Adaptation through Acquisition
Planning for Home Buyout and Acquisition in the New York Region

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Abstract

This paper analyzes how the New York Region instituted home buyouts and acquisitions as a tool for adaptation against flooding, program outcomes, and how proactive urban planning approaches can better prepare the region moving forward. Research uses three case studies of buyout and acquisition programs and incorporates a mixed-methodology design in literature review and qualitative interviews. The study first identifies the current literature on regional risk to climate change and flooding events and land use adaptation, then details acquisition and buyout program structure and outcomes through data collected from plans, reports, funding trackers and qualitative interviews with program administrators and experts. The study then discusses the findings from these case studies, defines the implications to urban planning, and makes recommendations for moving forward with a proactive planning for managed retreat through acquisitions and buyouts.
# Table of Contents

01  Introduction  
02  Methodology  
03  Climate and Flooding Risks and Implications  
  03-1 Climate Change Overview  
  03-2 Regional Impacts  
  03-3 Vulnerability and Health  
04  Adaptation Theory  
  04-1 The Role of Urban Planning  
05  Recovery, Buyout, and Acquisition  
  05-1 Responding to Flood Related Disasters  
  05-2 Federal Emergency Management Agency  
  05-3 Department of Housing and Urban Development  
  05-4 Previous evaluations of Home Acquisition Programs  
06  The Landscape of Acquisition in the New York-New Jersey Region  
  06-1 NY Rising- Governor’s Office of Storm Recovery Buyout and Acquisition Programs  
  06-2 NYC Build it Back - Acquisition, Buyout, Relocation and Resettlement Incentive Programs  
  06-3 Green and Blue Acres- Acquisition Program  
  06-4 Analysis of Acquisitions in the Region  
07  Recommendations for Adaptation through Acquisition Moving Forward: Urban Planning’s Implications  
  07-1 Funding  
  07-2 Planning Process  
  07-3 Evaluation and Research  
08  Conclusions  
09  Sources
Table of Figures

Figure 1: New York Region 7
Figure 2: Housing in the Floodplain 18
Figure 3: Social Vulnerability Index of the Region 19
Figure 4: Buyout and Acquisition Definitions 24
Figure 5: Differences in Funding 33
Figure 6: The Timeline of Funding for Recovery after Sandy by Source 38
Figure 7: Summary of Case Studies 50
Figure 8: Summary of Case Studies Continued 50
Figure 9: Landscape of Buyouts and Acquisitions from 1996 to Present by Program 51

List of Abbreviations

FEMA Federal Emergency Management Agency
HUD US Department of Housing and Urban Development
GOSR Governor’s Office of Storm Recovery
HMGP Hazard Mitigation Grant Program
CDBG-DR Community Development Block Grant- Disaster Recovery
01 Introduction

Communities vary in their efforts to reform the built environment and plan for climate change due to differences in partisanship, economic and social opportunity, and environmental risk and vulnerability (Brody et al., 2008; Werner and Svedin, 2017). Most movement towards resiliency, when there is movement, has been retroactive. Money becomes available after disaster, and communities must look to maximize both recovery and practices in housing and land use that can lead to resiliency within the bounds of what these policies make possible.

One of the major mechanisms for recovery comes in the form of home acquisitions or buyout. This is the practice of the government buying out a home and placing conditions on the land after the purchase to regulate the development that can occur there in the future. The terms “acquisition” and “buyout” have been used somewhat interchangeably in the literature before Hurricane Sandy, but the variety of programs that occurred after the storm began to distinguish them. “Buyout” now refers to a purchase of a home after a storm in which the land is then deed restricted and “returned to nature”. An “acquisition” on the other hand, refers to the purchase of a home that allows development of the land post-acquisition, but often requires it to meet local and state standards of resiliency.

The Federal Emergency Management Agency (FEMA) Hazard Mitigation Grant Programs (HMGP) is one of the mechanisms that funds adaptation to and mitigation of climate related impacts after disasters, including home buyouts. A second is through Community Development Block Grants for Disaster Recovery (CDBG-DR), which is funded through the US Department of Housing and Urban Development (HUD), that has flexible funding that can be applied to buyout and acquisition programs. There are also a few federal
programs that fund recovery, and at times buyouts, the Disaster Housing Assistance Program (DHAP) and HOME Funds from the Department of Housing and Urban Development (HUD) for disaster recovery, Disaster Relief Opportunity Funds for long-term recovery through the Economic Development Administration, and Small Business and USDA loans (Jackson, nd, p11-13). The choice in which funding to use after a disaster is largely political, but they do have differences in terms of the level of planning they require before disaster, how they are administered, and in the limitations they place on development on the acquired land after it has been bought out. FEMA HMGP and HUD CDBG-DR funding are the major contributors to home acquisitions and buyouts in the region. These programs have played out differently across the coastal and riverine areas of the Region, and a discourse of how they best be administered for local contexts is emerging.

This paper will explore three different programs of home acquisition that have been conducted in the New York Region to respond to flooding disasters. The New York Region or “Region” in this case, refers to the states of New York and New Jersey (see Figure 1). This geographic definition is used because it delineates the FEMA II region, but excludes US territories. It will examine the different strategies that involved agencies have...
explored in applying this funding and transforming hazard prone residential land into a new use, and how the resilience benefits of this repurposed land may be maximized through a more proactive planning process.

The goal is to examine the approach to transitioning the flood damaged parcels in these communities to more flood resilient land uses and explore the role of urban planning in these processes. Through this, this paper will strive to tackle two questions:

1. **How have our current practices in planning for flood-related disasters influenced the use of home acquisitions and buyouts as a tool for recovery and resiliency in the New York Region?**

2. **How can urban planning contribute to these processes moving forward?**

Proactive land use planning for home buyouts and acquisitions can play a role in contributing to increased community disaster resiliency by integrating a framework for acquisitions into community resiliency goals, creating knowledge and buy-in of acquisition and buyout programs, and identifying potential post-acquisition land uses and owners.

**02 Methodology**

This study used a qualitative, case-study approach to assess the use of home acquisitions and buyouts as a mechanism for community resiliency. A case study illuminates a decision or a set of early decisions, why they were taken, how they were implemented,
and with that, what result they have (Schramm, 1971). Case study research allows investigators to focus on a “case” and retain a holistic and real-world perspective (Yin, 2017).

First, a literature review was conducted to examine the impacts of climate change and increased flood events in the Northeast, the role of urban planning in resiliency and flood-related disaster recovery, and a review of findings from previous acquisition programs. From a broad desktop search of buyout and acquisition programs in the region, case studies were selected based on their varied funding sources and administration, as well as the data available on them. Three home buyout/acquisition programs were chosen for this paper: The Green and Blue Acres Acquisition program, the NY Rising Governor’s Office of Storm Recovery (GOSR) Buyout and Acquisition Program, and the NYC Build it Back - Acquisition, Buyout, Relocation and Resettlement Incentive Programs. These programs were chosen because they represent the types of programs that arose as a result from different federal funding opportunities as well as different local administrators. Together they represent the major ways that home acquisitions have been planned for and executed in the region, and their success as a mechanism to increase resiliency.

Data and shapefiles from FEMA Open Data, the Furman Center, SVI Index and NYC open data to create maps and tables to illustrate the geography of risk, vulnerability and home acquisitions and buyouts in the region. Beyond this, data was also compiled from NYC Build it Back, Blue and Green Acres, and NY Rising reports and budgets when open data sources were not available. Qualitative analysis was then performed through a series of semi-structured interviews with key staff involved in overseeing or administering the programs. It is important to note some of the limitations in accessing data for this research. FEMA tracks buyouts that they fully fund, although the geography is not exact, but does
not clearly track which programs these projects are a part of. There is also a lag in the tracking due to municipal reporting so projects may not appear in the database for years after they have begun. HUD does not have a tracking system at the national or regional level for acquisitions or buyouts, and data had to be pulled from budget reports and other quarterly reports. Here, the data is aggregated to larger geographies and to all housing projects, regardless of the treatment they received. Neither agency tracks ownership, use or status of the bought-out land, which was one of the main concerns of this project.

Altogether, interviews were conducted with 12 people, and five more were reached for questions and resource access via email. This information, along with examination of available data, plans, and reports, was then analyzed together with the relevant literature. Finally, recommendations were made for the implications of these programs to the discipline and practice of urban planning.

03 Climate and Flooding Risks and Implications

03-1 Climate Change Overview

The impacts of climate change on urban and rural populations throughout the world will call into question our patterns of development and our approaches to mitigating risks. In order to understand the implications of those impacts, it is important to understand the current literature on climate change implications and risks.

Since the beginning of the globe’s industrial era, human activities have increased the greenhouse gas concentrations in the atmosphere, causing the atmosphere and ocean to warm. This causes snow and ice to diminish, and sea levels to rise (IPCC, 2013). The
emission of carbon dioxide by industrial activities has contributed the most to global climate change since 1750 (IPCC, 2013). The IPCC (2013) reports that:

“Continued emissions of greenhouse gases will cause further warming and changes in all components of the climate system. Limiting climate change will require substantial and sustained reductions of greenhouse gas emissions.”

