

AFTER RETREAT:
Buyout Programs and Local Planning Goals after Hurricane Sandy

by

Dennis C. Harvey

Bachelor of Architecture
Syracuse University, 2011

SUBMITTED TO THE DEPARTMENT OF URBAN STUDIES AND PLANNING IN PARTIAL
FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

MASTER IN CITY PLANNING
AT THE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

JUNE 2017

@2017 Dennis C. Harvey. All rights reserved.

The author hereby grants to MIT permissions to reproduce
and to distribute publicly paper and electronic
copies of this thesis document in whole or in part
in any medium now known or hereafter created.

Signature redacted

Signature of Author: _____

Department of Urban Studies and Planning
May 23, 2017

Signature redacted

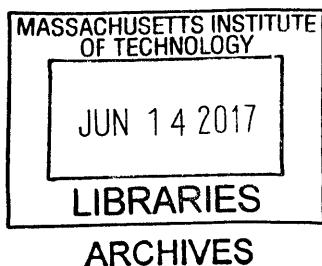
Certified by: _____

Sarah Williams
Assistant Professor of Technology and Urban Planning
Thesis Supervisor

Signature redacted

Accepted by: _____

P. Christopher Zegras
Associate Professor, Co-Chair of MCP Program
Department of Urban Studies and Planning



**AFTER RETREAT:
Buyout Programs and Local Planning Goals after Hurricane Sandy**

by

Dennis C. Harvey

Submitted to the Department of Urban Studies and Planning
on May 22, 2017 in Partial Fulfillment of the
Requirements for the Degree of Master in City Planning

ABSTRACT

State run home buyout programs are becoming increasingly popular as a means to mitigate flood damage to homes within floodplains. However, there are many local benefits associated with buyout programs, including the removal of services from the neighborhood, increased flood protection for adjacent neighborhoods, and increased green space for conservation and recreation purposes. With limited federal funding for these programs, policy designers make an effort to maximize these benefits. This thesis uses structured interviews, descriptive statistics, and mapping, to compare New Jersey's Blue Acres buyout program and the New York Rising Buyout and Acquisition Program. First, it compares the programs through the lens of 8 key policy decisions including parent institution, funding sources, municipal relationship, site selection, outreach, the offer, continued land management and future plans. Then, it uses a common framework to compare 3 coastal municipalities that utilized buyout programs, including Woodbridge, NJ, Lindenhurst, NY, and Mastic Beach, NY. I found that the ability to achieve local planning goals was influenced primary by the program's community outreach approach, site selection process, and its relationship with the municipality. As states design the next generation of buyout programs to deal with the increased flood risks associated with climate change, this paper will help guide buyout policy to achieve better outcomes.

Thesis Supervisor: Sarah Williams

Title: Assistant Professor of Technology and Urban Planning

After Retreat

Buyout Programs and Local Planning Goals
after Hurricane Sandy



Acknowledgements

First of all, I want to thank all of the interviewees that shared the experience and knowledge that made this thesis possible. Thank you to my advisor Sarah Williams for working with me through the various twists and turns of the thesis process. I'd also like to thank my reader Marie Law Adams for her pointed questions and feedback. Also, thanks to my thesis group for the discussion, contacts, and literature that you provided. I'd like to thank fellow student Sonja Boet-Whitaker for filing a FOIA request acquiring the buyout data from NY Rising. Also, thanks to Francis Ianacone from Blue Acres for supplying the data for the buyouts done in New Jersey. And, finally, thanks to my partner Yili for offering continued support throughout the process.

Table of Contents

Chapter 1: Introduction.....	6
What are buyouts?	6
Methodology	9
Chapter 2: Urban Resiliency, Risk, and Climate Change.....	10
Resiliency in the Context of Urban Systems	10
Are “Natural Disasters” Natural?.....	11
Climate Change and the Causes of Coastal Flooding.....	12
Flood Insurance and the Legislation of Risk.....	13
Chapter 3: The Structure of Buyout Programs.....	15
Buyout Programs and Decentralization	15
Federal Funding Sources of Buyout Programs.....	16
Are Buyouts “Strictly Voluntary”?	19
Negative Impacts and Minimizing Them	20
The Role of Community in Influencing Buyouts.....	21
Chapter 4: Comparing the Post-Sandy Buyout Programs.....	23
Parent Institutions	23
Funding.....	26
Municipal Relationship	30
Site Selection	32
Outreach.....	33
The Offer.....	35
Continued Land Management	35
Planning for the Future.....	37
Chapter 5: Case Studies.....	38
Woodbridge Township, NJ.....	39
Mastic Beach, NY	47
Lindenhurst, NY	54
Summary.....	60
Chapter 6: Discussion	62
Incentivizing Municipalities	62
Data Based Delineation	63
Avoiding the Checkerboard Pattern	64
Designing Transition	65
Looking to the Future of Buyouts	66

Chapter 1: Introduction

What are buyouts?

Over the past century, suburban growth in the northeast has led to an extensive amount of home building in coastal floodplains. This has been driven by the need for proximity to the region's commercial centers located in what were historically port cities along the coast. In the past 40 years, this trend was fueled by federally subsidized flood insurance that incentivized more construction in these vulnerable areas. Until recently, infrequent flooding gave the appearance that this practice was sustainable. However, because of climate change, flood risk is increasing both from the growing frequency of severe storms¹, as well as sea level rise. Now, repetitive flooding is placing increased costs on society and testing homeowners' tolerance for property damage. Because of this, post-disaster home "buyout" programs have become increasingly popular as a means to remove homes from flood risk. Buyout programs allow property owners to voluntarily sell their homes to local or state governments at, or above, pre-flood value. After the sale, the home is demolished and the property is placed under a deed-restriction that prevents future construction on the site. This ensures that it can perform as a natural floodplain in perpetuity. These programs have become popular because of their ability to mitigate the costs of future flood events including loss of life, property loss, damage to public infrastructure, and expensive emergency services.

In 2012, when Hurricane Sandy hit the New York metropolitan region, homeowners in coastal floodplains were devastated by the flooding that Sandy's storm surge brought to the region. With the region still in a recession, many homeowners were put in difficult financial situation with the cost of both repairing their homes, and protecting them against future storms. Many residents were also traumatized by the deaths of their neighbors and the experience of losing their homes and possessions. So when the idea of home buyout programs started to circulate among the hardest hit communities, there was a mixture of enthusiasm and trepidation. While many homeowners were desperate for the financial and psychological relief of leaving their embattled neighborhoods, there were many strong incentives to stay in place. Residents often felt a strong connection to place, their community, and their home. Also, living in a region with some of nation's highest housing costs made the prospects finding a comparable home they could afford unlikely.

These competing pressures to stay or to leave have resulted in an uneven geography of retreat along the New Jersey and New York coastline. Because these programs are "strictly voluntary," some

homeowners take the government buyout offer while their neighbors choose to stay. This inevitably resulted in the phenomenon of neighborhoods that are partially bought out. In some communities, buyouts are less popular and the neighborhood is pockmarked with vacant lots. In other cases, most people participate in the buyout program leaving a handful of scattered houses occupying the remaining street grid. These unpredictable and uneven results make it more difficult for planners to make new use of the resulting open space. The ideal, from a planning perspective, is for the entire neighborhood to take the buyout offers. This allows the town to remove streets and utilities from these areas and convert the land to new uses that are more compatible with flooding. Achieving these additional goals is rare because complete consensus is difficult to achieve, even in neighborhoods where buyouts are popular.

This geography is also the result of the structure of the buyout programs themselves, and how they are implemented by the government departments tasked with their execution. Both New York and New Jersey utilized buyout programs as part of their post-storm recovery and mitigation efforts. New York instituted the NY Rising Buyouts and Acquisition Programs, while New Jersey significantly expanded their pre-existing Blue Acres buyout program to cope with the disaster. Each program approached implementation differently and in a way that reflected the broader goals of their parent institution. NY Rising was part of the Government Office of Storm Recover (GOSR), whose goal was recovery and mitigation for coastal communities. They, therefore, focused on the hardest hit neighborhoods and offered buyouts to anyone within those neighborhoods that wanted relief. The Blue Acres program, on the other hand, was housed in the New Jersey Department of Environmental Protection (NJDEP). This program pre-dated Hurricane Sandy and has the dual goals of both mitigating flood costs and creating conservation land. Therefore, while they would take applications from anyone impacted by the Hurricane Sandy, they would ultimately only accept clusters of homes that they could convert into open space. The policy differences in these programs resulted in different spatial distributions of buyouts in each state.

With limited funding available, the agencies executing buyouts and the towns receiving buyout land want to maximize the additional benefits associated with the buyout programs. Because of this, the decision of what homes to buyout inevitably hinges on a series of larger planning goals. Because demolishing clusters of homes leads the greatest benefits, buyout programs typically target specific neighborhoods where there is a high density of interest among residents. Additional benefits can include the removal of roads and utilities because the costs of maintaining and fixing these services can be reduced. The resulting open space can also perform as a floodplain, acting as natural barrier that defends

neighborhoods farther inland. Removing clusters also makes it easier to build flood walls or other infrastructure to protect adjacent neighborhoods. Furthermore, the land can be converted to new uses such as conservation land or parks for recreational uses. In order to maximize the amount of land that can be converted, cheaper neighborhoods are usually preferred because you can maximize the number of properties you can purchase with a fixed budget. This also maximized the number of homeowners you can give relief to.

Buyout programs are touted by their proponents as a win-win arrangement. The homeowner gets much needed financial relief, and the government eliminates the future economic costs associated with providing financial assistance to home rebuilding. However, there are critiques of buyout programs and the way that they're implemented. The most significant pushback comes from municipalities that worry about losing a portion of their tax base.² Many small coastal communities, for instance, have a significant portion of their most coastal properties at risk. Additionally, homeowners that want to stay see buyouts as a threat to their community because it reduces the density and creates public space that needs additional security.³ Also, while buyout programs are intended to be "strictly voluntary," the pressure on program coordinators to achieve high participation has, in some cases, led to the use of coercion.⁴ Buyout programs have made attempts to mitigate these negative impacts in a variety of ways that I'll describe in following chapters.

While buyout programs do have their discontents, they are widely supported as a crucial measure in mitigating future flood risk. FEMA has determined that for every dollar spent on disaster mitigation, 4 dollars are saved⁵. Research has projected through benefit-cost analyses that post-Sandy buyouts will save money in the long term.⁶ While mitigating the costs of future storms is the primary purpose of buyouts, there are many potential additional benefits associated with buyouts. Buyouts don't just mitigate costs to that single property, but can create a green buffer that protects the adjacent parcels and neighborhood. Furthermore, the land can be converted to new uses including conservation land or space for recreation. Controlling these secondary benefits is more difficult because the voluntary nature of buyouts makes it difficult to know the resulting pattern of land-use. Planners need to better understand how to design policy that can better take advantage of these secondary benefits. This thesis asks the question: How did the policies of state run buyout programs in New Jersey and New York impact local planning goals in Woodbridge, NJ, Lindenhurst, NY, and Mastic Beach, NY?

Methodology

This thesis explores how the NY Rising Buyout program and New Jersey's Blue Acres buyout program impacted local planning outcomes in three coastal municipalities, Woodbridge, NJ, Lindenhurst, NY and Mastic Beach, NY. For New York State, this excludes New York City, which had the largest number of buyouts by far for that state. This decision was made to ensure that the scale and type of municipalities in the study are similar enough to draw meaningful comparisons. Each of these municipalities is either a township or village and consists of relatively low density residential neighborhoods dominated by single-family homes. New York City is relatively more dense, and is an immense municipality consisting of 5 boroughs. This means they have a very different relationship with the state when it comes to policies like buyouts. Also, the buyouts within New York City have been the subject of previous studies. Buyouts in the surrounding suburbs and exurbs are less understood.

This paper is a mixed method study that utilized qualitative information from structured interviews as well as data supplied by the NY Rising and New Jersey Blue Acres program. The interviews primarily targeted public officials in the state buyout programs, as well as the municipal officials from each town that worked most closely with the buyout programs. If I discovered that there were other people integrally involved in the buyouts for a particular town, I interviewed them as well. For Mastic Beach this includes someone from the Nature Conservancy as well as a Suffolk County official. For Lindenhurst I interviewed residents in an area impacted by buyouts.

The data that I analyze is the records of post-Sandy buyouts from both NY Rising and the Blue Acres programs. For NY Rising these records include all the homes that are within the programs designated Enhanced Buyout Areas. For New Jersey, the dataset only includes homes that have been closed on, or have scheduled a closing date. In order to compare the 2 programs, I used this data to generate descriptive statistics. Because the data includes either parcel ID's or street addresses, I was able to join the data to specific tax parcels. This allowed me to generate maps of each neighborhood with buyouts and assess spatial relationships between the buyout parcels, as well as between buyout parcels and adjacent open space. In order to compare these patterns between municipalities, I created a framework that quantifies the resulting patterns of open space. This allows for comparing the outcomes of the 3 case studies. Understanding the patterns of open space that result from buyout programs is crucial for planners who need to establish appropriate uses for them.

Chapter 2: Urban Resiliency, Risk, and Climate Change

Resiliency in the Context of Urban Systems

Cities are inherently resilient systems. While cities have been bombed, burned, flooded, starved, and irradiated, they often spring back to life, even if in a diminished form. From 1100 to 1800 only 42 cities were permanently abandoned.¹ While buyouts require abandonment, it is only a local abandonment that increases resiliency for the rest of the city and society. However, to understand how buyouts impact resiliency across scales, we must first define the word.

While emerging from the natural sciences, resiliency is a concept that applies both to natural and human systems. Resilience is the ability for a system to recover its core functions after an external disturbance.² According to this framework, a city is a human system, while a storm represents an outside disturbance. Resilience can be measured in two ways. The first is measuring the magnitude of disruption to core functions. In the case of a power outage, this could be the number of customers without power. The second is measuring the time it takes for the core functions to be restored.³ This would be the time that it takes for power to be restored to those customers. Using this framework, buyouts can impact urban resilience in two ways. First, they can decrease the magnitude of households affected by flooding simply by removing them from a flood zone. Second, they reduce the overall time of recovery by allowing recovery services to focus their limited resources on a smaller number of impacted homes.

Buyouts are particularly unique because they impact resiliency of various systems at a range of scales. For instance, at the scale of the nation, buyouts are an important part of reducing the overall amount of risk mitigated through the system of nationalized flood insurance. At the state level, they reduce the need for investment in flood mitigation infrastructure. At the municipal scale, buyouts reduce reliance on emergency services and investment in services. At the neighborhood scale, buyouts can create a natural buffer that protects the remaining homes. The ability for buyouts to improve resilience across scales is one reason why they have garnered support across various levels of government.

Are “Natural Disasters” Natural?

Hurricanes are not a new phenomena to the New York metropolitan region. While the memory of major storms has faded, the region has a rich history of storm impacts. One hurricane that hit New York City in 1821 divided the island of Manhattan in two, when flooding briefly extended along present day Canal Street connecting the Hudson River to the East River. Again in 1893, a category 2 hurricane hit Long Island with combined storm surge and waves reaching 30 feet at Brighton Beach. In 1938, the Long-Island New England Hurricane hit to the east of New York City area killing 60 people in the city and 600 people across the northeast. What is important about these storms is that they show that hurricanes have been able to retain a significant amount of their strength even as they move into the cooler waters of the mid-Atlantic.⁴

Despite a long history of hurricanes in the Atlantic basin, the economic cost of Hurricanes has only begun to rise in the past half century. In fact, the direct economic cost of hurricanes has been rising exponentially in recent decades.⁵ However, the effects of climate change are not large enough to account for this rise. More significant factors are the increase in coastal population and an increase in the wealth of these populations.⁶ These two trends mean that there is more development occurring in places that are vulnerable to coastal flooding, and that the values of the properties are higher. This is a clear indication that the costs of storms are largely the result of our own development practices.

This understanding should prompt a re-evaluation of what is meant by the term “natural disaster.”⁷ While hurricanes, storms and earthquakes are natural phenomena, it’s their impact on human systems that make them a “disaster.” To further undermine the term, human induced climate change is now coloring how we understand the word “natural.” The recent trend of an increasing global average temperatures is largely attributed to greenhouse gas emissions from human sources. Because this has an impact both on sea level rise and the likelihood of storms, what were once purely understood as natural phenomena are now influenced by human activity. Recent advances in climate science made it possible to attribute a certain percentage of extreme weather events to climate change.⁸ With this knowledge it’s clear that even hurricanes are no longer simply “natural.”

Climate Change and the Causes of Coastal Flooding

While flooding has always presented risk to development in coastal floodplains, climate change is changing this risk in two key ways. First, sea level rise is slowly increasing the level of the ocean, and second, there is an increased frequency of intense storms.⁹ Buyouts are gaining popularity as these threats become more evident both through past experience and future projections. Understanding these two factors are important in determining when, and how, buyouts can be implemented.

Sea level rise in the mid-Atlantic is created by a number of factors. Because oceans are warming, the volume of water is increasing. Warm water takes up more space than cold water, and ocean temperatures have risen significantly. Ocean water has also increased in mass from the melting ice sheets and glaciers depositing water into the oceans. Despite these changes, the amount of sea level rise varies locally. The weakening of the Gulf Stream, for instance, has increased the amount of sea level rise in the mid-Atlantic. Not only is the water rising, but in some places, like New Jersey, the land is sinking. This sinking is called isostatic subsidence and the New York metro region experiences some of the most extreme levels of land subsidence in North America. Isostatic subsidence is the result of Laurentian Ice Sheet melting at the end of the last ice age. Because of the weight of the ice, the Earth's crust was pressed down underneath it, causing uplift at the edges of the ice sheet. New Jersey was one such area that was previously lifted up, and is still in the process of subsiding. In addition, ground water extraction for public water supplies has a similar effect of lowering the level of the land. In total, subsidence accounts for half to the relative sea level rise in parts of the mid-Atlantic.

One impact of sea level rise is the increasing prevalence of tidal flooding, also called sunny day flooding and nuisance flooding. Neighborhoods typically first experience this flooding during the perigean spring tides that occur several times a year when the moon is at its perigee (closest point) with the Earth, and is also lined up with the sun. As sea levels have risen, so has the frequency of tidal flooding. Tidal flooding is expected to increase along the Atlantic Coast with the regions around the tide gauges at Sandy Hook, NJ, Atlantic City, NJ, and the Battery, NY predicted to have more than 3 times the number of tidal flood events by 2030.¹⁰ Residents of vulnerable areas are often aware of this trend and have watched it with their own eyes. One resident from Mastic Beach said she's been watching flooding increase every year for the 14 years that she's lived there. This knowledge weighs on those making decisions about whether to take buyouts. While tidal flooding can prevent passage of certain coastal roads or trap

residents in their homes for several hours at time, they do not cause significant property damage or loss of life.

A more significant threat to property is that of the changing behavior of tropical storms and hurricanes that bring the risk of storm surge. Models of future climate scenarios consistently predict that the global frequency of storms will actually not increase, but decrease instead. However, the frequency of strong storms, category 3 or higher, is predicted to increase. This is particularly concerning because the strongest 21% of hurricanes account for 83% of the damages.¹¹ When this increased frequency is compounded with higher water levels from sea level rise, flood risk increases significantly. Studies have suggested that current 100 year surge flooding could happen every 3-20 years under 1 meter of sea level rise.¹² These projections suggest that the current patterns of coastal development will be under increased attack in the future.

Flood Insurance and the Legislation of Risk

One reason why there has been an increase in flood prone development in the past several decades is because the National Flood Insurance Program (NFIP) has artificially suppressed the cost of flood insurance. With the risk of flooding so high floodplains, private insurance companies were unable to provide insurance at a price that homeowners were willing to buy on the free market. As a result, the federal government decided to create a nationalized flood insurance company that would provide insurance with subsidized premiums. This led to the passing of the National Flood Insurance Act of 1968, which created the NFIP.¹³ Under the NFIP, homeowners with a federally backed mortgage are required to pay flood insurance, while people who own their properties outright don't need to. Today there are 5.1 million flood insurance policy holders in US.¹⁴

While premiums are subsidized, the program still needed to model flood risk in order to determine how to set insurance rates, and project the costs of payouts. These models are documented in FEMA's Flood Insurance Rate Maps (FIRMs).¹⁵ However, these maps do more than just communicate risk, they are legal documents that determine how the government manages risk in a number of key decisions. FIRMs dictate who is required to have flood insurance, the flood insurance rates, which neighborhoods get grants for mitigation, what mitigation efforts are required, as well as what homes are eligible for

buyouts (at least those receiving FEMA funding). The intention was to create a system a risk management that would be fiscally sustainable over the long term.

However, FEMA FIRMs are limited in that the models used to calculate risk are based on past information about flooding. In a region where flood risk is constantly increasing, these risk assessments are always out of date. This became painfully obvious after both Hurricane Katrina and Hurricane Sandy created significant damages to NFIP insured properties. The result was that the NFIP had to disburse \$24.6 billion in claims for the two storms. This far exceeded what the models had determined were within a reasonable range of risk. Today, the program remains, \$23 billion in debt.¹⁶

After Hurricane Sandy, there was a push to make to reform the NFIP so it would be fiscally sound. In 2012, congress passed the Biggert Waters Flood Insurance Reform Act. This funded the redrawing of FIRMS to reflect an updated understanding of risk. It also ended the grandfathering of insurance rates and made rates reflect the actuarial risk of any property under the plan.¹⁷ Actuarial risk concentrates the cost on the highest risk homeowners, instead of mutualizing it the way insurance normally does. This led to rate increases that made flood insurance unaffordable, with many policy holders paying 20 to 30,000 dollars a year, more than 18 times what they were paying before. This created a backlash that resulted the 2014 passing of the Homeowner Flood Insurance Affordability Act. This new act repealed parts of the Biggert-Waters, including restoring grandfathering, and limiting rate increases. Because of this, there is no clear path to paying off the debt created by Hurricanes Katrina and Sandy, and there is not clear path for how the program will integrate the additional risk the climate change creates.

