



Buy-In for Buyouts

The Case for Managed Retreat from Flood Zones

ROBERT FREUDENBERG, ELLIS CALVIN, LAURA TOLKOFF, AND DARE BRAWLEY

POLICY FOCUS REPORT LINCOLN INSTITUTE OF LAND POLICY REGIONAL PLAN ASSOCIATION

POLICY FOCUS REPORT SERIES

The Policy Focus Report series is published by the Lincoln Institute of Land Policy to address timely public policy issues relating to land use, land markets, and property taxation. Each report is designed to bridge the gap between theory and practice by combining research findings, case studies, and contributions from scholars in a variety of academic disciplines, and from professional practitioners, local officials, and citizens in diverse communities.

ABOUT THIS REPORT

This report presents an in-depth study of buyouts in the New York metropolitan region following Hurricanes Irene and Sandy as a tool for adaptation against flooding. It provides an overview of flooding risk, a detailed summation of buyout programs in and outside of the region, quantitative analyses that organize the region into place types, and five case studies of the fiscal impact of buyouts on selected communities. The research draws from original analysis; interviews with buyout program staff, planners, conservation experts, and other stakeholders; and a round table workshop hosted by the Lincoln Institute of Land Policy and Regional Plan Association in December 2014. That meeting galvanized recommendations that address time frame, administration, funding, municipal participation, and resident concerns. The report offers a set of policy recommendations to improve the effectiveness of and participation in buyout programs. The lessons learned from analyzing buyout programs in New York will provide insight and guidance for the whole nation.



113 Brattle Street, Cambridge, MA
02138-3400, USA

P (617) 661-3016 or (800) 526-3873

F (617) 661-7235 or (800) 526-3944

help@lincolninst.edu

lincolninst.edu

ISBN 978-1-55844-353-2 (paper)

ISBN 978-1-55844-354-9 (pdf)

Policy Focus Report/Code PF047

Front Cover:

Hurricane Irene caused severe urban flooding in Lincoln Park, New Jersey.

Source: Christopher Mardorf/FEMA (2011).

Back Cover:

Abandoned and occupied homes lined the streets during buyouts in Oakwood Beach, Staten Island. *Source: Regional Plan Association.*

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Executive Summary



As we approach the four- and five-year anniversaries of Hurricane Sandy (2012) and Hurricane Irene (2011), respectively, the New York metropolitan region is still recovering from both storms. To date, more than \$60 billion in aid has been allocated and is now finding its way from federal coffers to the vast array of states, municipalities, homeowners, and recovery professionals. The aftermath of both storms has stimulated constructive dialogue throughout the region about how best to respond to storms of such damaging magnitude. But after all the work has been completed and the reports have been written, the question still remains: If another storm with the surge levels of Sandy or the riverine flooding of Irene were to strike again, would our communities be sufficiently protected?

In 2012, Hurricane Sandy swept away part of this house along the Jersey Shore. Source: © David Grossman/Alamy.



Debris from Hurricane Sandy is piled high outside homes in Long Beach, New York. Source: Andrea Booher/FEMA (2012).

Approximately 1.2 million residents of the New York metropolitan region—New York, New Jersey, and Connecticut—live in coastal surge zones and riverine floodplains at greatest risk of inundation. The number of vulnerable residents is expected to nearly double by 2050 due to rising sea levels, increasing frequency and intensity of storms, and a growing population.

The most frequently applied recovery and adaptation measures—rebuilding resiliently, reinforcing hard infrastructure, utilizing green infrastructure, and restoring or enhancing natural systems—can do much to reduce the risk of flooding. However, none of these measures can eliminate all risk. Therefore, some communities are practicing managed retreat through the use of buyout programs that relocate people away from the most vulnerable areas. These programs provide ways for residents to sell their homes in high-risk zones and move to safer locations.

Managed retreat has long been an unpopular adaptation strategy because of the obvious social and political

challenges it poses. Buyout programs, in particular, create numerous hurdles for individual residents, communities, municipalities, and administrators. But the likelihood of extreme weather events is increasing. Without intervention, many communities eventually will have to retreat from flood-prone zones because they will not be willing or able to afford the costs of repairing or rebuilding their homes. In the face of increasingly frequent and powerful storms, buyout programs can be designed and implemented to yield successful outcomes for residents and government entities alike.

Buyout programs were employed in New York, New Jersey, and Connecticut following Irene and Sandy, but they were considered politically unfeasible and thus were available to only a handful of communities. Of the billions of federal aid spent on resilience and recovery in the New York metropolitan region, at least \$750 million has been spent on buyouts, which alleviated the flood risk for more than 1,500 homes. However, the vast majority of recovery efforts focused on other measures of adaptation.

As an increasingly vital instrument in the adaptation toolbox, buyout programs must be improved to provide

viable and appealing strategies that factor in the needs of individuals, communities, and municipalities. The programs must be expanded to include all willing and eligible communities. Analyzing the buyout programs in the New York metropolitan region can provide lessons and resulting recommendations for the whole nation. This report provides such recommendations to increase the appeal of buyouts.

Chapter 1 introduces the current state of adaptation in the New York metropolitan region and asks if its residents are safer following the investment of billions of dollars. It posits that improved buyout programs are an essential adaptation tool in the age of climate change. The sources of risk faced by the participants in buyout programs and their communities are considered in chapter 2. Chapter 3 summarizes the key features of buyout programs and details the programs offered in the New York metropolitan region. Chapter 4 analyzes the impact of participating in buyout programs on communities, finances, and public health. In chapter 5, a series of case studies within the New York metropolitan region illustrates the different ways buyout programs are being implemented. Chapter 6 offers a wide-ranging set of recommendations to generate more effective and accessible buyout programs. The recommendations for federal, state, and local governments include the following measures:

- 1. Rethink the purpose and timeline of buyout programs.**
 - Design buyout programs as long-term adaptations to flood risk, not merely as short-term recovery tools.
 - Ensure that flood-prone communities finalize adaptation plans before the next disaster occurs.
 - Consider the long-term interests of buyout participants.
 - Address the long-term purpose of the land acquired through buyout programs.
- 2. Improve the administration of funding for buyout programs.**
 - Standardize buyout program requirements at the federal level and enhance implementation at the local level.
 - Ensure that administering agencies have the capacity to implement buyout programs.
- 3. Consider alternative funding models for buyout programs.**
 - Test pilot buyout strategies that can be executed incrementally, over time, and outside the context of the disaster.
 - Expand the use of open-space taxes to fund buyout programs.
- 4. Improve planning processes to anticipate and integrate buyout programs.**
 - Municipalities should identify priority acquisition zones by analyzing high-quality data and community input.
 - Municipalities should submit integrated, long-term local adaptation plans rather than flood-only hazard-mitigation plans.
- 5. Make participation in buyouts easier and more attractive for municipalities.**
 - State governments should not make municipalities responsible for paying the nonfederal match.
 - State and federal governments should provide technical assistance to municipalities to help them evaluate the fiscal impacts of buyouts.
- 6. Streamline buyouts to facilitate participation.**
 - Buyout program staff should help homeowners understand the full range of available financial assistance and compensation.
 - When possible, pursue housing blocks where neighbors can relocate together through partnerships with developers.

CHAPTER 1

Introduction



After Hurricane Irene hit New Jersey in September 2011, Wayne residents gained access to their home via boats in order to begin the process of cleaning up their property. *Source: Tom Pioppo/FEMA (2011).*

Between 2011 and 2012, the New York metropolitan region suffered far-reaching devastation from Hurricane Irene and Hurricane Sandy. The loss of life and property was unprecedented. The region was ill-prepared to confront these climatic phenomena and is still recovering from both storms. More than \$60 billion in recovery funding has been allocated to local governments, homeowners, and facilitators. Roads and seawalls have been repaired; buildings have been elevated, secured, or acquired; dunes and wetlands have been restored; and communities have been rebuilt. Yet, these numerous projects are unlikely to prepare the New York region for the increasing risks posed by climate change.

On Safer Ground?

Both storms generated a regional dialogue about how to prepare for and respond to such damaging storms. These conversations led to new and enhanced municipal and statewide programs, such as New York Rising (NY Rising), the Superstorm Sandy Blue Acres Buyout Program in New Jersey, and local programs in towns like Milford and West Haven, Connecticut. State-of-the-art, government-sponsored design competitions, such as Rebuild by Design, were established. At the federal level, the U.S. Army Corps of Engineers (USACE) conducted the two-year, \$19.5-million North Atlantic Coast Comprehensive Study, which focused on how best to protect Northeast residents from hurricanes.

After all these recovery efforts have been completed and appropriate programs implemented, one important question remains: Now, nearly five years later, are our communities better equipped to withstand the surge levels of another Sandy or the flooding of another Irene? The answer is mixed. On the one hand, we have taken some important steps in high-risk and high-value areas to better protect residents and businesses against high-magnitude storms. On the other hand, too many of the region's residents remain at risk of flooding and destruction. And, with sea levels rising, that risk is continuing to expand for more and more people.

The number of residents vulnerable to flooding will likely double by 2050. A key problem is that we continue to develop in locations that are most vulnerable to flooding in an age when climate change impacts will only worsen (figure 1).

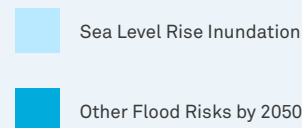
The Case for Buyouts

Largely, governments and communities have dismissed managed retreat as an adaptation strategy because it is laden with social and political difficulties. Buyouts raise many concerns for residents and municipalities that must be addressed. The decision



Figure 1

A Region of Water: Flood-Prone Zones in the New York Metropolitan Region



Source: Regional Plan Association.

for a homeowner to leave their community is made even more difficult because adequate and affordable housing is hard to find nearby. For municipalities, the loss of tax revenue from bought-out properties can have a serious impact on the local budget. History has shown that urban plans often involve relocating low-income communities, ostensibly for the greater good, which is a stark reminder of how well-intentioned, necessary measures like managed retreat can have negative impacts if they are not carefully considered in close consultation with residents.

Rebuilding and restoring are the most common resilience and adaptation tools. Examples include reinforcing and further developing hard infrastructure, incorporating green infrastructure, and restoring or enhancing natural systems. Used alone or in combination, these measures can significantly reduce the risk of flooding, but none can ensure complete safety.

Managed retreat is the strategy that most effectively eliminates risk. It allows residents to forge new beginnings on safer ground and helps create public amenities by acquiring homes in the flood-prone areas and restoring the land to natural floodplain functions. And, unlike other adaptation measures, retreat is a one-time investment that requires no further action beyond helping participants to relocate and protecting the natural landscape. Managed retreat also has the potential to create synergies with other resilience and adaptation strategies. Since development is not permitted on acquired land, this strategy can be used to implement projects such as seawall construction, wetlands restoration, and many other engineered and nature-based solutions.

Buyout programs are the mechanisms for managed retreat. Typically funded by federal or state dollars and managed at the state or county levels, these programs are designed to provide an easy way for residents who no longer want to live in high-risk zones to sell their homes and move to safer locations. Buyout programs were employed in all three states following Irene and Sandy, but too often they were considered a last resort even for the hardest hit areas.

Despite the fact that buyout programs remove risk within flood-prone areas and reduce long-term damage and destruction costs, only \$750 million (of the billions in federal aid allocated for resilience and recovery in the New York metropolitan region) has been spent on these programs. The vast majority of recovery efforts have focused on the other, more popular adaptation measures. While the promise of buyouts as an adaptation measure is great—yielding 100 percent risk reduction, a greater return on public investment, and other benefits to communities and habitats—the costs related to municipal tax rolls, the emotional state of homeowners, and other factors must also be addressed.

This report takes a comprehensive look at buyout programs in the New York metropolitan region by considering the sources of risk faced by program participants, the types of communities they live in, the structure and efficacy of current buyout programs, and the fiscal, social, and health impacts of such programs. A series of case studies from the region exemplifies the different ways that buyout programs can be implemented. Finally, a wide range of recommendations points the way toward more effective buyout programs.

This report presents and evaluates the challenges and benefits of buyout programs for individual residents, communities, municipalities, and administrators. Ultimately, we posit that buyout programs represent a viable adaptation tool if these challenges are addressed in design and implementation.

CHAPTER 2

People and Places at Risk



Climate change poses a myriad of growing risks to communities, including rising sea levels, intensifying storms, urban heat island effects, and ecological threats to wildlife and agriculture. The increased risk of flooding is now recognized as one of the most serious long-term challenges for the New York metropolitan area (figure 2). By 2050, an estimated 2 million people will live in flood zones; approximately one third of them will be socially vulnerable—the demographic group more likely to face disadvantages in recovering from a disaster (RPA 2015).

After Hurricane Sandy, the U.S. Army Corps of Engineers removed debris in Queens, New York, as part of a FEMA mission. *Source: Mary Markos/USACE (2012).*

Overview of Risks

In recent years, the region has been struck by two major storms, disasters that served as wake-up calls for policy makers and the public. In 2011, Hurricane Irene's intense rain caused widespread riparian flooding, an estimated \$2.6 billion in damage, and 23 deaths. The total damage along the Eastern Seaboard from New York to Florida was estimated at \$15.8 billion (Associated Press 2012). Just one year later, in 2012, Hurricane Sandy caused devastating storm-surge flooding along the coast, resulting in \$65 billion in damage and 60 fatalities in New Jersey, New York, and Connecticut (Pirani and Tolokoff 2014).

There are several types of flooding. While all are exacerbated by climate change, each poses a different kind of risk.

RIVERINE FLOODING

Riverine or riparian flooding occurs when rivers and streams overflow their banks, often following heavy rains. This kind of flooding is usually seasonal, but it may also occur after severe storms. It is the main

Mastic Beach, New York, frequently experiences nuisance flooding from high tides. *Source: Regional Plan Association.*



cause of flooding in upland areas and flood-related damage in the United States (Wright 2007). The growing intensity and frequency of storms due to climate change increases the occurrence of such flooding.

FREQUENT OR “NUISANCE” FLOODING

So-called “nuisance” flooding occurs when low-lying or natural basins collect water after rainfall. Nuisance flooding itself may not lead to large damage claims, but areas prone to such flooding are at a high risk of riparian or coastal flooding.

STORM SURGE

Storm surge develops when a combination of storm-related weather phenomena causes abnormally high tidal flooding. The nature of each storm surge can vary greatly depending on the velocity of the storm and the geophysical characteristics of its location. When flooding is accompanied by force, structures can be severely damaged, but this is generally limited to buildings directly on the coast.

SEA LEVEL RISE

Until quite recently, mitigation efforts have focused on the three types of flooding just described, with little or no consideration for the effects of climate change. Rising sea level causes coastal areas to experience permanent inundation regardless of the weather. In addition, a higher sea level expands the areas at risk of storm surge. By 2100, sea levels are estimated to rise between two and six feet above current levels (NOAA 2012; SIRR 2013).

Communicating Flood Risk

Researchers and officials at many levels of government work to understand and address flood risk. To reach the widest audience and achieve the highest impact, officials must find the best tools to share with the public the scientific information they gather to support resilience.

NATIONAL FLOOD INSURANCE PROGRAM

Currently, the most effective means of communicating flood risk is through the National Flood Insurance Program (NFIP), which is overseen by the Federal Emergency Management Agency (FEMA). In 1968, the NFIP was created to address the difficulty that flood-prone households have in finding and obtaining flood insurance. The program mandates and ensures that homeowners at flood risk can purchase flood insurance from the government. To determine who may enroll in the program, Flood Insurance Rate Maps (FIRMs) are drafted to illustrate the extent of the risk. FIRMs are determined through historic flooding data, which allows FEMA to identify flood recurrence intervals: the relationship between the severity of the flood and its likelihood in any given year. Generally, “at-risk” areas are locations with at least a 1 percent chance of flooding in any given year, which is also called the “100-year flood” zone.

Traditionally, NFIP premiums have been heavily subsidized to reduce the burden on homeowners. Unfortunately, this has resulted in the subsidization of development in risky areas, drawing more people and property into harm’s way. In 2012, Congress passed the Biggert-Waters Flood Insurance Reform Act (Biggert-Waters), which aimed to phase out much of the subsidization in premiums, bringing them closer to actuarial reality. However, the magnitude of the increase in premiums led to a public backlash, resulting in the Homeowner Flood Insurance Affordability Act of 2014, which delayed the implementation of Biggert-Waters for four more years.

Communities can receive further subsidization through participation in the Community Rating System (CRS), which provides for incremental discounts of up to 50 percent off premiums for community residents who take positive action to reduce risk. The program is generally popular. But, because discounts must be offset by higher premiums from non-CRS

communities, the program may shift higher burdens to communities that are already poorly equipped to deal with flood risk due to their small size or the fact that only a marginalized portion of residents face flood risks.

Because FIRMs are based on current and past conditions, not on trends or projections, they do not account for sea level rise or other effects of climate change. Biggert-Waters directed FEMA to establish an advisory committee to map future flooding conditions. Already, nearly a quarter of NFIP claims in the three states in the New York metropolitan region have originated from locations outside the designated 100- and 500-year flood zones. As the flood-prone zones exceed current designations, other maps and tools are being developed to communicate risk.

OTHER TOOLS

In recent years, growing interest in and accessibility to new technology has led to a proliferation of flood mapping and communication tools. The National Oceanic and Atmospheric Administration (NOAA) has launched several online mapping tools, such as DigitalCoast, Coastal Flood Exposure Mapper, and Sea Level Rise Viewer. The Nature Conservancy’s Coastal Resilience project and Climate Central are other useful tools to raise awareness of flooding risks. Rutgers University has also created NJADAPT, a flood-mapping tool with a targeted geographic scope for a broad audience that ranges from officials to the public.

Managing Risks: The Five Rs

Managing risk is a less popular way to define resiliency. Particularly since Sandy, billions of dollars have been dedicated to managing flood risk in many ways throughout the region. Researchers and officials have developed countless methods for classifying and describing various resiliency strategies in the process of determining and analyzing the best approach for a

particular community. The Regional Plan Association (RPA) has developed its own taxonomy of resilience, dubbed “The Five Rs” (RPA 2015). They are Rebuild, Resist, Restore, Retain, and Retreat. Recognizing that each category is by no means effective by itself, the Five Rs provide a framework for considering the most appropriate combination of strategies for managing risk.

- **Rebuild** strategies reinforce existing structures or redevelop damaged structures to withstand the effects of flooding. This approach includes floodproofing and elevating structures as well as implementing policy changes that address development requirements in flood zones.
- **Resist** strategies mitigate flooding through physical barriers. Large-scale projects, such as hard bay barriers, seawalls, and earthen berms help to keep water out.
- **Restore** strategies use nature-based solutions to limit the damage caused by flooding, including wetlands restoration and living shorelines.
- **Retain** strategies mitigate flood damage by controlling where water goes. This approach includes small-scale projects such as bioswales and green roofs, as well as large-scale projects designed to absorb large quantities of water during a flood.
- **Retreat** strategies relocate people and property out of harm’s way. The most common retreat strategy involves buyout programs.

To date, retreat has received the least attention of the Five Rs, even as resiliency has become a very popular topic within policy discussions. It is understandable that retreat has been considered the least viable politically, as it places higher financial, social, and psychological burdens on the people at risk than the other four Rs. The burdens of a costly federally funded megaproject such as the Bay Barrier are spread across the country, whereas buyout programs pose both economic and noneconomic costs to local residents and municipalities.

This report proposes several ways to mitigate the cost of buyouts to make them a more viable strategy when appropriate. Retreat in the form of buyouts may also make other strategies viable—by making room for berms or a wetlands restoration project, for example. No single strategy is enough to address the challenges posed by climate change. Strategies should be evaluated for their suitability alongside all other approaches. For example, we must consider the possible synergies between resiliency strategies, including retreat (e.g., buyout programs) and restoration (e.g., wetlands restoration), among others. One thing is certain: managing the growing risk posed by floods will be very costly—but not as costly as the price of inaction.

