible requirements of federal disaster assistance, noting that federal agencies have a national constituency to appease and national goals to achieve, which do not necessarily match the needs and desires of the local community. For example, buyout programs may save the federal National Flood Insurance Program (NFIP) from making repeated payments to the same properties, but local communities may strongly identify with being close to the coast despite the risk. Tailoring programs to local needs is also a way to ensure local involvement and investment in the outcomes of the adaptation strategy.

Recognize and address the underlying conditions that predate the disaster

For many vulnerable communities, the impacts of a natural disaster compound underlying conditions in the community such as poverty, household instability, financial instability, substance abuse, and personal and mental health issues. Indeed, not recognizing a housing market with racial bias before Hurricane Katrina had both equity and legal ramifications in and around New Orleans. Although disaster assistance is not intended to address these conditions directly, federal agencies and local leaders should identify strategies for

rebuilding and recovery with ancillary benefits of improving these underlying conditions. For example, some communities in Hurricane Sandy employed temporarily out-of-work residents in rebuilding efforts; other assistance programs promoted homeownership and provided mortgage and down-payment assistance. After floodwaters receded, many communities find themselves left with a clean slate on which to rebuild, and the goals of rebuilding should include addressing these underlying conditions to improve community resilience for future disasters.

Maintain a catalogue of lessons learned and best practices about different nonstructural adaptation strategies

With the disaster and its immediate impacts long past, many communities compile best practices and lessons learned for future disasters and to help other communities that experience the similar events and are seeking guidance. Sometimes these practices are compiled as part of federal reporting requirements. Mandatory or not, all communities should maintain a catalogue of lessons learned and best practices so that affected communities can learn from the real-world, on-the-ground experiences of other communities. These experiences may reveal otherwise minor details that ultimately made a significant difference in implementing or administering a given program, but those details may not appear in federal handbooks or guidance. Guidance from real-world experience may also save communities from wasting valuable time and resources. Many resources are available online, but a centralized compendium of best practices or a list of contacts specific to nonstructural adaptation strategies would help interested communities.

Conclusion

The case studies in this white paper demonstrate the importance of specifically reaching out and targeting vulnerable communities so they can receive the intended benefits of these programs. Delays are particularly devastating for vulnerable households and communities because they lack personal or other resources to draw from while waiting for federal and state assistance. Underlying conditions in vulnerable communities also tend to worsen with disaster impacts. Rebuilding actions and plans should account for and address, as much as possible, these conditions with an eye toward increasing community resilience. Obtaining community input and increasing community involvement are essential in implementing these strategies, particularly for voluntary property buyouts where clusters of properties are preferred to individual, scattered properties.

Future research should conduct additional comparative research into the implementation and long-term benefits of nonstructural adaptation strategies in vulnerable communities, as well as examining how these strategies directly and indirectly affected renters, many of whom are LMI. Future research could also provide more quantitative data regarding the percentage of LMI individuals whose needs were or were not met by the various funding programs, as well as the gender-based differences that motivated homeowners to decide to elevate their homes or accept a voluntary buyout offer. The case studies here were largely limited to flooding disasters and their impacts, but future research could examine disasters with more random and unpredictable patterns, such as tornadoes and wildfires, that do not necessarily affect an entire region. More research is also warranted on how disaster relief programs can be used to address underlying socio-economic conditions in vulnerable communities.

Ultimately, however, vulnerable communities should not be simply reduced to their vulnerabilities. In the face of disaster, many individuals and communities display strength, resilience, and resourcefulness, qualities gained from dealing with hardships throughout their lives, living on land that is constantly changing, and surviving multiple natural disasters. Nonstructural adaptation strategies should capitalize on these personal resources by providing financial and technical assistance to help these communities rebuild to weather the impacts of climate change.

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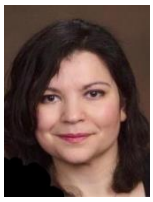

Nowal Jamhour is a third-year law student at Loyola New Orleans Law School, specializing in environmental law and social justice and experienced in disaster mental health. She witnessed firsthand the effects of Hurricane Katrina on both the New Orleans area as a resident and the Mississippi coast as a clinical psychology intern.

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Endnotes

[1] *See* National Wildlife Federation, *Higher Ground: A Report on Voluntary Property Buyouts in the Nation's Floodplains* (1998). Available at http://www.nwf.org/pdf/Water/199807_HigherGround_Report.pdf. 221 pp; U.S. HUD, "Voluntary Acquisition vs. Involuntary Acquisition of Property." http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/affordablehousing/training/web/relocation/acquisition (n.d.). Last visited August 28, 2015.

[2] David Salvesen, *Session No. 4: Breaking the Disaster Cycle: Future Directions in Natural Hazard Mitigation.* FEMA Training Course (September 19, 2003). Available at https://training.fema.gov/emiweb/downloads/breakingdisastercycle/session04-revised.pdf. 24 pp.

[3] Salvesen, 2003.

[4] Carolyn Kousky and Howard Kunreuther, *Addressing Affordability in the National Flood Insurance Program* (December 2013). University of Pennsylvania, Risk Management and Decision Processes Center, Working Paper #2013-12. Available at http://opim.wharton.upenn.edu/risk/library/WP2013-12_Affordability-NFIP_CK-HK.pdf. 24 pp.

[5] *See* FEMA, "Homeowner Flood Insurance Affordability Act: Overview" (April 3, 2014), http://www.fema.gov/media-library-data/1396551935597-4048b68f6d695a6eb6e6e7118d3ce464/HFIAA_Overview_FINAL_03282014.pdf. 5 pp. *See also* FEMA, "Biggert-Waters Flood Insurance Reform Act of 2012 (BW12) Timeline" (April 17, 2013), http://www.fema.gov/media-library-data/20130726-1912-25045-8239/bw_timeline_table_04172013.pdf. 2 pp.

[6] Deirdre Fernandes, Rich Towns Pay Less for Flood Coverage, Study Finds, THE BOSTON GLOBE (June 3, 2015); Chad McGuire, Michael Goodman, and Jason Wright, Subsidizing Risk: The Regressive and Counterproductive Nature of National Flood Insurance Rate Setting in Massachusetts (June 2015). University of Massachusetts Dartmouth, Public Policy Center Working Paper Series, Working Paper No. ENV-2015-01. Available at http://publicpolicycenter.org/wp/wp-content/uploads/2015/06/PPC_ENV_2015_01_FInal.pdf. 16 pp.

[7] FEMA, Emergency Management Institute, "Session 15: Comparative Emergency Management, Nonstructural Mitigation" (n.d.). Available at http://www.training.fema.gov/hiedu/docs/cem/comparative%20em%20-%20session%2015%20-%20unstructural%20mitigation.doc. 18 pp.

[8] Moser et al., 2014.

[9] Hurricane Betsy caused 76 deaths, 164,000 New Orleans homes to flood, and forced residents to their rooftops to escape the rising waters. Ten or more days passed before the water level in New Orleans receded and even longer to restore flooded houses to a livable condition.

[10] U.S. National Oceanic and Atmospheric Administration (NOAA), *State of the Coast, The Gulf of Mexico at a Glance: A Second Glance* (2011). Available at http://stateofthecoast.noaa.gov/features/gulf-of-mexico-at-a-glance-2.pdf. 58 pp.

[11] The Social Vulnerability Index (SoVI) uses U.S. Census data to calculate variability in vulnerability based on poverty, age, family structure, location, foreign-born status, wealth, gender, Native American status, and occupation. The SoVI was developed by the U.S. Centers for Disease Control and is one of many tools that geographers and demographers use. Although no tool is perfect, the SoVI is useful for the purposes of this white paper. *See* Social Vulnerability Index (SVI) Mapping Dashboard, http://svi.cdc.gov/map.aspx.