Hurricane Sandy signaled a shift from thinking of storms as acute events, to seeing them as chronic problems that are increasing in severity.¹⁸ With this new understanding, buyouts are seen as part of the solution to the woes of the NFIP. Repetitive loss properties are highly subsidized by the NFIP and are the programs Achilles heel. By removing these properties from the flood insurance program, buyouts make it cheaper to insure everyone else. Because of this, buyouts are a crucial part of bringing fiscal-sustainability to the NFIP.¹⁹

Chapter 3: The Structure of Buyout Programs

Buyout Programs and Decentralization

Buyout programs rely on cooperation across multiple levels of government. The federal government typically supplies a large portion of the funding. State governments are responsible for designing, staffing and implementing the buyout program. Municipalities, while they may not have a formal role, are consulted upon for determining where buyouts should take place, and for local outreach. This creation of federally funded, but locally implemented programs is part of the larger project of decentralization of federal government services. Buyout programs utilize a political framework of devolution, in which decision making is delegated from the federal government to state and local governments.¹ The theory is that state and local governments are better at executing certain programs because they are closer to the citizenry that they represent, and can execute programs more efficiently in the local context.²

Buyout programs are based on a model of decentralization of the federal government can be traced to President Nixon's New Federalism. His position was a reaction to what was considered the excessive centralization of power under Franklin D. Roosevelt. The New Deal era had spawned federally run programs that worked directly with city governments.³ New Federalism, however, favored delegating the tasks of policy making and execution to states and local governments. Mechanisms like block grants and revenue sharing made capital from federal taxes available to states and cities with few strings attached.⁴ The intention was to decentralize responsibilities to the government units that were most capable of executing them. Most buyout programs follow this model where funding comes from federal sources, but state and local governments are tasked with their execution. While funding for buyouts does have some requirements, states are responsible for developing much of the policy and execution of the program. Because of this, each state's buyout program is unique.

Understanding buyout programs in the context of decentralization is important for a second reason. Municipalities, empowered by decentralization, constitute a significant barrier to buyout program implementation. Historically, municipalities were seen as "political, subdivisions of the state for the purpose of exercising power."⁵ From the late 19th century, there have been successive pushes to give more control to local governance. The most common argument is that decentralization can improve efficiency and resource allocation.⁶ The theory is that local governments can better respond to local demand by creating unique bundles of services and taxes. This creates competition between municipalities that

attempt to attract residents and businesses who are “voting with their feet.” However, this system produces municipalities where an increasing amount of tax dollars go into competing for development and growth. This has the consequence of making buyout programs unpopular to municipalities that see any form of disinvestment as a negative. Reliant on their local tax base, municipalities are incentivized to attract and keep development.

While, technically, the state can circumvent a municipality and execute buyout programs regardless of their approval, this was uncommon in New York and New Jersey after hurricane Sandy. Opposing towns could generate opposition to the buyout program and undermine its ability to operate. For this reason, both New Jersey and New York largely steered clear of municipalities that were not interested in buyouts. This was the case for most towns along the barrier islands in New Jersey, and for the entirety of Nassau County in New York. The ability for one actor to block a buyout program means that there must be an alignment of interest between all levels of government.

Federal Funding Sources of Buyout Programs

Four different departments provide grants for buyouts, including FEMA, HUD, the USDA and the Army Corps of Engineers. Each of these departments has their own goals they are hoping to achieve through buyouts. Because of this, each department also has their own rules stipulating how the funding is used. States using these programs must make decisions about which program to use based on eligibility, availability, and desired outcomes of the program.

One of the largest providers of buyout funding is the Federal Emergency Management Agency (FEMA). In the 1980’s, FEMA recognized the need to support the NFIP through flood mitigation efforts.⁷ This led to the passing of the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988, which had a provision for buyout grants. Under this act, funding was available to states to carry out buyouts within their jurisdiction. At this point, FEMA provided 50% of the capital needed to perform the buyout, expecting the state to come up with the rest. However, devastating Midwestern flooding in 1993 led them to reevaluate the role of buyouts in flood mitigation.⁸ This led to an amendment to the Stafford Act so that the federal government can provide 75% percent of the cost of a buyout, instead of the previous 50%.⁹ This was intended to further incentivize states to pursue buyouts as part of their mitigation strategy.

Under the Stafford Act, post-disaster buyouts are performed by the Hazard Mitigation Grant Program (HMGP). The purpose of this program is to mitigate future property damage and to prevent loss of life. Therefore, all properties that receive funding from this program must be placed under a deed-restriction that prevents future structures from occupying the land. This restriction also prevents structures like flood walls or barriers from being built. They do, however, allow certain structures that promote ecosystem restoration, preservation, or enhancement. Also, paths for walking or bikes are allowed, as well as signs if they don't trap debris.¹⁰

Because FEMA is attempting to reduce costs over the long term, property eligibility requirements ensure that funds are only used to buyout high risk properties. Properties are eligible if they are within a 100-year floodplain and experienced "substantial damaged," which means damages exceeded more than 50% the value of the home. A property can also be eligible if it's deemed to be cost-effective based on FEMA's benefit-cost analysis.¹¹ HMGP grants are not limited to federally declared disaster areas, meaning that states can use the grants to fund buyout as a preventative measure. Since 2000, \$786 million has been spent on buyouts through the FEMA HMGP program.¹²

The cost of demolition is covered by federal buyout funding. FEMA requires that each site undergoes "site stabilization." This process includes the removal of all structures on the site, as well as any debris and household hazardous waste. All driveways, sidewalks and above grade concrete slabs are then removed. The foundation and basement are only demolished and removed to a foot below the surface of the ground plane. A hole of 1 foot diameter is drilled through the basement floor to allow for drainage. Then the basement is filled with fill and the entire site graded, leveled and stabilized to prevent erosion.

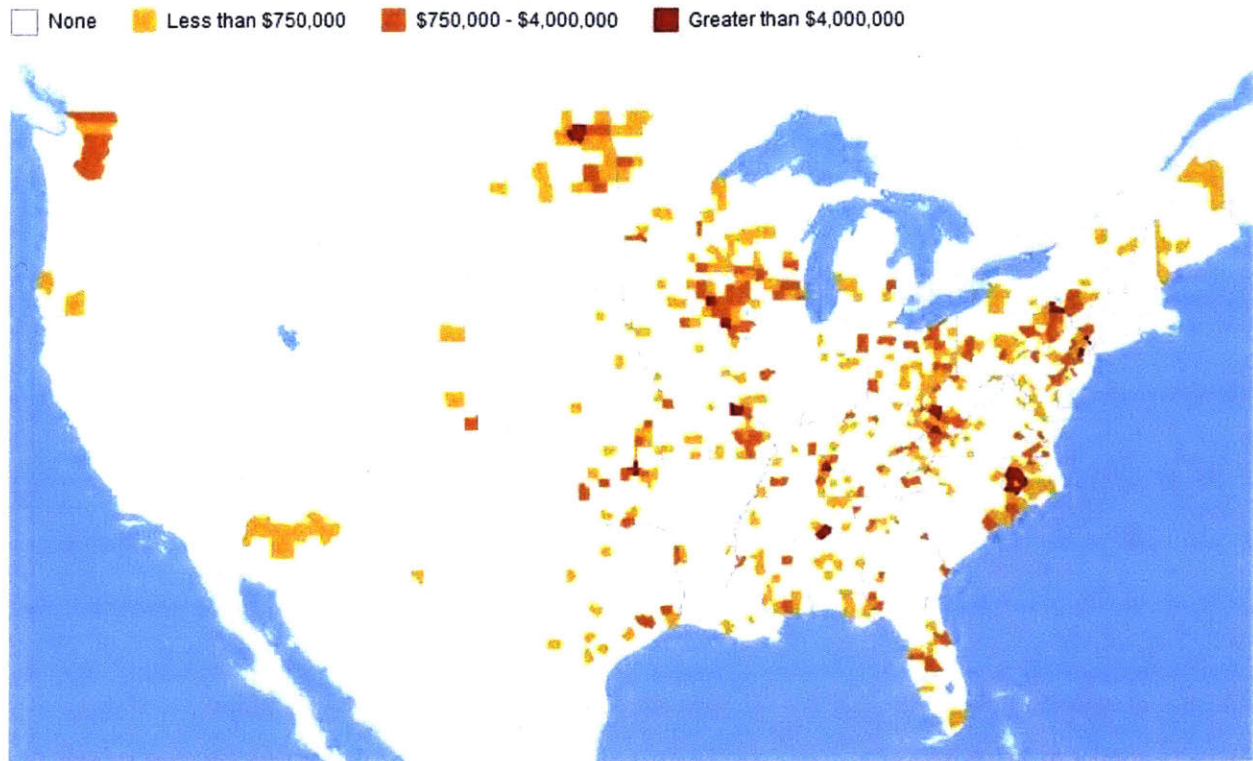


Figure 3.1: FEMA funding disbursed by county 2003-2014 (Benicasa, 2014)

Another significant source of federal funding for buyouts is from the Department of Housing and Urban Development’s Community Development Block Grant Disaster Recovery Program (CDBG-DR). This differs from HMGP in that the funding is intended primarily for low and moderate-income persons. Buyouts under this program must either benefit low or moderate income persons, prevent or eliminate slums or blight, or address community development needs that are urgent because they pose a significant an immediate threat to health or welfare of the community. However, funding can be used in any area where at least 51% of the populous are low or moderate income.¹³ Because HUD funding isn’t contingent of the ability to mitigate the cost of future floods, they have fewer requirements. For instance, they don’t require that a benefit-cost analysis be done for every property.¹⁴ Additionally, HUD doesn’t require that properties be placed under a deed-restriction like the HMGP funding. This becomes useful for a number of reasons. For instance, the state or municipality may want to build flood protection levies in place of the homes in order to protect the adjacent neighborhoods. Alternatively, they may want purchase damaged homes and auction them for redevelopment with more resilient structures.

Both the FEMA’s HMGP and HUD’s CDBG-DR funds have some limitations on what kind of properties are eligible. Neither FEMA nor HUD allows its funds to be used to purchase secondary or

vacation homes.¹⁵ However, CDBG-DR funds can purchase a home which is not the owner's primary residence if it is an investment property. A home would fall under this classification if it is used as a rental property.¹⁶ CDBG funding also extends buyouts to vacant lots in order to prevent future development.¹⁷ FEMA will only do this if the vacant lot is both abutting a lot with a structure on it that's also getting bought out, and if together, both lots are still cost effective as proven by a benefit-cost analysis.¹⁸

Because of the various programs available after a disaster, homeowners are often eligible for multiple types of assistance and need to choose based on their needs. Neither of these programs allow for the duplication of benefits (DOB). This means that a home can't receive the overlapping benefits. For instance, let's say a home has already received federal grants to repair their home. Then they decide that they want to take a buyout. The funding that was intended for repairs, will be subtracted from the total amount that they would have received for the buyout. This means if they had already spend the funds on repairs, they would not be able to recoup that cost. This is one reason why implementing programs quickly and communicating them clearly is important.

Are Buyouts "Strictly Voluntary"?

While federal requirements for buyout programs generally mandate that the programs be strictly voluntary, this is not always the case when executed by state and local governments. Often, the buyout program is initiated with the goal of having 100% participation within a neighborhood. This, in itself, primes those tasked executing the program to try to convince the residents to leave. This coercion can range from subtle and unintentional to, at times, aggressive and threatening. Program managers may say that the buyout program is a one-time offer and homeowners will be unable to get a better deal in the future. In some cases homeowners have even been threatened with eminent domain.¹⁹ While residents should be well informed of some of the risks associated with staying in a flood prone neighborhood, these facts should be communicated as impartially as possible.

While current buyout programs generally must be voluntary, there are some pressures placed on homeowners that make the program seem less voluntary. For instance, if a home has suffered "substantial damage," then FEMA requires that it's brought into compliance with local floodplain management regulations. This could mean costly improvements to the home including elevating it above the base flood

elevation. These costs can be prohibitively expensive meaning that the homeowner may have little choice but to participate in the buyout program.²⁰

Some buyout programs have used eminent domain to remove the homes remaining after the voluntary phase of the buyout is complete. While the federal funds don't allow this, a state can use their own funding to acquire the homes. While this is considered a "taking," it can be done legally given that it's done for a public purpose and the homeowner is given just compensation. After finishing a buyout program, the city of Grand Forks North Dakota used eminent domain to remove holdouts in order to build a levy that would protect adjacent neighborhoods. Some residents did make a legal challenge which was not upheld in Fargo District Court.²¹ Flood mitigation is widely recognized in court as a "public purpose" and, therefore, can be justification for a "taking."²² Despite this, eminent domain is rarely used for this purpose and federal programs opt for less contentious voluntary programs.

Negative Impacts and Minimizing Them

Buyout programs can be a very contentious issue. While some homeowners view it as lifesaving financial relief, other people see it as an attack on their neighborhood and way of life. Buyouts can have several negative effects on the neighborhoods and municipalities in which they are implemented. For those that decide to stay, property values can decrease as the perception of risk is heightened by the buyouts. Towns, especially smaller towns, can lose a sizeable percentage of their tax base. This makes some municipalities hostile to the idea of buyouts. Citizens also become worried that they will suffer from increased property taxes and a reduction in the quality of services the town provides as a result these tax losses.

While buyouts are voluntary, homeowners experience a variety of negative effects. In a heated housing marketplace like the NYC metro area, bought out homeowners can find it difficult to find an affordable home within their town or region. This can result in increased commute times, disrupted community connections, and the moving of children to new school systems. In the case of coastal communities, residents can also be separated from the unique natural amenities which they enjoyed from living near the coast. Additionally, residents can suffer "root shock" from the demolition of their homes and entire neighborhood. This traumatic stress reaction can occur from the destruction of the homes and spaces which they are emotional attached to.

Some buyout programs have sought to offset some of the negative impacts of breaking up a community. When the rural town of Valmeyer, Illinois was hit by a major flood, they decided to rebuild the entire village 2 miles away, and 400 ft higher, than its original location. Located on the Mississippi River flood plain, this village was historically prone to flooding. While it had flood defenses, the Great 1993 Midwest Flood overtopped them submerging most of the town. Rather than invest in significantly improving the flood defenses, the town opted to leverage buyouts as a way to move the entire town. Valmeyer bought a 500 acre farm, subdivided the parcels and sold them to those that had taken buyouts. The town rebuilt its municipal buildings, such as town offices, police station, fire station, and schools. Ultimately, only about 60% of the town's residents relocated to the new town center. Many of the other residents grew impatient with the lengthy relocation process and either rebuilt their homes in the vulnerable floodplain or moved to adjacent towns.²³

While relocating entire neighborhoods or towns may work well in rural areas like Valmeyer, it would likely be much more difficult on the densely populated northeast coast. Valmeyer was a small town surrounded by farmland. Its residents largely lived within a small village which was capable of being reproduced. New Jersey, however, is the most densely populated state in the United States.

The Role of Community in Influencing Buyouts

Previous research suggests that individual factors alone can't predict the popularity of a buyout program.²⁴ A comparative study of two towns, Oakwood Beach, NY and Rockaway Park, NY. The towns closely resemble each other in terms of income, demographics, tenure, length of homeownership, connection to place etc. From 133 interviews with local residents in the two communities she was also able to measure community cohesion, community resilience, and local narratives. While both communities closely resemble each other in these respects, they came to drastically different conclusions. In Oakwood Beach, 86% of respondents said they intended to take the buyout while, in Rockaway Park, 85.5% said they would not take the buyout. In searching for a reason why such similar communities could come to such different conclusions, the study suggests that local cultural norms play an important role in decision making. Those individuals from each neighborhood that said in they felt less connection to their local community were more likely to have made a decision against the norm. This suggests that community norms have the ability to sway the entire community in one direction or another.

This study also found that a shared narrative of risk is important. In Rockaway Park, Hurricane Sandy was seen as a freak incident, a one-time storm that would likely not be repeated. In Oakwood Beach, however, Hurricane Sandy was the second storm related flooding event that impacted the neighborhood. They were also experiencing worsening nuisance flooding from sea level rise. These impacts lead to a general understanding that flooding was only becoming more common.

While this study is limited in certain ways. Because it only looks at a narrow demographic and geographic spectrum, it is unable to show how income, race, flooding severity, etc. contributes to buyout popularity. While for the middle-income group that she studied, income may not contribute significantly to the decision to take a buyout. However, perhaps looking at a broader spectrum of income groups will show that income is significant for low or high income groups.

Lower income populations are more likely to be offered buyouts because they tend to live in places that are more susceptible to flooding²⁵, they are less capable of paying for their own risk mitigation, and purchasing their property is cheaper for the government. Minority and elderly residents are most susceptible to the impacts of being uprooted. They can be separated from their local connections such as families, health services, and social services.²⁶

The level of trust that residents have in the managers of the buyout program has an important effect on the number of people that participate in the program. Those who view the buyout program managers as not trustworthy, or not having the best interest of the neighborhood in mind, are less likely to take a buyout offer. Those who don't participate are also more likely to feel that they had little or no input into how the buyout program was structured. Community attachment did not vary much between those that decided to stay vs. leave.

Chapter 4: Comparing the Post-Sandy Buyout Programs

In the following section I'm going to describe both the NY Rising Buyout and Acquisition Program as well as the Blue Acres Program by focusing on 8 aspects of the programs: 1) parent institution, 2) funding, 3) site selection, 4) community outreach, 5) demolition, and 6) the offer, 7) Continued Land Management, and 8) planning for the future. In each of these sections, I will describe each of the programs, looking first at Blue Acres, and then at NY Rising. This will be followed by a brief discussion of the differences between the programs and how that impacts agenda, policy, and outcomes.

New York Rising and the Blue Acres have many structural differences that impact their execution and outcomes. The Blue Acres program is a permanent program that was created in the 1990's, while the New York Rising Buyout Program was created in response to Hurricane Sandy. The Blue Acres program is housed in the NJ Department of Environmental Protection (NJDEP), meaning that land conservation is one of the principal desired outcomes. The New York Rising Buyout Program is part of the Governor's Office of Storm Recover (GOSR), meaning its focus is on relief for victims and long term disaster mitigation. The Blue Acres allowed for applications state-wide, while New York Rising targeted specific neighborhoods to offer buyouts to. While the Blue Acres program received funding from FEMA, etc. etc., New York Rising got all of its funding from the Department of Housing and Urban Development (HUD). All of these differences result in different outcomes and should be recognized as influencing the success of a program.

They put out a call for applications from homeowners who had experienced flood damage. However, because the program wants to maximize its funding, they do not plan to buyout everyone who applies. Instead, they are looking for clusters of homes that they can buy out in unison. This allows the entire neighborhood to be demolished, including streets and utilities. However, finding discrete clusters of homes can be difficult, as there are often homeowners who simply don't want to leave, despite the flood risk, rise in insurance costs, and reduction in property value.

Parent Institutions

The Blue Acres program started in 2007 as a "popup" within the long running in the Green Acres Program. According to their mission statement, Green Acres aims to create a "system of interconnected open spaces, whose protection will preserve and enhance New Jersey's natural environment and its historic, scenic, and recreational resources for public use and enjoyment." Established in 1961, Green

Acres has a long history and predates even the New Jersey Department of Environmental Protection (NJDEP), which now serves as its parent institution. Because Blue Acres is housed within the Blue Acres program, conservation has always been a key part of the programs goals. This has an important influence on how the program's policies are designed.

The Blue Acres program started after receiving funding as the result of a 2007 bond referendum voted on by New Jersey citizens. The Green Acres, Farmland, Blue Acres, and Historic Preservation Bond authorized \$12 million for acquisition of lands in the floodways of the Delaware River, Passaic River and Raritan River. Another bond act in 2009 called the Green Acres, Water Supply and Floodplain Protection and Farmland and Historic Preservation Bond Act, gave another additional \$24 million to the program.¹ This is when the Blue Acres program got involved in the State Hazard Mitigation Plan, and took on the goal of hazard mitigation more explicitly.

Blue Acres found increased relevance after Tropical Storm Lee, Hurricane Irene, and Hurricane Sandy hit in rapid succession over the 2010, 2011, and 2012 respectively. While the first two storms led to 103 properties being purchased through the program, the widespread devastation brought by Sandy's flooding made it apparent that there was the potential to offer relief to more homeowners. Prior to Sandy, Blue Acres was only available to homeowners along the Delaware River, Passaic River, and Raritan River. After Hurricane Sandy, Blue Acres buyouts were made available statewide.

Alternatively, the New York Rising program was created as a direct response to Hurricane Sandy. Governor Cuomo created the Governor's Office of Storm Recovery (GOSR) to manage the various NY Rising recovery programs associated with the storm. According to their website, GOSR "aimed to address communities' most urgent needs, while also encouraging the identification of innovative and enduring solutions to strengthen the State's infrastructure and critical systems." New York Rising has four program area teams including 1) Housing, 2) Infrastructure, 3) Economic Revitalization, and 4) Community. Then they have additional support teams that include legal, policy, etc. Buyouts are managed under the housing team through the NY Rising Buyout and Acquisition Program. This program has two separate components: 1) the Buyout component, and 2) the Acquisition component. Under the Buyout component, NY Rising purchases the home based on the pre-flood FMV, and their home gets demolished with the land placed under a conservation easement. In the Acquisition component, NY Rising pays the post-flood value of the home, and then resells the home for redevelopment. Often, properties are sold at auctions with opening bids starting as low as \$30,000. The reason for this is that the homes being sold require expensive

improvements mitigate against future storm damage. Costly improvement often include elevating the home and utilities 10 feet or more off the ground.

The dialog between these components is an important one. While any flood damaged home is eligible for an acquisition, only those homes within the state delineated Enhanced Buyout Areas are eligible for buyouts. Under this system, no home is eligible for both buyouts and acquisitions. This benefits homeowners that are in the Enhanced Buyout Areas because they can receive more money for their home at the pre-flood valuation. Both of these programs are vehicles for the mission to mitigate the cost of future flooding, although with different approaches. The acquisition program does so by requiring the home be improved to withstand future storms, while the buyout program removes the home from the flood zone entirely.