Community Types

This study focuses on sociological and planning research to inform the design of buyout programs. Policy makers and buyout program staff may be able to reduce risk and minimize potential negative impacts to homeowners and municipalities by carefully selecting new locations for buyouts and residences. The quantitative component of this study is divided into two sections: (1) the development of a community typology; and (2) fiscal impact analyses of five case studies within the New York metropolitan region.

We have organized the New York metropolitan region into flood risk community types. The community types allow the scope of the analysis to remain regional, while still considering indicators that are relevant on a smaller scale. The typology is based on three socio-demographic factors related to social vulnerability: income, race, and housing tenure. These same factors may also influence participation in, satisfaction with, and outcomes of buyout programs.

The purpose of organizing communities this way is to determine whether existing programs are distributed and implemented equitably, and to understand how certain fiscal issues affect different types of commu-



Days after Hurricane Irene hit, Fayette Park in Wayne, New Jersey, remained impassable. Source: Tim Pioppo/FEMA (2011).

nities. The ultimate goal is to design buyout programs that accommodate each community type through all stages of the process.

FLOOD RISK PROJECTIONS

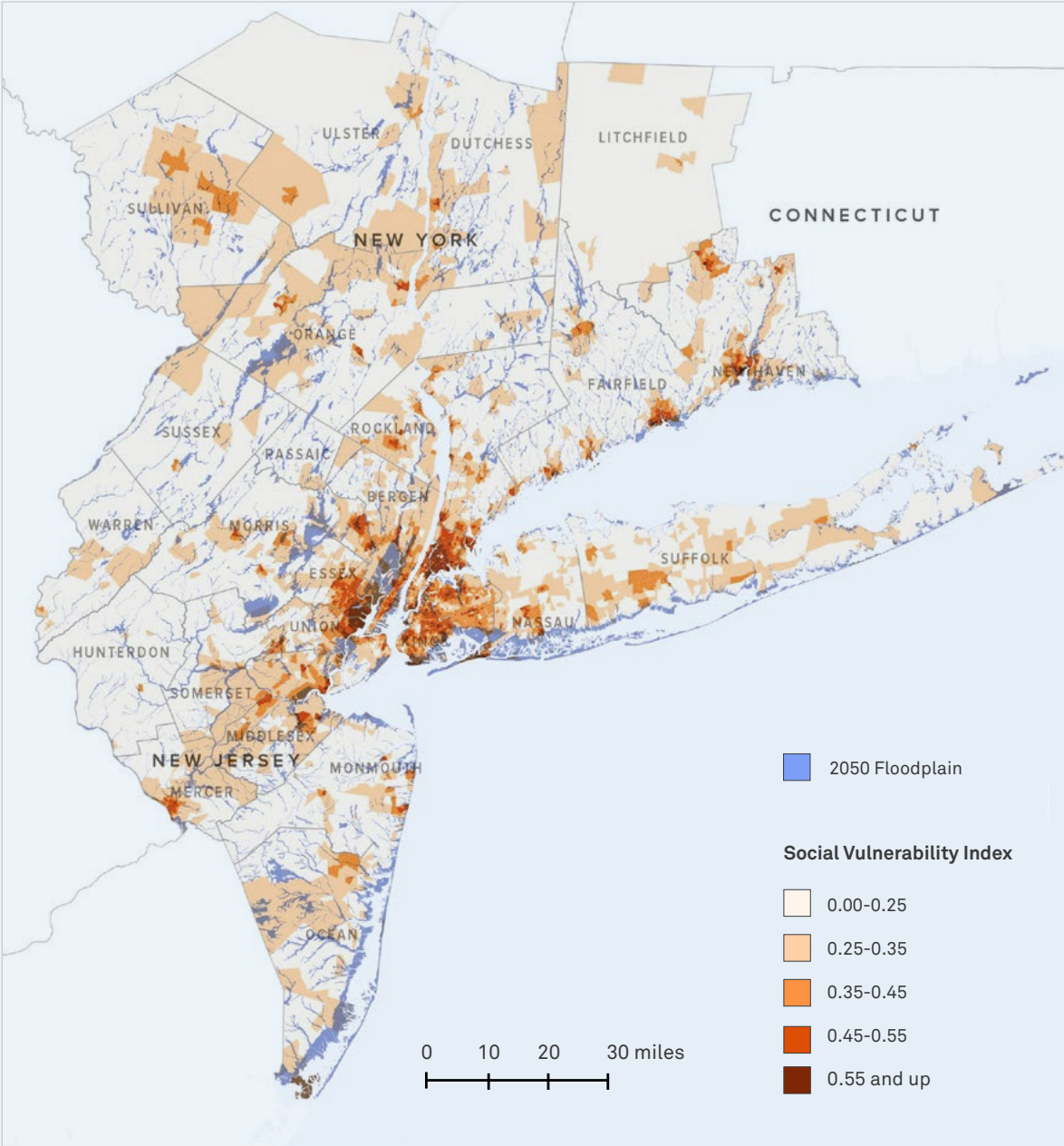
The first step is to identify the areas most vulnerable to floods, as illustrated in figure 2. While FEMA's Flood Insurance Rate Maps set the standard for mapping the extent of flood risk today, the risks are likely to intensify in the coming decades. Flood risk maps for 2050 were produced to estimate the extent of the growing flood risk over the next 35 years. Although organizations such as The Nature Conservancy have attempted to model the effects of storm surge on top of sea level rise, there is no consistent flood layer that spans the 31 counties across the three states that form the New York metropolitan region. Therefore, a composite layer was created from several data sources, including current 100-year flood hazard areas from FEMA's Flood Insurance Rate Maps across all applicable counties, NOAA's sea level rise mapping tool for New Jersey and New York, and The Nature Conservancy's 2050 storm surge model for Connecticut and New York.

INCOME

Household income is a crucial consideration in community adaptation and resiliency strategies. Households with lower incomes tend to have fewer resources available for reconstruction following a disaster. They also have fewer relocation options if they choose to move, because they compete with higher-income households for new housing in less risky neighborhoods. Additionally, rising actuarial-based insurance premiums may be increasingly burdensome in risky areas.

As part of disaster recovery, the U.S. Department of Housing and Urban Development (HUD) issues grants called Community Development Block Grants-Disaster Recovery (CDBG-DR) to eligible applicants—states and cities located within an area covered by a presidential disaster declaration. HUD typically requires that 70 percent of CDBG-DR funding be spent in low- and moderate-income areas. HUD also calculates annual household income levels to help grantees meet this criterion. These thresholds form the basis of the income levels and assumptions used in this analysis. Additionally, HUD provides geographic income data in the form of census block groups. Census block groups

Figure 2
Map of Social Vulnerability Within the Projected Flood Zone in the New York Metropolitan Region



Source: Regional Plan Association. Data: U.S. Census Bureau.

in which more than half the population is below 80 percent of the median income of the Core Based Statistical Areas (CBSA) are classified as Low-to-Moderate Income (LMI).

RACE

Race is not inherently related to adaptation or resilience, but two important factors suggest the need to include race within this typology. First, disasters tend to amplify existing vulnerabilities experienced by many populations, such as low-income individuals, minority groups, and the elderly. Because vulnerable populations often begin with fewer resources, disaster recovery can be more challenging for these groups (Graif and Waters 2011). Second, there is a long history of displacing nonwhite populations under the guise or consequence of development. This study includes race within its typology analysis to identify the particular financial issues that communities with high nonwhite populations face beyond income.

HOUSING TENURE

Housing tenure is a metric that describes whether a residential unit is occupied by the property's owner

or by renters. Buyout programs are naturally targeted toward homeowners because they legally own their properties and bear the financial burden of damaged properties. While renters do not have to directly pay for repair or reconstruction, they still face a number of challenges in the context of acquisition programs. Like homeowners, renters need to find new housing, but they may be priced out of lower-risk areas. Additionally, they have less say in the decision to accept a buyout and cannot receive compensation for property they do not own. Existing programs, such as NY Rising, provide relocation assistance for tenants displaced by the acquisition of their homes. However, not every program provides this type of assistance. This highlights the need to further expand programs to support renters before, during, and after the relocation process.

ANALYSIS

Based only on the population at risk from flooding, communities were classified as higher or lower than the average in low-to-moderate-income, nonwhite, and renters, resulting in eight possible combinations. These typologies are listed in table 1 and appear graphically in figures 3 through 7.

Table 1
Typologies of Flood-Prone Populations

ABOVE AVERAGE % OF LOCALITY		BELOW AVERAGE % OF LOCALITY	
L	Above average percentage of population in block groups with low-to-moderate income	H	Below average percentage of population in block groups with low-to-moderate income
N	Above average percentage of population in blocks with high nonwhite population	W	Below average percentage of population in blocks with high nonwhite population
R	Above average percentage of population in blocks with majority renter-occupied housing	O	Below average percentage of population in blocks with majority renter-occupied housing

Source: Regional Plan Association.

The quantitative component of this study contains two parts: (1) the high-level typology analysis of communities at risk throughout the New York metropolitan region; and (2) five local case studies that enable a closer inspection of flood risk and program scenarios. Along with contextual information gained from interviews, the typology analysis informed our selection of case studies. The cases provided a range of geographic and socioeconomic contexts and flood management experiences. The selected locations were Oakwood Beach, Staten Island, New York; Mastic Beach, Long Island, New York; Wayne Township, New Jersey; Sayreville, New Jersey; and Milford, Connecticut.

We compiled a list of quantitative and qualitative metrics to determine the feasibility of buyout strategies through interviews with buyout program staff, planners, conservation experts, and other stakeholders, as well as through examinations of cost-benefit analysis frameworks from FEMA's Hazard Mitigation Grant Program and Rebuild by Design. These metrics are listed in table 2.

Additional fiscal impact indicators listed in table 3 may have larger implications for the design of buyout

programs than the cost-benefit calculations. These indicators may be useful in determining how receptive certain communities may be to buyout programs or how programs can be better tailored to communities to increase participation or reduce attrition. For example, a community with high foreclosure rates may be receptive to a buyout program that provides escape from difficult mortgages, but the program may not have the mechanisms necessary to offer awards to homeowners and banks under those conditions. Some of these factors are difficult to quantify because data is unavailable or is too difficult to predict, such as property values 50 years out. The conceptual fiscal analysis will monetize or quantify metrics where possible and describe them qualitatively when necessary.

It is important to note that many relevant indicators are not included in the fiscal impact analyses either because the costs and benefits do not accrue to property owners or municipalities or because the impacts are incalculable. Excluded indicators include: reduction in loss of life, impacts on ecosystems and biodiversity, efficiency of energy, quality of ambient space and design, identity and social cohesion, crime and vandalism, availability of affordable housing, recreational value of impacted areas, and sales tax.

Table 2 **Fiscal Impact Indicators**

• Expected reductions in property damage • Expected reductions in dislocation • Property values • Property taxes • Expected reductions in flood insurance premiums • Emergency services • Municipal debt service
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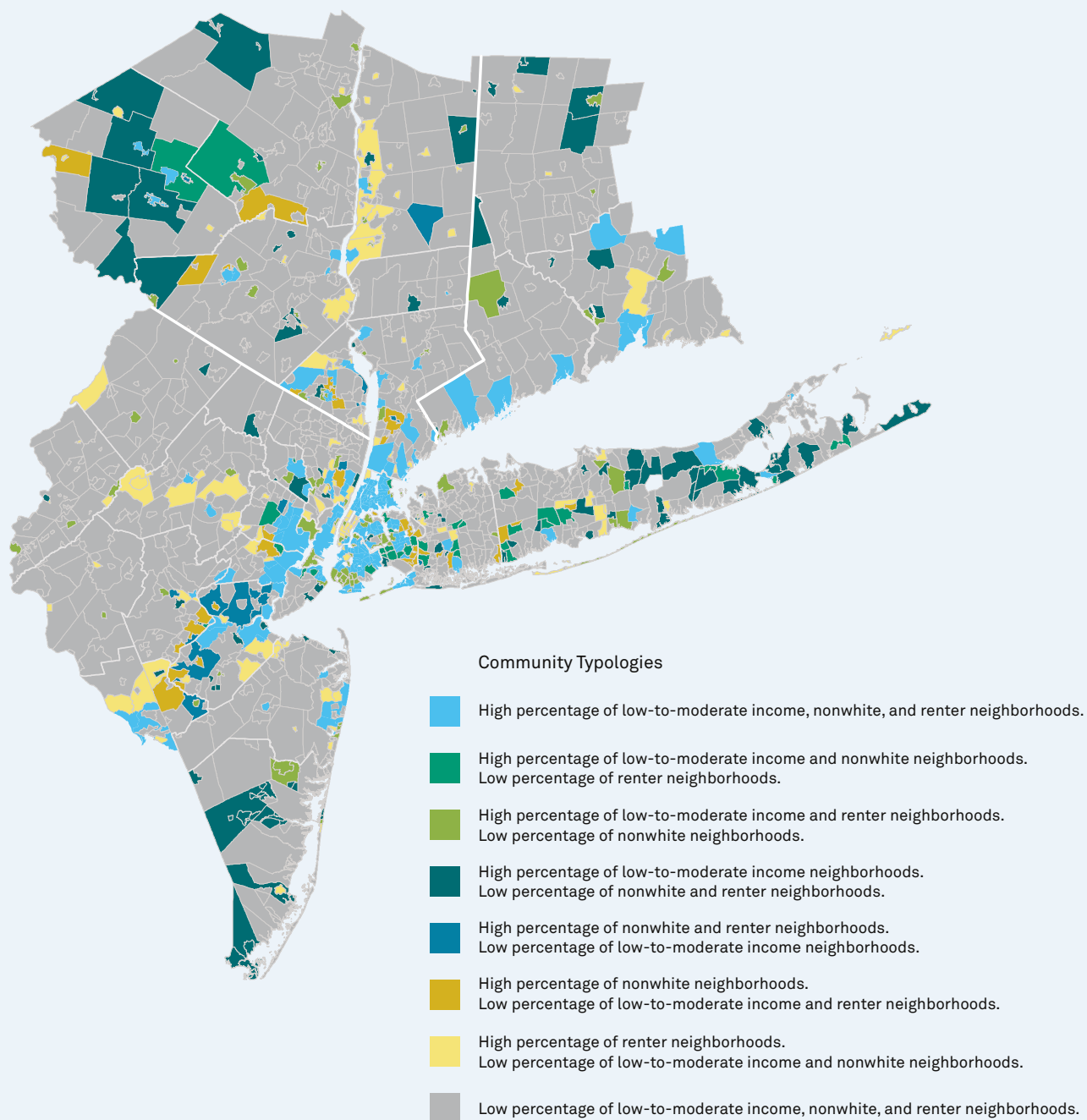
Table 3 **Additional Fiscal Impact Indicators**

• Home values • Change in home values • Repetitive-loss properties • FEMA Individual Assistance grants • Age of housing stock • Length of residence

Source: Regional Plan Association.

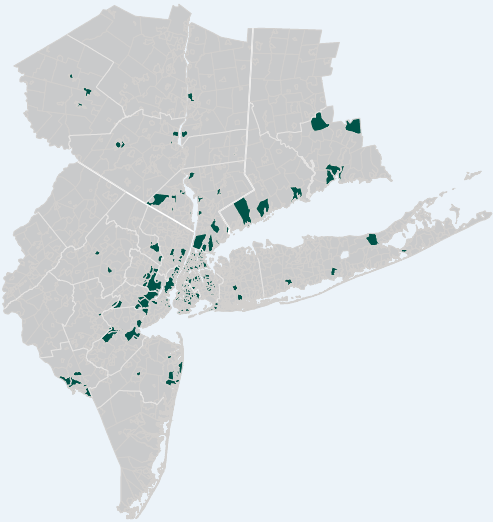
Figure 3

Community Typologies Based on Income, Race, and Housing Tenure



Source: Regional Plan Association (2016).

Figure 4
Low-to-Moderate Income Residents in Nonwhite Neighborhoods: Renters Versus Owners



Types L-N-R

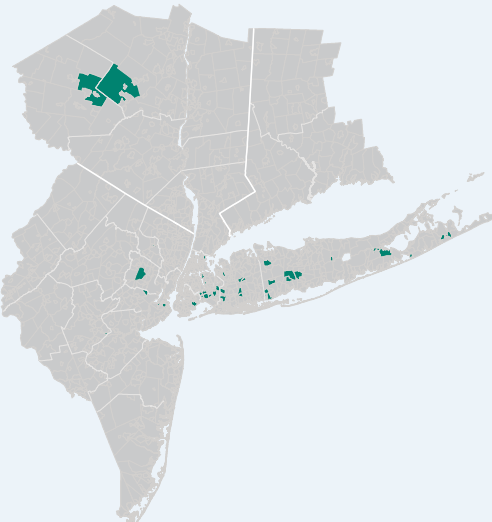
- **High percentage** of low-to-moderate income neighborhoods
- **High percentage** of nonwhite neighborhoods
- **High percentage** of renter neighborhoods

Includes Coney Island, New York; Jersey City, New Jersey; Sayreville, New Jersey; and Norwalk, Connecticut



Sample Block:
Long Street, 66 households

- 81% Black, 11% White, 8% Hispanic
- 4–8 unit, semidetached apartments
- Median annual income: \$15,000



Types L-N-O

- **High percentage** of low-to-moderate income
- **High percentage** of nonwhite neighborhoods
- **Low percentage** of renter neighborhoods

Includes Mount Vernon, New York; Glen Cove, Long Island, New York; and Red Bank, New Jersey



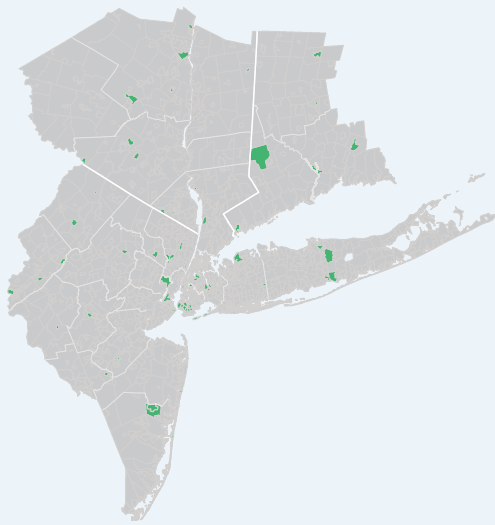
Sample Block:
Bonhomme Street, 60 households

- 61% Hispanic, 19% Black, 14% White, 4% Asian and other
- Modest, detached bungalows
- Median annual income: \$53,800

Source: Regional Plan Association. Images: © Google 2014.