Expected changes to the climate system may result in more frequent hot temperature extremes with heat waves occurring with higher frequency and duration (IPCC, 2013). The contrast in precipitation between wet and dry regions will increase and sea levels will continue to rise (IPCC, 2013). Without mitigation and adaptation measures, these changes will lead to impacts on ecosystems and biodiversity, agricultural production, the frequency of extreme weather events, and human health and migration globally.

There are a number of risks related to flooding that are exacerbated by climate change: riverine flooding, frequent or nuisance flooding, storm surge, and sea level rise. Riverine flooding is the main cause of flooding and flooding-damage in upland areas, and the growing intensity and frequency of storms and heavy precipitation events will increase occurrence of this type of flooding. Storm surge is a combination of storm-related weather that causes abnormally high tidal flooding. Repeated or nuisance flooding occurs in areas where there are natural basins or “bowl” effects that cause flooding after rainfall. Areas prone to this type of flooding are more at risk with increased coastal and riverine flooding. Sea level rise can cause coastal areas to experience permanent flooding and expands the areas at risk of storm surge. The frequency and severity of storms are also increasing with climate change, leading to increased flooding damages. In the last four decades, the frequency of natural disasters has increased three-fold, with the number of hydrological
and meteorological disasters increasing sharply (Thomas and Lopez, 2018). Since 2008, an average of 26.4 million people are displaced by disasters each year, and historical models suggest that the threat of being displaced by a disaster today is 60% higher than four decades ago (Internal Displacement Monitoring Centre, 2018).

Currently, almost 10% of housing units in the US reside in the FEMA designated 100- or 500-year floodplain (Furman Center, 2017). The FEMA maps that designate flood areas provide the basis for flood insurance rates and floodplain management regulations including land use requirements. These maps look to history to determine the floodplain based on past flooding events and the risk posed to households built in the floodplain. However, they do not take into account future conditions that could result from climate change such as more intense rain storms and sea level rise that influence flood risk through phenomena like storm surge potential (Scata, 2017). Research conducted by Climate Central shows that five million people live in 2.6 million homes that are located less than four feet above high tide (Strauss et al, 2012). With three feet of sea level rise, over 2.3 million people would be under water in the United States, and over 80% of these people live in metros with a population over 1 million (Strauss et al, 2012), and many more in the floodplain.

03-2 Regional Impacts

In the Northeastern United States, temperatures rose by 2°F from 1895-2011, and projections indicate warming of an additional 4.5°F - 10°F by the 2080’s (Horton and Yohe et al., 2014). Additionally, between 1958 and 2012, the Northeast saw more than a 70% increase in the amount of rainfall measured during heavy precipitation events (Horton et al.,
2014). Projections indicate a continued increase in precipitation. There has also been a sea level rise of one foot since 1900, which has cause more frequent flooding in coastal areas. This rate is almost twice the observed rate. It is projected that sea level could rise by one to four feet globally by 2100, but in the Northeast, higher sea level rise is possible, with 2.5 feet by the 2050s (Horton et al., 2014). In the Northeast, historical patterns of settlement and investment in coastal areas and along rivers combine to increase vulnerabilities in the region. Urban areas served by combined sewer systems are threatened by heavy rain events that cause overflow and flooding when the system capacity is overwhelmed.

In the region, two feet of sea level rise could flood or render unusable 212 miles of roads, 77 miles of rail, 3,647 acres of airport facilities and 539 acres of runways (Horton et al., 2014). Increased saltwater encroachment, flooding and coastal erosion will impact communications infrastructure, coastal power plants and energy equipment, transportation, waste and water infrastructure, and agriculture. These impacts will have significant economic consequences in terms of disrupting industry jobs, goods movement, and other economic activity. A report estimated that without adaptation, climate change costs could approach $10 billion annually by 2050 just in New York State (Leichenko et al., nd). Sandy caused $19 billion dollars in damage in New York City alone and it estimated that the United States economy lost up to $50 billion from the superstorm (City of New York, 2013; HIS Global Insight, 2012).

03-3 Vulnerability and Health

Beyond threats to the economy, property values, and the ability to fund rebuilding after consistent intrusion of seas, there are major threats to public health and security that
come with persistent flooding and disaster events. These are both direct, such as death and injury, and indirect like the impacts that come with disruption to the economy, displacement, and power loss. These impacts are the most disruptive for socially vulnerable populations that do not have the resources to survive or recover after climatic events (Finch et al., 2010; Juntunen, 2005).

Climate change threatens the health of people and communities through varying mechanisms that occur in the form of direct impacts, the exacerbation of underlying conditions, or compounding or cascading effects (Balbus, 2016). In the case of more frequent and powerful natural disasters, differences that already exist in life expectancy, ability, outcomes of chronic disease, and access to resources and health care for vulnerable populations may be worsened (Balbus et al., 2016). Pollution due to contaminant runoff from sewer systems, treatment plants, brownfields, and waste storage facilities could cause increased exposure to contaminants and waterborne illnesses (Horton et al., 2014). Physical hospitals, physicians’ offices, and other health and social assistance centers could be impacted by storms and flooding, rendering their facilities or communication capabilities unusable, leaving populations unable to access care. During Sandy, there were 43 deaths and 6,500 patients evacuated from hospitals and nursing homes (City of New York, 2013).

A person’s exposure to health threat depends on a complex set of vulnerability factors that encompass the elements of exposure, sensitivity, and adaptive capacity. Vulnerability to climate change is “determined by a community’s ability to anticipate, cope with, resist, and recover from the impact of major weather events” (Shonkoff et al., 2009). These vulnerability factors are influenced by individual behaviors as well as the social determinants of health (Balbus, 2016). Health outcomes on a larger scale are related to a
place’s adaptive capacity, which is tied to factors of the built environment, governance and management, and institutions (Ebi and Semenza, 2008).

People who live in the flood plain are vulnerable to direct loss of life and injury. Preexisting health conditions and life stage as well as the social and environmental determinants of health all contribute to vulnerability to climate related risks (Balbus, 2016). The environmental and social determinants of health include the built environment and social contexts that people live in, and both influence health and well-being (Northridge et al, 2003). Flooding victims have experienced immediate effects such as shock, coughs, throat infections and headaches, and long-term gastrointestinal issues, joint stiffness, respiratory illness and mental health problems (Tunstall et al. 2006; Weisler et al. 2006). These health impacts are mediated by social and economic factors as well as recovery programs (Tunstall et al., 2006).

Climate change is also occurring in a changing health landscape, and future trends of conditions need to be considered together with future risks. In the United States, the prevalence of Alzheimer’s and diabetes, number of US adults with mental illness, and the number of persons living with a disability are expected to increase in the coming decades (Herbert et al, 2013; Boyle et al, 2010; Heo et al, 2008; Waidmann and Liu, 2000). People with these health conditions may find them exacerbated due to extreme flood events or experience increased vulnerability during and after an event (Balbus, 2016). Socioeconomic status and health move together, but health status also demonstrates another dimension of the intersectional nature of vulnerability, which is why including factors that address these health conditions are important when considering overall vulnerability to climate events, and more specifically, flood events.
There is a robust body of literature that defines and tests the concept of social vulnerability in relation to natural hazards. Social vulnerability of those with flood risk is an important factor to take into consideration when thinking about recovery and adaptation to flooding. Economic loss may be greater in areas of higher flood risk, but the population in those areas may also have safety nets such as flood or health insurance, high household income, and additional resources (Cutter et al., 2000). This is why it is important to consider social vulnerability and risk when measuring response to disasters and assessing how to better plan for future risk. Social vulnerability indices use indicators of environmental and social determinants of health to identify “sensitive populations that may be less likely to respond to, cope with, and recover from a natural disaster” (Cutter and Finch, 2008). Susan Cutter’s Social Vulnerability Index was one of the first tools developed to assist with the identification of social vulnerabilities, followed by a similar one developed by the CDC labeled the SVI. The CDC SVI has been found to perform well to explain damages and fatalities that occur during natural disasters (Bakkensen et al., 2017). This tool uses 15 census variables at the census tract geography in the categories of socioeconomic statues, household composition and disability, minority status and language, and housing and transportation and uses a percentile rank to score them. There is strong evidence that populations with higher social vulnerability are at greater risk during a disaster and are more likely to experience negative impacts like loss of property and those to their health including emotional distress, illness and death (Morrow, 1999; Cutter et al. 2000, 2003; Hutton, 2010; Phillips et al, 2010; Enarson, 2007).