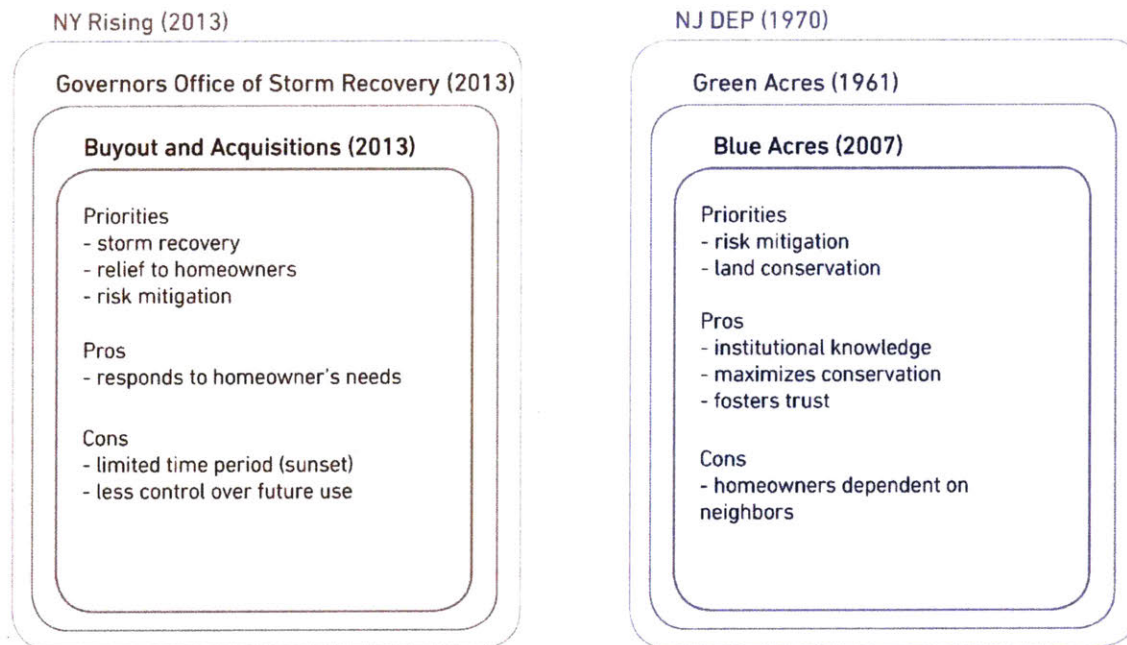


Figure 4.1: Diagram showing the parent institutions and the years in which they were established.

Both the Blue Acres and NY Rising are a product of the parent institution that they are a part of. Even though both buyout programs were responding to the same storm, these parent institutions have a defining role in the determining the policy design of the programs. The Green Acres program's primary focus is conservation, while NY Rising's primary focus is on relief for the homeowners. However, since buyouts inherently deal with homeowner relief, conservation, as well as long-term mitigation each

institution is required to extend beyond its core mission. For Blue Acres, this means that they are unable to give relief to as many homeowners because they only focus their funds on places that have high conservation priority. NY Rising was able to create the sister acquisition program to allow homeowners to sell their property even if it wasn't in close proximity to conservation land or open space.

Another significant difference arising from the parent institutions is how the two programs were established. Blue Acres had the advantage of pre-dating Hurricane Sandy. This is only the case because Green Acres advocates for long term planning when it comes to conservation management. Blue Acres was, is, and will be an important tool for creating regional resiliency and open space. This meant that when the Sandy arrived, Blue Acres already had much of the team and skills that they would need to respond to the storm. New York Rising, however, is an institution that had to be built almost overnight to deal with what was an unexpected disaster. This led to growing pains in the program. During the first year there was high turnover of staff leading to inconsistent policy and execution. Towns working with NY Rising complained that communication was erratic and there was a sense that the program was disorganized. This undermined their ability to act quickly and purposefully in a situation where time is of the essence. The continuity and embedded knowledge that Blue Acres had was an unusual asset that most buyout programs don't have. This

Funding

While Blue Acres' initial funding was from bond referendums, when Tropical Storm Lee (2010) and Hurricane Irene (2011) created extensive river flooding across New Jersey, they sought out additional funding sources. This is when Blue Acres first used FEMA HMGP grants, a principal source of financing the post-Sandy buyouts. This is important because FEMA has particular requirements when using this source of funding. As mentioned in Chapter 3, all parcels being purchased with HMGP capital must be put under a conservation easement. Fortunately, Green Acres already required a deed restriction preventing new structures and impervious surfaces. The project manager at Blue Acres noted that "the open space objective dovetailed well with the FEMA hazard mitigation goals." After Lee and Irene, Blue Acres submitted 5 HMG's to FEMA acquiring 18 million in funds for 103 properties. So when Hurricane Sandy hit in 2012, the Blue Acres program already had experience with FEMA buyouts. While Blue Acres had to expand to cope with the large number of home seeking buyouts, they could rest on the prior experience of going through the FEMA HMGP application process. Governor Christie requested a pre-approval of

\$300 million from FEMA to buyout 1,300 homes. However, each home still had to go through the same application process to get their approval to use the funds. Under this special agreement, FEMA would pay 90% of the cost of the buyout instead of the typical 75%.

Ultimately, Blue Acres sourced grants from a number of programs depending on the circumstances. It primarily used FEMA funding for communities that have a strong benefit-cost ratio for the community. However, it also used HUD CDBG-DR funding as well as money from its own Blue Acres Fund. Drawing from these additional sources gave them the flexibility they needed to perform buyouts in places which may not be eligible under FEMA's HMGP grants.

NY Rising, on the other hand, relied exclusively on CDBG-DR funding. After Hurricane Sandy, HUD gave the State of New York \$4.4 billion under the CDBG-DR program for storm recovery and mitigation. The Governor's Office of Storm Recovery was responsible to managing these funds and allocating them to different programs. The immediacy of the HUD funding made it attractive to use for buyouts. While the FEMA funding required that the state apply to use the funding, the HUD funds didn't. This meant NY Rising could remove a step that would delay the buyout process. Also, the HUD funding covers the entire cost of the buyout, while the FEMA funds would only cover 90% of the cost.

Another key difference of this funding is that there is an expenditure deadline. All HUD funds awarded to the state of New York need to be used by 2019. This could potentially place pressure on the program to use the funding before it becomes unavailable. However, the program has comfortably met the goals set by Governor Cuomo. While \$240 million were initially dedicated to buyout 610 homes, the program has spent \$286.5 million and completed 730 closings. Despite already meeting its goals, homeowner interest in buyouts continue and the state has continued to buyout properties. If homeowners want buyouts after the 2019 deadline, neither the program, nor the funding will be in place for it.²

	Parent Institution	Dedicated Funding	Funding Used to Date	Projected Number of Closings	Number of Closings to Date	Funding Sources
Blue Acres	Department of Environmental Protection (NJDEP)	\$300 million	\$122.3 million*	1,300	588*	CDBG-DR (HUD) HMGP (FEMA) EWP-FEP (USDA) Blue Acres
NY Rising	Governor's Office of Storm Recover (GOSR)	\$240 million	\$286.5 million**	610	730**	CDBG-DR (HUD)

Figure 4.2: Post-Sandy Buyout Programs by the Numbers

* Totals according to Blue Acres as of May 1, 2017

** Totals according to NY Rising as of April 4, 2017

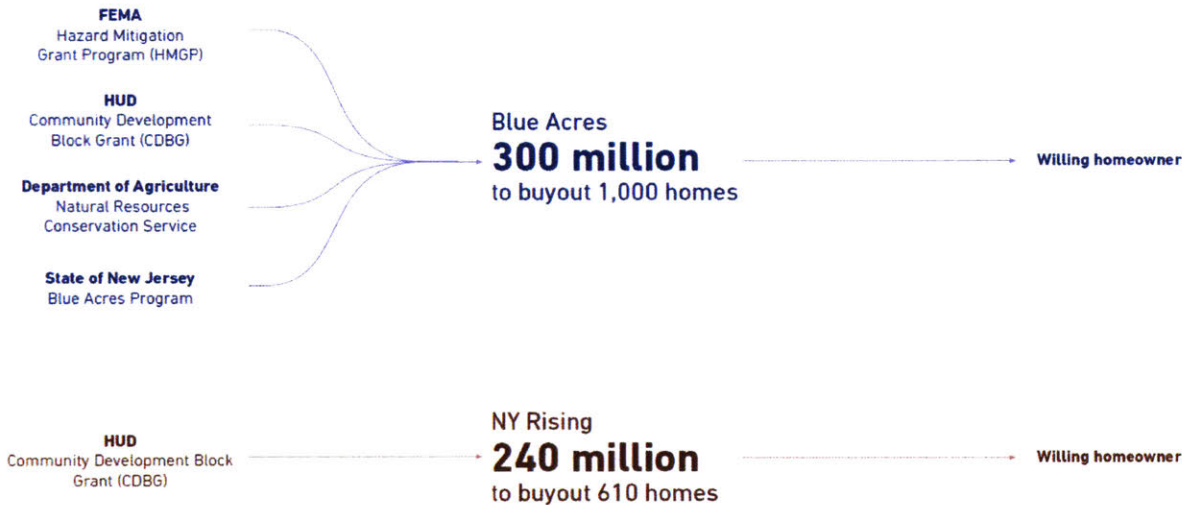


Figure 4.3: Capital flows for each of the state buyout programs.

While getting relief to homeowners quickly was one reason why NY Rising chose to use HUD CDBG-DR funds, this doesn't necessarily offer a quicker path. When comparing the closing dates between NY Rising, which used HUD funding, and Blue Acres, that used FEMA funding, both programs are on a similar timeline. Both programs close on their first properties 12 months after Hurricane Sandy hit. NY Rising does front load its program more with a median closing date of 10/29/2014. Meanwhile the Blue Acres program is not as front loaded and has a median closing date of 4/30/2015.

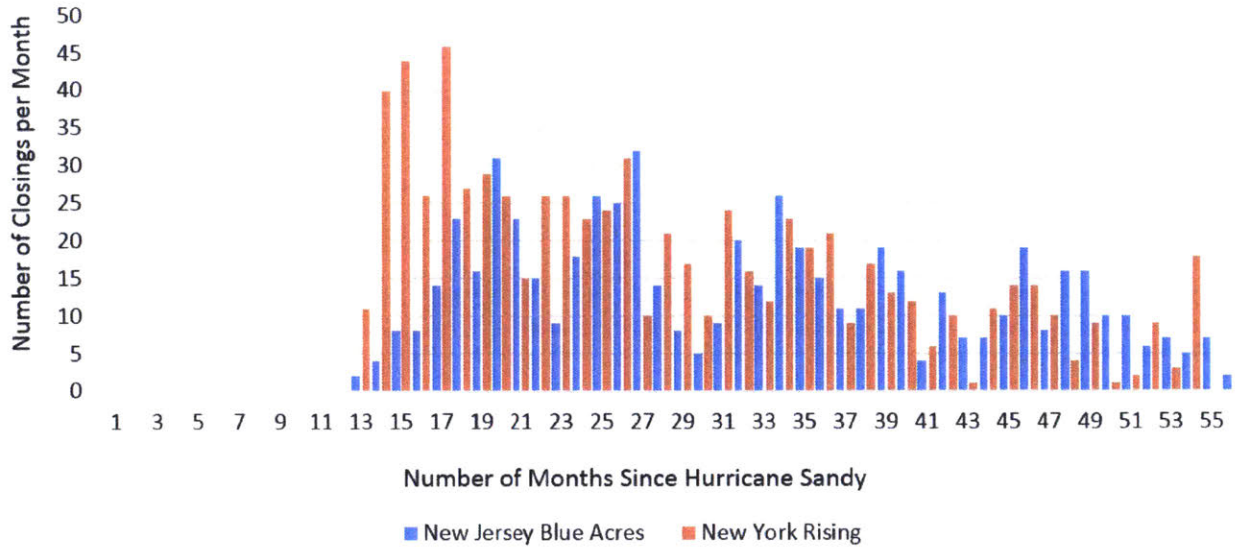


Figure 4.4: The number of closings per month for NY Rising and Blue Acres.

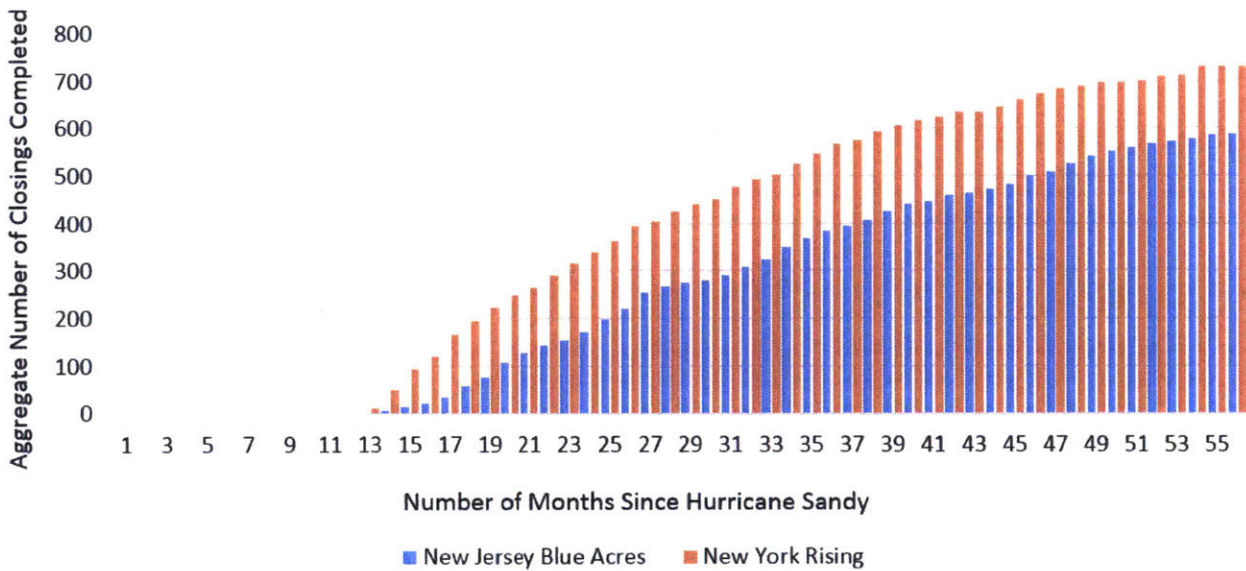


Figure 4.5: The aggregate number of closings completed by number of months after Hurricane Sandy.

Because buyout programs want to maximize the number of homes, and amount of land that they can buyout, they often tend to focus on neighborhoods with lower property values. Blue Acres in particular mentioned this strategy as being important to them. Since conservation was a primary objective

for them, maximizing the amount of urban land that they could convert to open space was critical. When asked why Blue Acres had steered clear of the more expensive barrier islands, a spokesman for the NJDEP said “the bang for the buck was not there.”³ The median closing price of Blue Acres is \$212,000 while for NY Rising it is \$403,500. While it’s possible this is evidence of Blue Acres approach to maximizing conservation, there could be other factors at play. Much of New York’s buyouts were on Staten Island which has high home values.

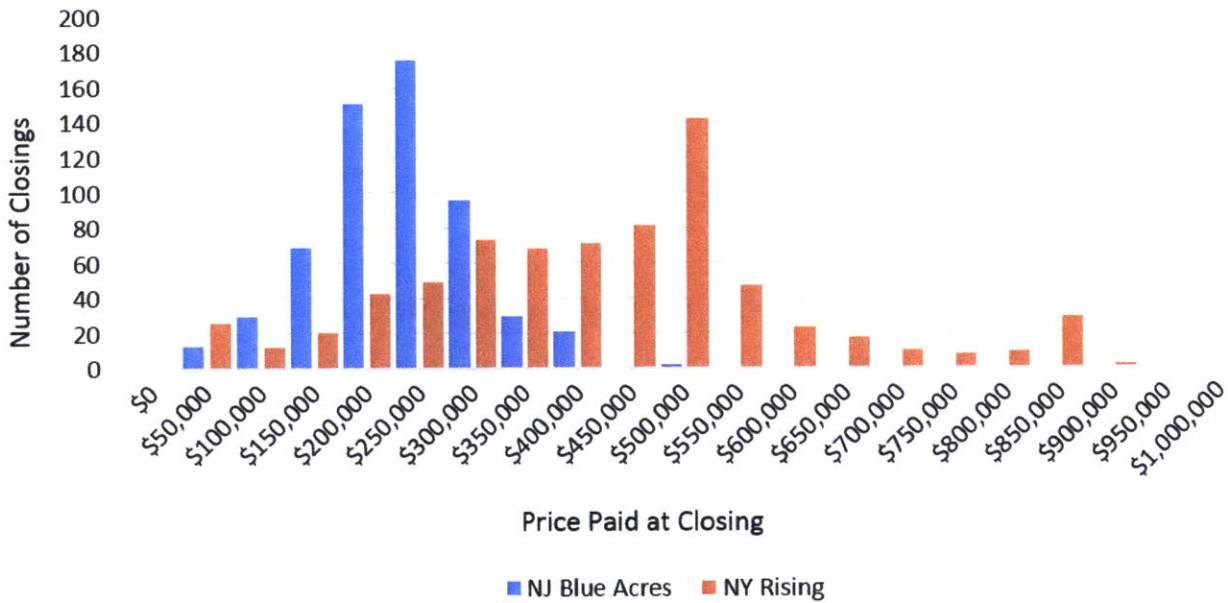


Figure 4.6: Histogram of the price paid at closing for buyout properties.

Municipal Relationship

The Blue Acres program had to evolve its property selection process. When buying out numerous homes, Blue Acres determined that the municipality had to be a partner. This is because one of the most significant barriers that buyout programs can face is that of municipal opposition. This is because buyout programs can have a significant impact on the tax base of a municipality. This can could require the town to increase taxes to make up for those lost through the buyout program. To make sure municipality were informed and on board, Blue Acres created an “advance” team that went to towns directly after the storm to talk to elected officials. These meetings also generated press coverage that were a means to spread

the word through the community. Governor Christie also made some press releases announcing the program statewide.

In the days after Hurricane Sandy Blue Acres set up an ad hoc team to start planning how buyouts could respond to the new challenges and scale of the disaster. Blue Acres recognized that, because of the quantity of homes that were likely interested in buyouts, they could not simply bypass the municipalities to work solely with the homeowners. Many towns had dozens or even hundreds of properties that could potentially want a buyout. Town's fear that this could result in a significant impact on the tax base. Because of this, Blue Acres made the determination early on that they would not do buyouts in towns that did not want them. In order to gauge interest in buyout among municipal governments, Blue Acres created the "advance team." This is a group of representatives who traveled to each municipality in the weeks after Sandy to discuss the potential of doing buyouts there. In each town they would set up a meeting with all a diverse group of municipal officials. For the towns that participated, Blue Acres established a point person that they could contact in that town. This point person was responsible for working with Blue Acres throughout the entire buyout process.

NY Rising emerged when residents from Oakwood Beach, Staten Island couldn't get buyouts from the New York City government. Even though New York City got their own \$4.2 billion from CDBG-DR funding from HUD⁴, they were reluctant to set up a buyout program. Buyouts were at odds with the Build it Back program that was looking to rebuild neighborhoods. Seeing an opportunity, Governor Cuomo circumvented the city and met with Staten Island residents. He offered to do buyouts under the state's NY Rising program. However, when expanding the program to other coastal communities, NY Rising met much more opposition at the municipal level and county level. Nassau County and some municipalities rejected buyouts altogether, limiting the areas where they could be pursued. Ultimately, buyouts were done in 6 additional municipalities in Suffolk County on Long Island, including Babylon, Lindenhurst, Islip, Patchogue, Mastic Beach, and Southampton.

NY Rising did not establish a clear relationship with these municipalities. While Blue Acres established a point person in each town, NY Rising had no such formal position. Communication with the towns was sparse, and municipal officials were often only notified of important progress after the fact. This led to misunderstanding and tensions between the municipalities and NY Rising. This lack of coordination was an impediment to creating a more unified vision of buyouts, and establishing rapport with the local homeowners.

Site Selection

Blue Acres opened up their offer application to homeowners state-wide. Homeowners could fill out and submit these offer applications online. This allowed Blue Acres to map the applications and understand where there was a high number and density of homes. They would also map the property in relation to the special flood hazard area, conservation land, rivers, landscape data, endangered species data and historical assets. Even if homes aren't 51% damaged, they will still be considered if they pass the cost-benefit analysis with a ratio of at least 1. This process would allow Blue Acres to prioritize buyout areas based on a mix of coverage and impact on conservation goals.

Whenever they got an offer application they would send it to the municipality to start a discussion with their government. If the town was on board they would set up a public meeting where the Blue Acres representatives could meet directly with the homeowners who applied. At the end of the meeting each homeowner would be assigned a case worker who would assist them throughout the entire buyout process.

New York Rising also required grass roots. New York Rising established what are called Enhanced Buyout Areas. According to the director of the NY Rising Buyout and Acquisition program, enhanced buyout areas are determined by 3 factors. The first is flood risk. This is assessed by NOAA and state data on past flooding. Homes at risk to flooding are classified as either as extreme, high, moderate, or low risk. The second factor is willingness from homeowners to participate. NY Rising requires that homeowners in the area rally together signatures from a majority of homeowners in a given area. This requires a grass-roots effort by leaders in the community. The last factor is that municipalities must be on board with the buyouts. In some cases. They asked municipalities to draw boundaries where the buyouts should take place. While this is the official description of the selection process, firsthand accounts suggest it was much more unorganized. One source said that, ultimately it was the governor that decided where the buyouts should be.

Having Enhanced Buyout Areas was intended to ensure that buyouts would only take place in neighborhoods that had majority participation. The dual program of buyouts and acquisitions was meant to completely dissolve neighborhoods where (almost) everyone wanted to leave, and make neighborhoods stronger where the majority wanted to stay. However, NY Rising did not expect the amount of attrition that happened within the buyout areas. Additionally, there were homeowners outside

the buyout areas that wanted a buyout, but were only eligible for an acquisition, which pays the post-flood value for the home.

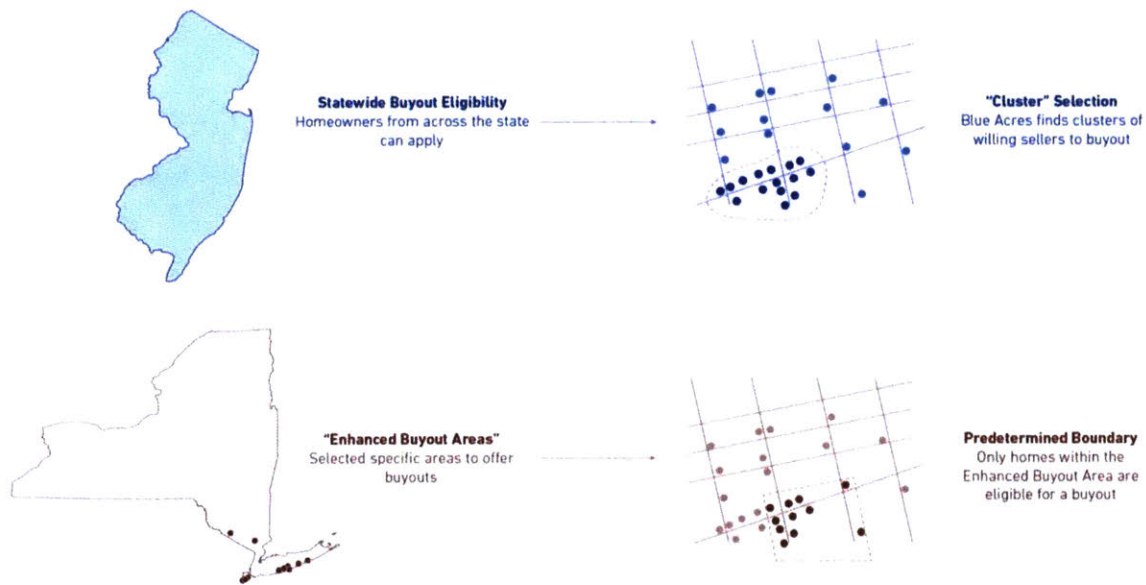


Figure 4.7: Eligibility and site selection process for Blue Acres and NY Rising.