Figure 5

Low-to-Moderate Income Residents in White Neighborhoods: Renters Versus Owners



Types L-W-R

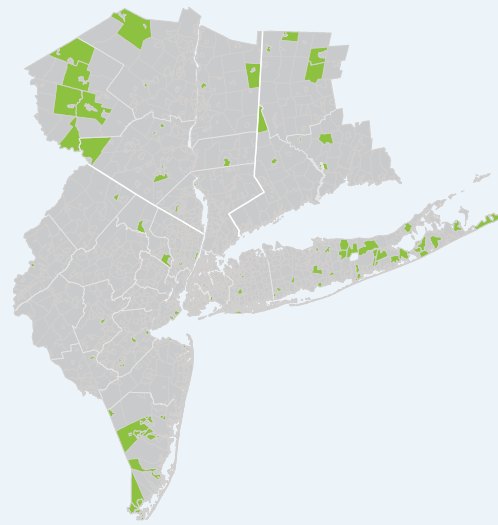
- **High percentage** of low-to-moderate income neighborhoods
- **Low percentage** of nonwhite neighborhoods
- **High percentage** of renter neighborhoods

Includes Bayonne, New Jersey; Greenpoint, New York City; and downtown Greenwich, Connecticut



Sample Block:
Clinton Avenue, 24 households

- 72% White, 24% Hispanic, 4% Black
- Mix of detached bungalows and duplexes
- Median annual income: \$50,300



Types L-W-O

- **High percentage** of low-to-moderate income neighborhoods
- **Low percentage** of nonwhite neighborhoods
- **Low percentage** of renter neighborhoods

Includes Mastic Beach, Long Island, New York; Little Egg Harbor, New Jersey; and South Beach, New York City



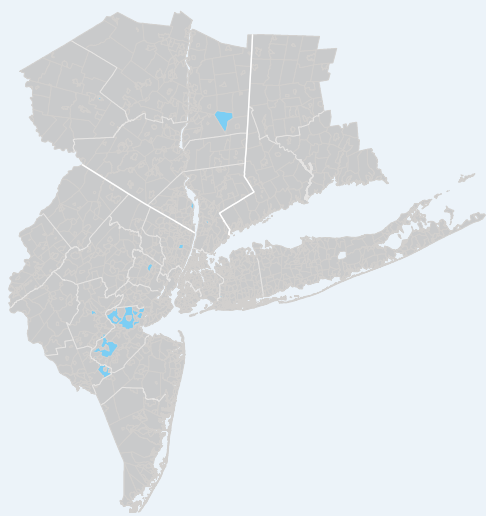
Sample Block:
Plainview Avenue, 31 households

- 71% White, 19% Black, 9% Hispanic, 1% other
- Bungalows on small lots
- Median annual income: \$35,900

Source: Regional Plan Association. Images: © Google 2013.

Figure 6

Higher-Income Residents in Nonwhite Neighborhoods: Renters Versus Owners



Types H-N-R

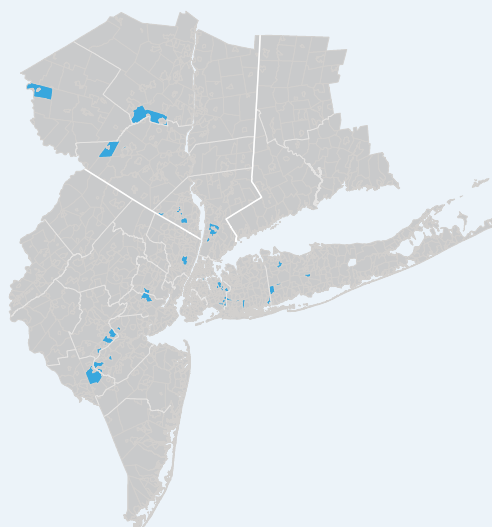
- **Low percentage** of low-to-moderate income neighborhoods
- **High percentage** of nonwhite neighborhoods
- **High percentage** of renter neighborhoods

Includes Edison, New Jersey and South Valley Stream, Long Island



Sample Block:
Henry Street, 19 households

- 93% Hispanic, 7% White
- Very small cottages on primarily industrial block
- Median annual income: \$49,400



Types H-N-O

- **Low percentage** of low-to-moderate income neighborhoods
- **High percentage** of nonwhite neighborhoods
- **Low percentage** of renter neighborhoods

Includes Tottenville, New York City and Sag Harbor, Long Island



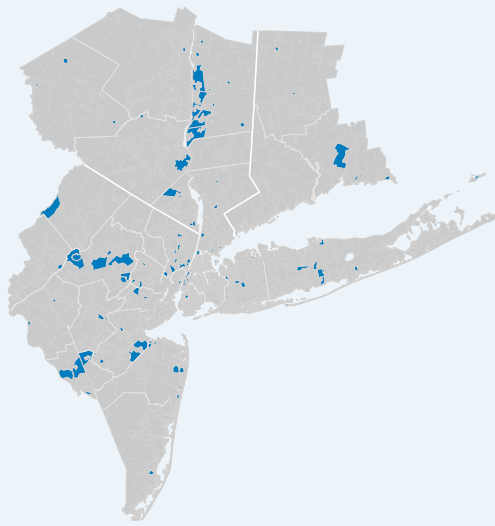
Sample Block:
Beechwood Avenue, 109 households

- 78% Black, 10% Hispanic, 6% Asian and other, 5% White
- Two-story bungalows on narrow lots
- Median annual income: \$46,700

Source: Regional Plan Association. Images: © Google 2013, 2014.

Figure 7

Higher-Income Residents in White Neighborhoods: Renters Versus Owners



Types H-W-R

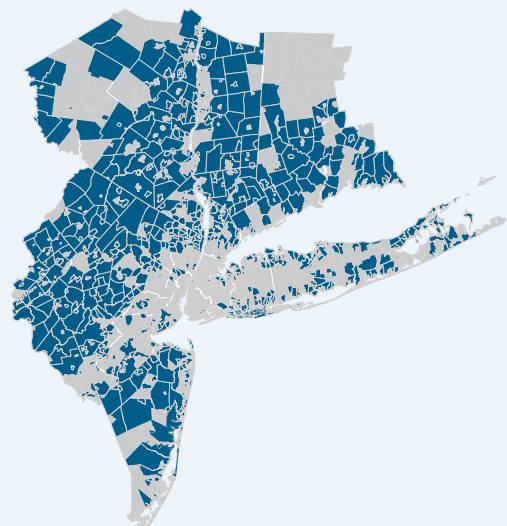
- **Low percentage** of low-to-moderate income neighborhoods
- **Low percentage** of nonwhite neighborhoods
- **High percentage** of renter neighborhoods

Includes Oakwood Beach, New York City; Woodbridge, New Jersey; Millburn, New Jersey; and Port Jefferson, Long Island



Sample Block:
Mill Street, 55 households

- 57% White, 22% Hispanic, 21% Asian and other
- Primarily semidetached modern duplexes
- Median annual income: \$59,000



Types H-W-O

- **Low percentage** of low-to-moderate income neighborhoods
- **Low percentage** of nonwhite neighborhoods
- **Low percentage** of renter neighborhoods

Includes Midland Beach, New York City; Massapequa, Long Island; Toms River, New Jersey; and Darien, Connecticut



Sample Block:
Biltmore Drive, 49 households

- 66% White, 16% Hispanic, 17% Asian and other, 3% Black
- One- and two-story houses on large lots
- Median annual income: \$76,700

Source: Regional Plan Association. Images: © Google 2014.

CHAPTER 3

Buyout and Acquisition Programs



These buyout duplexes in Oakwood Beach, Staten Island, await demolition. Source: *Regional Plan Association (October 2014).*

Since the 1970s, land acquisition programs have been used as risk management tools in numerous communities across the United States. The programs through which properties have been acquired share certain elements and have experienced varying degrees of success in outcomes and participation rates. This chapter covers the central tenets of buyout and acquisition program design, provides historical examples of programs throughout the United States (including the New York metropolitan region), and examines current program designs and historical precedents. The chapter also presents a framework for understanding the factors that promote and inhibit participation in land acquisition programs.

Federal Policies and Funding

Most buyout programs are funded through federal sources and are administered by state or local agencies, which target specific communities and homeowners. Federal funding for buyout programs originates from two primary agencies: the Federal Emergency Management Agency (FEMA) and the Department of Housing and Urban Development (HUD). Funding for buyouts through FEMA is available under the Hazard Mitigation Grant Program (HMGP), the Pre-Disaster Mitigation Grant Program (PDM), and the Flood Mitigation Assistance Program (FMA) (FEMA 2015a). Programs funded through HUD receive support from Community Development Block Grants (CDBG). A smaller number of properties has been acquired through the U.S. Department of Agriculture's (USDA's) Emergency Watershed Protection-Floodplain Easement Program (EWP-FEP) (USDA n.d.). Several key features and requirements are mandated at the federal level through the appropriation of these funds, although local program administrators have some discretion in the design of buyouts.

Key Features of Buyout and Acquisition Programs

ELIGIBLE PROPERTIES

Buyout funding must be used to purchase developed land rather than vacant parcels. FEMA Hazard Mitigation Assistance (HMA) grants (those falling under the HMGP, FMA, and PDM programs) must be utilized to acquire properties that contain at least one structure, and that structure (or structures) must be demolished or relocated from the site within 90 days of closing. FEMA funds can only be used to acquire undeveloped flood-prone land if that land borders a property containing a structure that is also eligible for a buyout and if the purchase of both parcels remains cost effective (FEMA 2015b).

Commercial properties are eligible for buyouts under both FEMA and HUD funding. However, sites with current or previous commercial uses containing hazardous materials are not eligible for FEMA funding. The acquisition of nonresidential properties through the use of CDBG-DR funding satisfies the HUD national objective of low-and-moderate income benefit if the property, which will be turned into publicly accessible green space, will also benefit low-to-moderate income areas (FEMA 2015b).

ELIGIBLE USES

Generally, properties acquired with FEMA and CDBG-DR funding must be preserved as open space. After properties are acquired, FEMA specifically states that “subrecipients must apply deed-restriction language to all acquired properties to ensure that the property is maintained in perpetuity as open space, consistent with natural floodplain functions” (FEMA 2015b, 8). The open space requirements of FEMA-sponsored buyout programs do not allow open spaces made available through property acquisitions to be used for flood levee systems. However, they do permit structures that promote ecosystem restoration, preservation, or enhancement (FEMA 2015b). FEMA also stipulates that properties that have been acquired through buyout processes are not eligible for future disaster assistance from the federal government.

ELIGIBLE RESIDENTS

Determining which homeowners are eligible for buyouts is largely left to the discretion of program administrators. Individual property owners do not apply directly to FEMA or HUD for FEMA HMA and CDBG-DR funding; rather, they apply through eligible subapplicants, such as state agencies, tribal agencies, federally recognized tribes, local governments, and (for HMGP funding) private nonprofits (FEMA 2015c). In all cases, federal funding guidelines recommend that program administrators designate priority acquisition areas and target residents within those

areas for buyouts. Some programs take a “willing seller” approach—areas are identified by the state and then outreach is conducted to identify owners willing to sell—or a hybrid approach—the state collaborates with county and local governments to identify areas and then reaches out to willing sellers. Other programs take a hybrid approach that combines the willing seller method with a targeted risk-management strategy.

New Jersey’s Blue Acres Program uses a willing seller approach. In this program, administrators identify individual properties or clusters of properties that experienced repetitive or severe repetitive losses only in municipalities that agree to participate in the program. It then conducts outreach to eligible property owners to inform them that the program is available. NY Rising uses a hybrid approach when collaborating with county and local governments to identify areas of contiguous parcels in locations that are most flood-prone. These are called “enhanced buyout zones” and are eligible for incentives, which are discussed in the following paragraph. Additionally, NY Rising distinguishes between buyouts and acquisitions. Buyouts are purchases within the enhancement zones—areas that regularly are at risk of flooding—that are made at pre-storm fair market value; buyout properties are preserved as open space in perpetuity. Acquisitions are properties purchased outside of enhancement zones at post-storm value and allow for more flood-safe rebuilding on the parcels.

VOLUNTARINESS

Buyout and acquisition programs are always voluntary; homeowners are never forced to sell their homes to the government. However, to minimize the risk of future flood damage, administrators design programs to encourage homeowners to seek out and accept buyouts. As mentioned, NY Rising identifies areas that are regularly at risk of flooding. Homeowners in these enhancement areas who agree to sell their homes can receive the fair market value plus a 10 percent

incentive if all property owners in the area agree to participate in the program. A 5 percent incentive is offered to property owners in enhanced buyout areas who relocate within the same county.

COMPENSATION

Compensation is a critical factor in encouraging residents to participate in buyout programs. Because the value of damaged homes declines significantly, most buyout programs offer sellers the pre-storm value of their property even though federal funding sources give program designers the choice of offering the either the pre-storm or post-storm value. However, offering pre-flood fair market value can mean that programs require more funding (HUD 2013).

RELOCATION ASSISTANCE AND ADDITIONAL HOUSING ALLOWANCES

Relocation and/or rental assistance is available to some buyout participants (property owners) as well as to renters who have been displaced from their homes. In some areas, homes outside of flood-prone areas are considerably more expensive than homes within the floodplain. To mitigate this discrepancy, FEMA allocates a shortfall allowance of up to \$31,000 per property for owners if they must pay more than the pre-storm value of their home for a comparable home in an area that is not prone to flooding (FEMA 2015a). This allowance is authorized by the Uniform Relocation Assistance (URA) and Real Property Acquisition Policies Act of 1970 (HUD 2015). This same act regulates the provision of rental assistance to tenants displaced by the acquisition of their buildings, as well as the relocation and rental assistance available to renters and owners of mobile homes. Renters are eligible to receive up to \$7,200 in assistance. All forms of assistance are subject to duplication of benefits restrictions and can only be applied to eligible uses. Additionally, CDBG-DR funds can be leveraged to create replacement housing incentive programs for property owners who were not income-qualified for the Replacement Housing Allowance.

NONFEDERAL MATCH AND PROGRAM ADMINISTRATION

In general, funding through FEMA's HMA programs may provide up to 75 percent of eligible project costs; the remaining 25 percent must be provided by a local match. Funding through the HMGP falls in this category, but there are exceptions within other FEMA programs. For instance, in small impoverished communities, FEMA can contribute up to a 90 percent federal cost share through the Pre-Disaster Mitigation Grant Program (PDM). Similarly, in the case of the Flood Mitigation Program, FEMA can contribute up to 90 percent of project costs for repetitive-loss properties and up to 100 percent for severe repetitive-loss properties. The local match can be a hurdle for communities that do not qualify for an increased federal cost share. CDBG-DR funding can be combined with FEMA funding to create local buyout programs that provide the 25 percent nonfederal match.

Buyout and Acquisition Program Precedents

Most buyout and acquisition programs rely on these federal grants for at least a portion of their funding. However, an examination of buyout programs in the United States since the 1970s reveals how community organization and the discretion of program administrators regarding program design can significantly impact the success of programs. The following case studies illustrate the importance of integral buyout programs, community input, and careful consideration of residents' needs.

SOLDIERS GROVE, WI (1978)

Soldiers Grove, Wisconsin, is a small village along the Kickapoo River that experienced periodic severe flooding shortly after it was incorporated in 1888 until the village fully relocated to higher ground in 1983 (Beckers 1994). In the late 1930s, the community and other towns along the river pressured Congress to

implement a flood control project. In 1962, several decades and devastating floods later, Congress finally released a preliminary plan for a dam and levee. Between 1974 and 1975, two events prompted community members to push for more progress and change. In 1974, Wisconsin mandated that Soldiers Grove pass a floodplain ordinance prohibiting any new construction in the downtown area and limiting repairs to existing buildings. This amplified the disinvestment and economic decline already underway. The following year, the USACE released the final plans for a levee. The capital construction costs would total \$3.5 million, require annual maintenance of more than twice the 1975 property tax levy, and protect only \$1 million worth of property (Beckers 1994). Residents petitioned Congress to reappropriate the \$3.5 million they had planned to spend on the levy to relocate the town to higher ground. In 1978, after several years of petitioning and withstanding the greatest flood on record, the village was finally granted \$900,000 in CDBG-DR funding to begin relocation. Between 1978 and 1983, the town moved to an adjacent area of higher ground, which they had purchased with

Since Hurricane Sandy, many homes in low-lying coastal areas have been raised like this one in Mastic Beach, Long Island, New York. Source: *Regional Plan Association* (October 2014).





Iowa residents and volunteers fill sandbags to stop the floodwaters from progressing. *Source: Andrea Booher/FEMA (1993).*

municipal resources for \$90,000 before they were granted HUD funding. The former downtown area was transformed into a municipal park (Siders 2013). The small size of Soldiers Grove, with a population of less than 750 at the time of the relocation, makes it challenging to replicate in all contexts. However, it reflects an extremely successful buyout process that was tested in 2007 and 2008 when the former downtown was severely flooded while the new town avoided any damages (Siders 2013).

IOWA FLOODS (1993)

The Great Flood of 1993 along the Mississippi River broke records for duration, magnitude, and scale. Throughout the spring, summer, and fall of 1993, much of the Midwest experienced severe flooding. During that time, 532 counties in nine states were declared disaster areas, 100,000 homes and 5,000 small businesses were damaged, and 6.6 million acres were flooded (Conrad et al. 1998). The flood is often credited with ushering in a new era in federal flood mitigation policy (Beckers 1994). The response to the profound damage “represente[d] an on the ground shift away from six decades of thinking that all floods can be controlled by ever more extensive construction projects. The buyouts are a recognition that in many instances the most sensible way to manage high-risk floodplains

is to let them be floodplains” (Conrad et al. 1998, 29). Since federal policies at the time did not support this kind of disaster response, Congress passed the Hazard Mitigation and Relocation Assistance Act, which amended the Stafford Act to allocate a greater portion of FEMA grants to buyouts and other mitigation efforts and to increase the federal cost share for recovery projects from 50 to 75 percent (Conrad et al. 1998).

Iowa was particularly hard hit by the floods. By mid-July, President Bill Clinton had issued a presidential major disaster declaration for all 99 counties within the state, which made them all eligible for federal assistance (White House Office of the Press Secretary 1993). Many reconstruction and mitigation projects, as well as several large-scale buyout programs, were funded this way. The state divided itself into ten Housing Recovery Zones in order to administer their buyout funds on a more local level. Each zone designed an administrative plan and selection criteria for buyouts in its zone. The programs provided a valuable framework to compare the merits of differing program designs. Residents considered the approaches in Cherokee and Ames, Iowa, to be the most successful. These two cities relocated the population from the most at-risk areas into safer parts of the city while creating buffers of green space to function as natural floodplains (Siders 2013).

In contrast, the program in Louisa County was maligned as a glorified blight-clearance program resulting in population loss and “checkerboarded” purchases—scattered, noncontiguous properties. Cherokee and Ames succeeded because they offered residents the pre-flood market value of their homes and additional incentives if the residents chose to relocate within the city. Additionally, they worked to secure relocation areas within their municipal boundaries (Siders 2013). The Louisa County project did not incorporate such strategies or incentives. The difference in the public perception of these programs, as well as their physical outcomes, indicates how important relocation assistance and planning are in

designing buyout programs. The Iowa buyout programs demonstrate the great value of designing integrated programs that consider more than property acquisition. Successful programs must also address the function of acquired land and retain community residents.

GRAND FORKS, ND (1997)

In the spring of 1997, the Red River in North Dakota flooded severely and reached a peak of 54 feet. The city of Grand Forks was particularly affected; over 83 percent of homes were damaged and 4.5 million acres were flooded, causing more than \$3.5 billion in destruction. The city organized a buyout of 802 properties using \$171 million in CDBG funding to turn the land occupied by these homes into the 2,200-acre Greater Grand Forks Greenway (Siders 2013). In addition to successfully creating a natural buffer and relocating the residents most at risk, the city took steps to ensure that buyout participants obtained alternative housing. The city partnered with a developer to build 180 homes in an underdeveloped area of Grand Forks (HUD 2007). Unlike the relocation assistance in the Ames and Cherokee buyouts, the alternative housing in Grand Forks was built in an area physically isolated from the rest of the city without local school districts. The new homes were nearly double the cost of the demolished homes. Almost three years after the storm, only 12 of the 180 new homes had been sold (HUD 2007). While it is generally advantageous for buyout programs to provide alternative housing options for displaced residents within the same municipality, the houses must be equivalent in cost and quality to the original homes in order to be successful investments for municipalities.