In terms of social vulnerability in the region, Cutter’s SVI and Furman Floodzone data shows that areas with a high share of units in the flood plain also have high social
vulnerability index, especially in Northern Jersey (see Figures 2 and 3). It is also important to note that in the city, where there are many areas with high social vulnerability, the sheer numbers of housing units in the floodplain are very high, with over 70,000 housing units in Manhattan, 68,000 in Brooklyn, and 43,000 in Queens in the floodplain. About 16% of the population estimated to be in the flood plain is living below poverty, a share which is greater than that in the overall US (15%) (Furman Center, 2017). Moreover, 22% of the units in the floodplain were built before 1960, which is an indicator for many health-related housing issues such as degradation that can lead to compounding issues in a disaster (Furman Center, 2017).
Figure 2: Housing in the Floodplain

Share of Housing Units in the 100- and 500-year Floodplains

Data Source: Furman Center Floodzone.us
Figure 3: Social Vulnerability Index of the Region
Environmental justice is the principle that “all people and communities are entitled to equal protection of environmental and public health laws and regulations” (Brullard, 1993) The framework for environmental justice incorporates the principle of the right for all individuals to be protected from environmental degradation, adopts a public health model of prevention, and redresses disproportionate risk burdens through targeted action and resources (Brulle and Pellow, 2006). This includes protection against environmental racism, which is the unequal environmental burden that disadvantaged communities of color face. The movement has led to successes on the national level, including the signing of Executive Order 12, 898 by President Clinton which mandates all federal agencies to ensure environmental justice in their operations (Brulle and Pellow, 2006). After Hurricane Katrina, flooding as a threat to wellbeing became part of the environmental justice moment as research demonstrated the disparities that exist for low income individuals and minorities in recovery and government relief (Pastor et al, 2006). From the environmental justice framework and the knowledge of disparate impacts on health due to social and environmental determinants, it is important that when approaching climate change adaptation and mitigation that we protect the most vulnerable populations. Vulnerable conditions and environmental injustices should not be re-created in the recovery process for these vulnerable populations. In planning for recovery, mitigation, and adaptation, these are the populations we should be most concerned with.
04 Adaptation Theory

In order to address climate change, there are different strategies that can work together to make places and people more resilient, or able to adapt to changing conditions and recover from disruptions, including risk mitigation and adaptation measures.

Resilience is defined as a capability to anticipate, prepare for, respond to, and recover from significant multi-hazard threats with minimum damage to social well-being, the economy, and the environment (Brierbaum et al., 2014). The concept of resilience in the field of disaster risk reduction links back to the definitions developed on the field of ecology and psychology (Toseroni et al., 2016). Ecological resilience is “a buffer capacity or the ability of a system to absorb perturbation, or the magnitude of the disturbance that can be absorbed before a system changes its structure by changing the variables” (Holling, 1973). Human geographer Adger first used the term “resilient communities” in the field of social science to describe social systems capable of absorbing and recovering from extreme events (Adger et al., 2009). From these fields, the characterization of resilience was integrated into disaster risk resilience (Toseroni et al., 2016). Community Disaster Resilience has come to be defined as the ability of a system to develop a self-regulatory and reorganization process in case of disturbance, and a group to be able to face disasters and recover equilibrium after the fact (Toseroni et al., 2016).

The IPCC defines mitigation as activities that aim to reduce GHG emissions directly or indirectly therefore dealing with the causes of climate change. In the arena of disaster risk reduction, a different conception of mitigation is used that is more closely linked to adaptation. Adaptation is defined as adjustments in human and natural systems, in response to actual or expected climate stimuli or their effects, that moderate harm or exploit
beneficial opportunities (IPCC Working Group, 2013). Hazard mitigation attempts to break the cycle of disaster damage by creating or restoring landscapes that can absorb the impact of a disaster and reduce risk, such as flood control works like dams, or more recently, non-structural solutions such as restoration of natural habitats such as wetlands. Climate mitigation strategies aim to reduce future climate changes while adaptation strategies (or hazard mitigation strategies) reduce the vulnerability of society, places, or people to climate change impacts (Brierbaum et al., 2014). They both aim to avoid climate change damages, and considering the impacts of climate change that we are already experiencing, both are necessary approaches to reducing harm to the environment, economy, and health.

This paper will focus on adaptation measures, because home acquisitions are a strategy to change human activities like patterns of development in the floodplain and an effort to mitigate risk from current and future climate change impacts.

Within the realm of adaptation strategies, theorists have worked to define different types of adaptation strategies (Biagini et al., 2014; Smit et al., 2000; Adger et al., 2009; White et al., 1993). There are a few ways to define strategies of adaptation: by the nature of the driver, the outcome or process, or by the type of strategy. When defining by the driver, adaptation measures can be proactive, autonomous or planned (Biagini et al, 2014, Cutter et al., 2000). Proactive measures are ones that are implemented before impacts of climate change are observed. Autonomous actions are triggered by changes in natural systems and market or welfare changes in human systems. Actions can also be planned, meaning they are deliberate policy decision based on awareness of changing conditions and understanding that action is required. When defined by the outcome or process, we look at strategies that are aimed at developing information systems, social structures, and
governance needed to support adaptation versus measures taken to reduce vulnerability. Strategies can be defined by their type, as effect oriented versus cause oriented. An example of this is that an effect orientation adaptation measure could be building flood protection, while a cause oriented would be changing the areas where housing development is allowed. Increasingly, adaptations in high-income countries are more proactive, focusing on planning, monitoring, increasing awareness, building partnerships and enhancing learning or research (Berrang-Ford et al., 2011). More reactive strategies tend to be considered those that focus on avoiding, retreating, coping, accommodating, spreading risk, or securing income or resources (Berrang-Ford et al., 2011).

Retreat is an adaptation strategy that is autonomous, cause oriented and aimed at reducing vulnerability. Buyouts are a retreat strategy that is a one-time investment paired with relocation assistants and protection of the natural landscape left behind. It has the potential to allow for restoration of natural flood plain functions or to implement engineered or nature-based resilience measures, like wetland restoration or green infrastructure construction. If that is not a possibility, then the land can provide opportunity for ecological restoration with native plants, new park land, community gardens or other novel uses. However, this method is politically controversial, due to local budget considerations from the loss of tax revenue and other social reasons. It has only attracted $750 million of aid compared to the billions invested in other mechanisms in the New York metropolitan region.

Resilient-rebuilding is an adaptation strategy that is autonomous, effect oriented and aimed at reducing vulnerability. Acquisition is a mechanism for this strategy. It allows for owners that cannot afford to rebuild their homes after they are damaged to relocate, and for buildings to be rebuilt to more resilient standards. This could be considered as part of
an adaptation strategy to “live with water”, which is one that recognizes that climate change is happening and flooding will be more frequent, but also that retreat isn’t suitable for all communities. Acquisition can get properties up to existing codes, and programs can ensure that resilient codes are also included.

**Figure 4: Buyout and Acquisition Definitions**

<table>
<thead>
<tr>
<th></th>
<th>Acquisition</th>
<th>Buyout</th>
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<tbody>
<tr>
<td><strong>Definition</strong></td>
<td>A purchase of a property that allows for rebuilding on the parcel</td>
<td>A purchase of a property that then returns the parcel to nature</td>
</tr>
<tr>
<td><strong>Purpose</strong></td>
<td>To permit impacted homeowners to relocate, to maintain tax base for rebuilding, to redevelop resiliently</td>
<td>Creation of natural buffers</td>
</tr>
<tr>
<td><strong>Redevelopment</strong></td>
<td>Yes, but often to more resilient standards</td>
<td>Deed-restricted-Only allowed for flood structures, parks, or allowed uses</td>
</tr>
</tbody>
</table>

**04-1 The Role of Urban Planning**

Urban planners are beginning to address connections between climate change and the urban form and integrating adaptation objective into policy by mainstreaming climate adaptation (Uittenbroek, 2012). Planning analysis and policy has refocused on the complexity of environmental, social, and economic systems in the scope of planning interventions due to the relationships between development and climate. But it is not yet a widespread practice. A 2014 study looking at climate change policy in 200 European urban
areas revealed 72% lack any adaptation plans, and 35% lack a dedicated mitigation plan (Dhar and Khirfan, 2017). Planners must overturn expectations for development and reframe them keeping the uncertainties of climate change in mind, and ask what climate-proof settlement looks like, what are the barriers to effective planning for such development, what are the implications for governance, and who will bear the risks (Davoudi et al., 2009). Urban planning can be used to generate social and technological innovations to support adaptation to climate change (Wheeler et al., 2009). The practice of planning is also familiar with integrating multiple objectives, sectors, and disciplines, meaning it can provide additional insights. Key areas that have been identified in the literature for how urban planning can contribute to adaptation from flood-related threats include limiting impervious land cover, managing coastal zones, spatial distributions in disaster prone areas, increasing green infrastructure to reduce flooding, and planning for post-disaster management (Dhar and Khirfan, 2017).

Building resilience in coastal and riverine zones requires a long-term approach (Beatly, 2014). Effective strategies, such as retreat zones and ecosystem repair, will take a regional, long-term perspective to steer population and development away from high-risk locations and to create connected systems of infrastructure (Beatly, 2014). Interventions can occur on a small scale but should fit into a broader vision for the future, which is where comprehensive planning for land use and resiliency comes into play.

Comprehensive plans can use analysis tools like health and social vulnerability indexes, risk assessment, and spatial analysis to inform us of the people and places most vulnerable to flood risks. Vulnerability indexes can help to prioritize those who are most at risk for investment in resiliency. Risk assessments are an important proactive planning tool.
to support decision-making on the allocation of land and design for resilience. They help to frame risks, identify stakeholders to involve, and determine options (Davoudi et al., 2009). Risk assessments can be a part of a local or regional climate resiliency plan and identify areas that experience flood risks as well as vulnerabilities in infrastructure, housing, and populations. They can also evaluate the effectiveness of different strategies to reduce risk. Creating consistency is also important. Without requiring that plans be vertically and horizontally consistent, recovery can be put into jeopardy.