These two programs are very different in site selection. While Blue Acres elicits applications from individual homeowners, NY Rising's process requires a grassroots, community effort by homeowners. This approach by NY Rising could potentially act as a barrier to some neighborhoods asking for buyouts because. The decision to have fixed Enhanced Buyout Areas means that the buyout zone can expand over time. One resident mentioned that she was one parcel outside the buyout zone and was not eligible as a result. In New Jersey, they were willing to expand the program to accommodate interest from nearby homeowners.

Outreach

Despite the significant scaling up of Blue Acres, the policy director was adamant about limiting the amount of outreach that they do. The Blue Acres attributes its success to the fact that they establish trust with homeowners by taking a more hands off approach. Rather than actively pursuing participants, they take a more passive approach and allow homeowners to come to them. Because of this, they do little outreach in the communities affected, but instead rely on statewide press releases about the program,

and some local press coverage. This allows Blue Acres to be perceived more as a service to the public rather than an institution imposing its own agenda on the homeowners. This low pressure approach to buyout outreach is intended to prevent people from feeling threatened by the program. This allows the program can operate more effectively in the long term.

Notification of the buyout program was first made by Governor Christie when he held a press release. In it, he dedicated \$300 million in funding to the buyout program and the stated goal of purchasing 1,300 homes. Homeowners were directed to fill out online forms if they were interested in the program. If after receiving offer applications from homeowners, there were residents in the neighborhood that hadn't sent in an offer application, then Blue Acres would send out letters to those homes notifying them of the buyout program, as well as other government programs. Once receiving enough applications that Blue Acres could identify a cluster of homes, they would set up a meeting with the homeowners who applied. At the end of the meeting each resident would get a case worker who could help them through the rest of the buyout process if the elected to continue.

The demolition of homes got a lot of press and became their own form of outreach. Seeing demolitions in their neighborhood, homeowners called Blue Acres showing interest in the program. Officials at Blue Acres could then tell them to talk to their neighbors participating in the program and hear about their experience. This approach fueled more participation. The town of Woodbridge for instance is on their third round of buyouts. After each round of demolitions more homeowners would become interested. This approach also helps to foster trust in the government. Trust has a large impact on the success of a buyout program, so and so found that those with greater distrust of the government, were less likely to take buyout offers. Blue Acres as able to take this more hands off approach because it is a permanent fixture of the NJDEP and is not rushing to complete buyouts after a storm.

NY Rising took a similar approach to community outreach. A series of press releases announced the program. Also, local relief centers set up by New York Rising became a place where residents could find out more about buyouts. Once the Enhanced Buyout Areas were determined, they then sent letters out to everyone who what within the area.

The Offer

Blue Acres offered pre-storm fair market value (FMV). This is real property value includes anything that is not easily separated from the home. This includes light fixtures, appliances, plumbing and millwork. The program used local appraisers and covered the cost of the appraisal. If homeowners were not happy with the offer they received, they could get an additional appraisal at their own expense.

NY Rising also offered pre-storm FMV. They however differed in that they offered additional incentives that would make the buyout offer more attractive. This included a 10% incentive for residents that moved outside of the Enhanced Buyout Areas and a 5% incentive for relocating within the county. Together, a homeowner could get a total of 15% above the FMV of their home. These incentives were designed to make an offer good enough that they could remove the majority of residences from the designated Enhanced Buyout Areas.



Figure 4.8: The offer packages for Blue Acres and NY Rising buyout programs.

Continued Land Management

While federal funds through FEMA and HUD don't stipulate who can have continued ownership of the land, the Green Acres program does. All land acquired under the Green Acres program has to remain under the ownership of the state. However, in most cases it doesn't make sense for the state to continually manage the land. While the NJDEP is capable of managing large pieces of conservation land, like State Parks and wildlife refuges, it doesn't make sense to devote resources to small, scattered parcels. Instead the state signs a Memorandum of Understanding (MOU) with the municipality. This is an

agreement that says, while the state maintains ownership of the land, the municipality is responsible for managing it. This leaves the possibility that the town can use it for low impact, passive uses. While the deed restriction doesn't allow any structures or impervious surface to be built, recreation and conservation uses that don't require these can be implemented. In the case of some isolated lots, the municipality will sign an agreement with the owners of adjacent homes to use them as side yards. Because the state will continue to own the land, Blue Acres has a point person in each municipality that is responsible for contacting them if there are any issues with the land.

NY Rising has taken an entirely different approach. Because NY Rising is a temporary institution, it doesn't have the capability to own and manage the land in perpetuity. Instead, it used the NY Housing Trust Fund Corporation (HTFC) to hold the land temporarily. So at the time of closing, the property owner is selling their property to the HTFC. The HTFC then must dispose of the land. Their solution has been to deed the land the local municipalities for free. This is intended to allow the municipalities to use the land for their own purposes. Because each municipality has different goals for the land, they can use it how they want. In rare cases, properties have been sold to adjacent homeowners to be used as side yards. This is only done in cases where the properties are too small to have any other meaningful use. In these cases, the deed restrictions still apply so no structures or impervious surfaces can be built on the parcels.

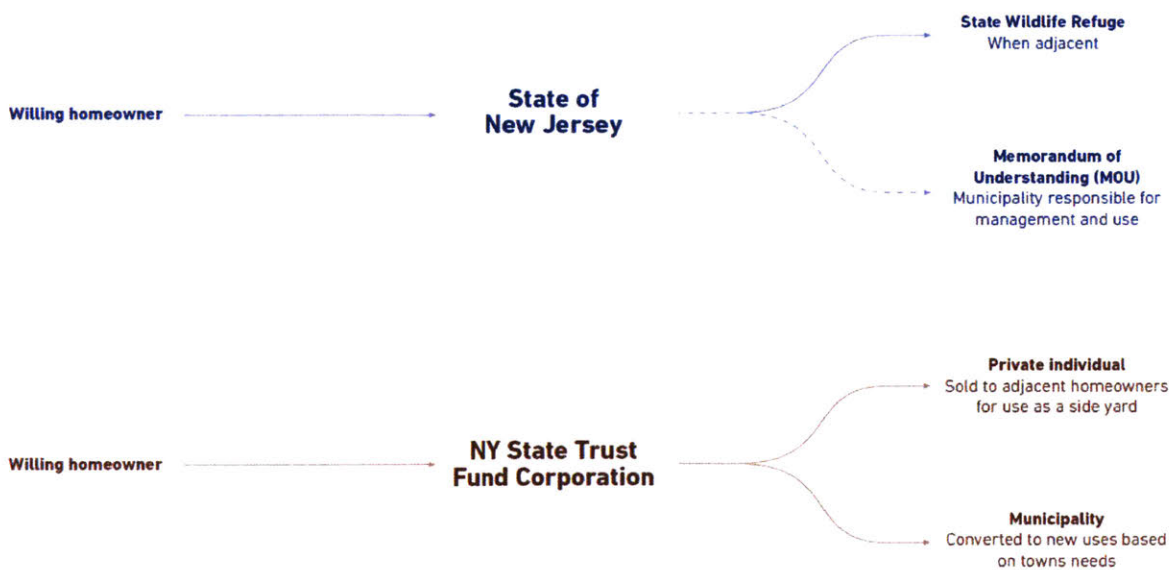


Figure 4.9: Diagram showing the passage of deeds between actors.

Planning for the Future

While Blue Acres will continue doing buyouts, there is no work going on to prepare for the increased flood risk expected from climate change. Within the New Jersey government there is a moratorium on using the phrase climate change in any government projects. Anecdotally, however, there officials are aware of climate change and thinking about it. They are also aware that they don't want to be fear mongers. Property owners need to trust them for the program to have continued success. Officially, Blue Acres will provide these same services into the foreseeable future.

NY Rising's Buyout and Acquisition program will cease to exist after either the 2019 or 2022 sunset. However, they are preparing a "lessons learned" document so that their knowledge can be picked up by other agencies in the state or future storm recovery teams. At this point, there are no plans for creating a permanent buyout program like the one in New Jersey.

There is a key difference between the two programs models. Because New York's is reactive and only exists for a period of time after the storm, there is a lack of continuity that has potential drawbacks. First of all, there is a loss of knowledge that comes from entirely dissolving the program. While New Jersey's program needs to expand and contract depending on storm damage, it still keeps a core group of people. This group preserves the working knowledge of the program, still performing buyouts at a smaller scale between major storms.

Chapter 5: Case Studies



	Woodbridge, NJ	Lindenhurst, NY	Mastic Beach, NY
Population Census (2010)	99,585	27,253	12,930
Population per square mile (2010)	4,290.1	7,248.1	2,400
Households (2011- 2015)	33,375	9,081	4,881
Median Household Income(2011-2015)	\$79,720	\$83,532	\$62,602
Housing Units (2010)	36,124	9,665	4,375*
Owner-Occupied Housing Unit Rate (2011-2015)	67.4%	76.4%	73.3%
Median value of owner-occupied housing units (2011-2015)	\$294,200	\$342,200	\$188,500
Race % (2010)			
White Alone	59.2%	92.1%	66.0%*
Asian Alone	22.4%	1.9%	1.9%*
Black Alone	9.9%	1.5%	9.8%*
Hispanic	15.6%	9.7%	18.3%*
Two or more races	2.9%	1.6%	3.4%*
American Indian and Alaska Native Alone	0.3%	0.1%	0.2%*
Native Hawaiian and Other Pacific Islander Alone	z	z	z

Figure 5.1: All data from the 2010 U.S. Census unless otherwise noted
z: Value greater than zero but less than half unit of measure shown

* source: city-data.gov from 2015

** source: 2000 U.S. Census

Woodbridge Township, NJ



Figure 5.2: Where homes once stood, there is fresh soil and seed from demolition and ecological restoration work. The homes on the right are just out of the flood plain, and were not considered for buyouts. Photo by author.

Introduction

Located at along the tidal Raritan River and Arthur Kill, Woodbridge is relatively far from the coast. Despite this, it's susceptible to flooding because wind driven storm surge is magnified as it passes into the shallow waters of the Raritan Bay. During Hurricane Sandy, the smaller Woodbridge Creek was responsible for most of the flooding that impacted residential neighborhoods. The worst impacted of these was the Watson-Crampton neighborhood. This neighborhood, in particular, had been known to flood for over 50 years, even during some high tides. The coordinator of Woodbridge's Emergency Management Office noted that every time there's a flood the lives of police and firefighters would be put at risk. The town was already in the process of flood mitigation efforts that included dredging portions of the Woodbridge Creek. After Sandy, they saw buyouts as an effective way of reducing risk to lives and property.

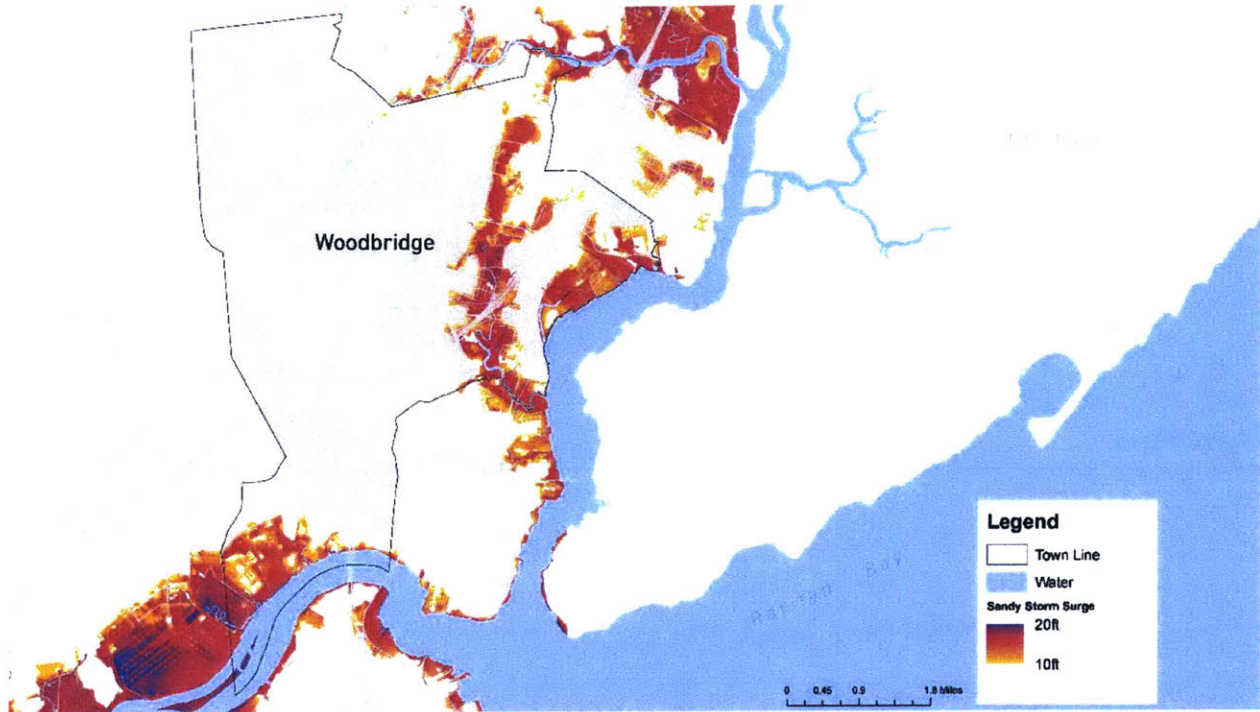


Figure 5.3: This map of Woodbridge shows where the storm surge took place.

Local Planning Goals

Woodbridge hoped that Blue Acres could relieve the town of its chronic flooding problem and the toll that it was taking on residents and emergency services. They also saw an opportunity to expand open space and remove from town infrastructure from flood prone areas. The Watson-Crampton neighborhood in particular already had an open space plan in progress so the ability to expand land and recreational opportunities there was a priority for the town. Despite these benefits, Woodbridge was also concerned about losing tax base. While other towns have opposed buyouts because of their impact on the tax base, Woodbridge was in a position where they were undergoing a significant amount of industrial development. A new power plant in Sewaren and new warehouse construction and renovation led the town to determine that there would not be a significant impact on the tax base.

The Buyouts

Hearing about the Blue Acres program in adjacent Sayreville, NJ, many people in Woodbridge applied to the state hoping for assistance. Recognizing the amount of interest, Blue Acres contacted Woodbridge Township and had a meeting with the town Mayor, business administrator, chief of staff and the Department of Public Works. With the town on board, they assigned a formal point of contact with Blue Acres. The town facilitated a meeting between Blue Acres and the residents at the local high school. This meeting allowed for the residents to learn more information about the program as well as meet with their assigned case workers. Each resident was given a case worker that would bring them through the buyout process.

Buyouts were the most popular 4 neighborhoods including Watson-Crampton, Sewaren (Roberts St.), Port Redding and Avenel (Bayer and Coddington Ave). Once 12 houses were closed, Blue Acres would put out an RFP for the demolition. They did this repeatedly as each new group of 12 homes was closed. Because homes were demolished based on when the homeowners closed, this means that they were not in clusters, but scattered throughout the town's 4 buyout sites. As soon as the parcels were demolished, they went under the management of the town through a MOU. Once streets had no homes, and were not essential thoroughfares, the town paid for, and executed their demolition.

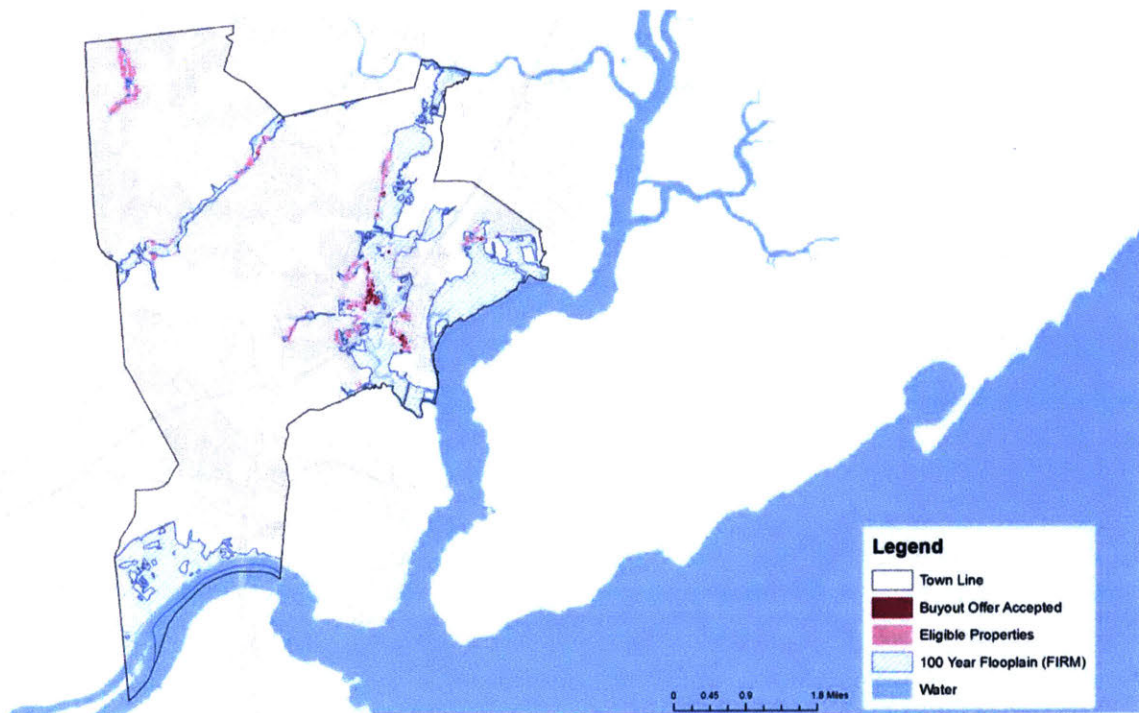


Figure 5.4: Homes are eligible if they are located in a FEMA designated 100 year floodplain.

Currently, Woodbridge is in their third round of buyouts with Blue Acres. However, the town didn't initially expect that there would be multiple phases of buyouts. Because Blue Acres applies for federal buyout funding from FEMA, they consolidate multiple homes into a single application package. At the same time, they need to process the buyouts in a timely fashion so the homeowners don't need to wait to close on their homes. So while there is a limited amount of time to be included in each round, homeowners can still apply with the possibility of being included in future rounds. This has the additional benefit of letting homeowners see their neighbors go through the process. Once homeowners have seen others benefit from buyouts, and see many of the homes around them get demolished, they may be more likely to take the buyout offer. Offering multiple rounds of buyouts is key to taking advantage of this effect.

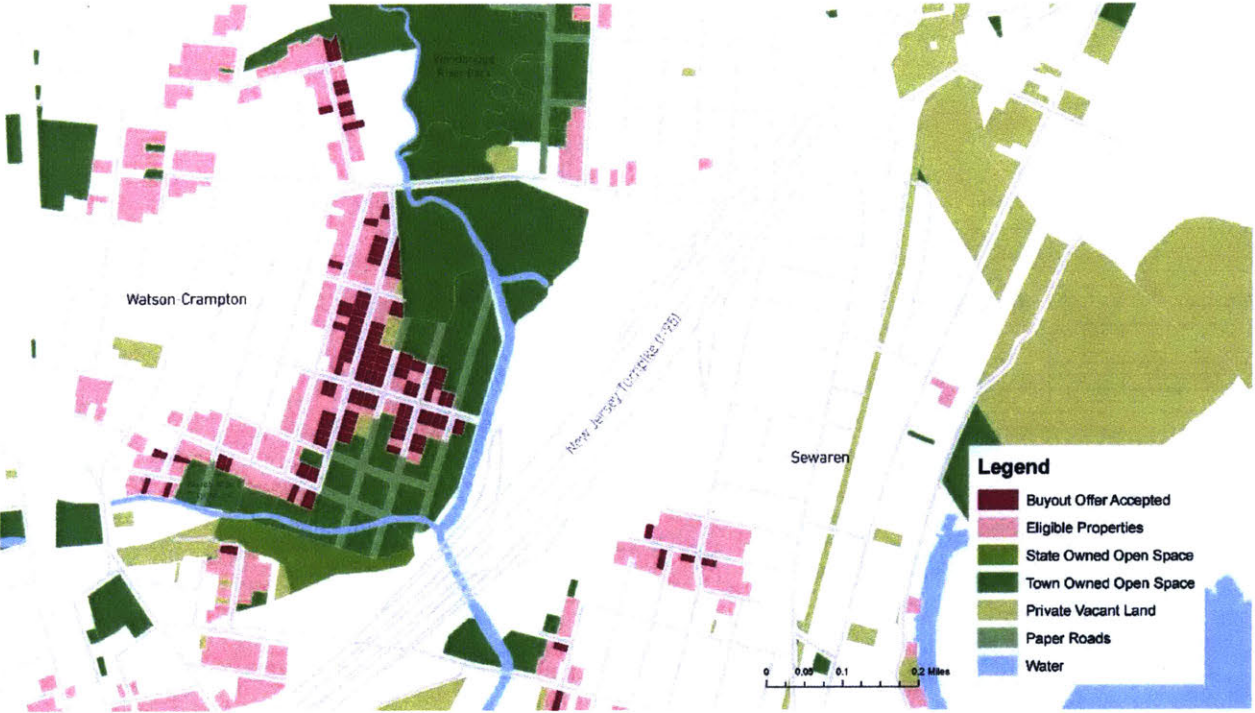


Figure 5.5: A portion of the Watson-Crampton neighborhood is in the low-lying flood plain of the Woodbridge Creek. This is where buyouts were the most popular.