NEW ORLEANS, LA (2005)

On August 29, 2005, Hurricane Katrina made its second landfall in Buras-Triumph, Louisiana. The destruction and levee failures were utterly devastating. In New Orleans Parish, over 70 percent of the nearly 200,000 housing units were damaged. In the immediate aftermath of the storm, Mayor Ray Nagin created the Bring New Orleans Back Commission (BNOBC) to create a

rebuilding plan by the end of 2005 (Olshansky et al. 2008). As part of this planning effort, the commission tasked researchers from the Urban Land Institute (ULI) with making preliminary recommendations. Among these recommendations was the suggestion that rebuilding efforts be organized strategically, beginning in the areas that suffered the least damage, and without the assumption that the most impacted areas would be fully rebuilt (Urban Land Institute 2005). The ULI suggested that planners carefully consider whether to rebuild the most impacted areas or convert them into floodplains to shrink the land area of New Orleans. When the ULI released its official report, the New Orleans' *Times Picayune* ran a version of the plan's map that highlighted with green dots areas targeted for buyouts. In these areas, the city would require residents to state their intentions to rebuild rather than rebuild automatically. This became known as the "Green-Dot" map and elicited tremendous opposition from residents. They accurately pointed out that many of the lowest-lying areas slated for buyouts were also racially segregated and economically disadvantaged areas with a tragic history of government-imposed relocations and disinvestments.

In response to the widespread opposition to this aspect of the plan, Mayor Ray Nagin announced that all residents would be permitted to rebuild even in the most at-risk areas (Olshansky et al. 2008). Nevertheless, the Road Home Program, which distributed the federal funding allocated to Louisiana homeowners, provided funding for rebuilding and acquiring properties that homeowners did not wish to rebuild. As of May 2015, just over 5,000 properties had been purchased through the Road Home Program in Orleans Parish (State of Louisiana Office of Community Development 2015). Although these properties compensated 5,000 homeowners, they are scattered and thus have not allowed for increased neighborhood flood resilience in the most at-risk sections of New Orleans. Property acquisition could not be used to increase the flood protection for at-risk areas because the initial buyout program did not obtain adequate public input

before proposing a radically transformed city. Instead, acquisition was a tool to help residents move out of harm's way. The program provided relief to residents who could relocate, but the public opposition created a missed opportunity to reduce future flood risk for those who remained.

Buyout Programs in the New York Metropolitan Region

NY RISING

In 2013, New York State established the New York Rising Buyout and Acquisition Programs (NY Rising) to address the damage caused by Hurricanes Irene and Sandy and Tropical Storm Lee. Under these programs, the Governor's Office of Storm Recovery determined priority areas for buyouts, enhanced buyout zones (see earlier in this chapter), where owners of one- and two-unit dwellings were eligible to receive the pre-storm fair market value of their homes, plus incentives. Structures purchased in these enhanced areas would be destroyed and the land would be restored to natural floodplain functions (Governor's Office of Storm Recovery 2014). As of June 2015, the enhanced buyout areas were limited to three communities on Staten Island—Ocean Breeze, Oakwood Beach, and Graham Beach—and Suffolk County on Long Island (Governor's Office of Storm Recovery 2015).

In many communities, homeowners outside of these priority zones were eligible for property acquisitions and were offered the post-storm fair market value of their homes. They were also eligible for incentives to make up the difference between the pre- and post-storm property values. Unlike homes acquired in the enhanced buyout areas, these properties could be redeveloped. In May 2015, approximately 150 state-owned properties in Nassau and Suffolk counties purchased through the acquisition program were sold at auction. The desire to prevent checkerboarding vacant or demolished neighborhood properties motivated the decision to sell these properties and

provide possible redevelopment. Some properties purchased as part of the acquisition program were deed-restricted as open space and maintained by cities and counties.

Within the enhanced buyout zones, the NY Rising Program has facilitated community-wide participation. In Oakwood Beach, 99 percent of residents have submitted applications for the buyout program (Governor's Office of Storm Recovery 2015). Although this community is a rather unique case, the high participation rate reflects NY Rising's success in identifying the communities most interested in buyout programs and reducing any potentially negative impacts of buyouts on the property values of surrounding homes. Furthermore, after the Oakwood Beach buyouts began, other communities along the southeastern shore of Staten Island expressed interest in buyouts. By April 2014, both Ocean Breeze and Graham Beach were incorporated into the enhanced buyout areas. However, the enhanced areas on Staten Island and in Suffolk County represented only a fraction of the areas most heavily impacted by Hurricane Sandy and most vulnerable to the future impacts. A notable aspect of the NY Rising Program is that the 25 percent nonfederal match normally passed on to individual municipalities is paid at the state level, thereby reducing the burden of buyout participation on local municipal finances. This helps to make buyouts more financially viable for municipalities, since they need to accommodate only the loss in tax revenue.

NEW JERSEY BLUE ACRES PROGRAM

The New Jersey Blue Acres Program is unique among buyout programs because it predates Hurricanes Sandy and Irene. The program began in 1961 to preserve open space and was initially authorized through the Green Acres, Farmland and Historic Preservation and Blue Acres Bond Act of 1995. Since 1995, the Blue Acres Program has received funding through two subsequent bond acts in 2007 and 2009, totaling \$68 million for the acquisition of flood-



prone properties. The 1995 Act included funding for both riverine and coastal properties; the 2007 Act authorized the acquisition of land only in the Delaware, Passaic, and Raritan River floodways. The Bond Act of 2009 allowed for statewide acquisitions. Just like the Green Acres Act, all properties acquired through Blue Acres must be permanently deed-restricted as open space that is accessible to the public (Green Acres Program 2011).

As mentioned earlier, the Blue Acres Program applied a willing seller approach that identified properties that suffered repetitive or severe repetitive losses only in municipalities that agreed to participate in the program. It then conducted outreach to inform eligible property owners that the program was available. Additionally, the Green Acres Program created a special program to earmark funds to help finance the 25 percent nonfederal match required by federal grants for property acquisition (Green Acres Program 2011). In this way, the Green Acres and Blue Acres Programs provided state funds for buyouts available outside of disaster recovery contexts, as well as resources to reduce the burden of federal buyout programs on municipalities.

MORRIS COUNTY, NJ

After the devastating impacts of Hurricane Irene in 2011, Morris County officials established a unique buyout program that used funds from a county open-space tax to fund the acquisition of flood-prone and repetitive-loss properties. The county administered funds to municipalities through two programs—one

Orange fencing surrounds properties acquired by the NY Rising Buyout Program in Mastic Beach, Long Island. *Source: Regional Plan Association (October 2014).*

that provided the 25 percent nonfederal match required by FEMA acquisition funding and one that supplied funding for municipalities with projects that lacked FEMA or New Jersey Department of Environmental Protection (NJDEP) Blue Acres funding (Morris County Planning and Public Works 2015). Part of the purpose for funding homes in the latter program was to provide options for homeowners who lacked flood insurance and were largely not included in FEMA programs. The County Planning Department performed GIS analyses to identify priority acquisition zones to help streamline the process for municipalities. Therefore, homeowners within the most risk-prone areas who approached municipalities expressing interest in an acquisition would automatically be approved for county funding.

All properties that are acquired using Morris County funds must become deed-restricted as open space. These terms, which have more stringent requirements than FEMA, stipulate that no structures, including those designated for recreational purposes, can be rebuilt on the site. The goal is to prevent any structures that might impede the ability for open lands to function as natural floodplains.

Buying In and Backing Out: Understanding Participation and Attrition

Several factors impact whether households and public officials choose to participate in buyout programs. Understanding how residents and public officials make relocation decisions can help program administrators improve the design of buyout programs and recovery services.

RISK

The perception of risk is hugely important to property owners and municipalities deciding whether to participate in a buyout program. Different stakeholders have different perceptions of risk. Buyout program staff may view risk in terms of the probability of future losses of life and property, while homeowners may focus on the possibility of losing their homes and financial stability or moving farther away from their jobs, families, or friends. For elected officials, risk may involve the possibility of lost property tax revenue, inability to service debt, or the death of first-responders. Each stakeholder requires information and decision tools tailored to their specific concerns. The goal is to more closely align perceptions of risk across these groups so that participants and program designers recognize shared priorities.

Flood insurance policies and rates represent and communicate risk. Increases in flood insurance rates have driven many homeowners to pursue buyouts outside of a post-disaster context. Nevertheless,

This Sayreville home was the first house to be demolished as part of the New Jersey Blue Acres Program. *Source: Rosanna Arias/FEMA (2014).*



there is an important balance between adequately communicating risk and placing undue financial burdens on homeowners. In 2012, the passage of the Biggert-Waters Flood Insurance Reform Act ushered in a new model for the National Flood Insurance Program (NFIP). The act catalyzed the transition of the NFIP from a subsidized program to a beneficiary pays system, which helped to make the program financially soluble and more able to communicate risk to homeowners. However, the Homeowner Flood Insurance Affordability Act of 2014 delayed the adoption of some of the Biggert-Waters statutes due to concerns over the very high costs they would impose on homeowners (FEMA 2015c). Instead, the NFIP will move toward this model more gradually, careful not to overburden households while providing more accurate risk information.

TIMING

Stakeholder interviews suggest that the timing of information is critical in determining whether homeowners choose to participate in a program. Homeowners who have experienced multiple floods are more likely to participate in a buyout program than those who have experienced one or none. In addition, many homeowners may not hear about buyout programs immediately after a disaster. For example, Congress did not approve the 2013 Disaster Relief Appropriations Bill until nearly three months after Hurricane Sandy occurred. Buyout programs were not announced in New York State until February 2013. By then, many homeowners had already submitted applications to FEMA for individual assistance or started to repair their homes. Homeowners who had already received other federal aid were subject to limitations to prevent duplication of benefits or were entirely ineligible to receive a buyout. This is a challenging issue, as most buyout funds are mobilized through Stafford Act Appropriations after a disaster strikes. As a result, program administrators are tasked with designing buyout programs while also responding to immediate disaster recovery needs. This is like building a plane while flying it.

Making sure that property owners receive compensation and incentives for their homes in a timely fashion is also incredibly important for ensuring that people have the capital to purchase and relocate to alternative housing. Otherwise, participants may not have the funds needed for a down payment on a new house. In New Jersey, Blue Acres officials work with real estate agents on behalf of buyout recipients seeking new homes to explain the timing of the down payment and to guarantee that the funding is coming. The timing of payments can be further complicated when buyouts occur immediately after a disaster, as the targeted homes may not be inhabitable and participants must seek temporary accommodations with rental assistance. However, according to stakeholder interviews, FEMA rental assistance tends to last only a few months, far less time than it takes to complete most FEMA buyout programs.

COMMUNITY ORGANIZING

Many of the most successful buyouts began as community-driven efforts. As discussed in chapter 5, Oakwood Beach residents formed the Oakwood Beach Buyout Committee in the aftermath of Hurricane Sandy to advocate for a program in the neighborhood. Shortly after the storm, many residents sought buyouts and wanted the land to be returned to its natural floodplain function to protect more inland communities. This community-planning effort helped to spur similar groups in adjacent Staten Island neighborhoods, such as Ocean Breeze and Graham Beach. In addition to conducting outreach efforts with residents, the Oakwood Beach Buyout Committee surveyed the most at-risk neighborhoods in order to map the areas that should be returned to floodplains. Residents were empowered by mapping these areas as a community rather than having the maps imposed by outside experts (Rush 2015). As of June 2015, nearly 99 percent of Oakwood Beach residents participated in the buyout program. This effort reflects the power of community-driven buyouts as compared to programs imposed by external parties.

However, grassroots efforts do not always develop. In such cases, it is especially important to actively support residents through the buyout process. Stakeholders have reported that homeowners are more satisfied with the outcome of a buyout if they feel engaged and consulted and if information is clearly presented during multiple stages of the program. The Blue Acres Program batches homeowners in different stages of the program and provides information during each phase. This approach may be a model for minimizing attrition and encouraging community-wide involvement.

COSTS

Homeowners consider a number of financial issues when they choose whether to participate in a buyout program. An offer at the pre-storm value of the home may not be sufficient for homeowners who owe more on their mortgage than the property's value. Banks that hold foreclosed properties want to be made whole and will only accept offers close to the amount that is actually owed on the property. In many cases, speculative investors make offers that compete with buyout programs. To prevent speculators from purchasing flood-ravaged homes and then selling them back to the state, only people who owned the properties before the storm are eligible to receive the pre-storm value of their home. Although land speculation can pose a challenge for all buyout programs, it can be particularly problematic in coastal areas where land is highly valuable and property values tend to recover more quickly. This suggests that buyout programs are most successful when relocation costs and housing counseling are provided and when pre-storm value is more competitive. These factors, along with the timing of assistance and the need to make purchase offers before housing markets fully recover, are critical to successful buyout programs.

DISPOSITION OF THE LAND

The subsequent use of the land acquired through buyouts is a concern for both homeowners and



In July 1993, 534 counties in nine Midwestern states, including Iowa pictured here, were declared eligible for federal disaster aid. Source: Andrea Booher/FEMA (1993).

municipalities. While FEMA- and HUD-funded buyouts must become deed-restricted for open-space uses, buyouts that use other funding sources are not required to restrict future development on these sites. Knowing that properties will remain undeveloped can reassure some homeowners that others won't profit from the sale of their homes (Rush 2015). One Staten Island resident reported, "If the land wasn't going back to nature, watching my house be demolished would have been very hard to swallow" (Rush 2014). Many program designers interviewed understood the impact that deed restrictions can have on residents. In 2015, village officials in Mastic Beach, New York, and many residents felt betrayed when the state announced auctions for the land acquired through the NY Rising

buyout program, as they had believed the land would be returned to nature. The village eventually negotiated to purchase the land itself to convert it to its natural state.

Developing and implementing a strong plan for the reuse of acquired properties can also encourage buy-in from municipal elected officials. A plan for reuse that adds value to the municipality will lessen the burden of acquired properties. For example, the Cuyahoga Falls Rain Garden Reserve in Ohio is constructed on four flood-damaged residential properties acquired through a FEMA Hazard Mitigation Grant Program. The garden landscape improves groundwater recharge, minimizes flooding during rain events, and provides a public amenity. FEMA is already starting to encourage states and cities to factor reuse into their benefit-cost worksheets. Once a proposed project has reached a benefit-cost ratio of 0.75, environmental benefits such as groundwater recharge can increase the ratio to 1.0 or higher. Planning for the reuse of acquired properties before and during a buyout program can help improve participation rates in the short term and ensure that costs to neighborhoods and municipalities are minimized in the future.

In some cases, redevelopment of acquired parcels can be a necessary or beneficial move. This is especially true in areas where properties were acquired in a checkerboarding fashion, where it isn't possible to create clusters of open space. In these cases, vacant and demolished properties are likely to lower surrounding property values and create zones of disinvestment. This concern led the NY Rising Program to sell 150 of its acquired properties at auction in May 2015. Properties that were clustered or located adjacent to existing open spaces were turned over to open-space uses. However, other isolated properties in the midst of residential neighborhoods were sold. Buyers of these formerly bought-out properties were allowed to repair existing structures or completely rebuild as long as they complied with strict building codes and elevation requirements.

CHAPTER 4

Fiscal, Community, and Health Impacts



The Regional Response Coordination Center holds a briefing as Hurricane Irene hits and the president declares an emergency for New York and New Jersey. Source: Elissa Jun/FEMA (2011).

The impact of buyout programs on communities, finances, and public health must be examined to understand the viability of programs as tools for resilient adaptation to the impacts of climate change. This information can help shape the design, administration, and reception of new and existing programs to better serve homeowners and communities. Public officials can benefit from this kind of analysis by understanding the consequences and implications of their decisions.

Fiscal Impacts

Not all development is positive. Although certain land uses may generate large amounts of tax revenue, servicing those uses can be costly and drain resources from cities and towns. The overall impact of development will depend on a municipality's fiscal structure—how it collects money and reallocates it to provide services and amenities such as schools, roads, garbage collection, and water treatment. Numerous people—supported by empirical studies—who have experienced costly disasters question whether development in flood-prone areas is fiscally responsible.

When a city or town considers implementing a buyout program, it weighs three choices: (1) rebuild to replicate the previous structure; (2) rebuild to reduce future flood damage; or (3) relocate development to remove the risk of future damage. Each of these options carries different costs and benefits, which accrue to local governments, homeowners, county governments, and federal taxpayers. What is a benefit to one unit of government may be a cost to another. In order to decide among these three options, a city or town would want to confirm the following:

- Which types of land use generate the highest revenue and the lowest costs?
- What are the costs and benefits of removing a development from the city budget?

To answer these questions, local governments can conduct fiscal impact analyses. At the most basic level, fiscal impact analyses reveal the costs and benefits of new development. Officials can better examine and address long-term needs by understanding the costs and benefits involved in recovery choices, particularly amid flood risks that continue to grow. The results can “make a community’s ability to pay transparent” (Kotval and Mullin 2006, 4) and help people understand that redevelopment may not be feasible without reducing the quantity or quality of the services and amenities to which residents are

accustomed. By contributing to this conversation, we hope to provide an objective lens through which public officials can better assess their flood mitigation and disaster recovery choices, including whether to rebuild, elevate, or relocate development.

BACKGROUND

Fiscal impact analyses can help cities and towns analyze the financial consequences of different development types and land-use decisions. An analysis can evaluate land-use scenarios to determine municipalities’ overall positions on jobs and housing in their general or comprehensive plans. Such analysis can help cities and towns prioritize proposed land development and infrastructure projects by illuminating real constraints tied to physical development. By assigning costs and benefits to local departments, municipalities can use fiscal impact analyses to develop budget and financing tools. Kotval and Mullin provide a full review of these methods, as well as alternatives to fiscal impact analysis (2006).

WHAT TYPES OF LAND USES GENERATE REVENUE?

In the 1950s and 1960s, dozens of cities emerged or expanded around the use of the car. Following the Federal-Aid Highway Act of 1956, highways were built and roads were widened to give people quick access to the whole country (Weingroff 1996). Single-family homes outside the city center dominated the landscape, and thus the city-suburb rivalry was born. Over time, many started to suspect that this sprawling urban form was inefficient and expensive to maintain. It increased the cost of transportation and sewer infrastructure while creating congestion and pollution. Starting in the 1970s, cities and researchers began to evaluate the costs and benefits of such sprawl. These fiscal impact analyses and cost of community service studies demonstrated that different types of development impacted a city’s overall budget in varying ways.

Numerous studies have found that certain land uses simply do not provide net benefits to local governments.

SOURCES OF REVENUE

Counties, municipalities, incorporated townships, and villages have different tax structures and tools for raising revenue, as well as different levels of obligations for services to fulfill. Property taxes typically account for the largest share of revenue. Other sources of revenue include federal and state grants and the issuance of licenses, permits, and fees.

Cities and towns have three primary revenue sources: “property taxes, state aid, and miscellaneous taxes and fees such as those paid for town government services” (Kotval and Mullin 2006, 5). State aid can include funds for education; miscellaneous fees can include fees leveraged for sewer services or special assessment districts.

- **Property Taxes**

Because property taxes are the primary funding source for local governments, they form the basis of revenue assessments. Property taxes are based on a percentage of the assessed value and vary widely by land use, class, and location.

- **State Aid**

States can raise revenue and reallocate or share that money among local governments. State aid can take the form of grants or loans, as well as shared revenue. It is most commonly used for education by a municipality or school district. State aid makes up

a diminishing share of local budgets as state budgets become increasingly constrained.

- **Federal Aid**

Federal aid in the form of public assistance, Hazard Mitigation Grants, and Community Development Block Grants-Disaster Recovery (CDBG-DR) are additional forms of revenue. Some types of federal aid operate as reimbursement, in which verifiable claims must be submitted and approved before funding is awarded. This type of funding is typically awarded to states, which then reallocate the funds locally. For example, cities and towns can be reimbursed for debris removal. Other types of federal aid are awarded to specific projects that assist the recovery process. For instance, CDBG-DR funds can be used to support construction of a piece of infrastructure or a new or higher berm to protect a vulnerable development.