Zoning, transfer of development rights, conservation easements and land acquisition can be used as implementation tools to enact the comprehensive plans vision (Beatly, 2014). Disaster recovery and rebuilding plans can help to determine proactively areas that should not be rebuilt. Thinking systemically before the disaster occurs in these plans can help communities be engaged and prepare. Some communities have identified places for businesses to be relocated to within their community, and others have created strategic zones to transfer development rights in order to take advantage of post-disaster opportunities to rebuild (Beatly, 2014). Floating zoning can be applied so it is more flexible and employed only in the event of a disaster. These strategies can be linked to an ecological resilience plan. Planning areas for acquisition and others for relocation can be paired with a strategy to recovering riverine or wetland buffers, restore dunes, and preserve or restore marsh systems.

Coalition and community building through the process of planning is also important. The planning process creates space for the community to engage in these issues and evaluate strategies. If certain areas are prime for elevation programs, and others for acquisition, or some for green infrastructure improvement, the community can participate
ahead of time and buy-in can be created in the event of a disaster and subsequent funding infusion. These processes can benefit communities by helping them gain an understanding of risk, injecting hazard mitigation into the recovery and reconstruction process, developing coalitions that advance an agreed upon set of goals, a vision for an implementation plan, and a more efficient and equitable distribution of resources post-disaster (Smith and Glavovic, 2014).

There are many reasons why the urban planning practices described above do not move beyond the realm of theory into implementation. There are major obstacles to local adaptation planning including low priority that local officials give to reducing future threats given the lack of a public constituency; the costs of reducing risk are immediate and the benefits are long-term, the physical manifestations of improved safety are not visible, and there is a failure to effectively engage marginalized population groups who are most vulnerable to future threats (Berke, 2014; Mileti, 1999; NRC, 2006). Limited funding and imperative for pre-event planning and capacity building is also an issue. Post-disaster monetary aid is largely relied on, which can drive less resilient recovery if programs are narrow, inflexible, and do not have resiliency standards themselves.

05 Recovery, Buyout, and Acquisition
05-1 Responding to Flood Related Disasters

In recent years, the United States has seen an increase of natural disasters that require need for federal funding to aid in the recovery of affected geographies (Smith and Katz, 2013). In the absence of adaptation planning to prepare for more frequent and
damaging storms, there is greater need for state and federal retroactive funding for post disaster recovery.

When a disaster occurs state and local governments must respond to determine the needs of those affected. Although many states appropriate some funds for disasters, funding for most states is limited and if the state does not have the resources necessary the governor may request a federal disaster declaration (Jackson, nd). Increasingly states are becoming more and more dependent on resources provided by the federal government with increasing disasters and it is unclear how much money many places are putting into planning and resilience for current conditions and in the future. Floods occur across political geographies, and the nature of local governance structures requires entities like the federal government that can coordinate and plan recovery and mitigation at scale.

The infusions of funds to rebuild, invest in preparedness, and reduce risks from future disaster are a large source of building community resiliency. Across agencies, absent a severe flood, very few dollars for risk reduction are available. According to an analysis performed by the National Institute of Building Sciences, hazard mitigation projects funded by FEMA and HUD can save the nation $6 in future disaster costs for every $1 invested, and $7 in the case of flood mitigation (Multihazard Mitigation Council, 2017). FEMA and HUD have spent $11.5 billion on flood mitigation grants—which include actions like home elevation, acquisition, and rebuilding—which has been estimated to save the United States $82 billion dollars (Multihazard Mitigation Council, 2017). On a sample of communities that used acquisitions as a strategy, the mean benefit cost ratio of the projects was 7 (1.4-12.5) (Multihazard Mitigation Council, 2017). These programs invest in communities becoming more resilient but are reactive. For FEMA, 90% of flood risk reduction funding comes after
a big flood, and HUD CDBG-DR funding is only available after a major disaster (Kousky and Shaban, 2017).

The following sections detail the actions of the FEMA and HUD surrounding post-disaster recovery and home acquisitions or buyouts. In the region, both FEMA and HUD funding have supported home acquisitions, and their policies have shaped the programs and land uses that result from them.

05-2 Federal Emergency Management Agency

In response to a disaster or emergency, there are various programs that the Federal Emergency Management Agency (FEMA) uses for disaster recovery, including general federal assistance, essential assistance and hazard mitigation. General Federal funding supports recovery and response efforts such as evacuation and immediate community recovery, while essential assistance covers the distribution of medical supplies, food, and other services (Jackson, nd). Hazard Mitigation Assistance is provided by FEMA to aid in long term risk reduction for natural disasters. It includes the Hazard Mitigation Grant Program (HMGP), the Flood Mitigation Assistance (FMA) Program, and the Pre-Disaster Mitigation (PDM) Program. HMGP provides assistance following a Presidential Major Disaster Declaration of a natural disaster, while the other two programs are allocated on an annual basis depending on amount appropriated by congress (Jackson, nd). In order to receive funding after a major disaster, states must have an updated mitigation strategy and State Administrative Plan and choose if they will participate in the HMGP program. These plans must be submitted every five years, and grants are provided to help them do so. These plans have three pieces. First it must include a documentation of the process involved to
create the document, resources used and the ways in which it was integrated with existing plans. It then must assess risks by hazard and detail the areas that are most prone and their vulnerabilities. Finally, it must include a mitigation strategy that is tailored to the area it covers and proposed actions. All communities or municipal entities are required to submit risk assessment at mitigation strategy in order to ensure funding is used well.

Local governments apply for HMGP funding through the state and will choose what projects they will conduct. These projects can include acquisition and relocation, elevation, education programs, planning, alterations to landscapes and more. In terms of flooding, FEMA funds reconstruction and buyout programs for homes that qualify through different local and state level programs and also determine which properties are mandated to buy flood insurance based on flood risk maps (Jackson, nd). Due to the structure of funding for recovery and mitigation, there is a wide array of responses to disaster by different entities in different geographies, from rebuilding, to making adjustments to withstand flooding, to turning over parcels to open space.

Local administrators of grant programs can identify home acquisitions or buyouts as a method for hazard mitigation and recovery in their flood Hazard Mitigation Plans. Through FEMA home acquisitions, the state or municipality provides a program to buy out the properties at their pre-disaster value that individual homeowners can apply to on a voluntary basis. The application is then reviewed on the basis of percent of damage incurred, the location of the property and if it experiences repeated inundation (or other hazards) and the cost-effectiveness of the project. Projects are eligible for funding under HMA programs if they have a benefit-cost ratio (BCR) equal to or greater than 1.0. In the case of acquisitions, FEMA has a pre-determined cost effectiveness value for properties in
Special Flood Hazard Areas (100-year floodplain). If the cost is less than or equal to the estimated benefit of $276,000, then it is considered cost effective. If the application is approved, the property can be acquired and structures removed. The property must then be deed restricted so that no development can occur and future risk of structural damage is mitigated. The land must be maintained in perpetuity for uses compatible with open space, recreational or wetlands management purposes. The local government or another public entity must also hold the property. Conservation easements, title transfers, and leases are allowed so other entities can take responsibility for projects such as community gardens or habitat restoration on the property.

Federal funds used for home buyouts that relocate families to safer areas and adapt the land bought-out are the most cost-effective mitigation effort, by reducing money spent on insurance claims by repetitive loss areas and other recovery expenses, and provide space to plan for change (Siders, 2013). Buy-out programs are designed to reduce the exposure of people to dangerous conditions, reduce costs for future disasters and restore natural buffers that protect communities. When plans are made in advance, they help implementation happen more quickly and programs are more successful (Siders, 2013).

Hazard Mitigation funding avoids 1.2 billion dollars a year in flood losses, but FEMA struggles to fund projects nationwide, as shown by only being able to finance less than half of the applications in 2013 (GAO, 2014). Federal funds used for home buyouts that relocate families to safer areas and adapt the land bought-out could be one of the most cost-effective measures of adaptation, and provide space to plan for change (FEMA, nd). They reduce the loss of life and property from future events and reduce future public costs for emergency response.
05-3 Department of Housing and Urban Development

Much like FEMA, HUD receives an appropriation of funds from congress following a Presidential Major Disaster Declaration. However, the process is more top-down than that of FEMA. HUD calculates allocations and notifies eligible cities, counties and states, that they are eligible for funds. In order to receive funds, states must then submit an Action Plan, allow citizen review and comment, and have it approved HUD. HUD CDBG-DR funding does not require any pre-disaster planning, just the action plan. The action plan must describe needs that are unmet by other agencies, primarily FEMA but also accounting for State and local funding and foundation investments. It must also identify the impacts from initial assessments on sectors and populations, and outline the programs and spending of the appropriated money, concentrating 80% on the most impacted and distressed counties, which the state HUD office identifies. The Action Plan can be amended as needs evolve. The funds can be used on activities at the State’s discretion as long as funds are used for “necessary expenses related to disaster relief, long-term recovery, and restoration of infrastructure, housing, and economic revitalization” according to the CDBG-DR Appropriation Laws. Activities must meet one of three national objectives: the benefit of people whose income is categorized as low or moderate, in aid to the prevention of slums or blight, or to meet other urgent community development needs because existing conditions pose threat to health and welfare where other financial resources are not available. At times, HUD CDBG funding is used to provide the 25% match to FEMA, meaning that there is no local contribution of funds for programs.
In the region, HUD CDBG-DR funds have been used in a few manners related to acquisition. At times they provide the local match in funding required by FEMA. They have also been used, mainly in New York post Sandy, for buyouts and acquisitions. In this case, buyouts pertain to homes in the 100-year flood plain that were substantially damaged (50% or more of fair market value) being purchased from the homeowner and must remain open space in perpetuity. Acquisitions, on the other hand, pertain to properties located outside the 100-year floodplain that have sustained damage, but homeowners are unwilling to repair. Acquisitions are eligible for redevelopment in the future, but in a flood resilient manner. HUD allows the program to choose whether to pay the pre- or post- storm value of the property. As of 2018, CDBG-DR has administered 125 Grants and has $70.7 Billion in Active Grants. In 2013, $16 billion was appropriated for Hurricane Sandy.