[12] State of Mississippi, Office of the Governor, *Three Years After Katrina* (n.d.). Available at http://mississippirenewal.com/documents/GovKatrinaThreeYearReport.pdf. 28 pp.

Endnotes (cont'd)

[13] The Steps Coalition, *Mississippi CDBG Recovery Fund Report Card and Recommendations* (January 2008). Available at http://mscenterforjustice.org/sites/default/files/pdfs/katrina%20report%202nd%20anniversary.pdf. 12 pp.

[14] In St. Bernard and Plaquemines Parishes, 75 percent and 72 percent of owner-occupied housing units were damaged, while 97 percent and 111 percent of renter-occupied buildings were damaged. The percentages suggest that more rental units existed post-Katrina than were counted in the 2000 census. In Orleans Parish, such a trend is not readily apparent: 76 percent of owner-occupied and 67 percent of renter-occupied units were damaged. However, these data fail to take into account boarders and other cohabitation arrangements that may be assumed more prevalent in the urban areas of the city than in the surrounding suburbs and small towns. U.S. HUD, Office of Policy Development and Research, *Current Housing Unit Damage Estimates: Hurricanes Katrina, Rita, and Wilma* (February 12, 2006). Available at http://www.huduser.org/publications/pdf/GulfCoast_Hsngdmgest.pdf. 45 pp. Jeff Adelson, Katrina Changes City's Ethnic Composition. The Advocate (July 11, 2015). Available at http://theadvocate.com/news/12479410-172/katrina-changed-the-citys-and.

[15] Personal communication.

[16] Adelson, 2015.

[17] Federal Emergency Management Agency (FEMA), News Release, "FEMA Temporary Housing Program Ending for Families of Hurricanes Katrina and Rita." Release No. 1603-845 (April 7, 2009). Available at http://www.fema.gov/news-release/2009/04/07/fema-temporary-housing-program-ending-families-hurricanes-katrina-and-rita.

[18] Richard A. Webster, New Orleans Public Housing Remade after Katrina. Is it Working?, THE TIMES-PICAYUNE (August 20, 2015).

[19] Although the most recent severe and significant flooding occurred in June 2008, other contemporary flooding events occurred in April 1993, July 1999, and May 2004. In Cedar Rapids, these flooding events reached between the 18.3 and 19.27-foot flood stage. City of Cedar Rapids, *Other Social Effects: City of Cedar Rapids, Iowa – Flood of 2008* (June 7, 2010). Available at http://www.cedar-rapids.org/city-news/flood-recovery-progress/Documents/Other%20Social%20Effects%20Report%2011.15.10.pdf. 78 pp.

[20] Nicole T. Carter, *Federal Flood Policy Challenges: Lessons from the 2008 Midwest Flood*. CRS Report R40201 (February 7, 2009). http://www.floods.org/PDF/2008_MidwestFloods/CR_Lessons_Learned_from_the_2008_Midwest_Flood.pdf. 43 pp.

[21] James A. Smith, Mary Lynn Baeck, Gabriele Villarini, Daniel B. Wright, and Witold Krajewski, *Extreme Flood Response: The June 2008 Flooding in Iowa*. 14 J. HYDROMETEOROLOGY 1810–1825 (2013). doi: 10.1175/JHM-D-12-0191.1.

[22] Smith et al., 2013.

[23] Carter, 2009.

[24] Carter, 2009.

[25] City of Cedar Rapids, "Flood of 2008 Facts and Statistics." http://www.cedar-rapids.org/government/departments/public-works/engineering/Flood%20Protection%20Information/Pages/2008FloodFacts.aspx (last updated 2014).

[26] City of Cedar Rapids, "Flood of 2008 Facts and Statistics," 2014.

[27] City of Cedar Rapids, "Flood of 2008 Facts and Statistics," 2014.

[28] Carter, 2009.

[29] Associations of Collegiate Schools of Architecture, "Affordable Housing & Disaster Resilience: Cedar Rapids, Iowa," http://www.acsa-arch.org/resources/faculty-resources/curriculum-research/housing-programs/housing-disaster-resilience-cedar-rapids-ia/background (last updated n.d.). Last visited September 9, 2015.

[30] City of Cedar Rapids, *Other Social Effects*, 2010.

Endnotes (cont'd)

[31] City of Cedar Rapids, *Other Social Effects*, 2010.
[32] City of Cedar Rapids, *Other Social Effects*, 2010.
[33] What began as Hurricane Sandy eventually lost hurricane-force strength as it moved northward along the Atlantic Coast. However, it merged with an Arctic cold front that dipped unusually far south, ultimately producing the second-largest Atlantic storm on record.
[34] Susanne C. Moser, Margaret A. Davidson, Paul Kirshen, Peter Mulvaney, James F. Murley, James E. Neumann, Laura Petes, and Denise Reed, "Ch. 25: Coastal Zone Development and Ecosystems," in *Climate Change Impacts in the United States: The Third National Climate Assessment* (Jerry M. Melillo, Terese (T.C.) Richmond, and Gary W. Yohe, Eds., 2014). 841 pp. doi:10.7930/J0Z31WJ2.
[35] U.S. Department of Housing and Urban Development (HUD), Hurricane Sandy Rebuilding Task Force, *Hurricane Sandy Rebuilding Strategy: Stronger Communities, A Resilient Region* (August 2013). Available at http://portal.hud.gov/hudportal/documents/huddoc?id=hsrebuildingstrategy.pdf. 208 pp.
[36] 79 Fed. Reg. 13,970 (March 12, 2014).
[37] 79 Fed. Reg. 13,970 (March 12, 2014).
[38] FEMA, Hazard Mitigation Assistance Guidance (February 27, 2015). Available at http://www.fema.gov/media-library-data/1424983165449-38f5dfc69c0bd4ea8a161e8bb7b79553/HMA_Guidance_022715_508.pdf. 162 pp.
[39] U.S. HUD, "Community Development Block Grant Program – CDBG." http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/communitydevelopment/programs (n.d.). Last visited September 14, 2015.
[40] Eugene Boyd, *Community Development Block Grant Funds in Disaster Relief and Recovery* (September 21, 2011). Congressional Research Service RL 33330. Available at https://www.fas.org/sgp/crs/misc/RL33330.pdf. 15 pp.
[41] U.S. HUD, "Community Development Block Grant Program – CDBG," http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/communitydevelopment/programs (last updated n.d.). Last visited September 14, 2015.
[42] U.S. HUD, "Community Development Block Grant Program – CDBG," 2015.
[43] U.S. HUD, "Community Development Block Grant Program – CDBG," 2015.
[44] Public Law 106-390 (October 30, 2000). The Stafford Act is the overarching federal disaster relief law, enacted in 1988 to provide an orderly and continuing means of federal assistance to states affected by disasters. 42 U.S.C. § 5121 et seq.
[45] 79 Fed. Reg. 22873 (April 25, 2014).
[46] City of New Orleans, Office of Homeland Security Emergency Preparedness, *Orleans Parish, Louisiana – 2010 Hazard Mitigation Plan Update* (March 7, 2011). Available at http://www.nola.gov/getattachment/Hazard-Mitigation/Hazards-and-Planning/Orleans-Parish-2010-Hazard-Mitigation-Plan-Final-032311.pdf. 421 pp.
[47] For more information about disaster relief funding, *see* Bruce R. Lindsay, *FEMA's Disaster Relief Fund: Overview and Selected Issues*. Congressional Research Service R43537 (May 7, 2014). Available at https://www.fas.org/sgp/crs/homesec/R43537.pdf. 30 pp.
[48] Personal communication.
[49] Personal communication.
[50] U.S. Census Bureau, American Community Survey 2014 Block Group Median Household Income in the Last 12 Months.
[51] The Data Center, "Lower Ninth Ward Statistical Area," http://www.datacenterresearch.org/data-resources/neighborhood-data/district-8/lower-ninth-ward/ (last updated March 28, 2014).
[52] The Data Center, "Lower Ninth Ward Statistical Area," 2014.
[53] "Hurrication" is a popular term in New Orleans that refers to the forced vacation due to an approaching hurricane.