- **Miscellaneous Fees and Taxes**

Many municipalities collect fees and taxes to create and maintain local services. For residential properties, these can include a library tax, an open-space tax, a school tax, and a county tax. Other taxes and fees may be imposed on commercial and industrial property owners, but they are not relevant for this analysis.

SOURCES OF COSTS

Cities and towns also incur costs, which can be broadly categorized under education, public services, and debt service.

- **Education**

In most cases, providing education and related resources represents the single largest cost to local governments. Education is often funded through school district taxes separate from municipal property taxes. Costs also may include funding for libraries and community colleges.

- **Public Services**

Local governments incur costs when providing public services to residents and businesses. These include public safety, such as fire protection and policing;

sanitation services, including garbage collection and wastewater treatment; emergency services, such as first responders and healthcare; recreation, such as building and maintaining parks and trails; and government services, including permitting and administration.

- **Debt Service**

Local governments often take on debt in the form of loans and bonds in order to build infrastructure, such as bridges, water treatment plants, and schools. Cities and towns must generate enough revenue to satisfy the debt they owe, or they risk defaulting. For some municipalities, debt service is a major obstacle to funding buyout programs.

While there is bound to be local variation, empirical studies have determined that mixed-use, multifamily, and open-space configurations have positive fiscal impacts (Burchell et al. 1998; Cervero and Duncan 2004; Deller 2001; Marlow 2008). Additionally, properties in and near areas with multiuse zoning had higher property values than those in areas zoned only for single-family homes.

Studies that evaluate the impact of urban growth boundaries on property values may also be relevant for places that are considering buyouts. Urban growth boundaries concentrate development within allowable areas, limiting where development can occur. Likewise, buyouts prohibit development in flood-prone areas and locate growth elsewhere. Economic theories and empirical studies suggest that restricting land use and creating scarcity of developable land increase property values in developable areas (Marlow 2008; Jaeger and Plantiga 2007; Escheverria 2007).

A study by the Trust for Public Land found that Long Island's parks and open spaces provide direct economic benefits of \$2.74 billion per year by encouraging tourism, reducing government costs, and improving air quality and public health. In terms of direct government savings, conserved lands in Long Island save \$23.9 million every year in storm water management costs (Trust for Public Land 2010). The study also found that residential properties near parks and protected open space were worth at least \$5 billion more than those lacking these amenities, increasing tax revenues by \$58.2 million a year.

WHAT TYPES OF LAND USES GENERATE COSTS?

As discussed, all forms of land use generate costs because they place demands on the government. There is a general consensus that residential land generally requires the most services, and that the revenue generated by residential uses does not balance out these demands. In this sense, residential land uses produce a negative net impact for local governments.

A study by fiscal expert Dr. Robert Burchell indicates that residential properties generally do not generate more tax revenue for municipalities than they cost, whereas nonresidential properties do (Burchell 2014). Dr. Burchell also finds that the impact of a development depends on its use and form. For instance, two-bedroom townhouses have a better net impact on property taxes than three-bedroom single-family homes. Both of these typologies have a more positive fiscal impact than four-bedroom single-family homes. This is partially due to the fact that home size corresponds to household size and the presence of school-aged children places additional demands on the city.

Most fiscal impacts and cost-of-service calculations focus strictly on routine or predictable government expenditures—policing, public education, and road maintenance, etc. Emergency services, such as the cost of removing debris or dispatching first responders, may not make it into the calculation. These fiscal impacts are also more likely to focus on a single point in time rather than a long-term scenario or one in which other factors are considered. For example, regular flooding may require an increase in road maintenance and street repairs. The quality of local water can be compromised by a high water table or more frequent flooding in areas lacking sewer systems where waste is contained in shallow storage and septic tanks. Dynamic and less predictable risks make each residential property more costly to the local government over time.

METHOD

What are the fiscal impacts of removing a development from the floodplain? What are the financial effects of removing a development from a city's tax rolls? The first question requires a fiscal impact analysis that accounts for the various costs and revenue sources that accrue to multiple and sometimes overlapping levels of government. The latter question involves a more traditional fiscal impact analysis, which tends to focus on only one unit of government. Both questions are important and each will yield different answers and



policy implications. We speculate that the cost difference between the impacts of removing a development from the floodplain and removing a development from the tax rolls is a primary reason local governments resist buyouts.

There are at least six methods for calculating the effects of development on municipal revenue and costs (Kotval and Mullin 2006). Two approaches are used in this report. Each method is applied depending on the availability and accuracy of local data for each category of revenue and cost that is analyzed. The first approach uses the Per Capita Multiplier technique—a common technique that links demographic information with land-use types, revenue, and operating costs for different levels of government. This method assigns costs to a development based on the average cost of providing services; this is useful for analyzing incremental demand. This report focuses on the incremental cost of removing a property (and therefore reducing or relocating demand). When complete data were not available, we used the case study technique, which relies on interviews with public officials for their subjective assessments of changes in revenues and costs associated with development or its removal.

Data in all of the categories was not available in some cases. When possible, the sources of revenue and costs were monetized. When this was not possible, revenue and costs were described quantitatively—as a percentage or using figures for specific flood events—or qualitatively—as a description of potential costs. We relied on local data because each municipality was unique; using multipliers and figures from other locations that share only some characteristics may obscure important differences and undercut our typology analysis.

Open spaces like the Jacob Riis Park beach in New York City provide enjoyment and economic benefits to the New York area.
Source: gigi_nyc, Flickr/CC (2014).

The aim of the fiscal study is to evaluate the differences in relative costs and benefits of buyouts for different types of communities to clarify the opportunities and challenges associated with buyouts as a resiliency strategy. The results of this study should not be interpreted as final, and fiscal impact analysis should not be the only consideration in determining whether to pursue a buyout. Assessing the fiscal effects of removing a property from the floodplain is intended to be conceptual and not specific to any particular parcel. Additionally, this high-level analysis should not replace a more focused analysis of fiscal impact. Such analysis should take into account whether the property involves repetitive loss and which locations are the most cost-effective to use buyout program funds. Ideally, a fiscal impact analysis is supplemented by considerations of residents' needs, current and future flood risks, integrated economic models, and environmental impact assessments.

Since there are many relocation scenarios, it is important to note that we did not quantify the fiscal impacts of relocating residents who live in properties purchased through buyout programs. Some people choose to move but stay within the same city or town; others move outside of the city or town but stay in the same county; others move outside of the county entirely. In addition, different land uses have various net impacts on municipalities. As discussed, numerous empirical studies have shown that multifamily properties have a better fiscal impact than single-family residential developments (Marlow 2008; Burchell 2014). Additionally, the relocation destination also contributes to cost.

Infill development, which does not require municipal services such as new roads or sewers, is significantly less costly than relocation to undeveloped greenfields.

HOW BUYOUTS IMPACT REVENUES AND COSTS

Removing a residential property from the floodplain generates fiscal impacts for local governments as well as taxpayers. Figure 8 illustrates the sources of revenue and costs associated with that decision. Although revenue and costs may accrue to the municipality, many accrue to other governmental entities as well, including the county or federal government. Therefore, public officials must consider the effects of buyouts on multiple levels of government in order to provide a complete picture of the fiscal impacts of buyouts.

The most immediate effects occur when a flood-prone property is purchased. Direct and immediate costs include pre-acquisition costs, purchase price, property maintenance, and demolition. As figure 8 shows, these are one-time expenditures that, under the current funding regime, primarily accrue to the federal agency that is funding the buyout program. When local matches are required, local governments also carry a portion of these costs. However, in some cases, buyout programs can mix and match federal funding sources into a “global match,” in which the local match requirement is actually covered by other federal funding.

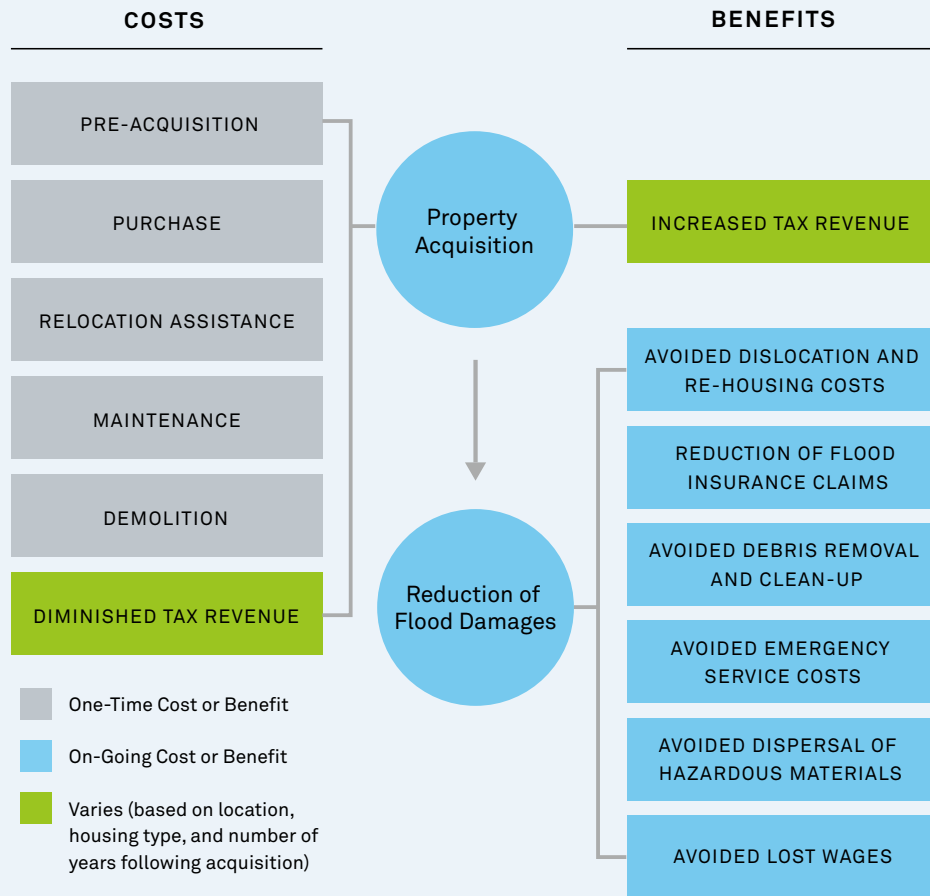
When a property is removed from the floodplain, it is also removed from the local government’s tax rolls. The magnitude of this impact varies but is often less significant than public officials project. Since disasters cause damage that lowers property values, homeowners can have their properties reassessed to account for this decline, thereby providing tax relief in the years immediately following a flood. Thus, local governments do not lose taxes that are calculated as a share of the pre-flood value of the property; they lose taxes on the post-flood value of the property. The difference can be substantial. When NY Rising purchased properties for their acquisition program

after Hurricane Sandy, they paid the pre-storm values. At auction, the acquired properties were sold at their current market value—often only 20 to 30 percent of their value before Hurricane Sandy (Chaban 2015).

Removing a property from the floodplain can provide local government revenue over time. Buyouts can create value if the local government takes appropriate steps to turn purchased parcels into local amenities, such as restoration areas or parkland, while embracing more intense residential development in areas without flood risk. Restricted land use coupled with new amenities can increase property values and, in turn, increase local revenue. If local governments plan properly, homeowners can relocate within the municipality and thereby maintain, and even enhance, the tax rolls. Second-order fiscal impacts occur because removing properties from flood-prone areas reduces future flood damages. In this scenario, the fiscal impacts are not calculated as revenue, but rather as avoided costs. These costs accrue to different stakeholders—including homeowners, local government, and the federal government—and also accumulate over time.

Because flood damage costs increase with the severity of a flood, avoided costs increase in kind. If homes are rebuilt in flood-prone areas without elevating or flood-proofing, the cost of flood damage will change depending on the flood intensity. For example, a 2 percent (1/50-year) flood is less damaging than a 1 percent (1/100-year) flood. These floods are both less damaging than a 0.2 percent (1/500-year) flood. The USACE calculates flood damage based on the estimated flood depth (inundation), height of wave crests (wave damage), and the percentage of the property compromised (erosion). The Corps develops depth-damage functions that illustrate the estimated damage for a given level of inundation, wave impact, or erosion for a range of building types. For instance, the structural damage from one foot of inundation in a two-story residential building with no basement is estimated at 9 to 20 percent of the building’s value. The structural damage from three feet of inundation

Figure 8

Fiscal Impacts of Buyouts: Costs and Benefits

Source: Regional Plan Association (2016).

would be approximately 32 to 60 percent of the building's value (USACE 2015a).

Buying out flood-prone properties precludes many future costs. As figure 8 highlights, these include avoided emergency costs, such as dispatching first responders. Buyouts also eliminate or lower costs related to evacuation, sheltering, and long-term displacement, as well as debris removal, repair, and maintenance. Buyouts can also prevent other harmful consequences of flooding, such as the dispersal of sewage and other hazardous materials into bodies of water—a significant environmental benefit. The value of avoided costs far outweighs the value of immediate costs. More importantly, these costs are avoided more than once. Every future flood represents a net savings

if people and properties remain out of harm's way. The challenge is that many of the avoided costs do not accrue directly to local governments and therefore may not be included in traditional fiscal impact analyses.

Community Impacts

Fiscal considerations are crucial in determining the feasibility of buyouts, but they are certainly not the only criteria. As previously mentioned, buyouts require affected communities to bear social and economic burdens more directly than other resiliency strategies. It is much more difficult to evaluate the social, economic, and physical costs and benefits to communities than to conduct a typical fiscal impact analysis. Therefore, it



U.S. Army Corps of Engineers discuss plans to build a berm in Oakwood Beach to protect against future storm damage. *Source: USACE, Flickr/CC (2014).*

is crucial to engage the community to clarify the costs and benefits of buyout programs and other strategies.

Communities that absorb relocated populations are impacted as much as neighborhoods located in flood zones. It is important to plan for relocation, reconstruction, reuse, and acquisition. Planners and program managers need to consider a host of questions, including: Where will people live? Are people more likely to want to live in rental housing, take on a new mortgage, or purchase another home? What are the cultural and economic resources that make this community attractive and could they be applied to low-risk places? How can the city ensure that there is sufficient affordable housing? Which services will still be available to the people who choose not to accept a buyout? The answers to these critical questions will determine whether a municipality can retain its tax base and thrive over time.

ECONOMIC HEALTH

Buyout programs create a number of economic challenges for communities that must be addressed. It is also important to note that climate change is a potential threat to the economic health of many communities, regardless of intervention. As communities become more susceptible to flooding, market forces may generate lower property values and greater disinvestment. Communities may receive relief after each disaster, but the increasing risk may gradually erode investment and economic vitality. Without any

intervention, individuals within the community may be left with few resources and fewer options.

Although buyouts do not guarantee community economic health, they provide potential economic lifelines for residents who find themselves highly vulnerable to flood risks. Some planners and advocates have suggested that designating floodplains simply reinvents redlining by creating zones of disinvestment. Programs must be designed and implemented properly in order to avoid disinvestment in areas selected for buyouts. Buyout programs typically limit, if not prohibit, new development in high-risk areas. This restriction can have a stagnating effect on the local economy, but it is necessary to prevent additional residents from exposure to flood risk. This is particularly harmful for communities with a legacy of precarious economic health, including black and Hispanic populations that consistently face institutionalized disinvestment. Without strategic planning for relocation and reconstruction, buyouts may actually deepen social and economic disparities.

Flood insurance premiums also play a role in the long-term economic health of communities. Premiums are expected to rise—in some cases quite steeply—with the delayed-but-still-impending implementation of the Biggert-Waters flood insurance reform. This will determine who can afford to live in the impacted communities. Paradoxically, this may lead to the kind of disinvestment described here and ensure that only the more affluent can enjoy the benefits of coastal living. By relocating residents from the most vulnerable properties, buyout programs can lessen the burden on individuals and flood insurance policy holders in general.

Buyout programs may also create opportunities for other economic benefits. Strong plans for the reuse of acquired properties that add value to municipalities may facilitate buy-in from elected officials, as in the case of the Cuyahoga Falls Rain Garden Reserve mentioned in chapter 3. Acquired land could also provide value to local residents and municipalities in the form of waterfront parks, community gardens, or recreational

amenities. However, programs should avoid redeveloping flood-prone properties for the sake of replacing less economically productive uses with greater ones.

TRUST AND ENGAGEMENT

Stakeholders must ensure that residents participate in meaningful ways by encouraging them to contribute to the community's plan for climate change adaptation. Residents should be engaged in the vision for the buyout program and the ways in which acquired properties will be reused. Additionally, communicating flood risks and resiliency strategies to whole communities, not just individuals, will enhance resiliency efforts in numerous ways, including facilitating more informed decision making. By developing hazard mitigation plans in advance of storms, communities can be better organized and prepared to act when a storm occurs—typically a time when decisions must be made quickly and more funding becomes available. In contrast, in Mastic Beach, New York, conflicting programs and messages from different agencies and levels of government led to confusion among residents over their options.

As mentioned previously, community leadership in developing buyout programs is key to participation. Community trust can be increased by designating and collaborating with emergency community block captains. Program officials can also benefit from the knowledge of local leaders and residents when programs are designed and emergency management strategies are developed.

The precarious locations of many low-income flood-prone communities may be due to a lack of affordable housing elsewhere. The absence of economic resources reduces their options for relocation. In these cases, policies that incentivize relocation or deter development may have a punitive effect on already socially vulnerable communities, engendering a mistrust of government and the efforts to build resiliency.

Even when a buyout program is underway, continued engagement with communities is critical. Residents

who feel that a buyout program is their best option may still face many economic, social, and emotional challenges. Yet the process may be eased by supporting communities throughout the program beyond financial aid—by providing counselors, therapists, artists, and other experts. New York City's Project HOPE is one example of a successful community-oriented program.

COMMUNITY CHARACTER

Community character is built through social networks, local institutions, aesthetic appeal, and a community's relationship to the surrounding area. In addition to the effect of flooding and buyout programs on economic health and institutional trust, the social and psychological impact on communities must be evaluated. As with economic capital, the design and operation of a buyout program can help or hinder the social health of a community. A community's social capital is particularly valuable when it has less economic capital, making the breakdown of social networks more devastating. Graif and Waters (2012) and Eliot et al. (2009) found that more disadvantaged neighborhoods experienced lower return rates. Some may view this as a benefit because it “disrupt[s] old routines and open[s] new options.” However, for those who do not “receive adequate help, the exhaustion of their resources may permit little else than a horizontal or even a downward move” (Graif and Waters 2012, 10).

When programs acquire sizeable contiguous clusters of properties, the social unity of a neighborhood can be preserved if residents relocate within clustered sites. However, the concept of community cohesion can also work against buyouts. Because people and communities who emerge from a storm often identify as “survivors,” this sentiment makes them more likely to oppose retreat. The key is to apply integrated planning before and during a disaster in order to minimize the possible negative impacts of buyouts on communities' social capital. Community cohesion combined with local leadership explains the relative success of NY Rising's buyout program in Oakwood Beach.

Health Impacts

Flooding is one of the most widespread hazards that affects human health. It can cause short- and long-term health problems by exposure to cold, mold, and contaminated water among other hazards. Flooding can also produce physical fatigue and recovery-related stress. The physical, mental, and financial impacts can be enduring, particularly when recovery factors exacerbate stress.

In their study of the impacts of flooding on physical and mental health in England and Wales, Tunstall et al. (2006) found that a large percentage of flood victims experienced immediate effects such as shock, coughs, throat infections, and headaches. Several months after the flood, respondents also experienced gastrointestinal issues, joint stiffness, and respiratory illnesses. They also reported several mental health problems, including anxiety when it rains, increased stress levels, problems sleeping, and increased tension in relationships. Weisler et al. (2006) found that survivors of Hurricane Katrina suffered similar mental health issues. However, each of these health impacts are mediated by social and economic factors and recovery programs (Tunstall et al. 2006). Few studies have been conducted to measure how repetitive flooding, such as tidal flooding, impacts health.