*Figure 5: Differences in Funding*

<table>
<thead>
<tr>
<th></th>
<th>Established</th>
<th>Acquisition</th>
<th>Buyout</th>
<th>Price</th>
<th>Additional Priorities</th>
<th>Local Match</th>
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<tbody>
<tr>
<td>FEMA HMGP</td>
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<td>Yes</td>
<td>Pre-disaster price</td>
<td>Cost-benefit, Repetitive loss properties</td>
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<tr>
<td>HUD CDBG-DR</td>
<td>1992</td>
<td>Yes</td>
<td>Yes</td>
<td>Pre- or post-disaster price</td>
<td>Unmet need, low and moderate income</td>
<td>None</td>
</tr>
</tbody>
</table>
Previous evaluations of Home Acquisition Programs

Strategies and programs involving land acquisition have been examined from a theoretical and policy level in the literature of urban planning, equity, and climate resiliency. When looking at the practice of hazard assessment, planning tools such as land acquisition have been found to be a common practice overall in hazard identification, and in vulnerability assessment. However, it was also found to be rarely used in any regard during risk analysis (Deyle et al., 1998). Some argue that land use management tools that are most effective are those that reduce land development in high hazard areas but found that it was only used 5-25% of the time by localities subject to floods and hurricanes (Olshansky and Kartez, 1998). There’s also discussion surrounding how local governments lack capacity to undertake acquisition programs, and that a lack of preparedness leads to poorly managed programs (May and Williams, 1986; Olshansky and Kartez, 1998). It has also been found that there is little local interest in adopting hazard zone impact taxes or fees (Burby et al., 1991).

Land acquisitions are held up high as a mitigation strategy because they give the local government full control over development in hazard areas (Godschalk and Bower, 1985). Locally based methods of land acquisitions can involve purchase of easements or development rights, land swaps, or seeking donations of land. Transfer of development rights is a special mechanism that allows for an owner in a restricted area to sell the development rights to an owner in a receiving area, who can then build with a greater FAR. This allows for hazard area landowners to profit from their land while holding it in an undeveloped state, and to maintain the tax base locally (Godschalk and Bower, 1985). In terms of the land that is left behind, a study from Kentucky found that most FEMA property...
remains vacant after the buyout, and the majority of participants it believes it had either no impact (65%) or positive impact (18%) on their property values (Zavar, 2015). It also found that a portion of residents were dissatisfied with the conditions of the open space, and the authors concluded that officials should work with the community to decide what to do with the property rather than leave it empty (Zavar, 2015). A later study, also on HMGP funded buyouts, found that the biggest challenges to managing bought out land are maintenance and costs associated with management (Hagelmann and Zavar, 2016).

In terms of costs, it has been found that buying out flood prone areas precludes many future costs in such a way that outweighs the value of immediate costs (Freudenberg et al 2016). Buyouts can also lessen the burden on individuals and flood insurance policy holders. However, they can create economic challenges for communities, because when done poorly, they can recreate conditions similar to redlining and create social and economic disparities (Freudenberg et al 2016). There may also be costs to health of disaster-related relocation and displacement that can be related to decreased mobility, loss of social networks, housing instability, and emotional distress. Some studies have also shown that residents feel alienated after relocation and restoration (Burley, 2007; Fullilove, 1996; Agyman et al. 2009). There are also certain groups that may have more difficulty recovering due to race and income (Merdjanoff, 2013).

When examining participation in programs, it has been found that for elected officials and homeowners, the perception of risk is very important, and it differs across these groups. The timing of information has also been found to be critical. If buyout programs are announced later than repair programs, homeowners who already have received federal aid for repairs are limited because they cannot duplicate benefits (Freudenberg et al 2016).
Community driven efforts behind buyout programs have also been found to have higher participation rates than top down approaches (Freudenberg et al. 2016). Also, in areas of low-socioeconomic status, where homeowners may owe more on their mortgage than the property value, the price offered for the home (pre- vs. post-storm) may have a big bearing on participation (Freudenberg et al. 2016). A lack of planning for how to disposition the land can also mean that there is greater burden to the municipality for buy-in properties. A study by Bukvic proposed that coastal communities should look at risks, utilities, public health and well-being, and local institutional capacity to inform rebuilding versus relocating after a disaster (Bukvic, 2015).

Some studies also show that there is a lack of evidence that buyout programs have evolved over time or exhibited signs of policy learning despite past failures, this might be due to a lack of buyout program evaluations or empirical examinations of buyouts (Greer and Brokopp Binder, 2016). This study also found that buyout programs often don't apply best practices.

06 The Landscape of Acquisition in the New York-New Jersey Region

Hurricane Sandy made landfall in October, 2012, and was one of the largest natural disasters the region has experienced. The storm flooded vital infrastructure, disabled power plants and transmission lines, exceeded green and blue infrastructure like dunes and floodwalls, damaged 6,000 homes and killed 60 people (Pirani and Tolkoff, 2014). Damage estimates for the metropolitan region exceeded $65 billion (Pirani and Tolkoff, 2014). It took three months to approve the 2013 Disaster Relief Appropriations Bill, and buyout
programs were not announced in New York State until another month after that. The bill made available $50.5 billion in federal aid for the East Coast. New York and New Jersey suffered roughly the same amount of damage, about $37 billion each. New York received $8.7 billion of that funding to address impacts in counties affected by Sandy and also previous damage from tropical storms Irene and Lee that hit in 2011. $4.5 billion was allocated to counties outside of the city, and $4.2 to New York City. A majority of the funding, about 60%, was made available through CDBG-DR funds, and more than half was allocated for housing programs. New York State also received about $9 billion in FEMA public assistance. New Jersey received $4.2 billion in CDBG-DR funding, $1.7 billion in FEMA public assistance. About $1.7 billion in HMGP funds was provided to New York and New Jersey following the hurricane.
Figure 6: The Timeline of Funding for Recovery after Sandy by Source

Note: Adapted from GAO, 2014
The following sections will detail home acquisition case studies from throughout the region in order to then discuss the role that proactive urban planning can play in resolving land use issues and increasing community resiliency.

06-1 NY Rising- Governor’s Office of Storm Recovery Buyout and Acquisition Programs

On a state level, the planning for reducing risk to natural disasters existed primarily in the form of the State Hazard Mitigation Plan of 2011. The plan details efforts to mitigate the risk of flood disasters, and gives the state access to FEMA funding in the case of an event. In the plan, risk is based off of historical calculations only, a mandate that was only changed later in 2013 to give the option of accounting for climate change in risk assessment and cost benefit analysis. Under the mitigation plan, it is the charge of NYSDEC and the NYS Office of Parks, Recreation and Historic Preservation (OPRHP) to continue to actively identify and acquire unique properties across the state. Since 2000, they have obtained 1 million acres of unique and sensitive lands with Environmental Quality Bond Act funds (NYSOEM, 2011). This has been done with the goal of preventing development along potential flood hazard areas, but was not a mechanism was not used in recovery from Sandy.

After Sandy, the State opted for the flexibility of CDBG-DR funding for its various programs, including acquisition. The State’s Action Plan for the funds was approved in April 2013, and it’s 20th amendment was approved in September of 2018. In the Action Plan, $680 million was proposed to be allocated to the NY Rising Buyout and Acquisition program, which was established in 2013 to address the damage cause by hurricanes Irene and Sandy. The State also created the Governor’s Office of Storm Recovery (GOSR), an office planned to last for 10 years and then be dissolved, to administer this and other
recovery programs. One aspect of this program is that the 25% municipal match normally required at the local level was paid by the state, reducing the dependence on local finances and limitations to participation. Under this program, the state very quickly purchased the properties and moved to auction and disposition them. However, the Office has not found long-term owners for many of the buyout properties, which could cause issues when it dissolves in 2021. According to GOSR’s 2018 Q3 report, approximately $610 million has been used for acquisitions and buyouts. The State Hazard Mitigation Plan is referenced thoroughly throughout the action plan in regard to infrastructure recovery, but there is no cross-referencing in terms of housing.

The State designated Enhanced Buyout Areas to purchase homes at their pre-storm value under the NY Rising Buyout Program. This program also provides incentives for group participation in order to prevent holdout homes that could result in “checkerboarding” of bought out properties. These Areas only covered three communities in Staten Island—Oakwood Beach, Graham Beach, and Ocean Breeze— and Suffolk County, which is only a fraction of the heavily damaged areas. According to the 5th Anniversary Report, 650 properties had been bought out for $254 million dollars. These buyouts are demolished and then returned to nature and must be dispositioned by GOSR to a municipal or community entity for long-term ownership. It is unclear what share of these properties GOSR has been able to disposition.