Endnotes (cont'd)

[54] Robert X. Fogarty, Connie Nguyen, Nicolette Pavlovics, Victoria Harrison, Carol Short, Thomas Montz, and Ashley McConnell, *Five Years Later: Emergency Preparedness in New Orleans, Louisiana, since Hurricane Katrina* (January 2011). Gulf Center for Evacuation and Transportation Resiliency. Available at http://www.evaccenter.lsu.edu/pub/10-02.pdf. 84 pp.

[55] *See* Mtangulizi Sanyika, "Katrina and the Condition of Black New Orleans: The Struggle for Justice, Equity, and Democracy" and Mafruza Khan, "The Color of Opportunity and the Future of New Orleans: Planning, Rebuilding and Social Inclusion after Hurricane Katrina," in RACE, PLACE, AND ENVIRONMENTAL JUSTICE AFTER HURRICANE KATRINA (Robert D. Bullard and Beverly Wright, eds.). Boulder, CO: Westview Press, 2009; and Alice Kaswan, *Domestic Climate Change Adaptation and Equity*, 42 Envt'l L. Rep. News & Analysis 11125 (2012).

[56] Fogarty et al., 2011.

[57] For more information *see* City of New Orleans, "NOLA Ready," http://www.nola.gov/ready/, the website devoted to hurricane preparedness. State of Louisiana, *Official Louisiana Hurricane Survival Guide* (n.d.). Available at http://www.lsp.org/pdf/LAHurricaneGuides2011.pdf. 16 pp. For a discussion of how evacuation plans affected men and women and lingering problems with New Orleans' evacuation plan, *see* Pamela Jenkins, John L. Renne, and John Kiefer, *Gender Differences in Self-Reported Evacuation Experiences: Analysis of the City Assisted Evacuation Program During Hurricane Gustav*, in WOMEN'S ISSUES IN TRANSPORTATION, SUMMARY OF THE FOURTH INTERNATIONAL CONFERENCE, VOLUME 2: TECHNICAL PAPERS (October 27-30, 2009). Transportation Research Board of the National Academies: Washington, D.C.

[58] The amount of unobligated funds was actually $1.1 billion at the start of the audit, but decreased to $812 million over the course of the study. U.S. Department of Homeland Security (DHS), Office of the Inspector General (OIG), *FEMA and the State of Louisiana Need to Accelerate the Funding of $812 Million in Hazard Mitigation Grant Program Funds and Develop a Plan to Close Approved Projects*. OIG-14-150-D (September 2014). Available at https://www.oig.dhs.gov/assets/GrantReports/2014/OIG_14-150-D_Sep14.pdf. 18 pp.

[59] DHS OIG, *Accelerate the Funding*, September 2014.

[60] DHS OIG, *Accelerate the Funding*, September 2014.

[61] The Louisiana coast shifts, gains, and loses land on an annual timescale, and property rights on coastal lands are "a bit problematic" and characterized by uncertainty. Mark Davis, *A Whole New Ballgame: Coastal Restoration, Storm Protection, and the Legal Landscape After Katrina*, 68 La. L. Rev. 419 (2008). The ACOE made the wetlands determination under section 404 of the Clean Water Act, which defines wetlands as "[t]hose areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for lie in saturated soil conditions." The three technical criteria specified are mandatory and must all be met for an area to be identified as wetland. This means the area possesses the three essential characteristics necessary for wetland identification: (1) hydrophyte vegetation, (2) hydric soils, and (3) wetland hydrology. The ACOE recognizes the need to use eminent domain in certain circumstances to implement nonstructural risk reduction measures and ecosystem restoration projects in the draft Southwest Coastal Louisiana project. U.S. ACOE, Mississippi Valley Division, New Orleans District, *Revised Integrated Draft Feasibility Report and Environmental Impact Statement* (March 2015). Available at http://www.mvn.usace.army.mil/Portals/56/docs/PD/Projects/SWCoastal/2015/2015-03SWCDraftIntegratedReportandEIS.pdf. 148 pp. *See also* Lonatro v. Orleans Levee District, No. 11-357, 2011 WL 3513726 (E.D. La. August 11, 2011); Mark Schleifstein, *Bellaire Drive Property Owners Win Round in Lawsuit Over 17th Street Canal Work*, THE TIMES-PICAYUNE (August 11, 2011); and Michael Grunwald, *The Threatening Storm*, TIME (August 2, 2007).

[62] Devlin Barrett, U.S., BP Finalize $20.8 Billion Deepwater Oil Spill Settlement, THE WALL STREET JOURNAL (October 5, 2015).

Endnotes (cont'd)

[63] U.S Dept. of Commerce, National Oceanic and Atmospheric Administration, *Service Assessment: Hurricane Katrina, August 23-31, 2005* (June 2006). Available at http://www.nws.noaa.gov/om/assessments/pdfs/Katrina.pdf.

[64] Personal communication. This interviewee cited the minimum years active requirement as a deterrent to applying for an unspecified grant, noting that later rule changes allowed the interviewee's organization to apply. The interviewee also observed that national NGOs successfully applied for grants because they had experienced grant-writing staff and other technical resources that local community-based organizations did not. In addition, language barriers and misunderstandings may have discouraged community groups from applying or even pursuing funding.

[65] The Data Center, "Village de l'est [sic] Statistical Area," http://www.datacenterresearch.org/data-resources/neighborhood-data/district-10/Village-de-lest/ (last updated March 28, 2014).

[66] City of New Orleans, Press Release, "Mayor launches $52 million First-Time Homebuyer Initiative to Promote Neighborhood Redevelopment" (October 27, 2011). Available at http://www.nola.gov/getattachment/SoftSeconds/release52Msoftseconds102711.pdf/. 6 pp.

[67] Louisiana Recovery Authority, "First-Time Homebuyers Program," http://lra.louisiana.gov/index.cfm?md=pagebuilder&tmp=home&pid=120 (last updated n.d.). Last visited September 10, 2015.

[68] City of New Orleans, Press Release, "City Announces that Highly Successful 'Soft Second' Mortgage Homebuyer Assistance Initiative is Nearly Complete" (June 20, 2014), http://www.nola.gov/mayor/press-releases/2014/20140620-soft-second/ (last updated February 19, 2015).

[69] Webster, 2015.

[70] Webster, 2015.

[71] The Road Home, "Small Rental Property Program – About Us and FAQs," https://www.road2la.org/srpp/SRPP_AboutUsFAQs.aspx#conditions (n.d.). Last visited October 26, 2015.

[72] The Road Home, "Small Rental Property Program – About Us and FAQs," 2015.

[73] U.S. HUD, *Climate Change Adaptation Plan* (October 2014). http://portal.hud.gov/hudportal/documents/huddoc?id=HUD2014CCAdaptPlan.pdf. 71 pp.