Buyout programs can have negative and positive health effects. Programs can provide relief from stressful situations for some households by relocating residents to areas that provide new opportunities. However, buyouts can also add stress during the recovery period by creating housing insecurity or disrupting place-based social support networks. As storms become more frequent and severe, buyouts will need to minimize the negative health impacts associated with flooding and relocation.

Several studies examined the health effects of disaster-related relocation and displacement

(Abramson et al. 2010, 2008; Merdjanoff 2013; Picou and Hudson 2010; Sastry 2009). Researchers have identified potential impacts of relocation and displacement, including neighborhood mobility, social networks, housing instability, and emotional distress. The wealth of information on the effects of relocation has resulted in housing mobility policies, such as Moving to Opportunity for Fair Housing and the Project on Human Development in Chicago Neighborhoods (Acevedo-Garcia et al. 2004; Evans et al. 2003; Fauth et al. 2008; Joseph 2009; Sampson 2012).

Mindi Fullilove (1996) argued that forced relocation can “[lead] to problems of nostalgia, disorientation and alienation,” or “rootshock” (Agyeman et al. 2009, 510). In reviewing several buyout programs, Fraser et al. (2003) found that although the programs were voluntary, many participants felt that they had no other option or that program staff forced them to participate. Burley et al. (2007) also found that communities in Louisiana felt alienated from relocation and restoration efforts following Hurricane Katrina. These findings reinforce the importance of working with communities to convey all of the options and to ensure that participants feel their decisions are truly voluntary.

Race and income play an important part in mediating the effects of relocation. Racial minorities and low-income groups may have more difficulty recovering due to lower income, fewer savings, and less access to capital (Merdjanoff 2013). These sociodemographic factors make residents more vulnerable to the negative health impacts of disaster.

Although buyout programs cannot be designed as public health programs, the health impacts of flooding can be addressed through their design. Many of the issues discussed previously, such as communication, engagement, and an integrated approach to help participants secure desirable new homes, can help reduce negative health impacts.

CHAPTER 5

Case Studies



Communities in the New York metropolitan area faced a variety of challenges in the wake of Hurricane Irene and Hurricane Sandy. To better understand the differing issues among the communities, the region was classified into eight community types based on income, race, and housing tenure. These considerations allowed elected officials and buyout program managers to design programs that were tailored to the needs of each community type, whether a community was predominantly low-income, nonwhite, and renters, or high-income, white, and homeowners. Additionally, certain fiscal impact indicators that drive decision making around buyouts were compiled and studied, such as property values and emergency services. Community characteristics and fiscal impact indicators were used to choose the case studies featured in this report.

Residents of Mastic Beach, New York, discuss buyouts with Regional Plan Association staff. Source: *Regional Plan Association* (October 2014).

The potential financial impacts of buyouts in each of the five communities was calculated for three damage thresholds: homes meeting the highest damage threshold (those projected to experience 50 percent damage or more), homes meeting the middle damage threshold (those with over 25 percent estimated damage), and homes meeting the lowest damage threshold (those with any amount of projected flood damage). The costs and avoided costs are calculated using a 100-year time frame.

Oakwood Beach, New York

Oakwood Beach is located on the central part of Staten Island's South Shore. The neighborhood is 31 percent low-to-moderate income, 16 percent non-white, and 69 percent owner-occupied. The lowest-lying part of the neighborhood is situated next to the marshes of Great Kills Park. The most serious flood risks come from storm surge off the Raritan Bay and

Lower New York Harbor. Additionally, sections of the neighborhood experience nuisance flooding following even modest rainfall. Along with the neighboring upland community of Oakwood, Oakwood Beach has a population of 22,000, and nearly 3,000 live in current FEMA Special Flood Hazard Zones. The number of people within high-risk flood zones is expected to increase nearly 150 percent to 7,300 by 2050.

Oakwood Beach is a middle-class community with a median annual household income of \$89,000. The neighborhood was largely developed in the 1960s and 1970s; nearly half its residents have lived in the community for more than 25 years. In general, the homes built closer to the water are smaller and cheaper than those located farther upland. Single-family homes dominate the neighborhood, but there are a handful of apartment buildings inland.

Nuisance flooding is common in low-lying Oakwood Beach, Staten Island, where many buyouts took place. *Source: Regional Plan Association (October 2014).*



Oakwood Beach was severely impacted by Hurricane Sandy. The storm surge overtopped the boulevard that runs along the coast and damaged the berm between the neighborhood and the Atlantic Ocean. The surge inundation was exacerbated by the floodwaters trapped within the “bowl” topography of the South Shore (SIRR 2013). Some homes were swept off their foundations; others were flattened. Staten Island as a whole was among the hardest hit areas, with 23 storm-related deaths in the borough (SIRR 2013; Koslov 2014). Prior to Sandy, there were several other historic floods in Oakwood Beach, including intense inundation from a nor’easter in 1992 and flooding from Hurricane Irene in 2011 (Oakwood Beach Buyout Committee 2015; Koslov 2014). After the 1992 storm, residents organized a Flood Victims’ Committee to petition for better flood protection from the state and federal governments. Although the USACE somewhat addressed residents’ concerns by constructing a berm, it was not completed until ten years after the nor’easter (Koslov 2014).

Oakwood Beach residents moved quickly to plan their recovery after Hurricane Sandy based on their experience organizing for flood protection in the 1990s. At an early community meeting devoted to immediate disaster response and aid, one organizer asked if residents would support a buyout program. Nearly all community members in attendance said yes. Residents then formed the Oakwood Beach Buyout Committee, which began to draft an application for a state buyout. The committee conducted outreach to gauge interest and provided information to residents about what a buyout program might entail. The committee collected signatures from nearly all the neighborhood’s residents to indicate their interest in a buyout program (Lavey 2014). Additionally, committee members surveyed residents about where they felt safe living within the neighborhood in order to generate maps of priority acquisition areas. This mapping effort is a powerful tool for communities organizing to receive buyouts.

However, some populations that are deciding if buyouts are the best way to reduce risk are settling in marginal flood-prone areas because they have suffered government-imposed relocations and disinvestments in the past. If buyout program plans are not community-driven despite being voluntary, they risk continuing this pattern of marginalization. As we observed in New Orleans, understandably there was strong community opposition to buyout programs proposed by outside planners because they did not consult the local population. Instead, Oakwood Beach residents collaboratively created their own “green dot” maps that showed targeted areas for buyouts to convey their goals for a buyout program and to confirm that they did not want redevelopment in their area.

The NY Rising Program heeded residents’ requests and launched a buyout program for Oakwood Beach. As of June 2015, nearly 99 percent of the neighborhood’s residents have participated in the buyout program. The state plans to purchase 326 properties, an acquisition process that will be completed in 2016. As of February 2015, the state owned 296 properties and had demolished 60 (Rush 2015; Governor’s Office of Storm Recovery 2015).

The relative success of Oakwood Beach’s program is not surprising considering the fiscal context. Factoring in the projected sea level rise by 2050, a single 100-year flood event could cause \$261 million of damage across 1,837 properties, 830 of which would have to be demolished. As summarized in table 4, a buyout of only those 830 properties would save community residents \$817,000 per year in flood insurance premiums and an annualized average of \$5.7 million in damages and dislocation costs. In terms of the potential costs to communities, Oakwood Beach benefits from being only one neighborhood in a very large city. The loss in tax revenue is quite negligible in the context of the city’s \$75 billion budget.

Table 4

Fiscal Impact Analysis for Oakwood Beach, New York

Damage Threshold	HIGHEST (50%+ damage)	MODERATE (25%+ damage)	LOWEST (any flood damage)
Properties at Risk	830	1,714	1,837
Avoided Damages and Dislocation Costs			
100-Year Flood Event	\$139,535,223	\$256,083,375	\$261,685,358
<i>per property:</i>	\$168,115	\$149,407	\$142,453
Annual	\$5,683,325	\$8,937,495	\$8,965,504
<i>per property:</i>	\$6,847	\$5,214	\$4,881
Net Present Value	\$81,096,791	\$127,531,351	\$127,931,031
<i>per property:</i>	\$97,707	\$74,406	\$69,641
Avoided Flood Insurance Premiums*			
Annual	\$816,699	\$1,686,532	\$1,807,561
<i>per property:</i>	\$984	\$984	\$984
Net Present Value	\$11,653,681	\$24,065,554	\$25,792,545
Cost of Removing Properties			
Cost of Removing Properties	\$154,288,240	\$341,946,060	\$370,566,230
Total Property Values at Risk	\$185,889	\$199,502	\$201,724
Losses in Property Taxes			
Annual	\$2,960,947	\$6,562,310	\$7,111,563
<i>per property:</i>	\$3,567	\$3,829	\$3,871
Net Present Value	\$42,250,495	\$93,639,247	\$101,476,675
<i>per property:</i>	\$50,904	\$54,632	\$55,240
2015 Appropriations (New York City) (\$75.027B)			
Lost Taxes as Percent of Most Recent Budget	0.00%	0.01%	0.01%

* Flood insurance premium figures are based on aggregate figure for New York City.

Source: Regional Plan Association.

Milford, Connecticut

Milford is a coastal city of 52,000 people, midway between Bridgeport and New Haven on Long Island Sound. The town is 25 percent low-to-moderate income, 15 percent nonwhite, and overwhelmingly owner-occupied. Milford has the distinction of having the longest coastline of any town in Connecticut (14 miles) plus two significant rivers, the Wepawaug and Housatonic, leaving residents vulnerable to both coastal and riparian flooding.

Milford has more waterfront homes than any other case study in this report. As such, oceanfront property is one of the town's most prized amenities. Currently, there are 8,100 Milford residents in the 100-year flood zone, with a 26 percent increase projected by 2050. Milford also has the most repetitive-loss properties of any municipality in Connecticut. Since 2007, Milford residents have made up 20 percent of registrants in FEMA's individual assistance program; FEMA awarded them \$3.5 million.

Milford's own analysis confirmed the city's incredible vulnerability. A Category 2 hurricane has the potential to inundate more than 2,000 properties, including 35 city facilities. More than 1,500 homes were damaged by Irene and Sandy, over 200 severely (Daley 2014). Over \$60 million in flood insurance claims were paid to Milford residents in 2011 and 2012 (City of Milford 2015). A year after Sandy, entire streets and dozens of homes remained empty while many others were elevated on piles and rebuilt. As in many areas damaged by Sandy, government funding came slowly, which retarded recovery (Zaretsky 2013). An estimated 4,000 to 5,000 homes in the city may still need to be elevated to satisfy building code requirements (Buffa 2013).

The primary strategies for combatting flood risk in Milford have included beach nourishment projects and building retrofits and elevations, revetments, jetties, and groins. The city's 2013 Hazard Mitigation Plan outlined over \$14.4 million in flood mitigation projects,

including elevating structures, protecting or upgrading critical infrastructure like the wastewater treatment plant, and replenishing dunes (City of Milford 2013). The highest priority projects were neighborhood drainage systems and catch basins. However, due to lack of funding, many proposed projects are either stalled or have not begun.

The USACE evaluated the coastline of Milford for the North Atlantic Coast Comprehensive Study and found that the implementation of structural measures, like beach fill or dune projects, may be limited due to space constraints even in areas where these approaches might be most cost-effective. If these measures are not applicable, flood proofing, and even acquisition and relocation, might be the most cost-effective, long-term strategies (USACE 2015b). These challenges are shared by many highly developed areas along the eastern Atlantic coast. Buyouts can be difficult to secure in the short-term and structural solutions do not effectively reduce risk.

Yet buyouts have received some attention from the city's residents. Several properties have been bought using FEMA Hazard Mitigation Grant funds. Additionally, Milford has received \$1.4 million from the USDA Floodplain Easement Program to buy at-risk properties (USDA n.d.). However, despite available funding, the programs received only seven applicants in 2013. Furthermore, the city's official position was "unenthusiastic" (Spiegel 2013). Milford stakeholders interviewed for this report cited concerns over the loss of the municipal tax base as the primary cause of resistance to buyouts, as coastal property owners pay the highest property taxes.

From the state's perspective, Milford presented a promising case for a buyout program since many of the repetitive-loss properties were adjacent to the Silver Sands State Park and acquired parcels could be incorporated into the park. Stakeholders indicated that positive alternative models for development are needed to encourage participation in buyout programs.

The fiscal analysis performed for this study reveals that, while buyouts would impact property taxes, the effects would not be as severe as perceived by municipal officials. As a percentage of the most recent budget, buyouts of the most vulnerable properties would only result in a 1.36 percent loss in revenue, as indicated in table 5.

Milford's vulnerable properties have the highest average value among the five case studies in this report. Factoring in 2050 sea level rise projections, Milford could face \$419 million in damage and relocation costs over the next 100 years, or up to \$468 million with a single 100-year flood. Relocating homeowners from just the most at-risk properties could save \$435,000 in annual flood insurance premiums alone. It is also worth noting that, although coastal properties are valuable, there are many more affordable properties built on low-lying or marshy land as well as on the shoreline. This may explain the disparity in average property price between the most vulnerable properties and the remaining at-risk properties.

Mastic Beach, New York

The Village of Mastic Beach has a population of 12,900 and is located on a peninsula between Long Island's Great South Bay and Moriches Bay. Mastic Beach has the highest percentage of low-to-moderate income households of the five case studies, at 48 percent; 13 percent of the population is below the poverty rate. The village is 28 percent nonwhite and 74 percent owner-occupied. The lagoon surrounding the village is separated from the Atlantic Ocean by Fire Island at Smith Point Park. Virtually the entire village is within one mile of water; approximately 2,600 people currently reside in the 100-year flood zone. By 2050, an estimated additional 1,200 residents will be at risk.

Mastic Beach contains a relatively homogenous housing stock in terms of size and value. Many previously seasonal homes have been converted to

year-round housing. Also critical is that Mastic Beach was deeply impacted by predatory lending and the subprime mortgage crisis in the last decade. This left numerous foreclosed and bank-owned properties within the village in disrepair. Poorly enforced building codes led to the referendum and incorporation of the village in 2010 (Berger 2010). Despite these concerns, the median home value has increased by more than 70 percent—the fastest rate among the five case studies. The village has also seen the highest percentage of new home constructions since 2000 and boasts more recent arrivals than any other location in this study.

Mastic Beach was severely impacted by Hurricane Sandy; emergency responders reportedly performed over 100 rescues during the storm. The village lost power and hundreds of homes were damaged. The flood overwhelmed residents' septic systems, releasing thousands of gallons of wastewater into the community and waterways and rendering some systems inoperable due to the absence of a central sewer system (Mastic Beach and Smith Point of Shirley Planning Committee 2014).

Mastic Beach's historic flooding has been the subject of several floodplain protection plans, some of which have included acquisition programs. In 1997, the Narrow Bay Floodplain Protection and Hazard Mitigation Plan released by Suffolk County outlined a program to acquire flood-prone properties. In 2009, the USACE conducted a regional study that included Mastic Beach in order to improve the resilience of Long Island's Barrier Islands against storms. In addition to outlining structural solutions and an extensive dune system, the report also proposed buyouts in Mastic Beach (NY Rising Community Reconstruction Program 2014).

Following Hurricane Sandy, some Mastic Beach residents expressed interest in buyout and acquisition programs. Although buyouts of the most flood-prone properties were prioritized in the NY Rising Reconstruction Plan, the village was divided on

Table 5

Fiscal Impact Analysis for Milford, Connecticut

Damage Threshold	HIGHEST (50%+ damage)	MODERATE (25%+ damage)	LOWEST (any flood damage)
Properties at Risk	426	1,139	1,543
Avoided Damages and Dislocation Costs			
100-Year Flood Event <i>per property:</i>	\$192,118,514 \$450,982	\$399,473,031 \$350,723	\$468,258,965 \$303,473
Annual <i>per property:</i>	\$14,356,247 \$33,700	\$26,851,392 \$23,575	\$29,373,913 \$19,037
Net Present Value <i>per property:</i>	\$204,852,881 \$480,875	\$383,149,249 \$336,391	\$419,143,723 \$271,642
Avoided Flood Insurance Premiums			
Annual <i>per property:</i>	\$435,582 \$1,022	\$1,164,619 \$1,022	\$1,577,705 \$1,022
Net Present Value	\$6,215,424	\$16,618,234	\$22,512,674
Cost of Removing Properties			
Cost of Removing Properties	\$136,811,570	\$446,640,900	\$637,628,520
Total Property Values at Risk	\$321,154	\$392,134	\$413,239
Losses in Property Taxes			
Annual <i>per property:</i>	\$2,756,857 \$6,471	\$8,360,751 \$7,340	\$11,686,619 \$7,574
Net Present Value <i>per property:</i>	\$39,338,287 \$92,343	\$119,301,649 \$104,742	\$166,759,303 \$108,075
2015 Appropriations (\$202.2M)			
Lost Taxes as Percent of Most Recent Budget	1.36%	4.14%	5.78%

Source: Regional Plan Association.



This Mastic Beach home was vacated after it was damaged by severe flooding. Source: *Regional Plan Association*.

the issue and a clear community consensus did not emerge (NY Rising Community Reconstruction Program 2014). Many municipal officials were concerned about the potential losses in tax revenue from buyouts, especially because the village had been incorporated so recently. Nevertheless, Suffolk County applied to the USDA for buyout funding for Mastic Beach. (Several properties were purchased through the NY Rising Acquisition Program, which typically offers fewer incentives to property owners and has fewer restrictions on redevelopment than the NY Rising Buyout Program.)

Because Suffolk County favored buyouts as a strategy to reduce risk and offered financial stability to residents who elected to relocate after Sandy, those residents were able to access the buyout program despite opposition from some municipal officials. Seven of the properties acquired in Mastic Beach through the NY Rising Acquisition Program, which allowed redevelopment, were deed-restricted as open space for perpetuity so that the area may return to natural floodplain functions and protect the community as a whole (Governor's Office of Storm Recovery 2015). A stakeholder involved in the NY Rising process commended the structure of the program for consistently informing residents and incorporating them into the recovery process through ongoing charrettes and planning exercises.

Finding alternative housing for homeowners who participated in buyouts and acquisitions within the municipality has been challenging because there are limited options for further development in Mastic Beach. One potential solution lies in the vacant bank-held properties—lingering evidence of the subprime mortgage crisis—located outside of the floodplain. Some community members involved in planning the recovery efforts and buyout program expressed frustration that these vacant properties could not be repurposed for residents displaced by buyouts. Currently, NY Rising can help homeowners navigate foreclosure and mortgage situations, but only if their cases involve flood-loss prevention. Programs must be designed to efficiently relocate displaced residents to available vacant properties within municipalities and to support them during the transition. Programs such as those in Ames and Cherokee, Iowa, following the 1993 floods integrated the acquisition of land with the resettlement of families, securing desirable and affordable areas for relocation. These strategies helped to mitigate the tax-base loss due to buyouts and ameliorate the neighborhood impacts of the 2008 fiscal crisis.

As highlighted in table 6, a 100-year flood event in Mastic Beach could cause as much as \$174 million in property damage and dislocation, once again devastating a large portion of the community. A buyout program of the most vulnerable homes would save an estimated \$3.7 million per year in damages and dislocation costs—a figure distributed among homeowners, the municipality, and the federal government. This program would also save participating homeowners more than \$1,100 in insurance premium rates—a number that is expected to increase markedly following the implementation of Biggert-Waters. Removing properties from the tax rolls would not have a significant impact because Mastic Beach currently receives the majority of its \$4.73 million appropriations from sources other than property taxes.