Acquisitions also occurred in this program for homes in the 500-year flood plain (according to staff, however reports say that these may also occur in the 100-year flood plain), mainly in Nassau and Suffolk County on Long Island under the NY Rising Acquisition Program. In this program, interested homeowners with substantially damaged properties
can sell at a post-storm value to GOSR, which will then be auctioned off. They are currently in their final round of auctions. The revenue generated from these auctions was then reinvested back into other housing and storm recovery programs, such as a new public housing complex in Freeport to replace one that was extensively damaged. The properties must be redeveloped resiliently, at least one foot above the base flood elevation and to local standards. This must be done within a three-year timeframe, or the property is returned to GOSR. Staff indicated that this was a very difficult timeframe to comply with, especially given the standards that new owners must develop to, and that they were currently having to deal with outreach to landlords that had failed to develop within the given timeframe. It is unclear what will happen to both buyout and acquisition properties, in terms of management and standards, that have not found long-term ownership when GOSR is dissolved. Looking ahead, if there are developers buying homes in the current round of auctions, GOSR will not exist to investigate or manage the properties when their 3-year time frame for development has been expended.

Oakwood Beach is a community on the East Shore of Staten Island next to Great Kills Park. Some sections of the neighborhood experience nuisance flooding from rainfall, but serious flood risks come from storm surge, which the community had experienced before Sandy. In 1992 they organized a Flood victim's committee to advocate for better flood protection. This organization helped them quickly organize after Sandy and conduct outreach and surveying for a buyout program, and collectively decide on their goals. NY Rising launched the buyout program for Oakwood Beach, and nearly 100% of residents have participated. According to staff at the Governor’s Office of Storm Recovery, the land is being transitioned into space for a levy and also potentially a soccer field.
In 2014, the State updated its Hazard Mitigation Plan. Climate change is included as a risk, but the hurricane and flooding risk assessment in the plan is still based on historical data. The State also established New York State Climate Smart Communities, a program across departments of Environmental Conservation, Health, State and Transportation; State Service Commission; and State Energy Research and Development. The program created a planning evaluation tool for communities called Climate Smart Resiliency Planning, that details how vulnerabilities and risk assessments can reveal the best locations for land acquisition, the role of comprehensive planning in acquiring flood prone lands, guidelines for hazard mitigation plans that help expedite acquisitions, and encourages methods of continuous funding for acquisition.

06-2 NYC Build it Back - Acquisition, Buyout, Relocation and Resettlement Incentive Programs

As noted, the city received a separate allocation of HUD CDBG-DR funding. It completed a separate action plan from the state, which was approved in May 2013 and has had 17 additional amendments, the most recent acknowledged in May 2018. This plan does not refer to the City's 2009 Hazard Mitigation Plan, which was the city's first. The Hazard Mitigation Plan did some groundwork on agencies that should be responsible for ongoing acquisition of repetitive loss properties and mentions funding streams for acquisition post disaster but does not detail implementation.

The New York City Build-it-Back program was put together to be administered by the Mayor's Office of Housing and Operations (HRO) in coordination with the New York City Department of Housing Preservation and Development (HPD). It focuses on waterfront communities within the five boroughs that were damaged in Hurricane Sandy.
The stated goal of the program is to make Sandy-affected New Yorkers and communities safer and more resilient. Among its programs for various sectors, it approaches recovery through funding home repairs, reimbursement for repairs, and buyouts and acquisitions. It also provides rental assistance and repairs for NYCHA housing. The Build it Back Acquisition, Relocation and Buyout Program, part of the Single-Family Program is the city’s program to purchase homes that were substantially damaged with the goal of assembling parcels for resilient redevelopment or as vacant land. Overall, $2.2 billion was allocated for the Build it Back Single-Family Program, an estimated $350 million was dedicated to the acquisition and buyout portion of the program.

Of the 2,200 substantially damaged homes receiving assistance through the program 1/3 are being purchased through acquisition and buyout. According to the program’s 2017 report, 600 homes had been purchased for buyout and 200 for acquisition (NYC Build it Back, 2017). The rest of the funds were dedicated to 1,400 homes undergoing construction assistance. The neighborhoods of Staten Island (South Beach, Midland Beach, Oakwood Beach, Great Kills, and Annadale), Brooklyn (Seagate) and Queens (Ramblersville, Broad Channel, Arverne, and Edgemere) outside of NYS Enhanced buyout areas were those that participated (NYC Build it Back, 2017).

Many of these homes are held by Neighborhood Restore, a non-profit organization that coordinate the acquisition and subsequent demolition or rehabilitation of properties and their maintenance until they are sold. According to staff, they experience different issues depending on if the property they are working with is a buyout property or an acquisition property. A major challenge with buyouts is determining disposition of properties. This is a process that requires assessment of the big picture of community needs
from what politicians want to what community groups want, and also what should be in that space in terms of hazard mitigation measures. There is not a formal community or stakeholder engagement process or assessment of land viability for resilience projects, but a general search for viable landholders in partnership with city agencies and in response to local political will. When buyouts are more targeted because they provide opportunity for current infrastructure projects, this disposition is somewhat easier. However, more often there is not a clear owner of the property, because the city or municipal entity does not have a vision for it and does not want to maintain it. Some buyout sites have been identified for transfer, such as a site that US National Parks Service wishes to acquire for its diverse bird populations, lots slated for new stormwater services that the Department of Environmental Protection has taken over, and Sheepshead Bay, Brooklyn properties that the homeowner association has agreed to take on the maintenance of. Properties that are much more difficult to deal with are buyout properties that are interspersed within neighborhoods that homes still remain in, creating a checkerboard of vacant property and homes. A good example of a solution to this is in Broad Channel, Queens where they have opened the properties that civic agencies have no interest in to be purchased as a yard expansion by a neighbor. In this example, buy-out property is bid out for a best offer to neighbors with lots connected to the property. They currently have 10-15 properties in contract, and even after assimilation into the neighboring property they will remain deed restricted.

At the end of the contract, if Neighborhood Restore cannot dispose of the buyout properties, they will have to return everything to the city who will put the properties through a ULURP process. As of November 2018, according to their deputy director, they
have not sold any acquisition properties or released a RFP for redevelopers and there are still homes to be demolished.

In the city, the storm spurred many efforts to update the vision for long term recovery planning. In 2013, the City released A Stronger, More Resilient New York, which outlined a coastal protection plan for the city. In 2015, OneNYC was released, which was a vision for a long-term recovery and resiliency plan. Numerous programs have been established to mitigate risk in damaged coastal communities, including buyout, community planning and land use and zoning efforts. The new city hazard mitigation plan mentions how natural buffers and wetland restoration would reduce the city's risk, but not the plan to acquire land to do that (NYCOEM, 2014). Special zoning and managed retreat are not mentioned in the plan.

06-3 Green and Blue Acres Acquisition Program

New Jersey State 2011 Hazard Mitigation Plan detailed a plan for mitigating risk of repetitive loss properties through acquisitions in the Green Acres program, involving how to approach funding and prioritization of projects (State of New Jersey, 2011). The State’s Action Plan for the CDBG-DR funds does not mention the Hazard Mitigation Plan or the Green Acres program, most likely because buyout funding was not a part of the initial action plan funding scheme (New Jersey Department of Community Affairs, 2013). In interviews, FEMA staff acknowledge some general issues with the applicability of these plans. They were not speaking to New Jersey Green Acres directly, but to the region as a whole. They mentioned that there are no accountability measures for proposed mitigation actions in state or municipal hazard mitigation plans, just the need to have an approved plan.
According to staff in the hazard mitigation division, these plans more often than not are more of a checklist item for municipalities than a true evaluation of risk and commitment to mitigation. Staff described the boilerplate plans they receive, and even a case in which a plan was rejected because it used the name of a different community, suggesting plagiarism and a lack of original evaluation. However, except for glaring issues like this one, plans are usually approved because FEMA wants to be cognizant of the resources it takes communities to produce them. Another issue that staff described it that there is no mention in mitigation plans of buyout strategy beyond stating it as an option. These are usually reactionary, and their reactionary funding does not allow for pre-emptive buyout strategies.

Green Acres is a program that began in 1961 and is administered by the New Jersey Department of Environmental Protection (NJDEP) to meet New Jersey’s conservation needs. In 2007, The Green Acres, Farmland, Blue Acres, and Historic Preservation Bond Act of 2007 authorized $12 million for acquisition of lands in the floodways of Delaware River, Passaic River or Raritan River, and their respective tributaries, creating the Blue Acres Program. An additional $24 million was approved in 2009 (McGee, 2018). This made properties eligible for acquisition on an ongoing basis. In 2013, after Hurricane Sandy, Blue Acres program received funding from both FEMA and HUD CDBG-DR. Approximately $375 million was earmarked for the purchase of 1,300 homes in areas subject to repeated flooding- $185 million from FEMA, $175 million from CDBG-DR, and $15 million from State bond funds (McGee, 2018). Areas prime for acquisition due to repeated flooding can apply for buyout and have their home purchased at fair market value. To be eligible, the residences must have experienced severe, repeated flooding, or sustained substantial damage (greater than 50% of the property value) and receive a minimum Benefit/Cost Ratio of 1:1. The
program also targeted clusters of homes, and those that provided opportunity for significant impact on environment or public health. These properties are then deed restricted as open space, except in special circumstances where local ordinances are established ahead of time. As of December 2017, 969 homes were approved for purchase and 507 properties have been demolished (McGee, 2018).