[74] The base flood is commonly called the 100-year flood, terminology that is misleading because people tend to interpret it as such a flood only occurs once every 100 years. Statistically speaking, however, such a flood could occur multiple times in one year, multiple times in less than 100 years, or not at all in 200 years. Thus, the term "base flood" is preferred. *See* U.S. Geological Survey, "Floods: Recurrence Intervals and 100-year Floods (USGS)," http://water.usgs.gov/edu/100yearflood.html (last updated August 19, 2015).

[75] FEMA, *Managing Floodplain Development Through the National Flood Insurance Program* (March 5, 2007). Available at http://www.fema.gov/media-library-data/20130726-1535-20490-8858/is_9_complete.pdf. 527 pp.

[76] Ning Lin, Kerry Emanuel, Michael Oppenheimer, and Erik Vanmarcke, *Physically Based Assessment of Hurricane Surge Threat under Climate Change*. 2 NATURE CLIMATE CHANGE 462-467 (2012). doi:10.1038/nclimate1389.

[77] FEMA, "Elevating your House," in *Homeowner's Guide to Retrofitting* (3d Ed. 2014). Available at http://www.fema.gov/media-library/assets/documents/480.

[78] U.S. HUD, Hurricane Sandy Rebuilding Task Force Press Release, "Federal Government Sets Uniform Flood Risk Reduction Standard for Sandy Rebuilding Projects" (April 4, 2013). Available at http://portal.hud.gov/hudportal/HUD?src=/sandyrebuilding/FRRS. Last visited September 14, 2015.

[79] State of Mississippi, Office of the Governor, *Three Years After Katrina* (n.d.). Available at http://mississippirenewal.com/documents/GovKatrinaThreeYearReport.pdf. 28 pp.

Endnotes (cont'd)

[80] For example, an applicant must conduct a lead inspection and a review for consistency with historic preservation requirements prior to receiving elevation funds. MDA, *Elevation Design Guidelines for Historic Homes in the Mississippi Gulf Coast Region* (2011). Available at http://www.msdisasterrecovery.com/documents/MDA%20EDG%20Final%20110308.pdf. 124 pp.

[81] For example, an applicant must conduct a lead inspection and a review for consistency with historic preservation requirements prior to receiving elevation funds. MDA, *Elevation Design Guidelines for Historic Homes*, 2011.

[82] MDA, Elevation Design Guidelines for Historic Homes, 2011.

[83] MDA, Elevation Design Guidelines for Historic Homes, 2011.

[84] The HAP included Phase III as well. In Phase III, or the "Sold Home" program, eligible applicants received grants for uncompensated losses after having sold their damaged primary residence at a diminished value. These homeowners had sold their homes without obtaining a signed covenant from the new owners to comply with building codes, local ordinances, flood insurance, and elevation requirements. These homeowners were therefore ineligible for HAP funds, despite otherwise meeting the remaining eligibility requirements. Under Phase III, these homeowners are eligible for a percentage of the Phase I or Phase II funding they would have received to compensate them for their losses, had they retained ownership or been able to obtain the covenants. *See* Mississippi Development Authority (MDA), Homeowner Assistance Program, *Guidelines* (n.d.). Available at http://mdah.state.ms.us/arrec/digital_archives/series/files/34/pdf/614.pdf. 5 pp; MDA, HAP. *Modification 9: Phase III Post Katrina Conveyance (Sold Home) Program* (October 1, 2007). Available at http://www.msdisasterrecovery.com/documents/HAP%20Sold%20HomeMod9Final.pdf. 5 pp.

[85] Jennifer Turnham, Kimberly Burnett, Carlos Martin, and Tom McCall, *Housing Recovery on the Gulf Coast, Phase II, Result of Property Owner Survey in Louisiana, Mississippi, and Texas*. U.S. HUD, Office of Policy Development and Research (August 2011). Available at http://www.huduser.org/publications/pdf/gulfcoast_phase2.pdf. 130 pp.

[86] MDA, "June 30, 2015, Katrina CDBG Disaster Recovery Expenditure Overview" (June 30, 2015). Available at http://www.msdisasterrecovery.com/documents/Federal%20Disaster%20Recovery%20Grant%20Report%20Summary%20for%20June%2030,%202015.pdf. 6 pp.

[87] HUD plans to conduct additional research that compares the required BFE to the existing levels of elevation. U.S. HUD, Office of Policy Development and Research, *Housing Recovering the Gulf Coast Phase I: Results of Windshield Observations in Louisiana, Mississippi, and Texas* (December 2010). Available at http://www.huduser.org/Publications/pdf/Housing_Recovery_in_the_Gulf_Coast_PhaseI_v2.pdf. 137 pp.

[88] Susan Cutter, Christopher T. Emrich, Jerry T. Mitchell, Walter W. Piergorsch, Mark M. Smith, and Lynn Weber, "Powering an Unequal Recovery," in *Hurricane Katrina and the Forgotten Coast of Mississippi*. New York, NY: Cambridge University Press, 2014. *See also* Kevin Fox Gotham, *Reinforcing Inequalities. The Impact of the CDBG Program on Post-Katrina Rebuilding*. 24 HOUSING POLICY DEBATE 192-212 (2014). doi:10.1080/10511482.2013.840666; Jonathan P. Hooks and Trisha B. Miller, *The Continuing Storm: How Disaster Recovery Excludes Those Most in Need*. 43 CAL. WESTERN L. REV. 21 (2006).

[89] Leslie Eaton, *In Mississippi, Poor Lag in Hurricane Aid*. N.Y. TIMES (November 16, 2007). Available at http://www.nytimes.com/2007/11/16/us/16mississippi.html.

[90] Campbell Robertson, *Mississippi's Recovery After Katrina Holds Lessons for Policymakers*. N.Y. TIMES (August 28, 2015) at A9.

[91] State of Mississippi, Office of the Governor, *Three Years After Katrina* (n.d.).

[92] State of Mississippi, Office of the Governor, *Three Years After Katrina* (n.d.).

Endnotes (cont'd)

[93] Mississippi Center for Justice and Lawyers' Committee for Civil Rights under Law, Press Release, "Mississippi Housing Advocates File Suit Against HUD over Diversion of Hurricane Recovery Funds" (December 10, 2008). https://lawyerscommittee.org/press-release/mississippi-housing-advocates-file-suit-against-hud-over-diversion-of-hurricane-recovery-funds/. Last visited September 14, 2015.

[94] Written Statement of Haley Barbour, Governor of the state of Mississippi, Before the Ad Hoc Subcommittee on Disaster Recovery, Committee on Homeland Security and Governmental Affairs, United States Senate (May 20, 2009). Available at http://www.hsgac.senate.gov/download/barbour-testimony. 19 pp.

[95] Jeffrey S. Lowe, Policy versus Politics: Post-Hurricane Katrina Lower-Income Housing Restoration in Mississippi. 22 HOUSING POLICY DEBATE 57 (January 2012).

[96] Written Statement of Haley Barbour, 2009.

[97] Cutter et al., 2014.