Outcomes

At this point, 139 buyouts have taken place accounting for almost 20 acres of open space (Figure 5.20). 73% of this area is contiguous with existing open space (Figure 5.21). This is high compared to the New York cases and is likely the result of development patterns in Woodbridge. The 100 year floodplain designated by FEMA is largely open space that extends along the Rivers through the town. Neighborhoods here often only extend into the flood zone one or two blocks, meaning that much of the eligible properties

are close to, or abutting open space. This made it easier for Woodbridge to integrate bought out parcels into existing open space.

The town has also inherited a number of parcels that are surrounded by other homes. Disconnected from other open space, they can't be easily integrated into the larger plans. While letting the lot revegetate would allow it to have additional flood mitigation properties, residents don't want an unkempt lot in their neighborhoods. This poses an additional maintenance hassle to public works because they have to continually mow the property so it doesn't grow in. They did find that the owners of the abutting parcels were interested in using the lot as a side yard. However, because the lots are state owned, they couldn't just sell it to an abutting property. Instead, the town has come up with the solution of signing an agreement with the owner of the abutting parcel that allows them to use and maintain it. This agreement lasts until they move from that home, at which point it going back under the control of the town. This has worked so far in numerous cases. One lot is even split in half and shared between the abutting parcels on either side.



Figure 5.6: The concept plan for the Watson-Crampton neighborhood. Image courtesy of Heyer, Gruel & Associates.

There are also homes that still remain in the floodplain surrounded by newly created open space. This undermines the town's interest in removing all of the homes in the buyout areas so they could convert the land to new uses. The largest barrier to this was the fact that many homes had been foreclosed on prior to Hurricane Sandy. This meant that rather than being the property of individuals, they were owned by banks. Blue Acres only works with properties owned by individuals which meant they could not buy out these homes. This meant that you had a lot of inexpensive foreclosed properties on the market that local developers were eager to purchase so they could redevelop them. This was not in alignment with the town's interests of removing homes from the floodplain. To prevent this from happening, they changed the zoning ordinance in these areas to require that homes undergoing major renovations are also elevated above the base flood elevation. This would mean an elevation of 13 feet in many places. After this zoning change, no one wanted to purchase the properties. The town is now in negotiation with the banks to have them simply deed the properties to the town. So far, one bank has agreed to do this.

Another issue has been with a duplex where one the owner on one side decided to take the buyout offer, while the other side has, at this point at least, rejected it. Technically, half of the duplex could be demolished and the party wall re-clad. However, funding from Blue

Acres only covers the demolition costs and not the cost of any construction work. Furthermore, the benefits of turning the land into natural flood plain are undermined by the fact that the remaining landowner still owns the entire parcel. Currently, the half of the duplex that is bought out remains vacant, while to other half is still being lived in. This shows why buyouts have been principally used for single family homes, and reveals the problems of applying buyouts to multi-family homes.

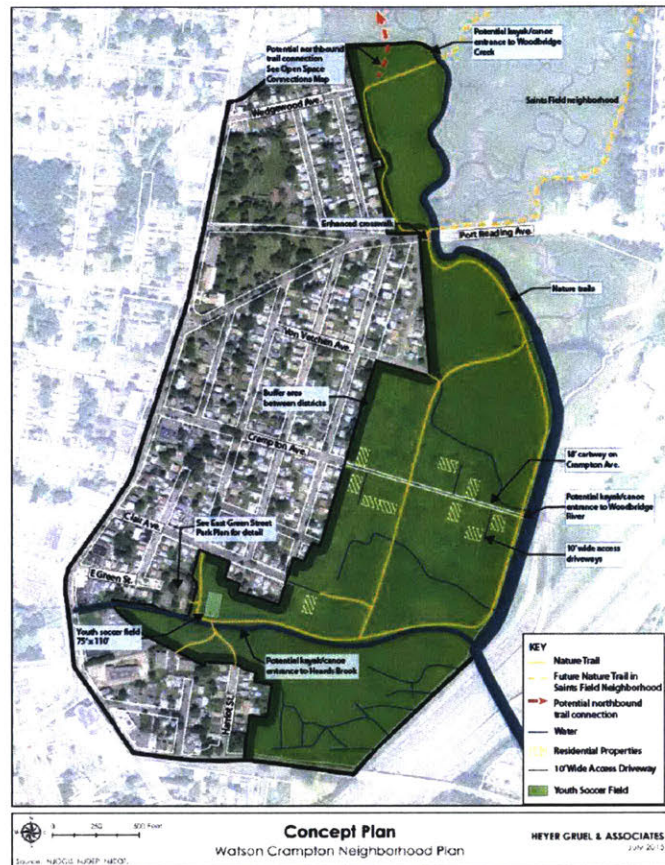


Figure 5.7: The concept plan for the Watson-Crampton neighborhood. Image courtesy of Heyer, Gruel & Associates.

Because buyouts were taken by the large majority of homeowners in the Watson-Crampton neighborhood, the town's Parks Department sought ways that the land could be utilized for conservation and recreation purposes. They had already been developing plans for the open space around the neighborhood. This made it particularly easy to expand to include the parcels that were bought out. To draw up the site plan, they hired Heyer, Gruel & Associates, an urban design and planning firm. The number of buyouts that took place, allowed for the removal and dead-ending of several streets in the neighborhood. The plan they developed depicts what was neighborhood as a solid swath of green, crossed with trails for recreation (Figure 5.7). The remaining residential parcels are shown merely as lightly



Figure 5.8: A stretch of Watson Road has been recently removed while the powerlines are, at least for now, still in place. Woodbridge, NJ. Photo by Author

hatched rectangles, suggesting that they blend into the open space. While the vision is for this to be an open space, in reality these homes will likely have a stronger presence than this map suggests. The director of public works for the town said that the most difficult part of the process is protecting the homes that are still there. They have to leave much of the sewer systems in place and maintain access to their homes so they can keep living their lives. The way he describes the work was “trying to get

all of these worlds to live together.” Even though the street can be demolished in some places (Figure 5.6), sewers and power lines remain in order to service the residents that did not leave (Figure 5.8).

With the site plan established, Woodbridge then hired researchers at Rutgers University to do environmental restoration work. Rutgers responded with a multiphase plan that includes planting of native species. The first phase of this, which included more than 50 trees and wildflower beds, was implemented in the fall of 2016. Once more of the homeowners have left, they are planning on mowing walking trails through the neighborhood. There are also plans to add a kayak launch to the Woodbridge River and the end of Crampton Ave. While the buyout program has resulted in some unusual circumstances for the town to deal with, its ability to convert a large area of the Watson-Crampton neighborhood to open space allowed it to take advantage of benefits beyond flood mitigation for the individual properties. The land can both perform as a continuous natural flood barrier for the adjacent

neighborhood, as well as double as recreation space for the residents. Getting such complete coverage was largely the result of repetitive flooding that had tested the residents' will to stay. However, the multiple rounds of buyouts that occurred aided in getting more participants by giving them time and precedent. Woodbridge also benefited from having already initiated a planning process to repurpose the neighborhood's surrounding open space. This allowed them to move swiftly and present a unified vision for the neighborhood to the residents considering the buyout offer

Mastic Beach, NY



Figure 5.9: Much of Mastic Beach is built on top of salt marshes and is subject to regular flooding. Here, puddles form on a vacant lot. Photo by author.

Introduction

Mastic Beach has been the target of real estate speculation since the 1920's. Only 90 minutes from New York City, Mastic Beach is unusual for the south shore because it offers properties that are both close to the waterfront and inexpensive. This has attracted the low and moderate income households unable to afford buying or renting in the adjacent towns.¹ More recently, many of these homes were bought with subprime mortgages which resulted in a significant amount of foreclosed homes during the subprime mortgage crisis. Because of this, the village is dotted with "zombie houses," which are vacant, bank owned properties.² The declining appearance of parts of Mastic Beach pushed residents to call for more control over zoning, land use and infrastructure investment. This led to the incorporation of Mastic Beach in 2010. Before that it was only a neighborhood within the town of Brookhaven.

While Mastic Beach is now an incorporated “village,” it is a sub-municipality of the town of Brookhaven. Under this arrangement, the town of Brookhaven still provides police, fire, and sanitation services. However, Mastic Beach controls their land use, zoning, and building code enforcement. This was important to many residents in Mastic Beach because they thought the town was not doing a good job at making the town an attractive place to live or invest. Also, some town officials and residents wanted to bring development to the coastline, something that Brookhaven doesn’t support. However, Mastic Beach will be short lived. As of March 2017, citizens voted to dissolve the young village and rejoin the town of Brookhaven later this year. This comes at an important time when the vision for the waterfront is still in the making.

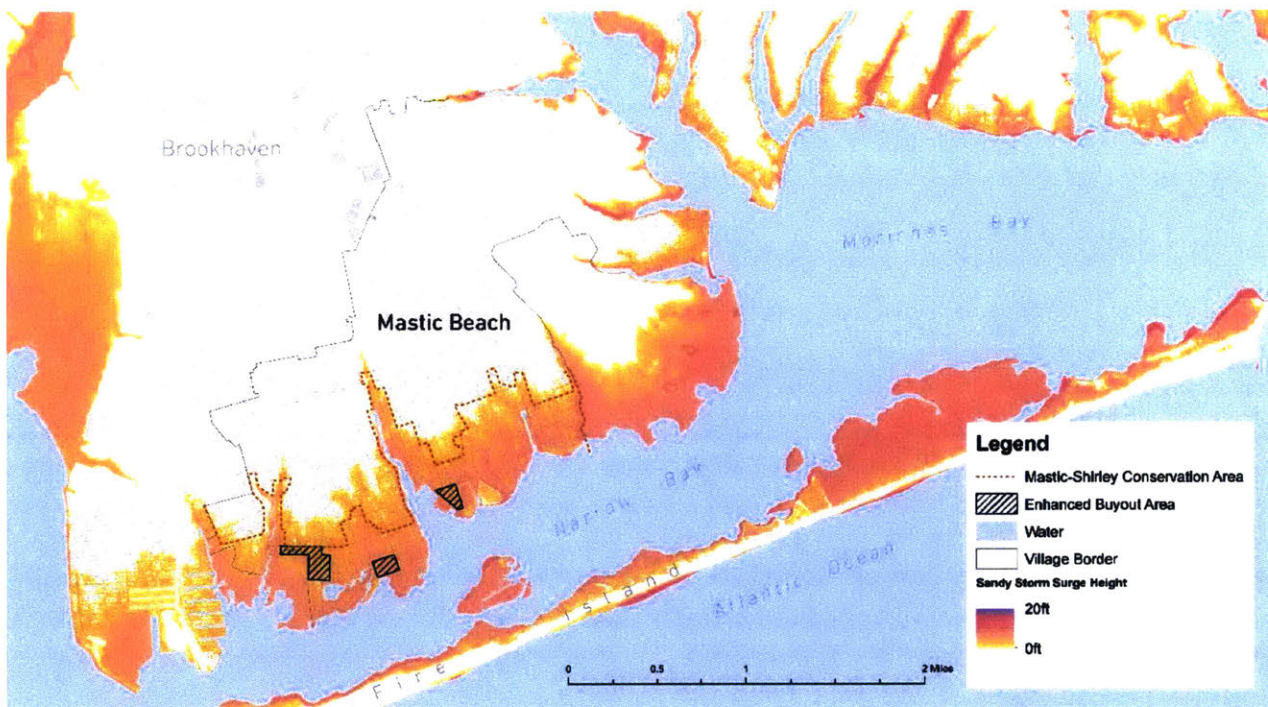


Figure 5.10: Flooding from Hurricane Sandy closely matched the boundaries of the Mastic-Shirley Conservation Area. The buyouts were located within the conservation area, but only represent a small portion of the storm surge impacted zone.

When Hurricane Sandy hit, it significantly impacted Mastic Beach with its storm surge. The village occupies a low-lying peninsula that projects into Long Island’s Great South Bay farther than much of the surrounding landscape. Much of the southern edge of the peninsula consists of neighborhoods built on salt marshes that regularly experience tidal flooding before the storm. During the storm, many homes flooded and emergency responders performed over 100 rescues within the flood zone.³ The storm also had a significant environmental impact in Mastic Beach. The town does not have a public

sewer system, meaning that each home has their own septic tank. However, these tanks were often poorly constructed and, even before Sandy, posed a leaching problem. Sandy's flooding damaged a significant number of septic tanks resulting in thousands of gallons of wastewater into the village and its waterways.⁴ Both the flooding and environmental catastrophe made it clear that new approaches to coastal land management had to be explored.

Local Planning Goals

After the Hurricane Sandy, the town was divided about what the coastal zone should look like. Some village board members still wanted to develop the coastline but with flood defenses like rip-rap and buildings elevated on pylons. While this group exerted some influence early after Sandy, they slowly got voted out of office and replaced by a board that was pro-buyout. This aligned much better with the vision of a de-developed coast that was also shared by the town of Brookhaven, Suffolk County, and conservation groups like the Nature Conservancy. In fact, all of these entities had been acquiring vacant parcels along the coastline for years as part of the Mastic-Shirley Conservation Area. As some of the last remaining salt marsh on the south shore, this area was a focus of conservation efforts. However, already subdivided for development, the properties were fragmented among numerous owners, and scattered with occupied houses. Despite attempts at consolidation by both the town and county, the conservation areas still resembles a patchwork of ownership between various public and private entities.

The Buyouts

When NY Rising started offering buyouts and acquisitions in the area, these groups saw it as a unique opportunity to remove some homes from this area. While the state reached out to Suffolk County for help of delineating the buyout areas, the final decision was made by a small group in the GOSR. Three areas were chosen as the Enhanced Buyout Areas that make up a small percentage of the floodplain (Figure 5.11). Each of these areas is adjacent to existing wetlands. The Huntington Drive buyout area (1) is next to John's Neck State Tidal Wetlands. The Diana Road buyout area (2) is surrounded by a mix of Suffolk County parkland and parcels that are proposed for acquisition by the county for parkland. The Locust Drive (3) buyout area is adjacent to a proposed floodplain easement. Each of these is a location for creating more continuity across what is currently a patchwork of conservation land.

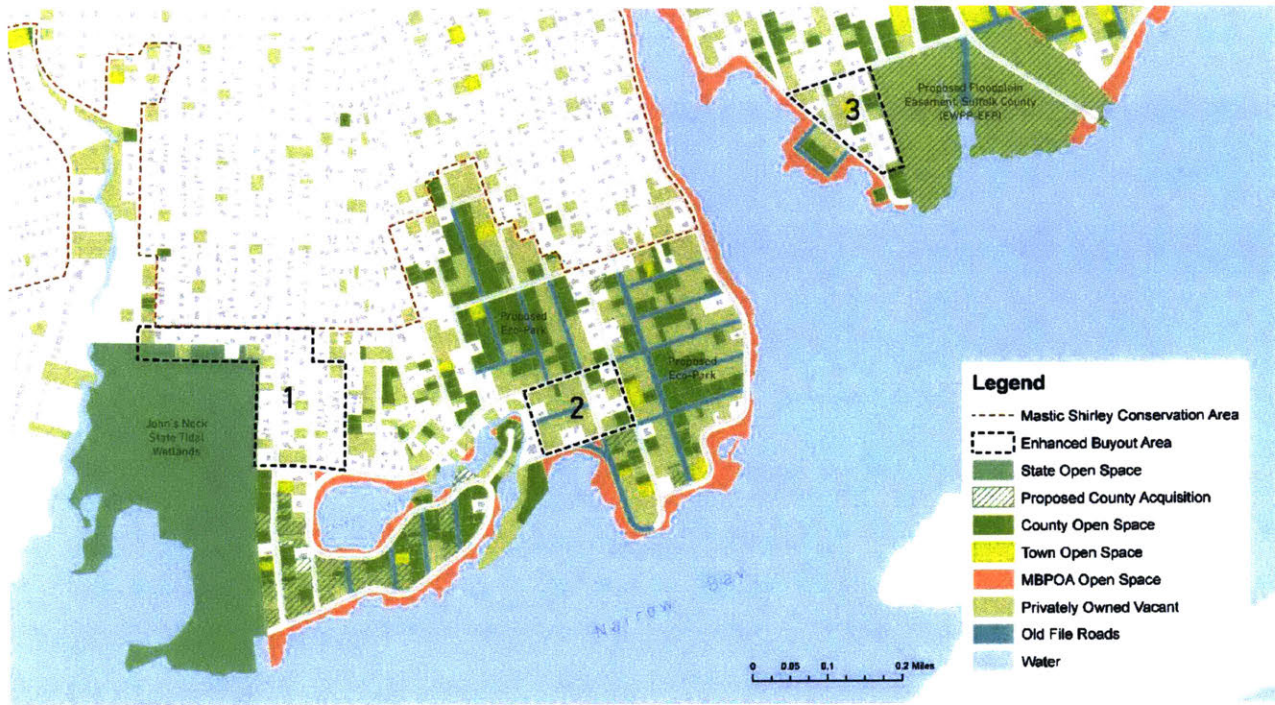


Figure 5.11: Within the Mastic-Shirley Conservation Area, the town of Brookhaven and Suffolk County have been purchasing vacant property for conservation. The three Enhanced Buyout Areas enter into this context with the unique ability to add already built parcels as conservation land.

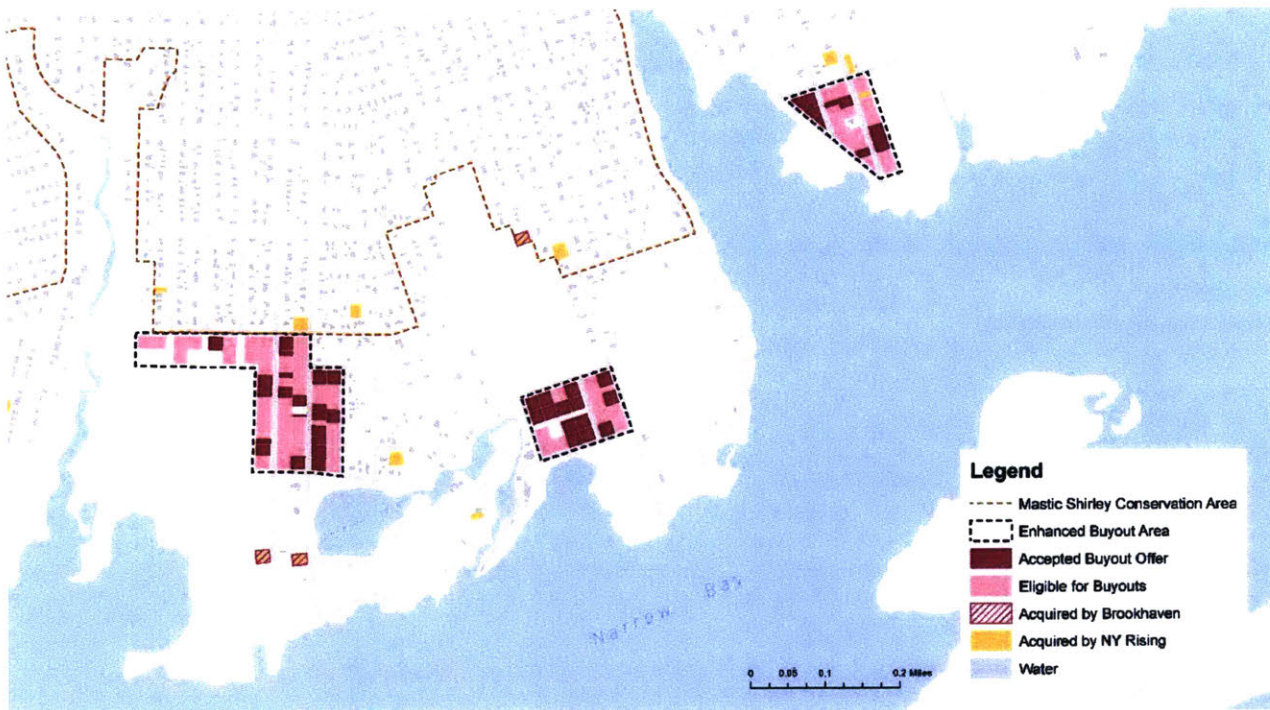


Figure 5.12: Properties that accepted the buyout offer included both vacant and occupied properties. Some of the parcels acquired by NY Rising for redevelopment were later purchased by the town of Brookhaven to be converted to conservation land.

Outcomes

Ultimately, NY rising purchased 40% of the privately owned land area within the buyout zones. Despite the fact that only 16% of this is contiguous with existing conservation land, this is still a success for the local conservation efforts. This is because the local governments and conservation groups are working on the long term goal of purchasing properties and de-listing roads. While most of the properties may be separated from adjacent conservation land by roads, eventually the road will be removed and the properties will be joined.



Figure 5.13: A buyout site is abutting the John's Neck State Tidal Wetlands directly in the background. Photo by author.

While the buyout program aligned well with the local planning goals, the acquisition program did not. Limiting buyouts to the small Enhanced Buyout Areas meant that every other home on the peninsula was eligible for acquisition for redevelopment. This program contrasted with the goals of the local governments we wanted to prevent further development. Furthermore, there was confusion within the local governments over future use of these lands. When the properties were announced for auction, there was a significant backlash among residents and government officials. In a unique situation, the town of Brookhaven worked out a deal with NY Rising to purchase the 15 of these properties. This was only made possible by a donation from the Nature Conservancy which paid the \$15-25,000 for the demolition of the properties and the removal of the septic tanks. The town now plans to revegetate the properties with native plant species from locally derived genotypes.

However, there were also some people that wanted buyouts, but could not get them because they were outside the buyout areas. Some residents who wanted to leave their homes were forced to stay and invest more than twice the home's value to bring it up to flood standards. To do this they largely used other government recovery grants for home elevation and repairs.⁵ This meant that it cost more money to keep homeowners in a flood zone than it would have cost to do a buyout. This is an inherent

disadvantage of the rigid Enhanced Buyout Area. Because it only occupies a small portion of the floodplain, other homeowners within the flood zone are incentivized to rebuild.

At this point, the goal is to bring all privately owned parcels into the public domain. To do this, they are continuing to acquire both vacant and occupied parcels so they can de-list some of the roads and revegetate them. This, they hope, will improve the poor water quality and expand scarce salt marsh habitat. The town is not the only entity acquiring land. Currently, Suffolk County is also undergoing a multi-phase acquisition process of privately owned vacant lots. One way this is being done under the USDA's Emergency Wetland Protection Program Floodplain Easements (EWPP-FPE). This program funds acquisitions of private parcels for wetland protection purposes.