In the town of Woodbridge, NJ experienced severe impacts from both Hurricane Irene and Superstorm Sandy. The town secured funding through the Blue Acres program and 178 properties were acquired by October 2017. After securing funding, the town partnered with Rutgers Cooperative Extension (RCE) to create an open space and floodplain restoration plan, including the acquisitioned properties. They recommended restoring natural areas with native plants, installing bioswales, stormwater wetlands and saltwater marsh restoration on properties adjacent to existing natural resources, and in residential areas that have a checkerboard of properties, establishing pocket parks, community gardens, and trail entrances (Maslo et al., 2016). A local ordinance established annual registration of properties and allowed construction on the acquired properties if they are elevated and abide by a stricter code, with the goal of trying to address the issue with checkerboarding.

FEMA staff maintained the importance of open space and natural buffers in interviews, but also questioned the appropriateness of deed-restriction in certain circumstances. They named instances where acquisitions have been performed, debilitating a main commercial and residential corridor for a town, or when there were needs for a broader view on how buyout properties could contribute to other resiliency projects, such as efforts to flood-proof transportation infrastructure. In both of these cases however, staff
described a lack of foresight on local, state and federal fronts to adjust the approach before deed-restriction. They also discussed a need to better capture the value of buyout properties through transition to community resources. They named some common suggestions such as pocket parks, community gardens or farms, trails or native plant and wetland restoration. They also mentioned efforts to not only restore wetlands on properties but use a wetland banking model to capture value of land in a way that could still be beneficial to local development.

After the storm, NJDEP released a Comprehensive Coastal Hazard Mitigation Strategy to identify actions municipalities could take to respond to coastal hazards (New Jersey Future, 2017). This plan goes further into detail the role buyouts and acquisitions could play and holds up communities that are doing local plans that evaluate acquisition programs and create risk protection zones that would employ these methods. It also provides recommendations for the Blue Acres program surrounding prioritization of properties.

06-4 Analysis of Acquisitions in the Region

In order to compare across plans, data and key features were examined and mapped across programs (see Figures 7, 8, and 9) It is important to note that there are some discrepancies between the data presented in the tables and the data in the map, due to data availability. In all interviews, staff were asked to provide the most up to date data, but they were unable to do so. It is not possible through the FEMA Open Data platform to distinguish buyouts that went through the Blue Acres Program versus other HMGP funded programs. The FEMA Open Data Platform also only features closed buyouts as late as 2013, and does
not list any buyouts in New York State from Sandy, even though other sources describe FEMA money being used for buyouts in the State. For the New York City program, geographical data is only reported via the Build it Back Funding tracker, which does not match the aggregated data provided in the 2017 Build it Back Progress Report. For the State data depicted in the maps, the 4th Anniversary Report was used because it distinguishes buyout/acquisition counts geographically, but it is not as up to date as the 2018 Performance Report data. It is also important to note that some data may be missing from this figure, as locally led buyouts and other CDBG-DR data for projects beyond those from Sandy in New York State is not available.

Looking at the funding committed to the programs and the number of acquisitions and buyouts performed, New Jersey Blue Acres was able to perform the most buyouts with the money they received, with 0.26 buyouts per $100,000. Although New York Rising received the most funding and performed the most buyouts and acquisitions, it was less efficient with funds with only 0.16 buyouts per $100,000 of funds. Also, looking back historically, the municipalities performed more buyouts than ever before in each sub-region after Sandy. Again, this analysis must be taken with a grain of salt, because the data availability on these programs is very poor.
Figure 7: Summary of Case Studies

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<th>Program</th>
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<td>Reactive, Action Plan</td>
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<td>NYC Build It Back</td>
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<td>New Jersey Blue Acres</td>
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Figure 8: Summary of Case Studies Continued

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<th>Program</th>
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<th>Acquisitions</th>
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<td>470</td>
<td>1,120</td>
<td>0.164</td>
</tr>
<tr>
<td>NYC Build It Back</td>
<td>$350 million</td>
<td>600</td>
<td>200</td>
<td>800</td>
<td>0.228</td>
</tr>
<tr>
<td>New Jersey Blue Acres</td>
<td>$375 million</td>
<td>969</td>
<td></td>
<td>969</td>
<td>0.258</td>
</tr>
</tbody>
</table>

Sources: GOSR Funding Tracker, New Jersey Blue Acres Presentation 2018, Mayor’s Office of Housing Recovery Operations, Build it Back Progress Update, 2017
Figure 9: Landscape of Buyouts and Acquisitions from 1996 to Present by Program

Sources: FEMA Open Data, Build it Back Funding Tracker, GOSR 4th Annual Report
It can be argued that through the region’s experience with Sandy, it was made apparent that federal policies and programs for risk management were not well aligned to reduce risk and restore coastal resources over the long term through buyouts and acquisitions due to their timing, funding structure, and planning practices. However, it can also be argued that the region has begun to establish some different models of planning for and undertaking home acquisitions, has created entities with expertise, and some interesting examples of transitioning land uses for increased resiliency. Regionally, new methods were used to support resilience in the recovery process through home buyouts and acquisitions. There were also new creative models for dispositioning land that can be built off of in the future.

The first thing to note is that the diversity of funding sources for buyouts and acquisitions were very limited after Hurricane Sandy. In exploring the literature for case studies, only one locally funded program was found in the region in Morris County New Jersey, for which officials used an open space tax to fund the acquisition of homes by matching FEMA funds and to areas that were not receiving any FEMA or Blue Acres funding. There was very little information available on this program, and no one was able to be reached for interview, so it was not included as a case study. This is to say that the options for funding acquisitions are largely federal and post-storm, and to date the timing of these programs is tied to recovery.

The lack of continuous funding also puts pressure on the recovery and rebuilding planning process to be structured to ensure long-term adaptation. The example of Oakwood Beach shows that a community can come together to establish long-term goals that can make the recovery and adaptation process more rapid, cohesive, and complete.
This engagement before the storm was integral to the success of the program in that neighborhood and is now allowing for flood protection and recreation space to be constructed, attributing to long term resiliency. Too often, the only form of pre-storm planning in the region has been mitigation plans, which before Sandy did not spend much time outlining plans for adaptation or buyouts. Moreover, there are very few linkages between the planning process for FEMA funding and HUD funding, as shown by how action plans do not refer to mitigation plans, even though they come together to fund the same programs. In a reaction to the storm and a lack of forward-thinking planning, some new plans emerged that seek to better address these issues.

Sandy also taught the region a lot about institutional capacity. Municipalities looked to institutions with experience in acquisitioning land for conservation, like NJDEP through Green and Blue Acres, or ones that had experience doing casework with residents and holding land for the government, like Neighborhood Restore. Green and Blue Acres was pre-established, so procedures, staffing, and application processes were already in place before the storm but did have to be adjusted to FEMA and HUD standards. There was also already had local government buy in for and familiarity with the program. For New York State, they decided to create an institution from scratch, which led to lag time in programs being deployed, and perhaps contributed to a lack of a contingency plan for incomplete programs when the GOSR office is dissolved. Regardless, there are now institutions in the region that hold expertise on how to administer these programs, and probably ample knowledge on how to improve them for the future. However, they lack permanence, since the region has not moved to instituting these programs as long-term adaptation programs, and instead when funding is gone will dissolve or render them dormant. It is important to
note that Neighborhood Restore and Green and Blue Acres have the capacity to activate when funding becomes available, but again, the funding will not be continuous.

In terms of land use post-acquisition, the FEMA and HUD CDBG-DR allow for very different approaches. For FEMA, the allowed land use is very constrained by federal mandate, rather than what may be appropriate on the ground. FEMA staff mentioned some of the difficulties with deed-restriction and how it is not always context appropriate. Municipalities like Wayne, NJ are working to try to figure out what new land uses may work within these constraints to protect communities from the checkerboarding of ownership and provide environmental and health resources. However, many municipalities might shy away from the long-term planning and maintenance of these open spaces in the midst of residential development. For GOSR and Neighborhood Restore, it has proved to be a long process of trying to find owners that are interested in this open space. Neighborhood Restore found a creative way to disposition these spaces in one neighborhood in Queens by putting them up for purchase by neighbors as extended yards. In other cases, there were obvious ways for them to contribute to green and blue infrastructure plans. Other examples of creative disposition investigated by interview staff across programs include community gardens, birdwatching parks, sports fields, and mobile library locations. With these organizations handling all of the case work with homeowners, demolition, acquisition auctions and more, there is not much room for thorough outreach to all civic and community entities that might be interested in the land. These programs weren't built with a long enough life cycle to deal with the properties that are more difficult to disposition, and the likelihood is that the programs will dissolve before all of the properties have found long-term purpose. The flexibility of HUD CDBG-DR funding helps resolve some of these issues
by allowing for the resilient rebuilding in denser, less at-risk neighborhoods through the acquisition model. However, the process of dispositioning these properties proved difficult for many purchasers, who did not understand the conditions placed on the properties they were purchasing. GOSR staff thought better communication processes might help with this issue.

From this analysis of the structure, successes, and struggles of acquisition programs in the region, it is recommended that the process of adaptive retreat through buyouts and acquisitions be shifted from reactive to proactive on all fronts. This could help to make these programs function better, better prepare homeowners and municipalities for their challenges, and make greater contributions to hazard mitigation and resilience. The next section will detail recommendations that could help municipalities make this shift, cite evidence from the case studies, and discuss potential outcomes.