[98] U.S. HUD, Memorandum, "Follow-up of the Inspections and Evaluations Division on Its Inspection of the State of Louisiana's Road Home Elevation Incentive Program Homeowner Compliance (IED-09-002, March 2010)" (March 29, 2013). Available at https://www.hudoig.gov/sites/default/files/Audit_Reports/2013-IE-0803.pdf. 15 pp. Not eligible for this assistance were owners of condominiums, mobile homes, and site-built homes on leased lands; properties outside of the advisory BFE (ABFE) or BFE zone maps; duplexes where owners cannot agree in writing to elevate; or homeowners who received Road Home funds under Options 2 or 3. Option 2 funds were for homeowners who sold their homes but remained in Louisiana as homeowners; Option 3 funds were for homeowners intended to sell their homes and either move out of state or remain in state but as renters. U.S. HUD, "Recovery Snapshot: Louisiana Road Home—Homeowner Compensation and Incentives" (n.d). https://www.hudexchange.info/onecpd/assets/File/CDBG-DR-Case-Study-Louisiana-Homeowner-Compensation-Grants.pdf. 2 pp.

[99] HUD, Memorandum, 2013.

[100] Louisiana required more than 150,000 homeowners who received money from the Road Home program to sign an agreement to allow the state the right to receive reimbursements paid to homeowners from their insurance companies. *In re: Katrina Canal Breaches Litigation, 2010-1823*, 63 So. 3d 955 (La. May 10, 2011).

[101] Louisiana Office of Community Development, Disaster Recovery Unit, "Elevate your Home" (2012), https://www.mitigatela.org/HMGP_Elevation.aspx. Last visited September 1, 2015.

[102] FEMA, "Increased Cost of Compliance Coverage," http://www.fema.gov/increased-cost-compliance-coverage (n.d.). Last visited September 1, 2015.

[103] U.S. HUD, OIG, *Inspection of the State of Louisiana's Road Home Elevation Incentive Program Homeowner Compliance* (March 2010). IED-09-002. Available at http://hud.gov/offices/oig/ied/IED-09-002.pdf. 22 pp.

[104] Robert McClendon, Thousands will have access to new Road Home money, others will be forgiven. THE TIMES-PICAYUNE (August 24, 2015).

[105] U.S. HUD, OIG, Inspection of the State of Louisiana's Road Home Elevation Incentive Program, March 2010. For an update, see also HUD, Memorandum, 2013.

[106] McClendon, 2015.

[107] Greater New Orleans Fair Housing Action Center, Press Release, "Civil Rights Organizations Settle Hurricane Katrina Housing Discrimination Case against HUD and Louisiana" (July 6, 2011). Available at http://dev.gnofairhousing.org/wp-content/uploads/2011/10/7-6-11_Road_Home_Settlement_Release.pdf. 3 pp.

[108] Overall, the effect of the exit penalty was probably small; slightly more than two percent of homeowners decided to sell their properties and move out of state. Eileen Norcross and Anthony Skriba, "The Road Home: Helping Homeowners in the Gulf after Katrina" in THE POLITICAL ECONOMY OF HURRICANE KATRINA AND COMMUNITY REBOUND (Emily Chamlee-Wright and Virgil Henry Storr, eds.). Northampton, MA: Edward Elgar Publishing, Ltd. 2010.

Endnotes (cont'd)

[109] Eileen Norcross and Anthony Skriba, "The Road Home: Helping Homeowners in the Gulf after Katrina" in THE POLITICAL ECONOMY OF HURRICANE KATRINA AND COMMUNITY REBOUND (Emily Chamlee-Wright and Virgil Henry Storr, eds., 2010). Northampton, MA: Edward Elgar Publishing, Ltd.

[110] *See* Campbell Robertson and John Schwartz, *Decade after Katrina, Pointing Finger More Firmly at Corps*, NYT at A13 (May 25, 2015); J. David Rogers, G. Paul Kemp, H.J. Bosworth, and Raymond B. Seed, *Interaction between the US Army Corps of Engineers and the Orleans Levee Board Preceding the Drainage Canal Wall Failures and Catastrophic Flooding of New Orleans in 2005*, 17 Water Policy 707 (2015). doi:10.2166/wp.2015.077.

[111] U.S. Government Accountability Office (GAO), *Gulf Coast Disaster Recovery: Community Development Block Grant Program Guidance to States Needs to be Improved* (June 2009). GAO-09-541. Available at http://www.gao.gov/new.items/d09541.pdf. 49 pp.

[112] Under the Road Home program, homeowners had three options: Option 1 was to rebuild and stay in the home; Option 2 was to purchase another home in Louisiana; and Option 3 was to sell the home and relocate out of state.

[113] Norcross and Skriba, 2010.

[114] GAO, *Gulf Coast Disaster Recovery*, June 2009; Personal communications.

[115] GAO, *Gulf Coast Disaster Recovery*, June 2009.

[116] GAO, *Gulf Coast Disaster Recovery*, June 2009.

[117] Norcross and Skriba, 2010.

[118] Norcross and Skriba, 2010.

[119] Reilly Morse, *Environmental Justice Through the Eye of Hurricane Katrina* (2008). Joint Center for Political and Economic Studies, Health Policy Institute. Available at http://web.stanford.edu/group/scspi/_media/pdf/key_issues/Environment_policy.pdf. 46 pp.

[120] Testimony of David A. Montoya, Inspector General, U.S. HUD OIG, "Reducing Waste, Fraud and Abuse in Housing Programs: Inspector General Perspectives" (September 10, 2013). Available at https://www.hudoig.gov/sites/default/files/Montoya%20Testimony%20-%20House%20Financial%20Services%209-10-13%20-%20FINAL.pdf. 13 pp.

[121] HUD, Memorandum, 2013.

[122] HUD, Memorandum, 2013.

[123] *See* National Wildlife Federation, *Higher Ground: A Report on Voluntary Property Buyouts in the Nation's Floodplains* (1998). Available at http://www.nwf.org/pdf/Water/199807_HigherGround_Report.pdf. 221 pp; U.S. HUD, "Voluntary Acquisition vs. Involuntary Acquisition of Property." http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/affordablehousing/training/web/relocation/acquisition (n.d.). Last visited August 28, 2015.

[124] Involuntary acquisitions occur through the use of a government's power of eminent domain. Involuntary acquisitions are possible in certain circumstances and trigger federal and state constitutional protection. Discussion of involuntary acquisitions exceeds the scope of this paper.

[125] Shiva Polefka, *Moving out of Harm's Way* (December 12, 2013). Center for American Progress. Available at https://cdn.americanprogress.org/wp-content/uploads/2013/12/FloodBuyouts-2.pdf. 18 pp.

[126] Iowa Homeland Security, "2008 Iowa Mitigation Success Story – Avoided Losses through Property Acquisition and Relocation Assistance" (2010). Available at http://homelandsecurity.iowa.gov/documents/hazard_mitigation/HM_StatePlan_2-0_AnnexC.pdf. 12 pp.

[127] Polefka, 2013.

[128] Salvesen, 2003.

Endnotes (cont'd)

[129] Trevor Tompson, Jennifer Benz, Jennifer Agiesta, Kate Cagney, and Michael Meit, *Resilience in the Wake of Superstorm Sandy* (June 2013). The Associated Press-NORC Center for Public Affairs Research. Available at http://www.apnorc.org/PDFs/Resilience%20in%20Superstorm%20Sandy/AP_NORC_Resilience%20in%20the%20Wake%20of%20Superstorm%20Sandy-FINAL.pdf. 17 pp.

[130] David R. Godschalk, Rebecca Elmore, and William Rohe, *Implementing Floodplain Land Acquisition Programs in Urban Localities* (2004). Report prepared for FEMA (Grant No. EMW-2002-GR-0037) and the National Science Foundation (NSF-2001-0109423). The Center for Urban and Regional Studies, University of North Carolina at Chapel Hill. 74 pp.

[131] FEMA, "Flood Mitigation Assistance Grant Program," http://www.fema.gov/flood-mitigation-assistance-grant-program (last updated August 25, 2015); FEMA, *Hazard Mitigation Assistance Guidance*, 2015.