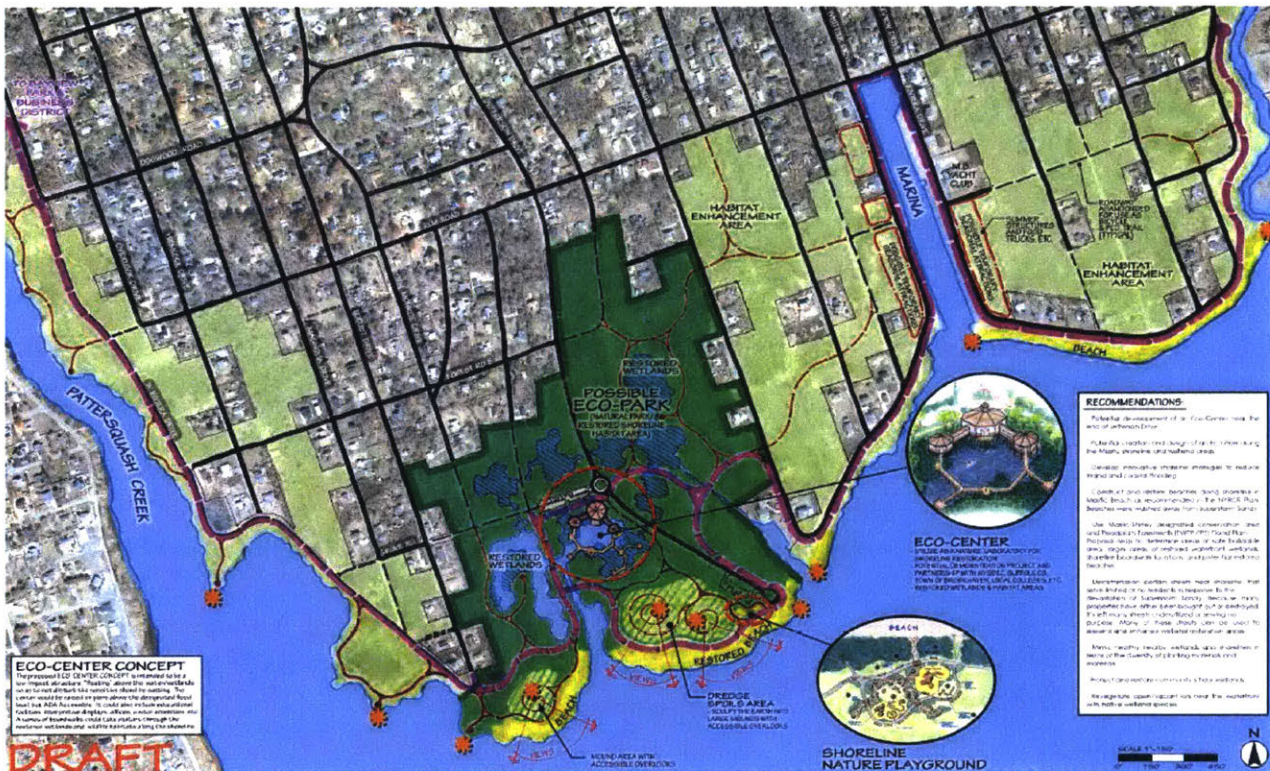


Figure 5.14: A draft masterplan document shows plans for the Mastic-Shirley Conservation Area. Image courtesy of Vision Long Island.

While Brookhaven and Suffolk County both know that conservation is the primary purpose of the acquisitions, they have not yet established a vision for what the coastline will look like. While the goal is to de-develop the peninsula, it's still important to them that residents and visitors can continue to have physical and visual access to the marshes. This will likely include recreation trails and boardwalks. A draft

comprehensive plan for the area developed by a partnership between the village, the town, and the county, suggests an “eco-park” with numerous trails providing physical access to the area. An eco-lodge is the centerpiece of this plan which would educate visitors about coastal restoration. Proponents of this vision will still have to contend with those residents that wish to stay, as well as the privately held lots which could still be redeveloped.

Lindenhurst, NY



Figure 5.15: The Lindenhurst shoreline is densely developed with homes. The barrier island, barely visible in the background, provides protection from wave action. Photo by author.

Introduction

Lindenhurst, NY is located on the South Shore of Long Island on the westernmost end of the Great South Bay. Located within an hour from Manhattan, it offers residents the ability to live in a waterfront community while also being able to commute to New York City. This has made it attractive to development and makes it the densest municipality of the three cases. This also means that it lacks open space, especially along the coast. Almost the entire shoreline is lined with homes protected by bulkheads. Many are just several feet from the water's edge. While the town is protected from most wave action by Fire Island, the lack of any wetlands or natural shoreline makes it vulnerable to some wave action from the bay. When Hurricane Sandy hit, its storm surge inundated much of the neighborhoods south of the Montauk Highway (Figure 5.16).

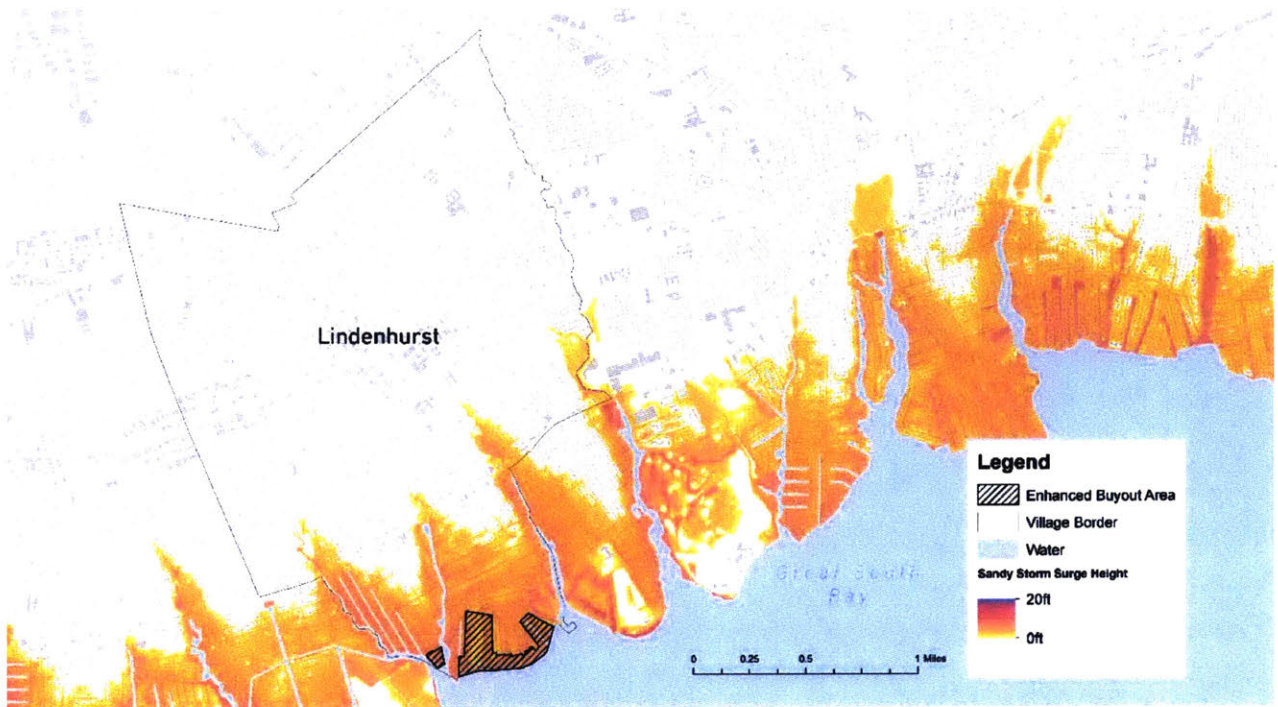


Figure 5.16: Storm surge overlaid on a map of Lindenhurst. Image by author.

Local Planning Goals

Within a month of Hurricane Sandy the town started to get notification of various state programs. Buyouts were among one of the programs that generated a lot of interest among homeowners that were incapable of paying for the repairs required to make their home resilient. When the city heard of buyout programs they were interested in pushing some of their own planning goals. This included expanding Shore Road Park. Lindenhurst “sorely” lacks open space and the prospect of buyouts seemed like a rare opportunity to add some much needed sports fields. They also supported the state’s vision of protecting the village by creating an open space buffer along the water’s edge. Like many other municipalities faced with buyouts, they looked into the impact it would have on the tax base. The village has 8,200 homes, so they determined that even if 75 homes took the offer, an overestimation, there would not be a significant impact on the tax base.

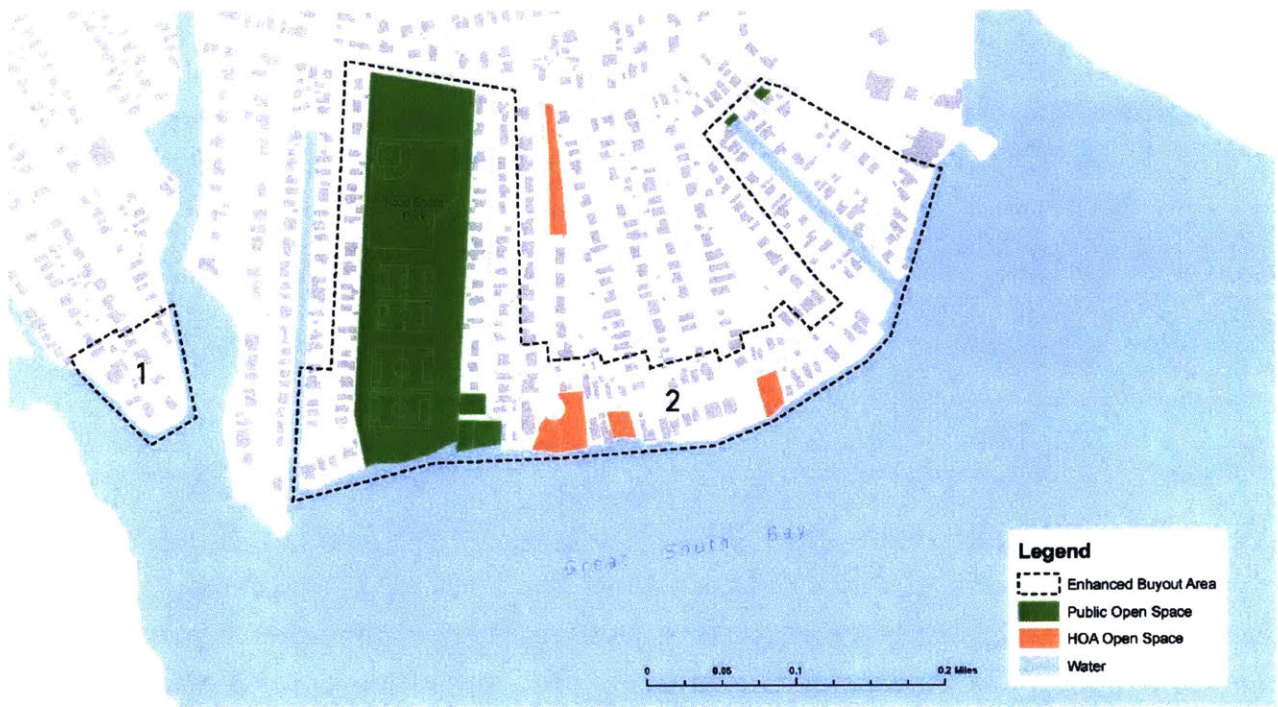


Figure 5.17: The Enhanced Buyout Areas are seen here adjacent following the coastline, Road Shore Park and one of the canals.

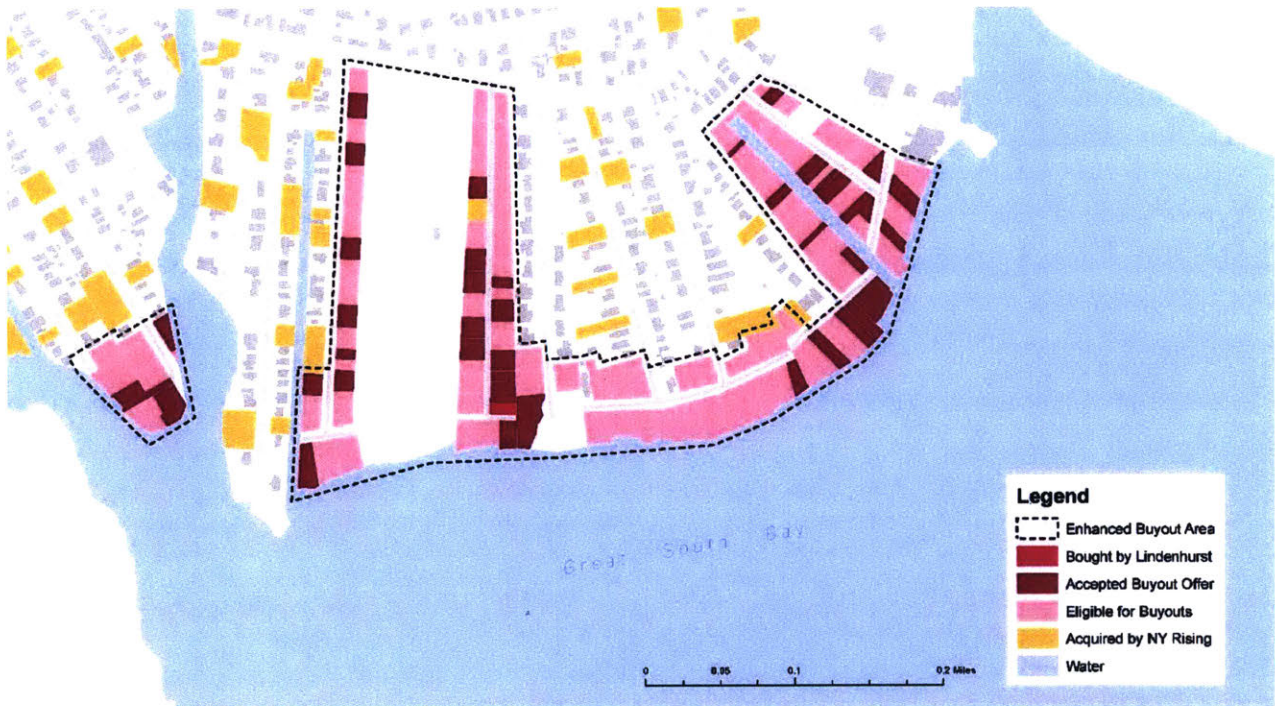


Figure 5.18: Buyouts were somewhat sparse within the buyout area. The number of acquisitions just outside of the buyout area shows that there was plenty of appetite for leaving, but perhaps not enough to make significant contiguous open space.

The Buyouts

With the village's approval of the buyout program, NY Rising continued working with interested homeowners in the Enhanced Buyout Areas. At this point communication between the state and the village started to dissipate. There wasn't a formal role for the town making it difficult for the village to do any planning around the bought out parcels. This was exacerbated by the fact that the early New York Rising program was disorganized and suffered from high employee turnover rate. Often, the village would receive news about the buyout program's process after the fact. The designation of the Enhanced Buyout Areas was one such process that town officials did not have clarity on. The delineation of the buyout area, while received unstructured input from the village, was ultimately made at the state level. However, the factors that resulted in the final area were not clear to the Lindenhurst officials. This lack of clarity and transparency contributed to a lack of trust between the municipality and NY Rising and between residents and NY Rising.

Outcomes

Ultimately, only 42 of 159 households participated in the buyout program, resulting in about 29% of the eligible acres being converted to conservation land (Figure 5.22). 56% of this area is completely isolated from existing open space (figure 5.23). Parcels are largely scattered throughout the neighborhood creating numerous small open spaces. Because of the "jack-o-lantern" effect created along the park and shoreline, the town may find it difficult to find use for these spaces. This also makes it unlikely the town would be able to build additional sports fields (Figure 5.20). One solution to using the isolated parcels was to sell them to one of the owners of the abutting parcels to use as side yards. In one case, there were enough houses bought out that a short stretch of road is likely to be demolished.



Figure 5.19: In a couple places, contiguous parcels along the coast could allow for natural protection from future storms. Photo by



Figure 5.20: Potential open space plan showing parcels that have already closed with NY Rising. Buyouts mostly created what is referred to as the “jack-o-lantern effect” along the park and shoreline

Some residents still living in the neighborhoods where buyouts took place are concerned about impact that the program has had. Losing homes means losing neighbors, and some felt that their neighborhood was diminished as a result. The residents that did not leave also pose a significant barrier to reusing the parcels that were bought out. Many of them are opposed to the idea of using the parcels



Figure 5.21: While the Road Shore Park is abutting many parcels, local residents don’t want the open spaces to be connected to prevent the activities of the park from spilling into their neighborhood. Photo by Author.

as public parks. They were concerned about the noise, foot traffic, and other “deviance” that parks could bring to their neighborhoods. Resident opposition has stymied plans to expand the Road Shore Park to the abutting parcels that were bought out. This leaves the town looking for other options to use these parcels.

Any concerns about losing tax base have not materialized. Every year since Sandy, Lindenhurst has found that the assessed value of homes along the

waterfront has increased. This is because people are investing in their homes to make them more resilient. What were originally seasonal bungalows are being retrofitted into higher value structures. Federal grants and insurance claims resulted in an influx in investment within the flood zone. This shows that pairing buyouts with redevelopment can actually create a net increase in taxes for municipalities.

In general, there has been a lack of leadership and vision within the Lindenhurst government about what to do with the land after the buyouts. There was no strong voice that took enough interest to push a planning process forward. Because of this, there have been no engineers, planners, or architects hired to do studies for the sites. At this point, however, none of the land bought by the state has been dispositioned to the town. While the town has expressed frustration about the delays in exchanging the land, they have not yet established a plan to repurpose it.

Summary

		Woodbridge, NJ	Mastic Beach, NY	Lindenhurst, NY
Number of Parcels	Eligible	1,322	112	159
	Accepted Buyout	139	44	42
	Percent Accepted Buyout	10.51%	39.29%	26.42%
Area of Parcels (acres)	Eligible	221.16	22.06	19.96
	Accepted Buyout	19.85	8.36	5.74
	Percent of Area Accepted Buyout	8.98%	37.90%	28.76%

Figure 5.22: Assessment of participation rate for each municipality.

		Woodbridge, NJ	Mastic Beach, NY	Lindenhurst, NY
Parcels Contiguous with Existing Open Space	Area (acres)	14.64	1.36	2.53
	Percent of Participating	73.75%	16.27%	44.08%
Parcels Isolated from Existing Open Space	Area (acres)	5.21	7	3.21
	Percent of Participating	26.25%	83.73%	55.92%
Area Added to Open Space from Parcels (acres)		19.85	8.36	5.74
Unnecessary Road	Length (ft)	1,605	0	320
	Area (acres)	1.85	0	0.30
Total Area Added to Open Space (acres)		21.7	8.36	6.04

Figure 5.23: Assessment of open space outcomes. All contiguous land calculations are based on the assumption that all unnecessary roads are removed.

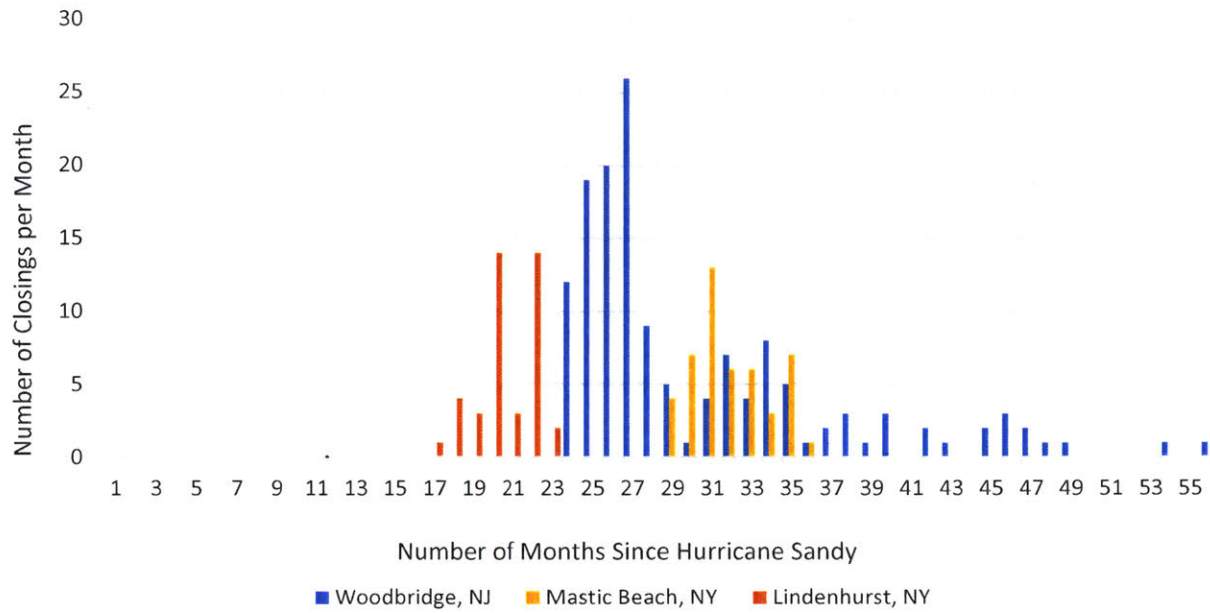


Figure 5.24: Histogram of the number of closings per month in Lindenhurst, Mastic Beach, and Woodbridge.



Figure 5.25: Histogram of showing the number of closings by the price paid at closing in Lindenhurst, Mastic Beach, and Woodbridge.

Chapter 6: Discussion

From looking at these three cases, it's apparent that the local context significantly influences the ability for buyouts to achieve benefits above and beyond flood risk mitigation for single properties. In each case, the county, town, and local residents had their own visions of what the neighborhood should look like, and buyouts either impeded or aided this vision. Seeing how the NY Rising and Blue Acres programs operate in these towns also suggests ways that the policy design of the programs impact the ability to achieve additional benefits.

Incentivizing Municipalities

Perhaps the most significant barrier to buyout policy being implemented is the municipal opposition. Municipal and county opposition resulted in large swaths of the states opting out of buyouts altogether, including Nassau County in New York and most of the New Jersey barrier islands and bay shore. In many discussions about flood mitigation, buyouts were often completely "off the table."¹ This was the case even though there are some homeowners that were desperate to move away from a home they deem too risky to live in.²

Finding more alignment between state and local planning goals is important because decentralization has given municipalities the power to oppose buyouts. The state programs should recognize that municipalities want to attract investment and grow their tax base. NY Rising's hybrid approach of offering both buyouts for demolition and acquisitions for redevelopment recognizes this. However, after Hurricane Sandy, municipalities were able to opt out of the buyout portion of the program. Instead, buyouts could be required in order to receive investment for redevelopment. This could incentivize towns to participate in buyout programs.