07 Recommendations for Adaptation through Acquisition Moving Forward: Urban Planning's Implications

In order to move from a reactive model of home buyouts and acquisitions to one that is more proactive, there are a number of planning implications. These recommendations address the funding scheme, planning process, and initiatives to increase capacity and research in the area.
07-1 Funding

As discussed, the current funding schemes for buyouts and acquisitions are reactive and tied to recovery. In order to adapt to climate conditions, protect vulnerable populations from huge losses, and provide continuous options for those at risk, funding needs to shift to also be available proactively not just for planning purposes, but also for buyout and acquisition programs themselves. Federal funding should look to diversify its timeline of availability to make more funding available pre-storm and find ways to prioritize properties especially at risk or that have experienced repetitive losses. Governments should also look for funding mechanisms that can be implemented locally, to decrease dependence on the federal government and design them to specific local needs. Strategies include those discussed in the planning theory section such as land trusts to reduce risk, or open space or stormwater management taxes to fund buyouts.

07-2 Planning Process

First, it is important to strengthen the connections between pre-disaster and post-disaster planning. This can be done by making connections between program requirements and finding efficiencies. Administrators should foster continuity by encouraging that action plans refer to hazard mitigation plans. A strong hazard mitigation plan can make cities better able to write an action plan that is aligned with local and national priorities, and timely. Integrating this plan into other planning functions can help ensure that disaster recovery will meet long term goals of resilience. Striving for vertical and horizontal consistency will help these plans work better regionally.
Moreover, in areas where continuous funding is not being used for buyouts, plans should look to envision in greater detail what acquisition and buyout programs will look like after an infusion of recovery funds. This could be integrated into a greater process of resiliency planning or open space planning on the local or state level. It would involve the groundwork to establish entities that are responsible for programs, administrative and application processes ahead of time. They could also include more in-depth risk assessments using tools that FEMA has made available as well as additional indexes, such as the one produced by the Regional Plan Association in their report "Buy-in for Buy-outs" that created a typology of communities that can help in evaluating fiscal impacts for properties at risk. Analysis can also use pre-made indexes such as the Social Vulnerability Index by Cutter. These can help to pay special attention to vulnerable communities in the planning process. Implementing some form of zoning mechanism, such as New York City's special flood hazard areas or floating zoning that can be applied in the event of a disaster to make programs available such as transfer of development rights, or just to acknowledge zones that will be targeted in the future for risk mitigation programs should be considered. Of course, this cannot be without community participation. Municipalities that are organized and educated have shown to be more resilient in the face of disaster and able to advocate for their desires. An improved planning process that brings in community members to educate them about their risks and options can create greater understanding around those risks and efforts to mitigate them in the future.

The planning process should not only include a better evaluation of risks and where buyout and acquisitions could be applied using available funding and urban planning tools but should also consider a process for dispositioning land. Shifting some of the planning for
disposition to the pre-storm planning period could help maximize the potential for land. This could be done through a visioning process that brings together multiple civic agencies as well as community groups. Much like the auctioning process that invites developers to bid on properties, the visioning session could help to bring a number of beneficial uses of the deed-restricted land to light in the context of community needs. Unique partnerships and opportunities envisioned earlier on could garner support and provide direction to the dispositioning process. This should be done with the intention of finding an array of ownership possibilities and maximizing the benefits of the newly acquired land. This will also help to make the remaining open space an integral part of the acquisition process, rather than an afterthought. This is shown in how Build it Back has "closed" their program, and GOSR is set to dissolve although many properties have yet to be dispositioned. This visioning process might also involve urban design professionals, like what Wayne County did with its plan. Urban design competitions by students, firms, or even just with staff of previous buyout programs that have heard many concepts in their time, could bring in fresh ideas to address the design issue of unused lots and checkerboarding.

A lack of vision in the disposition process also creates limitations in the cost benefit analysis. In CBAs the environmental benefits of open space are estimated for green space and riparian open space. However, other potential benefits are not considered. Local planning processes that determine potential post-acquisition land uses could better estimate the benefits that other projects could provide, such as community gardens, environmental education space, increased stormwater management infrastructure, or recreational uses. For example, if a community identified zones ahead of time prime for
wetland restoration and proposed an entity that would be able to acquire the land for a wetland bank model, then the benefit of acquiring that land would be greater.

07-3 Evaluation and Research

In order to create better programs in the future, municipalities and institutions should invite evaluation and research of their processes. One issue with this is the sparse and mixed availability of funding and locational data. There is no locational data available for GOSR or NYC Build it Back buyout and acquisition properties beyond figures that have been aggregated to high levels in reports or buried in budgets. Individually, the programs lump in acquisitions and buyouts with funding for repairs, and it is difficult to assess what funding went into planning and administration versus the home purchases themselves. There is also no source that clearly tracks the funding in the region overall. Creating a live-tracking system that can be built out in the case of another event, where the landscape of acquisitions and buyouts are visible to the public could aid the city and program administrators in engaging researchers, advocacy groups, and community groups to come up with innovative solutions for these properties and spaces. Also, in the event of another storm or flooding event, a spatial database of this open space will help to evaluate the hazard mitigation impact that deed restriction or resilient redevelopment can have. This would inform program goals and resiliency plans in the future. Good examples of evaluation and research happening around this topic is that of the Regional Plan Association and the National Center for Disaster Preparedness at Columbia’s Earth Institute. The Regional Plan Association published a report after the storm with a new framework for assessing risk. The National Center for Disaster Preparedness produces research on vulnerable populations, health, recovery and
resiliency, and more. They then take this research and apply it to practice in training, education and consulting. Involving organizations like these in evaluation and research of these programs could produce useful results.

Along with guidebooks for forming plans, municipalities or federal agencies should look to create design guidelines for buyout and acquisition programs that have recommendations from structure, to case work, to ownership models. The region now has some interesting models for transitioning land post-acquisition that can be learned from, as well as highly experienced staff and organizations. To create these plans, an in-depth evaluation of the administering organizations could be conducted. The staff in these organizations have a wealth of knowledge on obstacles to administering these programs, the staff training and casework procedure, the necessary communication measures, and the process of dispositioning land. Before they disperse, a thorough look at lessons learned and how to move forward could inform the establishment of more permanent administering agencies and policies for these programs.

08 Conclusions
To conclude, there is robust literature on the risks that climate change and that the region will experience flooding with higher frequency and magnitude in the coming decades. There is also a body of literature on urban planning’s role in retreat and risk mitigation that goes back at least two decades describing the methods planners can employ to develop in a more resilient and safe manner. Buyouts and acquisitions are one tool among many that may be used in partnership with other land use methods to manage retreat from hazardous areas. These were deployed on a scale never before experienced by the region, and there
is much to learn from how the planning for these programs impacted their mechanics, and therefore their outcomes. The challenges and successes of these programs in terms of their funding, their administration structure, or their approaches to dispositioning land can help us plan and design solutions before the next storm event, and protect the welfare and health of people and communities in the region while providing much needed natural spaces and manmade infrastructure.

Moving to a proactive planning model for these programs will take a restructuring of the approach to funding to make it more consistently available. Along with more established local funding sources, municipalities should look to increase institutional capacity to take these programs on quickly after storms and through the full duration of the program, including land disposition. A more connected planning process with deep engagement of communities, civic entities, and experienced administrators will help to integrate these programs into a greater community vision and better prepare the administering entities to disposition land and target appropriate neighborhoods. Further building out guidebooks, examining program operations, encouraging longitudinal research, and opening up program data can also help to increase knowledge and capacity beyond the current administrators of these programs.

There are many limitations to this research, largely due to the structure of the data. All the governing agencies involved in this process collect data in different ways, or not at all, and some are more transparent than others. Future research should seek to acquire more reliable data sources on both buyout locations and the ownership and use of the bought-out land to take a closer look at how these properties are succeeding or failing in benefitting communities through added value or climate mitigation. Future research should
immediately attempt to address the issues with dispositioning land and look into examples of successful dispositions so that administrators, local institutions, and elected officials have examples of what a successful land transition process looks like from start to finish. This could help to inform a more integrated pre-disaster planning process that considers ownership structures for transitioned land that takes advantage of these parcels.

Through these case studies, interviews and literature review, it became clear that the region was unprepared for a storm like Sandy, had a difficult time getting programs off of the ground, and seven years later has still not completed its programs. But this does not have to be the case for the next storm.

09 Sources

Beatley, T. (2014). Planning for Resilient Coastal Communities: Emerging Practice and Future Directions. Adapting to Climate Change, 123–144. [https://doi.org/10.1007/978-94-017-8631-7_6](https://doi.org/10.1007/978-94-017-8631-7_6)
Berke, P. R. (2014). Rising to the Challenge: Planning for Adaptation in the Age of Climate Change. Adapting to Climate Change, 171–190. [https://doi.org/10.1007/978-94-017-8631-7_8](https://doi.org/10.1007/978-94-017-8631-7_8)


Leichenko, R., Major, D. C., Johnson, K., Patrick, L., & O'Grady, M. (n.d.). An Economic Analysis of Climate Change Impacts and Adaptations in New York State, 149.