[132] Cedar Rapids also implemented other programs to assist homeowners and businesses with flood damage. These programs included: the JumpStart Housing Program, which provided $32 million for rehabilitation, down-payment assistance, and interim mortgage assistance; the Rental Rehabilitation Program and Landlord Business Support Program, which provided assistance for flood-damaged rental properties; and the Replacement Housing Programs, which provided funds to replace flood-impacted houses in low- to moderate-income neighborhoods with affordable housing options.

[133] City of Cedar Rapids, "Voluntary Property Acquisition (Buyout) Program." http://www.cedar-rapids.org/city-news/flood-recovery-progress/floodrecoveryresources/buyoutprogram/Pages/default.aspx (n.d.). Last visited September 14, 2015.

[134] City of Cedar Rapids, "Flood Protection: Both Sides of the River." http://www.cedar-rapids.org/city-news/flood-recovery-progress/floodmanagementsystem/Pages/default.aspx (n.d.). Last visited September 14, 2015.

[135] City of Cedar Rapids, "Voluntary Property Acquisition (Buyout) Program," 2015.

[136] Adler, 2011.

[137] Adler, 2011.

[138] Rebuild Iowa Office (RIO), *Speak Up Iowa! Public Input Final Report* (August 2008). Available at https://rio.urban.uiowa.edu/sites/rio/files/sui_report_08-2008.pdf. 15 pp.

[139] Adler, 2011.

[140] Adler, 2011.

[141] Matthew 25, "Neighborhood Building." http://www.hub25.org/programs/neighborhood-building/ (n.d.). Last visited September 14, 2015. Rick Smith, *Cedar Rapids 'Block by Block' Rebuilding Program Hailed*. THE GAZETTE (March 30, 2014); and Rick Smith, *Matthew 25 Fundraiser Past 80 Percent of Goal*. THE GAZETTE (March 10, 2015).

[142] When it made landfall in New Jersey on October 29, 2012, what had been Hurricane Sandy as it traveled northward along the Atlantic Coast lost its hurricane strength. Thus, this paper will refer to the storm as it hit the northeastern coast of the United States as "Superstorm Sandy."

[143] Matthew Schuerman, *Christie Details Sandy Buyout Plan*. WNYC.org (May 16, 2013). Available at http://www.wnyc.org/story/293725-christie-offers-own-sandy-buyout-plan/.

[144] Governor's Office of Storm Recovery (GOSR), NY State Homes and Community Renewal, Housing Trust Fund Corporation, and Office of Community Renewal, *Buyout and Acquisition Policy Manual: NY Rising Buyout Program* (April 2014). Available at https://stormrecovery.ny.gov/sites/default/files/uploads/nys_buyouts_policy_manual_20140407.pdf. 77 pp.

[145] GOSR, Buyout and Acquisition Policy Manual: NY Rising Buyout Program, April 2014.

[146] GOSR, Buyout and Acquisition Policy Manual: NY Rising Buyout Program, April 2014.

Endnotes (cont'd)

[147] Lisa Bova-Hiatt and Matt Millea, *Rising Waters and Storm Resiliency* (2014). The 13th Annual Land Use & Sustainable Development Conference, Pace University Law School. Available at http://law.pace.edu/sites/default/files/LULC/Conference_2014/Rising%20Waters.pdf. 17 pp.

[148] GOSR, *New York Rising 2012-2014: A Report from the Governor's Office of Storm Recovery* (2015). Available at http://stormrecovery.ny.gov/sites/default/files/uploads/gosr_report_letter_full_high.pdf. 44 pp.

[149] GOSR, New York Rising 2012-2014, 2015.

[150] GOSR, Press Release, "Governor's Office of Storm Recovery Announces over $22 Million for 150 Long Island Properties Purchased by NY Rising Acquisition Program" (May 21, 2015). Available at http://stormrecovery.ny.gov/sites/default/files/uploads/auction_press_release.pdf. 2 pp.

[151] GOSR, Press Release, "State Announces Expanded Enhanced Buyout Area to Include the Graham Beach Community" (April 5, 2014). Available at http://stormrecovery.ny.gov/sites/default/files/uploads/graham_beach_release.pdf. 3 pp.

[152] GOSR, New York Rising 2012-2014, 2015.

[153] Elizabeth Rush, *Leaving the Sea: Staten Islanders Experiment with Managed Retreat* (February 11, 2015). Urbanomnibus.net. Available at http://urbanomnibus.net/2015/02/leaving-the-sea-staten-islanders-experiment-with-managed-retreat/. Last visited September 14, 2015.

[154] Personal communication; Rush, 2015.

[155] New Jersey Department of Environmental Protection, "Frequently Asked Questions: Superstorm Sandy Blue Acres Buyout Program" (April 29, 2015). Available at http://www.nj.gov/dep/greenacres/pdf/faqs-blueacres.pdf. 6 pp. State of New Jersey Department of Community Affairs, "Blue Acres Buyout Program," http://www.renewjerseystronger.org/homeowners/blue-acres-buyout-program/ (last updated n.d.). Last visited September 14, 2015.

[156] State of New Jersey, Office of the Governor. "Third Summer After Sandy" (2015). Available at http://dspace.njstatelib.org:8080/xmlui/bitstream/handle/10929/35152/20150529c.pdf?sequence=1&isAllowed=y. 5 pp.

[157] John Upton, *Jersey Retreating from Rivers, but not Coast, after Sandy*. Climate Central (November 4, 2014). Available at http://www.climatecentral.org/news/nj-hurricane-sandy-blue-acres-18275.

[158] Upton, 2014; Colleen O'Dea, *Blue Acres Buyouts Attract over 1,000 Owners of Flood-Prone Homes*. NJ Spotlight (February 21, 2014). Available at http://www.njspotlight.com/stories/14/02/20/blue-acres-applications/.

[159] Personal communication.

[160] Personal communication.

[161] Personal communication.

[162] Personal communication.

[163] Among the many letters sent by Fox Beach residents to Governor Cuomo to request a buyout, one homeowner wrote:

> We will never be able to feel safe or secure in that house again. One thing that is important to understand is that this house was my husbands childhood home, a home he loved so much that even though the house was paid off by his late parents we re-purchased the house from his parents, because he could not bear the thought of leaving his home, his community, our neighbors. And for a few years we lived and loved in that house in more ways than I can express. But now that is gone, pushed aside by the tide waters and residual ocean debris.

Fox Beach 165, "Stories: Letter from Fox Beach Ave," http://foxbeach165.com/stories/ (n.d). Last visited September 9, 2015.

[164] Rush, 2015.

[165] *See* 44 C.F.R. 206.191.

Endnotes (cont'd)

[166] Christopher Dalborn, Scott A. Hemmerling, and Joshua A. Lewis, Community Resettlement Prospects in Southeast Louisiana (September 2014). Tulane Institute on Water Resources Law & Policy. Available at http://www.law.tulane.edu/uploadedFiles/Institutes_and_Centers/Water_Resources_Law_and_Policy/Content/Community%20Resettlement%20Prospects%20in%20Southeast%20Louisiana.pdf. 49 pp.

[167] Dalborn et al., 2014.