Much municipal concern is also predicated on worries that the tax base would be significantly reduced by buyouts. While buyouts can reduce the tax base, the case studies suggest that this can be offset in a number of ways. In Mastic Beach, the mayor noted that the loss in taxes would be balanced out by savings from reducing municipal services. Fewer homes mean fewer roads, less trash to collect, and less students in the school system. The loss in tax base may be negligible in growing towns.

Woodbridge, for instance calculated that they would still have a net gain in property tax base, even with 139 buyouts taking place there.³ This is because they were experiencing growth in industrial activity, including refurbished warehouses, and a new power plant. This suggests that towns should consider the larger context within which buyouts are taking place. The impact of losing taxes may be offset by growth elsewhere.

Lindenhurst is an example of how the tax base can even increase along the coast. Here, only a small fraction of homes in the floodplain were eligible for the buyouts. This means that nearly every other home damaged by flooding put significant investment into their properties to repair them. Lindenhurst found that even with buyouts, the tax base along the coast increased. This shows that a mixed approach of buyouts and rebuilding can offset the loss in tax base. While it doesn't maximize the number of buyouts that could take place, it may offer a balanced approach that both the town and the state can agree to.

However, as the sea level rises, the loss in tax base may challenge a town's financial viability. In this case, the dissolution or merger of municipalities should be seriously considered. This will allow buyouts to occur while not undermining important public services. This may be necessary for small coastal towns that don't have enough high ground to shift new development to.

In the meantime, municipalities should not entirely reject buyouts as a tool for homeowner relief and community resiliency. Instead they should be asking: how many buyouts can we afford? This allows them to do buyouts in the most high risk areas, or the places where homeowners are desperate to leave their current homes. Likewise, states should recognize the municipalities want to maintain their tax base and incentivize buyouts with investment in redevelopment.

Data Based Delineation

Determining where buyouts should take place is one of the most fraught parts of the buyout process. Program managers and municipalities may want to achieve their own planning goals with buyouts, but ultimately, they must focus where there is significant interest among the residents. Gauging interest through information gathering is important in making the good decisions about where to target buyout programs.

The New Jersey approach of soliciting homeowners to apply from across the state allowed for buyout areas to emerge in places where the government may not be aware there is interest. This approach means that Blue Acres has a significant amount of data about where there is interest. Eventually, there is a top down determination about what clusters to target buyout funding. However, unlike NY Rising, Blue Acres doesn't delineate a fixed Enhanced Buyout Area. Instead they allow the area to grow to accommodate more homeowners. This is evident in Woodbridge, where the first round of buyouts resulted in a patchwork pattern of open spaces and residents. However, once residents had time to process the changes and see their neighbors go through the buyout process, more decided to participate. After multiple rounds of buyouts a large majority of residents have chosen the buyouts. By having multiple rounds of buyouts, Blue Acres has extended the buyout period and gotten a higher participation rate (Figure 5.24). The flexibility of the buyout zone is one of the most important policies that led to the effectiveness of Blue Acres over the long term.

Avoiding the Checkerboard Pattern

Most municipalities want to avoid having a partially bought out neighborhoods because of the issues it poses with maintenance, security, and reuse. One way to avoid the checkerboard pattern would be to allow the trade of deed restrictions between parcels. In this scheme, property owners with damaged homes close the coast, who've rejected the buyout, would be offered a property that is farther inland. This would essentially be relocating holdouts so that they fill the vacant lots left by the buyouts. Since the homes are substantially damaged, and many will need to rebuild and elevate anyway, this could be a viable alternative to rebuilding in place. This would put more distance between the neighborhood and the coast and could allow the natural storm buffer to perform better. Another variation of this could be home swap programs where people can move within their neighborhood but to a home that someone else wants to vacate.

Home relocation could be another option that would make this scheme for viable for homeowners that wanted to keep their house. HMGP offers funding for the relocation of flood damaged homes. However, using this source of funding means you need to prove through benefit-cost analysis that the move is cost effective. This generally means moving homes outside of the 100 year flood zone. Because, in this circumstance, the home would be moved to another location within the flood zone, the

cost of the move could probably not be recouped. If towns are serious about utilizing the space left over by buyout programs, consolidating structures may be a cost they would be willing to incur themselves.

Of course, the best way to prevent the checkerboard pattern is by making the buyout program mandatory. This would involve using eminent domain to force homeowners to sell their property. While this can be difficult to implement politically, it may be the right solution in cases where there is extreme cost associated with mitigating flooding in a neighborhood.

Designing Transition

While much attention is paid to maximizing participation in a neighborhood to prevent the checkerboard effect, I would argue that planners should find opportunity in this transitional state. The three cases show that buyout programs should not expect to achieve high participation after one storm. Instead, buyouts will occur intermittently, dependent on major flooding events. Furthermore, as climate change slowly ratchets up the flood risk, larger areas will be pushed into this state of transition. This means that development practices should embrace the state of change that occurs there. Design can be a tool that allows for the inhabitation of a place that is in constant retreat.

As a result of being in transition, buyout areas contain a truly novel mix of uses. Both residential, and recreation uses not only coexist in the same area, but are intertwined with each other. The potential for incompatible uses is evident in Lindenhurst, where residents are concerned about the types of activities taking place close to their home. More public space requires that additional policing has to take place to ensure the safety of the local residents. The solution considered both in Lindenhurst and Woodbridge, of giving abutting property owners responsibility for managing single parcels is one solution. Residents in Lindenhurst also had the idea of creating gated community gardens that could be operated by after school gardening programs.

Communities on the coast are also grappling with is how to make a partially bought out community attractive. Many people have a fixed notion of what makes an attractive neighborhood. When flood mitigation measures force houses up on stilts and create vacant lots, this new appearance doesn't align with their image of a neighborhood. In Lindenhurst, the village government was forcing homes to

cover their stilts with external walls that would make the homes look more conventional. Part of adapting to these new conditions is finding a new aesthetic that embraces flooding and flood mitigation strategies.

While creative programming is part of the solution, I argue that the design should play a larger role maximizing the use of these spaces. Design could mitigate much of the clashing of uses. Designing for privacy could allow homes to exist in close proximity sports fields and public space. Designing for security could limit the types of public space that would require additional policing. Designing for conservation could mitigate the impact that roads and houses have on the surrounding ecology. By engaging the professions of architecture, urban design, and landscape architecture, planners could develop a new type of urbanism for these landscapes.

Looking to the Future of Buyouts

Current buyout programs will not be capable of dealing with the increasing need to retreat from coastal floodplains. Buyouts should be reframed under a larger suite of policy tools that can promote and facilitate coastal retreat more comprehensively. Part of this may require giving homeowners additional incentives to leave flood prone areas. For instance, the reforms taking place in the NFIP to increase insurance rates is one way to discourage coastal development and promote buyout program participation. Alternatively, cities can simply decline services to coastal properties where it becomes too expensive to maintain them. Beach nourishment, for instance, could be stopped in places where it becomes too expensive to continue. This could leave many homeowners unable to protect their homes with private mitigation measures. Buyouts would then be the only option to recoup the value of their home. Municipalities could also decline to continue repairing water and sewer lines in areas where they see frequent damage.

However, these approaches will likely be unpopular. When the Biggert Waters Flood Insurance Reform Act started to impact insurance premiums in 2015 there was a backlash by homeowners living in floodplains. Withdrawing funding from other projects that make living in vulnerable locations possible will likely face similar opposition. There are likely external forces that will start to place pressure on homeowners to leave. Property values along the coast are projected to decline because of the perceived risk of coastal investment.⁴ This could make buyouts more attractive if homeowners aren't satisfied with what they can get for their home on the market.

Home reversion is another tool that can make buyouts more attractive to some homeowners. Under what's called a reverse mortgage, the state could buy the home and let the owner live there until they pass away. Payment could come as a lump sum or could be disbursed in monthly payments. The Watson-Crampton neighborhood was home to many older homeowners who, in some cases, said they wanted to die in their house.⁵ However, incentivizing homeowners to continue living in flood prone areas poses some ethical issues.

While we don't know when the next storm will hit, we know it's only a matter of time. That's why it's important to develop buyout programs ahead of time, to be prepared for when flooding does occur. Because flooding is increasing being viewed as a chronic problem, buyout programs should be permanent fixtures of the state government. Developing policy now will ensure that when a storm does hit, states are capable of responding quickly and effectively, while also aiding in local planning goals.

Interviews

New York Rising

3/29/2017

Rachel Wieder, Buyout and Acquisition Program Director, Governor's Office of Storm Recovery
Simon McDonnell, Director of Research and Strategic Analysis, Governor's Office of Storm Recovery

4/12/2017

Jane Brogan, Managing Director of Policy, Governor's Office of Storm Recovery

Blue Acres

4/6/2017

Courtney Wald-Wittkop, Project Manager

Department of Environmental Protection, NJ

4/5/2017

Brian Zarate, Endangered and Nongame Species Program

Woodbridge Township, NJ

4/30/2017

Patrick Kenny, Coordinator, Emergency Management Office, Woodbridge, Township

5/4/2017

Dennis Henry, Public Works and Parks, Woodbridge Township

Village of Lindenhurst, NY

5/3/2017

Shawn Cullinane, former Village Clerk and Treasurer

5/7/2017

Robert and Darlene, residents

5/10/2017

John Reynolds, town Planning Board

Village of Mastic Beach, NY

4/11/2017 + 5/7/2017

Maura Sperry, former Mayor

Town of Brookhaven, NY

5/9/2011

John Lessler, Land Management

5/11/2017

John Turner, Open Space Program Coordinator

Suffolk County NY

5/16/2017

Lauretta Fischer, Principal Environmental Analyst, Division of Planning and Environment

The Nature Conservancy, Long Island

5/16/2017

Randall Parsons, former Land Conservation Specialist

Endnotes

Chapter 1: Introduction

¹ Thomas R. Knutson et al., “Tropical Cyclones and Climate Change,” *Nature Geoscience* 3, no. 3 (March 2010): 157–63, doi:10.1038/ngeo779.

² Amy Auermuller, “Advances in Resilience Planning: Coastal NJ” (Lecture, APA National Planning Conference, New York, May 7, 2017).

³ Robert and Darlene, Interview with Lindenhurst Residents, May 7, 2011.

⁴ Daniel H. de Vries and James C. Fraser, “Citizenship Rights and Voluntary Decision Making in Post-Distaster U.S. Floodplain Buyout Mitigation Programs,” *International Journal of Mass Emergencies and Disasters* 30, no. 1 (March 2012): 1–33.

⁵ “Protecting Yourself Through Mitigation | FEMA.Gov,” accessed April 20, 2017, <https://www.fema.gov/protecting-yourself-through-mitigation>.

⁶ Robert Freudenberg et al., “Buy-In for Buyouts: The Case for Managed Retreat from Flood Zones” (Lincoln Institute of Land Policy, 2016), <http://www.lincolnst.edu/sites/default/files/pubfiles/buy-in-for-buyouts-full.pdf>.

Chapter 2: Urban Resiliency, Risk, and Climate Change

¹ Lawrence J. Vale and Thomas J. Campanella, *The Resilient City : How Modern Cities Recover from Disaster* (New York : Oxford University Press, 2005., 2005).

² Lance H. Gunderson and C. S. Holling, *Panarchy: Understanding Transformation in Human and Natural Systems* (Washington: Island Press, 2002).

³ Stuart L. Pimm, “The Complexity and Stability of Ecosystems,” *Nature* 307 (January 26, 1984).

⁴ Nicholas K.1 Coch, “Unique Vulnerability of the New York-New Jersey Metropolitan Area to Hurricane Destruction,” *Journal of Coastal Research* 31, no. 1 (January 2015): 196–212, doi:10.2112/JCOASTRES-D-13-00183.1.

⁵ Hans Visser, Arthure C. Peterson, and Willem Ligtoet, “On the Relation between Weather-Related Disaster Impacts, Vulnerability and Climate Change,” *Climatic Change* 125 (2104): 461–77.

⁶ Roger A. Pielke Jr. and Christopher W. Landsea, “Normalized Hurricane Damages in the United States: 1925--95,” *Weather & Forecasting* 13, no. 3 (September 1998): 621.

⁷ Neil Smith, “There’s No Such Thing as a Natural Disaster,” accessed May 10, 2017, <http://understandingkatrina.ssrc.org/Smith/>.

⁸ Peter Stott, “Attribution: Weather Risks in a Warming World,” *Nature Climate Change* 5, no. 6 (June 2015): 517–18, doi:10.1038/nclimate2640.

⁹ Knutson et al., “Tropical Cyclones and Climate Change.”

¹⁰ Kristina A. Dahl, Melanie F. Fitzpatrick, and Erika Spanger-Siegrfried, “Sea Level Rise Drives Increased Tidal Flooding Frequency at Tide Gauges along the U.S. East and Gulf Coasts: Projections for 2030 and 2045,” *PLoS ONE* 12, no. 2 (February 3, 2017): 1–23, doi:10.1371/journal.pone.0170949.

¹¹ Visser, Peterson, and Ligtoet, “On the Relation between Weather-Related Disaster Impacts, Vulnerability and Climate Change.”

¹² Ning Lin et al., “Physically Based Assessment of Hurricane Surge Threat under Climate Change,” *Nature Climate Change* 2, no. 6 (June 2012): 462–67, doi:10.1038/nclimate1389.

¹³ Scott Gabriel Knowles and Howard C. Kunreuther, “Troubled Waters: The National Flood Insurance Program in Historical Perspective,” *Journal of Policy History* 26, no. 3 (July 2014): 327–53, doi:10.1017/S0898030614000153.

¹⁴ “Written Testimony of FEMA for a House Committee on Financial Services, Subcommittee on Housing, and Insurance Hearing Titled “Flood Insurance Reform: FEMA’s Perspective | Homeland Security,” accessed May 11, 2017, <https://www.dhs.gov/news/2017/03/09/written-testimony-fema-house-committee-financial-services-subcommittee-housing-and>.

¹⁵ Knowles and Kunreuther, “Troubled Waters.”

¹⁶ “Increasing Flood Insurance Resilience – The Role of Reinsurance | FEMA.Gov,” accessed May 11, 2017, <https://www.fema.gov/blog/2017-01-03/increasing-flood-insurance-resilience-role-reinsurance>.

¹⁷ “Flood Insurance Reform - The Law | FEMA.Gov,” accessed May 11, 2017, <https://www.fema.gov/flood-insurance-reform-law>.

¹⁸ William Solecki, “Hurricane Sandy in New York, Extreme Climate Events and the Urbanization of Climate Change: Perspectives in the Context of Sub-Saharan African Cities,” *Current Opinion in Environmental Sustainability* 13 (April 1, 2015): 88–94, doi:10.1016/j.cosust.2015.02.007.

¹⁹ James C. Fraser, Matrin W. Doyle, and Hannah Young, “Creating Effective Flood Mitigation Policies,” *Eos, Transactions American Geophysical Union* 87 (2006), doi:10.1029/2006EO270002.

Chapter 3: The Structure of Buyout Programs

¹ de Vries and Fraser, “Citizenship Rights and Voluntary Decision Making in Post-Distaster U.S. Floodplain Buyout Mitigation Programs.”

² Omar Azfar et al., “Decentralization, Governance and Public Services: A Review of the Literature” (IRIS Center, University of Maryland, September 1999).

³ David Goldfield, *Encyclopedia of American Urban History* (SAGE Publications, 2006).

⁴ Ibid.

⁵ *Atkin v. Kansas*, No. 191 U.S. 207 (U.S. Supreme Court November 30, 1903).

-
- ⁶ Azfar et al., “Decentralization, Governance and Public Services: A Review of the Literature.”
- ⁷ Knowles and Kunreuther, “Troubled Waters.”
- ⁸ William Rohe, “Implementing Floodplain Land Acquisition Programs in Urban Localities,” accessed May 11, 2017, http://www.academia.edu/27892388/Implementing_floodplain_land_acquisition_programs_in_urban_localities.
- ⁹ Eric Tate et al., “Flood Recovery and Property Acquisition in Cedar Rapids, Iowa,” *Natural Hazards* 80, no. 3 (February 1, 2016): 2055–79, doi:10.1007/s11069-015-2060-8.
- ¹⁰ FEMA, “Hazard Mitigation Assistance Guidance Addendum: Hazard Mitigation Grant Program, Pre-Disaster Mitigation Program, and Flood Mitigation Assistance Program,” February 27, 2015.
- ¹¹ Tate et al., “Flood Recovery and Property Acquisition in Cedar Rapids, Iowa.”
- ¹² “FEMA HMGP Property Acquisitions | FEMA.Gov,” accessed May 12, 2017, <https://www.fema.gov/media-library/assets/documents/85455>.
- ¹³ “CDBG-DR Eligibility Requirements - HUD Exchange,” accessed May 9, 2017, <https://www.hudexchange.info/programs/cdbg-dr/cdbg-dr-eligibility-requirements/>.
- ¹⁴ Courtney Wald-Wittkop, Interview with Project Manager at Blue Acres, NJDEP, April 6, 2017.
- ¹⁵ “Secondary Home, Secondary Vacation Home, Rental Property | FEMA.Gov,” accessed May 9, 2017, <https://www.fema.gov/faq-details/Secondary-Home-Secondary-Vacation-Home-Rental-Property>.
- ¹⁶ Governor’s Office of Storm Recovery et al., “NY Rising Buyout and Acquisition Program Policy Manual,” Policy Manual, (April 2015).
- ¹⁷ HUD: Community Planning and Development, Disaster Recovery and Special Issues Division, “Program Guidelines: Buyout Implementation Tool #1,” accessed May 8, 2016, https://www.hudexchange.info/resources/documents/Disaster_Recovery_Buyout_Program_Guidelines.docx.
- ¹⁸ Freudenberg et al., “Buy-In for Buyouts: The Case for Managed Retreat from Flood Zones.”
- ¹⁹ de Vries and Fraser, “Citizenship Rights and Voluntary Decision Making in Post-Distaster U.S. Floodplain Buyout Mitigation Programs.”
- ²⁰ Ibid.
- ²¹ Ibid.
- ²² Samantha Riley Medlock, “Protecting Property Rights to Reduce Liability” (Two Rivers-Ottawaquechee Regional Commission, Vermont Law School’s Land Use Institute, and the Vermont Department of Environmental Conservation, 2008).
- ²³ Dennis M. Knobloch, “Moving a Community in the Aftermath of the Great 1993 Midwest Flood,” *Journal of Contemporary Water Research & Education* 130, no. 1 (March 1, 2005): 41–45, doi:10.1111/j.1936-704X.2005.mp130001008.x.

²⁴ Sherri Brokopp Binder, Charlene K Baker, and John P Barile, "Rebuild or Relocate? Resilience and Postdisaster Decision-Making After Hurricane Sandy," *American Journal Of Community Psychology* 56, no. 1–2 (September 2015): 180–96, doi:10.1007/s10464-015-9727-x.

²⁵ Daniel H. de Vries and James C. Fraser, "Citizenship Rights and Voluntary Decision Making in Post-Distaster U.S. Floodplain Buyout Mitigation Programs," *International Journal of Mass Emergencies and Disasters* 30, no. 1 (March 2012): 1–33.

²⁶ de Vries and Fraser, "Citizenship Rights and Voluntary Decision Making in Post-Distaster U.S. Floodplain Buyout Mitigation Programs."

Chapter 4: Comparing the Post Sandy Buyout Programs

¹ Matthew Knoblauch, "You Probably Shouldn't Build There: Watershed-Based Land Use Strategies for Mitigating Global Climate Change in New Jersey's Freshwater Systems," *Sustainable Development Law & Policy* 16, no. 1 (Fall 2015): 4–38.

² NY Rising has requested that HUD extend the 2019 expenditure deadline to 2022 so other programs can continue to use the funds. This could extend the buyout program as well.

³ John Upton, "Jersey Retreating from Rivers, But Not Coast, After Sandy," *Climate Central*, November 4, 2014.

⁴ "NYC Community Development Block Grant - Disaster Recovery - Approved Action Plan," accessed May 5, 2017, http://www.nyc.gov/html/cdbg/html/approved/action_plan.shtml.

Chapter 5: Case Studies

¹ Freudenberg et al., "Buy-In for Buyouts: The Case for Managed Retreat from Flood Zones."

² Tim Henderson | Stateline org (TNS), "'Zombie Houses' Multiply in Some States," accessed May 11, 2017, <https://www.abqjournal.com/741996/zombie-houses-multiply-in-some-states.html>.

³ Freudenberg et al., "Buy-In for Buyouts: The Case for Managed Retreat from Flood Zones."

⁴ Ibid.

⁵ Spery, Interview with the Ex-Mayor of Mastic Beach.

Chapter 6: Discussion

¹ Auermuller, "Advances in Resilience Planning: Coastal NJ."

² Wald-Wittkop, Interview with Project Manager at Blue Acres, NJDEP.

³ Blue Acres Program, "Sandy Blue Acres - Land Buyout Program: Closing Detail as of May 1, 2017," May 1, 2017.

⁴ John Dorschner, "Rising Sea Levels, Falling Real Estate Values," *Miamiherald*, accessed May 10, 2017, <http://www.miamiherald.com/news/local/community/miami-dade/article1957294.html>; Ian Urbina, "Perils of

Climate Change Could Swamp Coastal Real Estate," *The New York Times*, November 24, 2016,
<http://www.nytimes.com/2016/11/24/science/global-warming-coastal-real-estate.html>.

⁵ Wald-Wittkop, Interview with Project Manager at Blue Acres, NJDEP.