Table 6

Fiscal Impact Analysis for Mastic Beach, New York

Damage Threshold	HIGHEST (50%+ damage)	MODERATE (25%+ damage)	LOWEST (any flood damage)
Properties at Risk	456	1,497	2,000
Avoided Damages and Dislocation Costs			
100-Year Flood Event <i>per property:</i>	\$59,215,216 \$129,858	\$156,573,025 \$104,591	\$173,593,559 \$86,797
Annual <i>per property:</i>	\$3,672,487 \$8,054	\$5,310,701 \$3,548	\$5,395,804 \$2,698
Net Present Value <i>per property:</i>	\$52,403,642 \$114,920	\$75,779,725 \$50,621	\$76,994,076 \$38,497
Avoided Flood Insurance Premiums*			
Annual <i>per property:</i>	\$530,948 \$1,164	\$1,743,047 \$1,164	\$2,328,720 \$1,164
Net Present Value	\$7,576,233	\$24,871,975	\$33,229,091
Cost of Removing Properties			
Cost of Removing Properties	\$42,375,823	\$167,323,628	\$234,482,663
Total Property Values at Risk	\$92,929	\$111,773	\$117,241
Losses in Property Taxes**			
Annual <i>per property:</i>	\$50,494 \$111	\$199,380 \$133	\$279,406 \$140
Net Present Value <i>per property:</i>	\$720,517 \$1,580	\$2,845,005 \$1,900	\$3,986,911 \$1,993
2015 Appropriations (\$4.7M)			
Lost Taxes as Percent of Most Recent Budget	1.07%	4.21%	5.90%

* Flood insurance premium figures are based on Town of Brookhaven, which includes Mastic Beach.

** Village property taxes only.

Source: Regional Plan Association.

Wayne, New Jersey

Wayne is a township of 55,000 people in the outer ring of suburbs of northern New Jersey. Twenty percent of households are low-to-moderate income, 20 percent of residents are nonwhite, and 80 percent are homeowners. The town is landlocked but lies within the Passaic River Basin. Approximately 12 miles of Wayne's western border is formed by the Pompton River, which has a history of flooding. Additionally, the township has several lakes and streams with development encroaching on flood zones. Approximately 5,400 people currently live in Special Flood Hazard Areas, which represents nearly 10 percent of the total population. Wayne is the wealthiest of the five case studies but has experienced the slowest property value growth since 2000. FEMA has provided \$6.9 million in individual assistance to Wayne homeowners since 2007, with 15 percent of registrants occupying repetitive-loss properties.

Wayne has experienced extreme flooding since the colonial period. The most severe flood to impact the entire Passaic River Basin occurred in 1903. Since then, there have been several major floods each decade. Although the USACE began plans to reduce flooding in the Passaic River Basin in 1936, a comprehensive plan for the area has yet to be implemented.

The first buyouts in the Passaic River Basin began after the NJDEP Blue Acres Program was formed in 1995 and have continued through various funding sources, including NJDEP, FEMA, and in the case of municipalities in Morris County, open-space taxes. However, Wayne was not included in the first round of buyouts through the Blue Acres Program in the late 1990s. As a result, municipal officials approached the state about funding the town, which led to several other programs. Notably in 2005, the Hoffman Grove neighborhood within Wayne was identified as a priority area for buyout funding by NJDEP and USACE (USACE 2005). A series of allocations since 2005, including

additional funding after Hurricanes Irene and Sandy, allowed for the purchase and removal of 96 homes in the Hoffman Grove neighborhood. FEMA was the primary source of funding for these purchases; the Blue Acres Program provided the nonfederal match. Despite this significant funding, news sources reported that “there is no immediate funding to buy and raze the houses that are left standing” (McGrath 2011). Nevertheless, all but 29 homes in this neighborhood have now been purchased and removed.

In May 2015, the USACE, together with NJDEP, released a follow-up to that 2005 study identifying 27 additional properties within Hoffman Grove as priorities for acquisition. Wayne municipal officials are now working to identify willing residents in order to move the program forward. Once these buyouts are complete, the entirety of the Hoffman Grove neighborhood will return to a floodplain.

The buyout programs in Wayne more closely resemble the FEMA buyout programs that began in the 1990s in response to the Great Flood of 1993, given Wayne's vulnerability to seasonal and storm-related riverine flooding. Buyouts have undergone greater testing in riverine settings, leading to simpler program designs. Additionally, lower property values in inland riverine areas make it possible for buyout programs to purchase a greater number of homes. (Following disasters, property values of riverine flood properties are less resilient than coastal property values.)

The fiscal impact analysis for Wayne reveals that, after the acquisition of 96 Hoffman Grove properties, the township has a relatively small number of properties vulnerable to severe flooding compared to the other case studies. Even so, a 100-year flood event could still cause \$62 million in damage and dislocation costs, as shown in table 7. It is also worth noting that applying Wayne's buyout program to the remaining most vulnerable properties may lead to an average of \$840,000 in lost tax revenues per year.

Table 7

Fiscal Impact Analysis for Wayne, New Jersey

Damage Threshold	HIGHEST (50%+ damage)	MODERATE (25%+ damage)	LOWEST (any flood damage)
Properties at Risk	127	382	644
Avoided Damages and Dislocation Costs			
100-Year Flood Event <i>per property:</i>	\$25,158,629 \$198,099	\$50,761,974 \$132,885	\$62,061,637 \$96,369
Annual <i>per property:</i>	\$1,972,474 \$15,531	\$3,432,245 \$8,985	\$3,810,397 \$5,917
Net Present Value <i>per property:</i>	\$28,145,719 \$221,620	\$48,975,571 \$128,208	\$54,371,506 \$84,428
Avoided Flood Insurance Premiums			
Annual <i>per property:</i>	\$242,611 \$1,910	\$729,745 \$1,910	\$1,230,250 \$1,910
Net Present Value	\$3,461,884	\$10,412,910	\$17,554,749
Cost of Removing Properties			
Cost of Removing Properties	\$31,209,638	\$89,768,007	\$155,305,833
Total Property Values at Risk	\$245,745	\$234,995	\$241,158
Losses in Property Taxes			
Annual <i>per property:</i>	\$840,485 \$6,618	\$2,425,012 \$6,348	\$4,204,889 \$6,529
Net Present Value <i>per property:</i>	\$11,993,089 \$94,434	\$34,603,104 \$90,584	\$60,000,613 \$93,169
2014 Appropriations (\$78.1M)			
Lost Taxes as Percent of Most Recent Budget	1.08%	3.10%	5.38%

Source: Regional Plan Association.

Sayreville, New Jersey

The borough of Sayreville is located on the southern bank of the Raritan River, where it flows into the Raritan Bay. Thirty-four percent of the population is low-to-moderate income and 69 percent of residents own their homes. The town has a large nonwhite minority (40 percent of the population), most of whom live in the 100-year flood zone. Coastal and low-lying, Sayreville is surrounded by potential flood risks with the Raritan Bay to the East, the Raritan River to the North, the South River to the West, and the Cheesequake River along part of the southern border. Despite the adjacent rivers, the biggest flooding threat is storm surge, which can travel up the mouth of the Raritan River and into the tributaries.

Sayreville contains a significant amount of at-risk multifamily housing, which most buyout programs are not equipped to handle. Currently, 3,100 of the borough's 42,000 residents live in the FEMA-designated 100-year flood zone; that number may increase by 140 percent to 7,400 by 2050. Since 2007, Sayreville homeowners have received \$8 million in individual assistance, with 7 percent of program registrants occupying repetitive-loss properties.

Sayreville has numerous low-lying residential neighborhoods that are subject to chronic flooding, particularly along the South River tributary of the Raritan River. This area floods during yearly storm events, hurricanes, nor'easters, and even during high tides without storms. The Old Bridge section of town—a secluded block containing five streets—is frequently the hardest hit. Between 2010 and 2012, Old Bridge and other low-lying neighborhoods suffered three consecutive annual flooding events, including the 2010 Nor'easter, Hurricane Irene in 2011, and Sandy in 2012.

Both the 2010 Nor'easter and Hurricane Irene generated flooding as high as 16 inches, which overwhelmed streets and damaged the first stories of homes. But it was Hurricane Sandy that dealt the strongest blow

to this community that was still rebuilding from the previous two events. Four to six feet of floodwater inundated the borough's low-lying neighborhoods, and at least 30 trapped residents required rescue from their homes. The flooding also shut off gas, electric, and water supplies and permanently damaged the foundations of many homes.

During the recovery period following Hurricane Sandy, the hardest-hit residents expressed a strong desire to participate in the state's buyout program. Three consecutive floods in three years persuaded these residents that it was no longer worth investing in flood-prone homes. The \$300 million statewide buyout—the Superstorm Sandy Blue Acres Buyout Program, which is managed by the NJDEP—is funded largely by FEMA's Hazard Mitigation Grant Program. Rather than aggressively pursuing buyouts in municipalities, the state allows residents and elected officials to decide if they would like to participate.

Approximately 200 homeowners applied for buyouts. The state approved and made offers to 199 of them: \$48.4 million was awarded for the purchase and demolition of 196 homes in Sayreville and \$15.2 million was awarded for the purchase and demolition of 76 homes in neighboring South River (McGee 2016). As of June, 2015—more than two years following Sandy—343 closings statewide have been completed and 207 homes have been demolished. Contrary to other New Jersey municipalities like Woodbridge, Sayreville is letting the properties return to nature (McGee 2016).

Factoring in the sea level rise projected by 2050, table 8 reveals that a 100-year flood event could seriously damage as many as 1,059 Sayreville properties, leading to \$186 million in damage and dislocation costs. A buyout program targeting only the most vulnerable properties could save the homeowner, municipality, and federal government \$4.2 million in damage and dislocation costs. It is also worth noting that the loss of the properties has a larger impact on Sayreville's tax revenue proportionately, compared to the other case studies.

Table 8

Fiscal Impact Analysis for Sayreville, New Jersey

Damage Threshold	HIGHEST (50%+ damage)	MODERATE (25%+ damage)	LOWEST (any flood damage)
Properties at Risk	405	1,039	1,059
Avoided Damages and Dislocation Costs			
100-Year Flood Event <i>per property:</i>	\$84,906,747 \$209,646	\$183,714,877 \$176,819	\$186,369,224 \$175,986
Annual <i>per property:</i>	\$4,231,044 \$10,447	\$8,059,184 \$7,757	\$8,132,447 \$7,679
Net Present Value <i>per property:</i>	\$60,373,821 \$149,071	\$114,998,512 \$110,682	\$116,043,921 \$109,579
Avoided Flood Insurance Premiums			
Annual <i>per property:</i>	\$348,969 \$862	\$895,257 \$862	\$912,490 \$862
Net Present Value	\$4,979,531	\$12,774,649	\$13,020,552
Cost of Removing Properties			
Cost of Removing Properties	\$94,052,522	\$275,588,181	\$285,094,525
Total Property Values at Risk	\$232,228	\$265,244	\$269,211
Losses in Property Taxes			
Annual <i>per property:</i>	\$2,208,877 \$5,454	\$6,520,850 \$6,276	\$6,747,797 \$6,372
Net Present Value <i>per property:</i>	\$31,519,020 \$77,825	\$93,047,643 \$89,555	\$96,286,007 \$90,922
2014 Appropriations (\$52.2M)			
Lost Taxes as Percent of Most Recent Budget	4.23%	12.48%	12.91%

Source: Regional Plan Association.

CHAPTER 6

Recommendations



New York City residents posted a warning to approaching Hurricane Sandy. Source: *jaydensonbx, Flickr/CC (2012)*.

Retreat has long been avoided in public dialogue as an adaptation strategy. Yet when weighed against the magnitude of risk faced by coastal and riverine communities, retreat must be included in the toolbox of strategies for climate adaptation. Buyout programs can be viable and effective methods to enable retreat from flood zones. The five case studies highlight the potential value of buyout programs as well as the political, social, and economic challenges of implementing such programs. The varied experiences and levels of success of programs in these communities is due to many factors discussed in this report, including the timing of the program, the level of program engagement with residents, the attachment of participants to place, and the availability of alternatives to retreat, such as elevation.

In order for buyouts to meet the needs of residents and municipalities, we must rethink the goals, strategies, and timing of these programs; improve the administration of program funding; reform the planning process; and ultimately design minimally disruptive buyout programs.

1. Rethink the purpose and timeline of buyout programs.

- **Design buyout programs at the federal, state, and local levels as long-term adaptations to flood risk, not merely as short-term recovery tools.** To date, the funding and timing of buyout programs has been closely tied to disaster recovery. However, the pervasive threats of flooding brought on by climate change necessitate a restructuring of buyout programs, including redefining long-term goals and strategies, and implementing viable time frames.
- **States should ensure that at-risk communities finalize adaptation plans before the next disaster occurs.** If continuous or consistent funding is not available to communities interested in buyout programs, they should create detailed plans before the next disaster to minimize the confusion of recovery and lay the groundwork for long-term adaptation to flood risk. As the example of Oakwood Beach demonstrates, organization prior to a disaster may help secure buy-in and funding when it becomes available.
- **Structure programs to consider the long-term interests of buyout participants.** An integral buyout program should not end when the offer is accepted by the participant. Relocation can be a challenging process, whether the participants

stay within the community or relocate elsewhere, especially if they have limited resources. In most cases, the concerns of the municipality are aligned with the resident, as there is a shared desire to maintain the tax base as well as economic and social stability. Buyout programs must consider what follows the transaction itself and provide community support throughout all stages of the process.

- **Programs need to address the long-term purpose of the land acquired through buyouts.** Just as buyout programs must consider the well-being of participants beyond the property transaction, they must also consider the long-term use of the acquired land. In many cases, returning the land to nature may be the best option, especially when integrated within a larger ecological context. Yet even this land-use transition requires long-term planning and maintenance. In some cases, land acquisition through buyouts may be necessary to implement additional resiliency strategies, such as building berms. Although a blanket ban on development of bought-out properties may be too extreme, residents may not wish to sacrifice their communities to new development. Therefore, buyout program participation depends a great deal on maintaining open communication and trust among the stakeholders.

2. Improve the administration of funding for buyout programs.

- **Standardize buyout program requirements at the federal level and enhance implementation at the local level.** The complexity and sensitivity of buyouts, as well as the current institutional framework, necessitate cooperation among multiple levels of government. The depth and

scope of this challenge call for national funding, the coordination of programs across municipal boundaries and state administrations, and the management of knowledge at the local level. For these reasons, high-level standardization of program funding and basic requirements should be coupled with local-level flexibility to generate optimal planning at the community level.

- **State governments should ensure that administering agencies have the capacity to implement buyout programs.** Buyout programs in the New York metropolitan region are unable to expand much beyond their current boundaries because these programs have funding tied to previous disaster events and are still viewed as pilot programs. In many cases, administering state agencies should be scaled up to oversee a broader geographical context and programmatic scope for buyout programs.

3. Consider alternative funding models for buyout programs.

- **Governments that implement programs should test pilot buyout strategies that can be executed incrementally, over time, and outside the context of the disaster.** Funding for buyout programs can be spread over many years when removed from the context of disaster recovery. This framework opens the door to new sources of funding and acquisition. Two potential strategies include establishing land trusts in order to reduce flood risk and creating regulatory mechanisms that give the state the right to refuse sales of at-risk properties.

- **State or local governments can expand the use of open-space taxes to fund buyout programs.**

Morris County, New Jersey, used local open-space taxes to acquire high-risk properties. Another example is the Martha's Vineyard Acquisition Program that used community preservation taxes. This funding source alone may not be sufficient to finance a scaled-up buyout program, but it may help to fill in funding gaps within existing federal programs, such as the nonfederal match.

4. Improve planning processes to anticipate and integrate buyout programs.

- **Municipalities should identify priority acquisition zones by analyzing high-quality data and community input.** Instead of relying on political expediency and a first-come, first-served approach to identify priority acquisition zones, municipalities should apply a more rigorous strategy based on analyses of the highest levels of physical and social vulnerability, paired with input from community residents. The exchange of scientific findings and local knowledge can help identify priority areas and create buy-in among residents and officials. These priority acquisition areas should be codified into local and state hazard-mitigation plans.
- **Municipalities should submit integrated, long-term local adaptation plans rather than flood-only hazard-mitigation plans.** Although it is critical to identify and mitigate flood risk in the short term, long-term adaptation strategies

are necessary to address the growing risks and far-reaching implications beyond the physical location of flooding. Municipalities should be required to submit long-term adaptation plans that integrate hazard mitigation with social resiliency, physical infrastructure adaptation and preservation, economic development, and environmental conservation.

5. **Make participation in buyouts easier and more attractive for municipalities.**

- **State governments should not make municipalities responsible for paying the nonfederal match.** The nonfederal funding match (commonly 25 percent) remains too high an obstacle for many municipalities seeking to engage buyout programs as viable adaptation strategies. Additionally, passing on the nonfederal match to participants is likely to deter participation. When programs are designed for states or additional federal funding sources to make up the difference, as in the case of Blue Acres or the NY Rising Buyout Program, they are more likely to be implemented at the local level.
- **State and federal governments should provide technical assistance to municipalities to help them evaluate the fiscal impacts of buyouts.** Although communication has increased and analysis tools have become more accessible, many municipalities and communities still lack the information and technical resources to evaluate the fiscal impacts of flood risk and the strategies to address them. Furthermore, existing fiscal cost-benefit analysis models in programs such

as the Hazard Mitigation Grant Program do not take into full account the increasing risks associated with climate change. Therefore, state and federal governments must assist municipalities in obtaining the resources necessary to evaluate the potential benefits and detriments of buyouts for their communities.

6. **Streamline buyouts to facilitate participation.**

- **Buyout program staff should help homeowners understand the full range of available financial assistance and compensation.** Eligible participants are not always aware of available financial help even though some programs include supplemental housing relocation assistance. Receiving such information allows potential participants to determine whether a buyout is their best option and to plan accordingly.
- **When possible, programs should pursue housing blocks where neighbors can relocate together through partnerships with developers.** Simple monetary incentives may not be enough to encourage participation in buyout programs if residents fear the loss of community. Recognizing the disadvantages of checkerboarding buyout properties, programs such as NY Rising and Blue Acres provide incentives for entire housing blocks to participate. Social incentives, such as the development of new housing blocks where communities can relocate together, can increase buyout program participation and foster long-term stability for participants.

APPENDIX A

Buy-In for Buyouts Roundtable

PURPOSE

The Regional Plan Association and the Lincoln Institute of Land Policy sponsored a roundtable on December 11, 2014. The purpose of this roundtable was to foster conversation about participants' experiences and to study buyout and disaster recovery programs. Another goal was to develop preliminary recommendations on program design to maximize risk reduction and avoid undue harm.