[168] Overall, less than ten percent of Road Home program participants elected the buyout option. HUD, *Recovery Snapshot: Louisiana Road Home: Homeowner Compensation and Incentives* (n.d). Available at https://www.hudexchange.info/onecpd/assets/File/CDBG-DR-Case-Study-Louisiana-Homeowner-Compensation-Grants.pdf. 1 pp. The buyout program tended to undercompensate homeowners and did not benefit the most vulnerable areas. David A. Lewis, *The Relocation of Development from Coastal Hazards through Publicly Funded Acquisition Programs: Examples and Lessons from the Gulf Coast.* 5 Sea Grant Law and Policy Journal 98 (2012).

[169] Adler, 2011. *See also* Alice Kaswan, *Seven Principles for Equitable Adaptation,* 13 SUSTAINABLE DEVELOPMENT L. & POL'Y 41, 44 (2013) (noting importance of culturally sensitive communication strategies in the aftermath of disaster).

Appendix A: List of Interviewees

Below is a list of individuals and officials interviewed for this White Paper. Interviews were either conducted by phone or in person by the research team.

Interviewee	*Organization or Affiliation*	*Date of Interview*
Ashley Reeb	Community Activist, Chalmette, Louisiana	July 26, 2015
Bill Murphy	Faubourg St. Roch Improvement Association, New Orleans	August 8, 2015
Camille Strachan	St. Charles Avenue Association, New Orleans	August 3, 2015
Clint Twedt-Ball	Matthew 25, Cedar Rapids, Iowa	August 17, 2015
David Perkes	Gulf Coast Community Design Studio	September 4, 2015
Debby Pigman	Faubourg Delachaise Neighborhood Association, New Orleans	August 13, 2015
Diem Nguyen	Mary Queen of Vietnam, Village de l'Est, New Orleans	August 5, 2015
Gabriel Nehrbass	Feed the Children, New Orleans	August 4, 2015
Jennifer Pratt	City of Cedar Rapids, Iowa	August 4, 2015
Joe Tirone	Oakwood Beach Buyout	August 26, 2015
Jon Siebert	Friends of Long Island	August 4, 2015
Leo Hayden	Orleans Parish Sheriff's Office	August 7, 2015
Leslie Wright	United Way of East Central Iowa	August 18, 2015
Marie Galatas Ortiz	Lower Ninth Ward, New Orleans	August 4, 2015
Michelle Buuck	St. Bernard Project, New Orleans	August 14, 2015
Rachel Weider	New York Rising Buyout and Acquisition Program	August 18, 2015
Rebecca Sinclair	New York Rising Buyout and Acquisition Program	August 18, 2015
Rita Rassmussen	City of Cedar Rapids, Iowa	August 4, 2015
Ruth Kennedy	Hollygrove Neighbors, New Orleans	August 10, 2015
Seth Nehrbass	Audubon Boulevard Neighborhood Association, New Orleans	August 2, 2015
Sharene Jaber	N.P. Trist Middle School, Chalmette, Louisiana	August 2, 2015
Sie Jabr & Mejdy Jabr	Continental Realty, Chalmette, Louisiana	August 8 and 15, 2015

Sophie Harris	Friends of Lafitte Greenway, Louisiana	August 12, 2015
Theopholis Moore	Council on Drug and Alcohol Abuse, Louisiana	August 7, 2015
Wayne Clark	Gert Town Neighborhood Association, New Orleans	August 6, 2015

Appendix B: Interview Questions

Interviewees were provided with the following list of questions prior to the interview.

(1) Process. How would you describe the process for public participation?

   a. How would you assess the effectiveness of the public participation process?

      i. What worked well?

      ii. What could be improved?

   b. How was information shared and distributed in the community?

   c. Did government agency responsible for implementing the strategy or program reach out specifically to vulnerable communities? How?

   d. How would you assess the government's efforts to reach out to vulnerable communities?

(2) Governance. How would you describe and evaluate the process for coordinating among different governmental agencies, including federal, state, tribal, and local?

   a. To what extent were non-governmental organizations and institutions (such as private companies, non-profits, and churches) involved in implementing the strategy?

   b. What were their roles?

   c. How would you assess the effectiveness of the NGO involvement?

(3) Resources

   a. What resources were available when implementing the strategy or program?

   b. Were other resources needed? If so, what kinds of resources—for example, money, staff, information, etc.?

   c. Were resources targeted to meet community needs? To meet the needs of vulnerable communities?

    d. Did you observe any overlooked sources of funding? How could more resources be obtained? From where?

(4) Outcomes, Lessons, and Best Practices

    a. How did the strategy or program affect your community?

    b. What were the most notable outcomes or lessons of the strategy or program?

    c. What are the most notable shortcomings of the strategy or program?

    d. Did vulnerable communities benefit?

(5) If you could rewrite or redo the story of how this strategy or program was implemented and its impact on your community, what would be different?

(6) Are there other folks you'd recommend speaking with?

Appendix C: Additional Resources

Websites & Compilations

FEMA, "Recovery Lessons Learned and Information Sharing" (last updated March 30, 2015). http://www.fema.gov/recovery-lessons-learned-information-sharing.

Texas A&M University, College of Architecture, Texas Sustainable Coastal Initiative, "Best Practices" (last updated n.d.). https://coastalatlas.arch.tamu.edu/resources/best-practices/.

National Oceanic and Atmospheric Administration, Lessons Learned and Best Practices for Community Recovery (n.d.). Available at http://www.ct.gov/deep/lib/deep/long_island_sound/shorelinepreservation/lessonslearnedandbestpractices_sandy.pdf.

U.S. HUD, Disaster Impact and Unmet Meeds Assessment Kit B-7, Appendix B – Existing Resources and Tools (March 2013). Available at https://www.hudexchange.info/resources/documents/Disaster_Recovery_Disaster_Impact_Needs_Assessment_Kit_App_B_Resources_and_Tools.pdf. 7 pp.

State of Colorado, Department of Public Safety, School Safety Resource Center, "Natural Disasters" (last updated n.d.). https://www.colorado.gov/pacific/cssrc/natural-disasters-0.

General

Annegret H. Thieken, Holger Cammerer, Christian Dobler, Johannes Lammel, Fritz Schöberl, Estimating changes in flood risks and benefits of non-structural adaptation strategies - a case study from Tyrol, Austria. MITIGATION AND ADAPTATION STRATEGIES FOR GLOBAL CHANGE (2014). doi: 10.1007/s11027-014-9602-3

Zbigniew W. Kundzewicz, Non-structural Flood Protection and Sustainability. 27 WATER INT'L 3 (2002). doi: 10.1080/02508060208686972.

Jörn Birkmann and Korinna von Teichman, Integrating Disaster Risk Reduction and Climate Change Adaptation: Key Challenges—Scales, Knowledge, and Norms. 5 SUSTAINABILITY SCIENCE 171-184 (July 2010). doi:10.1007/s11625-010-0108-y.

Roger Few, Katrina Brown, and Emma L. Tompkins, Public Participation and Climate Change Adaptation (2006). Tyndall Centre for Climate Change Adaptation. http://www.ccrasa.com/library_1/22636%20-%20Public%20participation%20and%20climate%20change%20adaptation.pdf. 23 pp.

National Wildlife Federation, *Achieving Resilience in Coastal Communities: Resources and Recommendations* (August 2014). Available at http://online.nwf.org/site/DocServer/ac-proof-aug.2014.pdf. 267 pp.

Flood Insurance

Ernest B. Abbott, Flood Insurance and Climate Change: Rising Sea Levels Challenge the NFIP, 26 FORDHAM ENVTL. L. REV. 10 (2014).

Rawle O. King, National Flood Insurance Program: Background, Challenges, and Financial Status (July 1, 2011). Congressional Research Service R40650. Available at https://www.fas.org/sgp/crs/misc/R40650.pdf. 33 pp.