Bibliography

- "2 HURRICANES: Kinston's Response to Floyd Lessened Matthew's Impact - News - The Free Press - Kinston, NC." Accessed December 4, 2016. <http://www.kinston.com/news/20161015/2-hurricanes-kinstons-response-to-floyd-lessened-matthews-impact>.
- "93 Homes Purchased as Iowa City Flood Buyout Draws to Close - Iowa City, IA Patch." Accessed December 4, 2016. <http://patch.com/iowa/iowacity/93-homes-purchased-as-iowa-city-flood-buyout-draws-to-close>.
- American Institutes for Research. "A Chronology of Major Events Affecting the National Flood Insurance Program: Evaluation of the NFIP," December 2005.
- Atkin v. Kansas, No. 191 U.S. 207 (U.S. Supreme Court November 30, 1903).
- Auermuller, Amy. "Advances in Resilience Planning: Coastal NJ." Lecture presented at the APA National Planning Conference, New York, May 7, 2017.
- Azfar, Omar, Satu Kähkönen, Anthony Lanyi, Patrick Meagher, and Diana Rutherford. "Decentralization, Governance and Public Services: A Review of the Literature." IRIS Center, University of Maryland, September 1999.
- Beaudreau, Pierre. "Urban Planning and the Scientific Uncertainties of Sea Level Rise." Thesis, Massachusetts Institute of Technology, 2015. <http://dspace.mit.edu/handle/1721.1/99059>.
- Berry, Marisa, and Todd K. BenDor. "Integrating Sea Level Rise into Development Suitability Analysis." *Computers, Environment and Urban Systems* 51 (May 2015): 13–24. doi:10.1016/j.compenvurbsys.2014.12.004.
- "Biggert-Waters Flood Insurance Reform Act of 2012 Timeline | FEMA.Gov." Accessed May 11, 2017. <https://www.fema.gov/media-library/assets/documents/31946>.
- Bin, Okmyung, Ben Poulter, Christopher F. Dumas, and John C. Whitehead. "Measuring the Impact of Sea-Level Rise on Coastal Real Estate: A Hedonic Property Model Approach." *Journal of Regional Science* 51, no. 4 (October 2011): 751–67. doi:10.1111/j.1467-9787.2010.00706.x.
- Binder, Sherri Brokopp, Charlene K Baker, and John P Barile. "Rebuild or Relocate? Resilience and Postdisaster Decision-Making After Hurricane Sandy." *American Journal Of Community Psychology* 56, no. 1–2 (September 2015): 180–96. doi:10.1007/s10464-015-9727-x.
- Binder, Sherri Brokopp, and Alex Greer. "The Devil Is in the Details: Linking Home Buyout Policy, Practice, and Experience After Hurricane Sandy." *Politics & Governance* 4, no. 4 (December 2016): 97–106. doi:10.17645/pag.v4i4.738.
- Blue Acres Program. "Sandy Blue Acres - Land Buyout Program: Closing Detail as of May 1, 2017," May 1, 2017.

-
- Brady, Alexander F. (Alexander Foster). "Buyouts and Beyonds : Politics, Planning, and the Future of Staten Island's East Shore after Superstorm Sandy." Thesis, Massachusetts Institute of Technology, 2015. <http://dspace.mit.edu/handle/1721.1/98926>.
- "Brookhaven Buys Sandy-Damaged Houses in Mastic Beach to Keep Homes out of Flood Plain | Newsday." Accessed May 11, 2017. <http://www.newsday.com/long-island/suffolk/brookhaven-buys-sandy-damaged-houses-in-mastic-beach-to-keep-homes-out-of-flood-plain-1.10521047>.
- Calvin, Ellis. "From Tangier Island to Long Island: How Will Coastal Communities Adapt to Sea Level Rise?" *RPA Lab*, 17:12. <http://lab.rpa.org/from-tangier-island-to-long-island-how-will-coastal-communities-adapt-to-sea-level-rise/>.
- "CDBG-DR Eligibility Requirements - HUD Exchange." Accessed May 9, 2017. <https://www.hudexchange.info/programs/cdbg-dr/cdbg-dr-eligibility-requirements/>.
- Cheung, Darren Man-wai, and Bo-sin Tang. "Recreation Space or Urban Land Reserve? Land-Use Zoning Patterns and the Transformation of Open Space in Hong Kong." *Journal of Urban Planning and Development* 142, no. 3 (September 2016).
- "Clearwaters-Spring 07 - Staten-Island-History-and-Bluebelt-Land-Acquisitions.Pdf." Accessed March 15, 2017. <http://urbanomnibus.net/redux/wp-content/uploads/2010/12/Staten-Island-History-and-Bluebelt-Land-Acquisitions.pdf>.
- Coch, Nicholas K.1. "Unique Vulnerability of the New York-New Jersey Metropolitan Area to Hurricane Destruction." *Journal of Coastal Research* 31, no. 1 (January 2015): 196–212. doi:10.2112/JCOASTRES-D-13-00183.1.
- Collins, Michael G., Frederick R. Steiner, and Michael J. Rushman. "Land-Use Suitability Analysis in the United States: Historical Development and Promising Technological Achievements." *Environmental Management* 28, no. 5 (November 1, 2001): 611–21. doi:10.1007/s002670010247.
- "Community Development Block Grant Program - CDBG/U.S. Department of Housing and Urban Development (HUD)." Accessed December 5, 2016. http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/communitydevelopment/programs.
- Curti, Julie M. (Julie Marie). "Strategies for Equitable Climate Change Adaptation : Lessons from Buyback and Elevation Programs in Rhode Island." Thesis, Massachusetts Institute of Technology, 2015. <http://dspace.mit.edu/handle/1721.1/98928>.
- Dahl, Kristina A., Melanie F. Fitzpatrick, and Erika Spanger-Siegfried. "Sea Level Rise Drives Increased Tidal Flooding Frequency at Tide Gauges along the U.S. East and Gulf Coasts: Projections for 2030 and 2045." *PLoS ONE* 12, no. 2 (February 3, 2017): 1–23. doi:10.1371/journal.pone.0170949.

-
- Dineen, Kathryn P. (Kathryn Patricia). "Reading the Tea Leaves : The Tea Party Movement, the Conservative Establishment and the Collapse of Climate Change Legislation." Thesis, Massachusetts Institute of Technology, 2011. <http://dspace.mit.edu/handle/1721.1/66804>.
- Dorschner, John. "Rising Sea Levels, Falling Real Estate Values." *Miamiherald*. Accessed May 10, 2017. <http://www.miamiherald.com/news/local/community/miami-dade/article1957294.html>.
- Douglas, Bruce C., Michael S. Kearney, and Stephen P. Leatherman. *Sea Level Rise: History and Consequences*. London: Academic Press, 2001.
- Elliott-Ortega, Kara. "Urban Design as Problem Solving : Design Thinking in the Rebuild by Design Resiliency Competition." Thesis, Massachusetts Institute of Technology, 2015. <http://dspace.mit.edu/handle/1721.1/98931>.
- FEMA. "Hazard Mitigation Assistance Guidance Addendum: Hazard Mitigation Grant Program, Pre-Disaster Mitigation Program, and Flood Mitigation Assistance Program," February 27, 2015.
- "FEMA HMGP Property Acquisitions | FEMA.Gov." Accessed May 12, 2017. <https://www.fema.gov/media-library/assets/documents/85455>.
- Ferrara, Catherine G. "Learning through Competition : Resilience on the Jersey Shore after Rebuild By Design." Thesis, Massachusetts Institute of Technology, 2016. <http://dspace.mit.edu/handle/1721.1/104993>.
- "Flood Insurance Reform - The Law | FEMA.Gov." Accessed May 11, 2017. <https://www.fema.gov/flood-insurance-reform-law>.
- Fraser, James C., Matrin W. Doyle, and Hannah Young. "Creating Effective Flood Mitigation Policies." *Eos, Transactions American Geophysical Union* 87 (2006). doi:10.1029/2006EO270002.
- Freudenberg, Robert. "More Than 1.8 Million Homes at Risk of Permanent Flooding." *RPA Lab*, 16:24. <http://lab.rpa.org/more-than-1-8-million-homes-at-risk-of-permanent-flooding/>.
- Freudenberg, Robert, Ellis Calvin, Laura Tolckoff, and Dare Brawley. "Buy-In for Buyouts: The Case for Managed Retreat from Flood Zones." Lincoln Institute of Land Policy, 2016. <http://www.lincolninst.edu/sites/default/files/pubfiles/buy-in-for-buyouts-full.pdf>.
- Fu, Xinyu, Jie Song, Bowen Sun, and Zhong-Ren Peng. "'Living on the Edge': Estimating the Economic Cost of Sea Level Rise on Coastal Real Estate in the Tampa Bay Region, Florida." *Ocean and Coastal Management* 133 (December 1, 2016): 11–17. doi:10.1016/j.ocecoaman.2016.09.009.
- Goldfield, David. *Encyclopedia of American Urban History*. SAGE Publications, 2006.
- Gornitz, Vivien, Stephen Couch, and Ellen K Hartig. "Impacts of Sea Level Rise in the New York City Metropolitan Area." *Global and Planetary Change, Global and Regional Sea-level Changes and the Hydrological Cycle*, 32, no. 1 (December 2001): 61–88. doi:10.1016/S0921-8181(01)00150-3.

-
- Governors Office of Storm Recovery. "NY Rising 2012-2015: A Report from the Governor's Office of Storm Recovery." Anniversary Report, 2015.
<https://www.governor.ny.gov/sites/governor.ny.gov/files/atoms/files/GOSRreport102915.pdf>.
- Governor's Office of Storm Recovery, New York State Homes and Community Renewal, Housing Trust Fund Corporation, and Office of Community Renewal. "NY Rising Buyout and Acquisition Program Policy Manual." Policy Manual, April 2015.
- Gunderson, Lance H., and C. S. Holling. *Panarchy: Understanding Transformation in Human and Natural Systems*. Washington: Island Press, 2002.
- Herrington, Susan. "The Nature of Ian McHarg's Science." *Landscape Journal* 29, no. 1 (March 2010): 2–20.
- HUD: Community Planning and Development, Disaster Recovery and Special Issues Division. "Program Guidelines: Buyout Implementation Tool #1." Accessed May 8, 2016.
[https://www.hudexchange.info/resources/documents/Disaster Recovery Buyout Program Guidelines.docx](https://www.hudexchange.info/resources/documents/Disaster_Recovery_Buyout_Program_Guidelines.docx).
- "Increasing Flood Insurance Resilience – The Role of Reinsurance | FEMA.Gov." Accessed May 11, 2017.
<https://www.fema.gov/blog/2017-01-03/increasing-flood-insurance-resilience-role-reinsurance>.
- "Iowa City Closes Books on Flood Buyouts | The Gazette." Accessed December 4, 2016.
<http://www.thegazette.com/2012/08/24/iowa-city-closes-books-on-flood-buyouts>
- "Iowa City Flood Victims Ask for Buyout Option." Accessed December 4, 2016.
<http://www.kwwl.com/story/8581936/iowa-city-flood-victims-ask-for-buyout-option>.
- Jacob, Klaus H. "Sea Level Rise, Storm Risk, Denial, and the Future of Coastal Cities." *Bulletin of the Atomic Scientists* 71, no. 5 (September 2015): 40.
- "Jersey Retreating From Rivers, But Not Coast, After Sandy." Accessed November 25, 2016.
<https://www.climatecentral.org/news/nj-hurricane-sandy-blue-acres-18275>.
- "Jersey Retreating From Rivers, But Not Coast, After Sandy." Accessed November 25, 2016.
<https://www.climatecentral.org/news/nj-hurricane-sandy-blue-acres-18275>.
- Jongman, Rob, and Gloria Pungetti. *Ecological Networks and Greenways: Concept, Design, Implementation*. Cambridge: Cambridge University Press, 2004.
- Katich, Kristina Noel. "Urban Climate Resilience : A Global Assessment of City Adaptation Plans." Thesis, Massachusetts Institute of Technology, 2009. <http://dspace.mit.edu/handle/1721.1/49698>.
- Kayden, Jerold. "Market-Based Regulatory Approaches: A Comparative Discussion of Environmental and Land Use Techniques in the United States." *Boston College Environmental Affairs Law Review* 19, no. 3 (May 1, 1992): 565.

-
- Knoblauch, Matthew. "You Probably Shouldn't Build There: Watershed-Based Land Use Strategies for Mitigating Global Climate Change in New Jersey's Freshwater Systems." *Sustainable Development Law & Policy* 16, no. 1 (Fall 2015): 4–38.
- Knobloch, Dennis M. "Moving a Community in the Aftermath of the Great 1993 Midwest Flood." *Journal of Contemporary Water Research & Education* 130, no. 1 (March 1, 2005): 41–45. doi:10.1111/j.1936-704X.2005.mp130001008.x.
- Knowles, Scott Gabriel, and Howard C. Kunreuther. "Troubled Waters: The National Flood Insurance Program in Historical Perspective." *Journal of Policy History* 26, no. 3 (July 2014): 327–53. doi:10.1017/S0898030614000153.
- Knutson, Thomas R., John L. McBride, Johnny Chan, Kerry Emanuel, Greg Holland, Chris Landsea, Isaac Held, James P. Kossin, A. K. Srivastava, and Masato Sugi. "Tropical Cyclones and Climate Change." *Nature Geoscience* 3, no. 3 (March 2010): 157–63. doi:10.1038/ngeo779.
- Kousky, Carolyn. "Managing Shoreline Retreat: A US Perspective." *Climatic Change* 124, no. 1–2 (May 2014): 9–20. doi:http://dx.doi.org/10.1007/s10584-014-1106-3.
- Lin, Ning, Kerry Emanuel, Michael Oppenheimer, and Erik Vanmarcke. "Physically Based Assessment of Hurricane Surge Threat under Climate Change." *Nature Climate Change* 2, no. 6 (June 2012): 462–67. doi:10.1038/nclimate1389.
- Lincoln Institute of Land Policy. "The Case for Managed Retreat from Flood Zones." *RPA Lab*, 14:49. <http://lab.rpa.org/the-case-for-managed-retreat-from-flood-zones/>.
- "MAP: FEMA Is Buying Out Flood-Prone Homes, But Not Where You Might Expect." *NPR.Org*. Accessed December 9, 2016. <http://www.npr.org/sections/thetwo-way/2014/10/20/357611987/map-femas-buying-out-flood-prone-homes-but-not-where-you-might-expect>.
- McCoy, Sarabrent. "Mapping the Region's Vanishing Wetlands." *RPA Lab*, 17:41. <http://lab.rpa.org/mapping-the-regions-vanishing-wetlands/>.
- Medlock, Samantha Riley. "Protecting Property Rights to Reduce Liability." Two Rivers-Ottawaquechee Regional Commission, Vermont Law School's Land Use Institute, and the Vermont Department of Environmental Conservation, 2008.
- Morang, Andrew. "Hurricane Barriers in New England and New Jersey: History and Status after Five Decades." *Journal of Coastal Research* 32, no. 1 (January 2016): 181–205. doi:10.2112/JCOASTRES-D-14-00074.1.
- "NYC Community Development Block Grant - Disaster Recovery - Approved Action Plan." Accessed May 5, 2017. http://www.nyc.gov/html/cdbg/html/approved/action_plan.shtml.

-
- “Overwhelming Risk: Rethinking Flood Insurance in a World of Rising Seas (2013).” *Union of Concerned Scientists*. Accessed November 25, 2016.
http://www.ucsusa.org/global_warming/science_and_impacts/impacts/flood-insurance-sea-level-rise.html.
- Patel, Toral. “Funding for Adaptation to Climate Change : The Case of Surat.” Thesis, Massachusetts Institute of Technology, 2014. <http://dspace.mit.edu/handle/1721.1/90100>.
- Peckett, Haley Rose. “Land Use and Climate Change in Miami-Dade County.” Thesis, Massachusetts Institute of Technology, 2009. <http://dspace.mit.edu/handle/1721.1/50113>.
- Pelling, Mark, and Sophie Blackburn. *Megacities and the Coast: Risk, Resilience, and Transformation*. New York: Routledge, 2013.
- Pielke Jr., Roger A., and Christopher W. Landsea. “Normalized Hurricane Damages in the United States: 1925--95.” *Weather & Forecasting* 13, no. 3 (September 1998): 621.
- Pimm, Stuart L. “The Complexity and Stability of Ecosystems.” *Nature* 307 (January 26, 1984).
- Plovnick, Amy (Amy Rebecca). “Measuring Climate Adaptation : Assessing the Use of Indicators in U.S. Coastal Cities.” Thesis, Massachusetts Institute of Technology, 2016.
<http://dspace.mit.edu/handle/1721.1/105008>.
- Powell, Michael R. “Living in the Mastics and Shirley, L.I. : A Struggling Area With Low Prices and a Beach.” *The New York Times*, April 3, 2009.
<http://www.nytimes.com/2009/04/05/realestate/05livi.html>.
- “Protecting Yourself Through Mitigation | FEMA.Gov.” Accessed April 20, 2017.
<https://www.fema.gov/protecting-yourself-through-mitigation>.
- Pugh, David. *Changing Sea Levels: Effects of Tides, Weather and Climate*. Cambridge: Cambridge University Press, 2004.
- Reeve, Kara E. “NGOs & Climate Change Campaigns : Understanding Variations in Motivations and Activities of Environmental and Development Organizations.” Thesis, Massachusetts Institute of Technology, 2008. <http://dspace.mit.edu/handle/1721.1/45425>.
- Robert, and Darlene. Interview with Lindenhurst Residents, May 7, 2011.
- Rohe, William. “Implementing Floodplain Land Acquisition Programs in Urban Localities.” Accessed May 11, 2017.
http://www.academia.edu/27892388/Implementing_floodplain_land_acquisition_programs_in_urban_localities.

“Secondary Home, Secondary Vacation Home, Rental Property | FEMA.Gov.” Accessed May 9, 2017.
<https://www.fema.gov/fag-details/Secondary-Home-Secondary-Vacation-Home-Rental-Property>.

Sherman, Diana R. (Diana Ruth). “Participatory Parks Planning : Exploring Democratic Design as a Tool to Mediate Cultural Conflict over Neighborhood Green Space.” Thesis, Massachusetts Institute of Technology, 2005. <http://dspace.mit.edu/handle/1721.1/33052>.

Shyduroff, Sasha A. “Greening Climate Adaptation : Exploring the Use of Green Infrastructure as an Adaptation Strategy in Boston and Cambridge, MA.” Thesis, Massachusetts Institute of Technology, 2016. <http://dspace.mit.edu/handle/1721.1/105046>.

Smith, Neil. “There’s No Such Thing as a Natural Disaster.” Accessed May 10, 2017.
<http://understandingkatrina.ssrc.org/Smith/>.

SMITH, TARA. “County Acquires Mastic Beach Wetlands.” Accessed May 11, 2017.
<https://www.longislandadvance.net/4005/County-acquires-Mastic-Beach-wetlands>.

Solecki, W. D. “28 - Moving toward Urban Sustainability: Using Lessons and Legacies of the Past.” In *Metropolitan Sustainability*, edited by Frank Zeman, 680–96. Woodhead Publishing Series in Energy. Woodhead Publishing, 2012. doi:10.1533/9780857096463.6.680.

Solecki, William. “Hurricane Sandy in New York, Extreme Climate Events and the Urbanization of Climate Change: Perspectives in the Context of Sub-Saharan African Cities.” *Current Opinion in Environmental Sustainability* 13 (April 1, 2015): 88–94. doi:10.1016/j.cosust.2015.02.007.

Spaulding, Malcolm L. *Estuarine and Coastal Modeling*. Reston, Virginia: American Society of Civil Engineers, 2012.

Sperry, Maura. Interview with the Ex-Mayor of Mastic Beach, April 11, 2017.

Steiner, Frederick. “The Application of Ecological Knowledge Requires a Pursuit of Wisdom.” *Landscape and Urban Planning*, Ecological Wisdom for Urban Sustainability: Doing real and permanent good in ecological practice, 155 (November 2016): 108–10. doi:10.1016/j.landurbplan.2016.07.015.

Stern, Robert A. M., David Fishman, and Jacob Tilove. *Paradise Planned: The Garden Suburb and the Modern City*. The United States: The Monacelli Press, 2003.

Stott, Peter. “Attribution: Weather Risks in a Warming World.” *Nature Climate Change* 5, no. 6 (June 2015): 517–18. doi:10.1038/nclimate2640.

Tate, Eric, Aaron Strong, Travis Kraus, and Haoyi Xiong. “Flood Recovery and Property Acquisition in Cedar Rapids, Iowa.” *Natural Hazards* 80, no. 3 (February 1, 2016): 2055–79. doi:10.1007/s11069-015-2060-8.

The Nature Conservancy. *It's Imperative - Mastic Beach*, 2016.

<https://www.youtube.com/watch?v=94l4StaHmcw>.

Thenhaus, Emily. "What We're Reading: NYC's Beaches, Parks and Pools Attract Record Crowds." *RPA Lab*, August 9, 2016. <http://lab.rpa.org/what-were-reading-nycs-beaches-parks-and-pools-attract-record-crowds/>.

(TNS), Tim Henderson | Stateline.org. "'Zombie Houses' Multiply in Some States." Accessed May 11, 2017. <https://www.abqjournal.com/741996/zombie-houses-multiply-in-some-states.html>.

Turner, John. Interview with Open Space Program Coordinator, Town of Brookhaven, May 11, 2017.

Ullah, Kazi Masel, and Ali Mansourian. "Evaluation of Land Suitability for Urban Land-Use Planning: Case Study Dhaka City." *Transactions in GIS* 20, no. 1 (February 2016): 20–37. doi:10.1111/tgis.12137.

Upton, John. "Jersey Retreating from Rivers, But Not Coast, After Sandy." *Climate Central*, November 4, 2014.

Urbina, Ian. "Perils of Climate Change Could Swamp Coastal Real Estate." *The New York Times*, November 24, 2016. <http://www.nytimes.com/2016/11/24/science/global-warming-coastal-real-estate.html>.

Vainio, Teija. "Motivations, Results and the Role of Technology in Participatory Design Research during 2000's - a Review in the Field of Architecture and Urban Planning." *Architecture & Urban Planning* 11, no. 1 (July 2016): 14–18. doi:10.1515/aup-2016-0002.

Vale, Lawrence J., and Thomas J. Campanella. *The Resilient City : How Modern Cities Recover from Disaster*. New York : Oxford University Press, 2005.

Visser, Hans, Arthure C. Peterson, and Willem Ligtoet. "On the Relation between Weather-Related Disaster Impacts, Vulnerability and Climate Change." *Climatic Change* 125 (2104): 461–77.

Vries, Daniel H. de, and James C. Fraser. "Citizenship Rights and Voluntary Decision Making in Post-Distaster U.S. Floodplain Buyout Mitigation Programs." *International Journal of Mass Emergencies and Disasters* 30, no. 1 (March 2012): 1–33.

Wald-Wittkop, Courtney. Interview with Project Manager at Blue Acres, NJDEP, April 6, 2017.

"Written Testimony of FEMA for a House Committee on Financial Services, Subcommittee on Housing, and Insurance Hearing Titled "Flood Insurance Reform: FEMA's Perspectiv | Homeland Security." Accessed May 11, 2017. <https://www.dhs.gov/news/2017/03/09/written-testimony-fema-house-committee-financial-services-subcommittee-housing-and>.