PROGRAM

Welcome and Introductions

- **Armando Carbonell**, Chair, Department of Planning and Urban Form, Lincoln Institute of Land Policy
- **Rob Freudenberg**, Director, Energy and Environment, Regional Plan Association

Buy-In for Buyouts: Planning, Relocation and Re-Use

- **Laura Tolkoff**, Senior Planner, Regional Plan Association
- **Ellis Calvin**, Associate Planner, Regional Plan Association

The Sandy Child and Family Health Study

- **David Abramson**, Clinical Associate Professor of Public Health, Director, Program on Population Impacts, NYU's Global Institute of Public Health
- **Alexis Merdjanoff**, Assistant Research Scientist, NYU's Global Institute of Public Health

Understanding Adaptive Relocation: The Sociology of Buyouts in Post-Sandy New York City

- **Liz Koslov**, PhD Candidate, NYU's Institute of Public Knowledge

Moderated Discussion: Breakout Sessions | Best Practices

Armando Carbonell, Lincoln Institute of Land Policy

- **Topic 1:** Risk Communication, Information, and Decision Making
Dr. Richard Lathrop, Grant F. Walton Center for Remote Sensing and Spatial Analysis at Rutgers University
- **Topic 2:** Integrated Planning and Tax Base Retention
- **Topic 3:** Health Impacts

PARTICIPANTS

- **David Abramson**, New York University's Global Institute of Public Health
- **Gabriella Amabile**, U.S. Department of Housing and Urban Development
- **Diego Arias**, Ironbound Community Corporation
- **Alyson Beha**, U.S. Department of Housing and Urban Development
- **Dare Brawley**, Regional Plan Association
- **Ellis Calvin**, Regional Plan Association
- **Yang Cao**, New Jersey Department of Environmental Planning
- **Armando Carbonell**, Lincoln Institute of Land Policy
- **Kizzy Charles-Guzman**, The Nature Conservancy
- **Arnold Cohen**, Housing and Community Development Network of New Jersey
- **Hermia Delaire**, State of Connecticut
- **Gordon Douglas**, New York University's Institute for Public Knowledge
- **Lynn Englum**, Rebuild by Design
- **Roni Epstein**, The Governor's Office of Storm Recovery NY Rising Recovery Programs
- **Naomi Fraenkel**, U.S. Army Corps of Engineers
- **Rob Freudenberg**, Regional Plan Association
- **Eric Goldstein**, Natural Resources Defense Council
- **Jay Habansky**, City of Bridgeport
- **Carri Hulet**, The Consensus Building Institute
- **Chris Jones**, Regional Plan Association
- **Liz Koslov**, New York University's Institute for Public Knowledge
- **Kyle Kozar**, Regional Plan Association
- **David Kutner**, New Jersey Future
- **Sharai Lewis-Gruss**, Regional Plan Association
- **Kristin Marcell**, New York Department of Environmental Conservation
- **Michael Marrella**, New York City Department of City Planning
- **Alexis Merdjanoff**, New York University's Global Institute of Public Health
- **Juliette Michaelson**, Regional Plan Association
- **Michael Molina**, Ironbound Community Corporation
- **Randy Parsons**, The Nature Conservancy
- **Elizabeth Rush**, CUNY Graduate School of Journalism
- **Sanjay Seth**, Regional Plan Association
- **Rebecca Sinclair**, The Governor's Office of Storm Recovery NY Rising Recovery Programs
- **Maura Sperry**, Village of Mastic Beach
- **Alexan Stulc**, ARUP
- **Nava Tabak**, Scenic Hudson
- **Laura Tolkoff**, Regional Plan Association
- **Robert Tratner**, FEMA
- **Jessica Yager**, New York University's Furman Center

APPENDIX B

Place-Type Analysis Methodology

Developing Community Typologies

For this study, we organized the New York metropolitan region into place types, or typologies, which allowed the scope of the analysis to remain regional while still considering indicators that were relevant at a smaller scale. The typologies were based on the types of sociodemographic factors related to social vulnerability. These same factors may have influenced participation in buyout programs, satisfaction with programs, and the outcomes of the programs. This methodology describes the types of factors that were included in the typologies.

The purpose of applying this “equity lens” is not only to determine whether existing programs were distributed and implemented equitably, but also to understand how certain fiscal issues affected different types of communities and how programs can best be designed to accommodate them. The three socioeconomic characteristics analyzed in the development of typologies were income, race, and housing tenure. However, before identifying communities with those characteristics, we isolated the areas of the region most at risk from floods.

Flood Risk Areas

Flood risk areas were 2010 census block groups located within the 2050 floodplain, which represented the potential extent of coastal and riverine flooding in 2050 (see appendix C). For the typology analysis, we selected only these census blocks, which covered a significant area of the region, as they contained the constituency for the most conceivable buyout programs.

LOCALITIES

The term *locality* was defined as a census-designated place, census county subdivision or municipality, or New York City neighborhood as defined by the NYC Department of City Planning. We developed this composite geography to bridge the gap between the boundaries that communities experienced and perceived and local administrative boundaries. For each locality, we calculated

- the total population of each locality within the flood risk area;
- the percentage of the population of each locality within the flood risk area that lived inside a block or block group designated as low-to-moderate income;
- the percentage of the population of each locality within the flood risk area that lived inside a block classified as “nonwhite”; and
- the percentage of the population of each locality within the flood risk area that lived inside a block classified as “renter.”

To compare all localities within the region, those with an above-average percentage of the population in blocks or block groups that were categorized as low-to-moderate income, nonwhite, or renter were assigned those typologies, respectively. Localities that contained a below-average percentage were assigned the opposite typologies: moderate-to-high income, white, and owner-occupied.

The reason for classifying whole blocks or block groups as a particular typology before scaling up rather than simply calculating the overall (raw) percentage of the population was to better identify localities that contained concentrations of people with the three socioeconomic characteristics we were evaluating. This helped to identify smaller clusters that more closely aligned with the scale through which buyout programs operate.

Figure B.1
Typologies

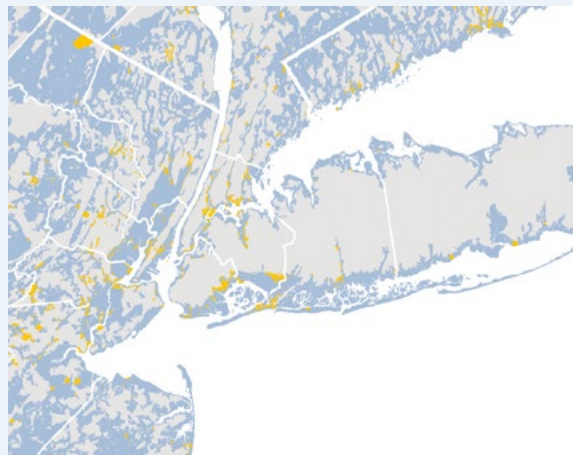


Income

Census block groups in which more than half of the population was below 80 percent of the median income of the Core Based Statistical Areas (CBSA) were classified as low-to-moderate income (LMI). Census block groups in which incomes were greater than 80 percent of the CBSA's median family income were considered medium-to-high income (MHI).

Income Type

- Low-to-moderate income block groups with 2050 flood risk
- Other census blocks with flood risk



Race

Census blocks that were more than 75 percent nonwhite were classified as “nonwhite” for these typologies.

Race Type

- Nonwhite (>75%) census blocks with 2050 flood risk
- Other census blocks with 2050 flood risk



Housing Tenure

Census blocks with a majority of renter-occupied housing units were classified as “renter” blocks.

Tenure Type

- Renter (>50%) census blocks with 2050 flood risk
- Other census blocks with 2050 flood risk

Table B.1
Typology Components

ABOVE AVERAGE % OF LOCALITY		BELOW AVERAGE % OF LOCALITY	
L	Above average percentage of population in block groups with low-to-moderate income	H	Below average percentage of population in block groups with low-to-moderate income
N	Above average percentage of population in blocks with high nonwhite population	W	Below average percentage of population in blocks with high nonwhite population
R	Above average percentage of population in blocks with majority renter-occupied housing	O	Below average percentage of population in blocks with majority renter-occupied housing

Sources: *Regional Plan Association.*

APPENDIX C

Fiscal-Impacts Analysis Methodology

The fiscal-impacts analyses conducted for the five case study communities drew from a number of data sources. The analyses were by no means comprehensive in anticipating all of the costs and benefits that municipalities may have accrued in implementing a buyout program to minimize flood risk. Instead, the analyses accounted for only the most significant fiscal factors using the available data. Damages, relocation costs, and flood insurance premiums that were avoided, as well as lost tax revenue and property acquisition costs, were calculated with the following data and methods.

2050 FLOOD ZONE PROJECTION

The projected 2050 Flood Zone layer is a composite of flood data from several sources compiled by RPA. For New Jersey and New York State excluding New York City, coastal flooding data was obtained from the National Oceanic and Atmospheric Agency’s (NOAA)

Sea Level Rise Planning Tool. The New Jersey and New York State (excluding New York City) data integrates FEMA’s best available special flood hazard area (SFHA) with the highest scenario of sea level rise. This scenario provided estimates of global sea level rise by the year 2050 based on the best available science provided by the U.S. National Climate Assessment and developed by a panel of experts from multiple federal agencies and academic institutions. A detailed explanation of the scenarios was published in an interagency report titled “Global Sea Level Rise Scenarios for the United States National Climate Assessment” (National Oceanic and Atmospheric Association 2012).

For New York City, the data also originated from the NOAA Sea Level Rise Planning Tool, but the data included regional sea level rise scenarios developed by the New York Panel on Climate Change (NPCC).

The RPA composite used the highest sea level rise scenario for 2050.

For Connecticut, The Nature Conservancy provided data generated from their sea level rise plus storm surge model. In this case, the RPA composite featured the extent of flooding predicted for a Category 3 storm on top of the highest sea level rise scenario for 2050.

PROPERTY DATA

Tax parcel property data for the five case study communities was obtained from various sources, including the New York City Department of City Planning; New Jersey Department of the Treasury; Suffolk County, New York; and the South Central Connecticut Council of Governments. Structure data was only available for Oakwood Beach from the New York City Department of Information Technology, and for Mastic Beach from Suffolk County. For the remaining three case studies, RPA mapped building footprints in the floodplain and then matched structures to their respective parcel data.

DEPTH GRID

To estimate the damage to residential structures caused by flooding under the composite 2050 floodplain mentioned here, the extent of the floodplain was overlaid onto a digital elevation model (DEM), in this case, the U.S. Geological Survey (USGS) 2015 National Elevation Dataset (NED) with a resolution of one meter. To estimate the depth of riverine flooding, numerous cross sections were drawn along the extent of the flooding to determine the elevation of the hypothetical flood water. For coastal areas, the elevation along the boundary of storm surge flooding was sampled to determine the elevation of flooding caused by storm surge. These points were extrapolated to generate a flood elevation layer, from which the DEM was subtracted to estimate flood depth.

RECURRENCE INTERVAL OF FLOODING

Recurrence intervals for flooding events are typically based on previous events. This makes it particularly

difficult to estimate future flooding events as probability will change due to climate change and sea level rise. Nevertheless, recurrence intervals for 100-year, 50-year, and 10-year storms were estimated for each community, adapting the method outlined in the FEMA Benefit-Cost Analysis Tool Guide (FEMA 2011).

DEPTH DAMAGE CURVE

There are many methods for modeling depth damage curves or the amount of damage expected to structures based on the depth of flooding (David and Skaggs 1992; Tsakiris 2010; Aerts et al. 2013; USACE 2015a). In this study, estimated damages were based on the method developed by USACE for the North Atlantic Coast Comprehensive Study (NACCS) (USACE 2015a). Their method, informed by a regional survey after Hurricane Sandy and a three-day workshop with engineering and insurance experts, was based on twelve prototypical structures. These prototypes were the result of combinations of several prototype characteristics, including type of structure, number of stories, foundation type, and basement use. The scope of this study and the existing housing stock of the case study communities resulted in the use of only six of the prototype buildings (table C1).

The quality of property and structure data for each of the case study communities varied greatly. For the purposes of this study, the data points necessary for the depth damage function were building type (e.g., residential, and more specifically, single family or apartment), building area, number of stories, basement use, improvement value, and base elevation. When data points were not available, estimates were made using the best quantitative and qualitative data available. Residential buildings in the floodplain of each of the case study communities were classified as one of the six prototype structures. The depth of flooding for each structure was calculated for each of the three recurrence intervals, and the estimated damage calculated based on the NACCS depth damage curve.

DAMAGE AND DISLOCATION COSTS

For each property in the flood zone, the percent of damage to the structure for each level of flooding was multiplied by the value of the structure. Likewise, estimated damage to the contents of the structure was calculated. Dislocation costs during a disaster were estimated using the values generated by the FEMA Benefit-Cost Analysis tool. For each of the three flooding events, these three costs were summed to arrive at the total damage per property. An annualized risk figure was then calculated based on the probability of the flooding events, and the net present value (NPV) was calculated based on a 100-year time frame.

FLOOD INSURANCE PREMIUMS

Current aggregated flood insurance policy and premium figures by NFIP community were used to calculate the average flood insurance premium for each case study. For Wayne, Sayreville, and Milford, the NFIP community corresponded to the municipal boundaries. In the case of Mastic Beach, the figures for the Town of

Brookhaven, New York, were used, and in the case of Oakwood Beach, the average premium was calculated from the New York City NFIP community.

COSTS OF REMOVING PROPERTIES AND LOSS OF PROPERTY TAXES

This analysis assumed that all buyout offers were for current market value of properties at risk. Property values (the value of both the land and structure) were obtained by equalizing assessed property values for each area. Estimated loss in property taxes was based on current tax rates for each community. The analysis assumed the loss of tax revenue for the 100-year time frame. It did not account for the possibility of gradual buyout programs for which the onset of lost tax revenue would also be gradual.

MUNICIPAL BUDGETS

Municipal budgets were obtained from public budgets released by the municipal governments of each of the five case study communities.

Table C.1
Prototype Structures for Physical Depth Damage Functions

PROTOTYPE STRUCTURE	DESCRIPTION
1A-1	Apartments: 1 story without basement
1A-2	Apartments: 3 stories without basement
5A	Single-story residence without basement
5B	Two-story residence without basement
6A	Single-story residence with basement
6B	Two-story residence with basement

Source: U.S. Army Corps of Engineers (2015c).

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Acknowledgments

The authors would like to thank a number of individuals who contributed invaluable input, expertise, and editing for earlier drafts of this Policy Focus Report. We thank Armando Carbonell, Chair of the Department of Planning and Urban Form at the Lincoln Institute of Land Policy. We are grateful to our partners at NYU's Institute of Public Knowledge and Global Institute of Public Health, including David Abramson, Eric Klinenberg, Liz Koslov, and Alexis Merdjanoff, who shared important lessons from their ethnographic and survey-based research on Sandy-affected communities in New York City and New Jersey. Thank you for your partnership in research and for helping to create safer and stronger communities in the New York metropolitan region.

We are grateful to a number of scholars and experts who provided technical guidance and information in support of this research. These include Jeanne Herb, Jennifer Rovito, and Will Irving from the Edward J. Bloustein School of Planning and Public Policy at Rutgers University; Jon Miller from the Association of State Floodplain Managers—New Jersey; Chad Berginnis from the Association of State Floodplain Managers Foundation; Rebecca Sinclair from the New York Governor's Office of Storm Recovery; David Kutner from New Jersey Future; Maura Sperry from the Village of Mastic Beach, New York; Meg McGaffin and MaryRose Palumbo from the City of Milford, Connecticut; Michael Foley, Robert Tranter, Mike Moriarty, and Joe McDonald from the Federal Emergency Management Agency; Jeff Ward from Jeffrey S. Ward and Associates; Chris Testa from the New Jersey State Office of Emergency Services; Fawn McGee from the NJDEP Blue Acres Program; Diane Ifkovic from the Connecticut Department of Energy and Environmental Protection; Dorian Dale from Suffolk County, New York; and Nicky Sheats from the John S. Watson Institute for Public Policy at Thomas Edison State University.

The authors also wish to thank a number of staff members at the Regional Plan Association whose diligence, creativity, and passion made this research possible. We thank Sharai Lewis-Gruss, who collected the data used in this report and helped design the methodology applied to identify place types and communities at risk in the New York metropolitan region. We are grateful to Rob Lane and Lucrecia Montemayor for sharing their knowledge of urban form and community design. We thank Kyle Kozar, who shared his vast knowledge of open-space planning and green infrastructure to support this work. We are also thankful to Dare Brawley for helping to prepare and plan for the Buy-In for Buyouts Roundtable.

ABOUT THE AUTHORS

Robert Freudenberg is the director of energy and environmental programs at Regional Plan Association, leading the organization's initiatives in areas including climate mitigation and adaptation, open-space conservation and park development, and water resource management. Rob works closely with other RPA staff to integrate these objectives with RPA's economic, transportation, land use, design, and community development initiatives.

Rob has been with RPA since 2006 and most recently served as New Jersey Director where he managed the state program that focused on sustainability planning and policy. Prior to joining RPA, Rob served as a coastal management fellow at the National Oceanic and Atmospheric Administration where he developed policies for the New Jersey Department of Environmental Protection. Rob holds a Master's of Public Administration in Environmental Science and Policy from the Columbia University School of International and Public Affairs and a Bachelor's in Environmental Biology from the SUNY College of Environmental Science and Forestry.

Ellis Calvin is an associate planner for Regional Plan Association's energy and environmental programs dedicated to making the New York metropolitan region a more equitable and resilient place. His work includes researching best practices in climate change and adaptation strategies as well as conducting data and spatial analyses to clarify the impact of environmental planning and policies on quality of life and economic competitiveness. Ellis' graduate thesis focused on the relationship between urban design, public projects, and the politics of global economic competitiveness in Medellin, Colombia. He has a Master's in Urban Planning from Columbia University and a Bachelor's in Geographical Studies from the University of Chicago.

Laura Tolkoff previously served as senior planner for energy and environmental programs at Regional Plan Association where she focused on advancing climate mitigation and resilience through research, planning, and advocacy. Her work included a number of rebuilding efforts, innovating in design and planning, building community resilience, and reshaping federal policies and programs to address future climate impacts. She also managed RPA's Energy Program, which works on reducing energy use through smart land use and transportation options, developing energy infrastructure to meet twenty-first century needs, and promoting innovation in business and policy. Laura holds a Master's in Urban and Environmental Policy and Planning from Tufts University and a Bachelor's in Media Studies from the University of California at Berkeley. She is currently the San Jose Policy Director for SPUR, the San Francisco Bay Area Planning and Urban Research Association.

Dare Brawley was previously a research analyst for energy and environment programs at RPA. She led research efforts in resilience and scenario planning for "The Fourth Regional Plan," a set of analyses, projections, and policy recommendations about the future dynamics of the Greater NYC urban system. She holds a Bachelor's in Architecture with a double concentration in physics and the ethics of data visualization from Barnard College. Her work has been exhibited and published by the Storefront for Art and Architecture, The Architectural League, the Lincoln Institute of Land Policy, Columbia University's *Abstract*, and in Interboro Partner's *The Arsenal of Inclusion and Exclusion*. She is currently program administrator at the Center for Spatial Research at Columbia University.

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EDITOR & PROJECT MANAGER
Emily McKeigue

DESIGN & PRODUCTION
Sarah Rainwater Design

PRINTING
Recycled Paper Printing



113 Brattle Street, Cambridge, MA
02138-3400, USA

P (617) 661-3016 or (800) 526-3873

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Buy-In for Buyouts

The Case for Managed Retreat from Flood Zones

Between August 2011 and October 2012, Hurricanes Irene and Sandy killed 83 residents and caused \$80 billion of damage in New York, New Jersey, and Connecticut. The storms prompted a regional dialogue about how to prepare for and respond to extreme weather events. Yet nearly five years later—after recovery efforts have been completed and appropriate programs implemented—many communities in the region still could not withstand the surge levels of another Sandy or the riverine flooding of another Irene. And the number of residents vulnerable to flooding in this region and across the country will increase exponentially due to rising sea levels, increasing frequency and magnitude of storms, and steady population growth.

Rebuilding and restoring are the most popular adaptation tools to strengthen community protection and resilience in the face of climate change. But the strategy that most effectively eliminates risk is managed retreat through the use of buyout programs. Yet governments and communities across the United States have largely dismissed managed retreat as an adaptation strategy because it is laden with social and political challenges. In order for buyouts to be implemented more often, we must rethink the strategies, goals, and time frames of these programs; improve the administration of funding; reform the planning process; and design minimally disruptive programs.

This report presents an in-depth study of buyouts in and outside the New York metropolitan region. It considers flooding risk, quantitative analyses that organize the region into place types, and five case studies of the fiscal impact of buyouts. The authors offer policy recommendations to improve the effectiveness of and participation in buyout programs. The lessons learned from analyzing buyout programs in New York area provide insight and guidance for the entire nation.