Rawle O. King, Federal Flood Insurance: The Repetitive Loss Problem (June 30, 2005). Congressional Research Service RL32972. Available at https://www.fas.org/sgp/crs/misc/RL32972.pdf. 45 pp.

U.S. Government Accountability Office, NFIP: Actions to Address Repetitive Loss Properties. Statement of William O. Jenkins, Jr., Director of Homeland Security and Justice Issues March 24, 2005). Available at http://www.gao.gov/assets/120/110626.pdf. 22 pp.

Robert R. M. Verchick and Lynsey R. Johnson, When Retreat is the Best Option: Flood Insurance after Biggert-Waters and Other Climate Change Puzzles. 47 JOHN MARSHALL L. REV. 695 (2014). Loyola University New Orleans College of Law Legal Studies Research Paper Series 2014-19. doi: 10.219/ssrn.2418089.

Federal Disaster Resources

FEMA, Federal Disaster Recovery Framework: Strengthening Disaster Recovery for the Nation (September 2011). Available at http://www.fema.gov/media-library-data/20130726-1820-25045-5325/508_ndrf.pdf. 116 pp.

John Travis Marshall, Weathering NEPA Review: Superstorms and Super Slow Urban Recovery 41 ECOLOGY LAW QUARTERLY __ (2014). Georgia State University College of Law, Legal Studies Research Paper No. 2014-35.

Sarah Fox, This is Adaptation: The Elimination of Subsidies Under the National Flood Insurance Program. 39 COLUMBIA J. ENVT'L L. __ (2014).

U.S. Government Accountability Office, Better Planning Needed For Housing Victims of Catastrophic Disasters (February 2007). GAO-07-88. Available at http://www.gao.gov/assets/260/257122.pdf. 91 pp.

Vulnerable Communities

S. V. R. K. Prabhakar, Ancha Srinivasan, and Rajib Shaw. Climate Change and Local Level Disaster Risk Reduction Planning: Need, Opportunities and Challenges. 14 MITIGATION AND ADAPTATION STRATEGIES FOR GLOBAL CHANGE 7 (January 2009).

Matthew D. Ekins, Large-Scale Disasters Attacking the American Dream: How to Protect and Empower Homeowners and Lenders, 30 W. NEW ENG. L. REV. 351 (2008).

Jonathan P. Hooks and Trisha B. Miller, The Continuing Storm: How Disaster Recovery Excludes Those Most in Need, 43 CAL. W.L. REV. 21 (2006).

U.S. Government Accountability Office, FEMA Needs More Detailed Guidance and Performance Measures to Help Ensure Effective Assistance after Major Disasters (August 2009). GAO-09-796. http://www.gao.gov/products/GAO-09-796. 58 pp.

MDC, Inc., When Disaster Strikes: Promising Practices, Low Income Families and Communities (n.d.). Available at http://www.mdcinc.org/sites/default/files/resources/When%20Disaster%20Strikes%20-%20Promising%20Practices%20-%20Low-Income%20Families%20and%20Communities.pdf. 7 pp.

General Recovery Lessons

FEMA, Lessons in Community Recovery: Seven Years of Emergency Support Function #14, Long-Term Community Recovery from 2004 to 2011 (December 2, 2011). Available at http://www.fema.gov/pdf/rebuild/ltrc/2011_report.pdf. 76 pp.

U.S. Department of Agriculture, Food and Nutrition Service, FNS 2008 and 2009 Disaster Lessons Learned and Best Practices Report (December 2009). Available at http://www.fns.usda.gov/sites/default/files/2008-2009_lessons.pdf. 31 pp.

National Voluntary Organizations Active in Disaster, Long Term Recovery Guide (2012). Available at http://www.nvoad.org/wp-content/uploads/2014/05/long_term_recovery_guide_-_final_2012.pdf. 96 pp.

John Cosgrave, Responding to Flooding Disasters: Learning From Previous Relief and Recovery Operations (2014). ALNAP Lessons Paper. Available at http://reliefweb.int/sites/reliefweb.int/files/resources/alnap-lessons-flood-cosgrave.pdf. 34 pp.

Ben Cheatham, Anne Healy, and Becca O'Brien Kuusinen, Improving Disaster Recovery: Lessons Learned in the United States (June 2015). McKinsey & Company. 24 pp.

Specific Case Studies

City of Grand Forks, North Dakota. Grand Forks Flood Disaster and Recovery Lessons Learned (2011). Available at http://www.grandforksgov.com/home/showdocument?id=528. 14 pp.

Boulder County, Colorado. "Successes in Flood Recovery Efforts" (Spring 2015). Available at http://www.bouldercounty.org/doc/flood/floodrecoveryguide.pdf. 12 pp.

Alaskan Native Villages. U.S. Government Accountability Office, Limited Progress has been Made on Relocating Villages Threatened by Flooding and Erosion (June 2009). GAO-09-551. Available at http://www.gao.gov/assets/300/290468.pdf. 53 pp.

Hurricane Sandy. Association of State Floodplain Managers, Inc., Hurricane Sandy Recovery: Using Mitigation to Rebuild Safer and More Sustainable Communities (December 13, 2013). Available at http://www.floods.org/ace-files/documentlibrary/Hot_Topics/HurricaneSandyRecovery_ASFPM_Actions_12-13-12.pdf. 9 pp.

Louisiana

Hurricane Katrina. Office of President George W. Bush, The Federal Response to Hurricane Katrina: Lessons Learned (February 2006). Available at http://www.floods.org/PDF/Katrina_Lessons_Learned_0206.pdf. 228 pp.

Camille M. Broome, Jeanette Dubinin, and Pam Jenkins. 2015. The view from the coast. Center for Planning Excellence. 80 pp.

Christopher Dalbom, Scott Hemmerling and Joshua Lewis. Community Resettlement Prospects in Southeast Louisiana: A Multidisciplinary Exploration of Legal, Cultural, and Demographic Aspects of Moving Individuals and Communities (2014). Tulane Institute on Water Resources Law & Policy. Issue Paper.

Michelle M. Thompson, Monitoring Public Reinvestment Post-Disaster: Louisiana Land Trust Option 1 Properties (n.d.). University of New Orleans, Department of Planning and Urban Studies. Available at http://www.urisa.org/clientuploads/directory/Documents/Journal/Under%20Review/Thompson_Option_1October2013%20-%20FINAL-FULL%5E.pdf. 26 pp.

Christina Finch, Christopher T. Emrich, Susan L. Cutter, Disparities and differential recovery in New Orleans, 31 POPULATION AND ENV'T 179-202 (2010).

David A. Lewis, The Relocation of Development from Coastal Hazards through Publicly Funded Acquisition, 5 SEA GRANT L. & POL'Y J. 98 (2012). Available at http://nsglc.olemiss.edu/sglpj/vol5No1/Lewis.pdf. 42 pp.

Cedar Rapids, Iowa

Rebuild Iowa Office, Disaster Recovery Lessons Learned (2011). Available at http://publications.iowa.gov/11080/1/2011-06_Iowa_Disaster_Recovery_Lessons_Learned_final.pdf. 18pp.

FEMA Mitigation Assessment Team Report. Midwest Floods of 2008 in Iowa and Wisconsin: Building Performance Observations, Recommendations, and Technical Guidance. 258 pp. http://www.fema.gov/media-library-data/20130726-1722-25045-0903/fema_p_765.pdf.

Adler, Kevin F. 2015. Natural Disasters as a Catalyst for Social Capital : A Study of the 500-Year Flood in Cedar Rapids, Iowa.