Managed Retreat: An Introduction and Exploration of Policy Options

American Meteorological Society
Policy Program Study
October 2022

AMS

Policy Program Study

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Lauren White

This report should be cited as:

White, L. 2022: Managed Retreat: An Introduction and Exploration of Policy Options. An AMS Policy Program Study. The American Meteorological Society, Washington, D.C. https://doi.org/10.1175/managed-retreat-2022.

The American Meteorological Society's Policy Program is supported in part through a public—private partnership that brings together corporate patrons & underwriters, and Federal agencies. Supporting agencies include the National Aeronautics and Space Administration (NASA), the National Oceanic & Atmospheric Administration (NOAA), & the National Science Foundation (NSF). Corporate partners include Ball Corporation, Maxar, and Lockheed Martin.

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Acknowledgements:

Many people critical to the development of this study deserve our thanks including Emma Tipton, Andy Miller, Paul Higgins, Keith Seitter, and Bill Hooke. This study was supported, in part, by NASA grant 80NSSC20K0015.

Cover image photos:

“House near Rodanthe collapsed” The National Park Service, public domain

“Severe erosion of bank of the Ninglick River threatens Newtok homes” by Romy Cadien

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Executive Summary

The human relationship with nature can be difficult to parse, especially when hazardous environmental conditions threaten our way of living. As sea levels rise, 100-year floods occur more frequently than ever, and permafrost melts at unprecedented rates, these phenomena (and others) inflict change in our environment that may necessitate a reaction. Deciding on how to react and ensuring those steps are taken is a large part of the weather, water, and climate community's work from weather forecasting to emergency response. Sometimes the hazards and threats that communities face from weather or climate-related events are repeated and, on some level, forecastable. Researchers have projections for the rates of sea level rise along the coasts and for seasonal drought outlooks, tools that can inform the process of decision-making. Taking proactive steps instead of only reactionary actions to these threats can be a live-saving approach.

Proactive measures against environmental threats can take many forms including protection, accommodation, and relocation. In some cases, protective and accommodating actions such as building sea walls and elevating structures respectively can be sufficient for the protection of life and property. However, not all communities experience the same degrees of exposure, hazard, vulnerability, or resilience—some communities may be at greater risk for hazards that cannot be accommodated for or be protected from.

Managed retreat is a tool for community adaptation to repeated environmental threats that involves the physical relocation of people, structures, and infrastructures away from areas exposed to repeat hazards. Though conversations surrounding managed retreat are becoming more commonplace in academic literature and public policy vernacular, the practice has been around for decades, as explained in the case studies at the end of this document.

Managed retreat is not particularly a popular choice: much of our human experience is tied to the place where we live, our neighbors, shared location-based history and culture, and a sense of belonging. Asking people to physically move away from their home or homeland is an idea often met with resistance. For this reason, we approach managed retreat as a tool for decision-making. Keeping conversations open to managed retreat, not necessarily as an end goal but as an avenue to explore, may help communities find creative solutions to their concerns or better understand what barriers to adaptation efforts exist in their neighborhoods.

The list of stakeholders that are involved in discussing or enacting managed retreat extend far beyond the weather, water, and climate (WWC) community of which the American Meteorological Society (AMS) is part. However, there are opportunities for those involved in the WWC enterprise to inform, enable, and support fellow stakeholders in these conversations and decisions. From research to public communications to community engagement, the WWC community, including key federal, academic, NGO, and private institutions, can be a supporting partner.

The AMS Policy Program conducted literature reviews, attended conferences with managed retreat as the focus, and conducted interviews with experts in the field to gather, organize, and

synthesize relevant and up-to-date information on managed retreat. There exist four main goals for this document: 1) to provide relevant, useful, introductory information to demystify retreat for decision-makers; 2) to encourage and enable conversations around this adaptive strategy; 3) to promote a framework of continual education and emphasize that progress on managed retreat is grounded in iterative processes instead of a one-time activity; and 4) to provide a range of potential actionable next steps tailored to community and local audiences. *If society is broadly unprepared and unwilling to have these conversations, the option of retreat as a climate adaptation will be overlooked despite its potential merits and without addressing the roots of its inadequacies*. This study explores the intricacies of managed retreat and to enable the individuals and local communities to consider whether, when, and how managed retreat can meaningfully address climate change vulnerabilities.

In this study, we introduce and explore managed retreat as an adaptive strategy to climate hazards with the goal of identifying the policy options for enacting managed retreat and exploring these policies' strengths and limitations. We seek to provide the context and information that can enable deliberations but stops short of including value judgements and being prescriptive, leaving stakeholders to decide the best course of action for their own nuanced situation. This study will include background information regarding risk assessment, strategies for resilience, and the terminology behind "managed retreat" to describe why this adaptive strategy is being discussed. We will identify key stakeholders in the discussions surrounding managed retreat and the role that they may be able to play. Though AMS is part of the WWC community, the issue of managed retreat and community adaptation in general extends far beyond the reaches of this community. The identification of stakeholders outside the WWC community is not an attempt to punt the responsibility of creating solutions off to another sector, but rather to identify areas of need and opportunities to provide external support and highlight the inherent interdisciplinary nature of this issue. We will also outline best practices for exploring managed retreat that include but are not limited to 1) champion community led efforts, 2) listen, 3) operate with voluntary participation, and 4) frame the process with human rights in the forefront of decision-making. We will explore eight case studies illustrating how different policies can shape how managed retreat is done. To round off the document, we will identify key funding opportunities to enable decision makers to find resources for further assessment or action, with a particular emphasis on federal programs FEMA and HUD.

1.0 Background

The ramifications of climate change are unprecedented, chronic, and threatening. As greenhouse gasses trap heat in the atmosphere, humanity is witnessing longer periods of increased air temperatures, longer periods of drought, more frequent wildfires, sea levels rising, and other ill effects of our collective impact on the atmosphere. Disasters that used to be considered acute, rare events, are now occurring more frequently. Harris County, Texas, experienced three 500-year floods in three years (Ingraham 2017). In 2020, the United States experienced more than 20 billion-dollar disaster events, continuing a trend of a steadily rising number of costly disasters (Adam 2022). More people are also being exposed to these hazards, especially hurricanes, sea level rise, and other coastal threats: in 2019 almost 30% of the U.S. population, or 94 million people, lived in coastline counties (Cohen 2019). As society feels the growing impacts of these events, the need to understand and mitigate for the risk we face comes to the forefront.

1.1 Adding up the Risk

Chapter 3 of the 2012 IPCC report outlines four factors that combine to create Risk: Hazard, Exposure, Vulnerability, and Resilience (Seneviratne et al 2012). A breakdown of a complex problem (Risk) into its parts like this may be a helpful framework for the creation of targeted solutions (Figure 1). Depending on different community situations, there may be some factors that are easier to address than others, and applying a comprehensive risk management approach that involves identifying and characterizing all four components can aid in this decision making process. Actions to reduce risk as a whole can focus on a single factor or be multifunctional.

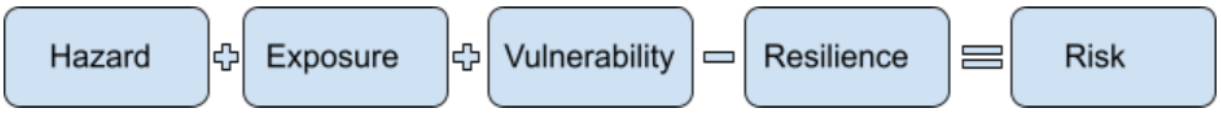

Figure 1: Factors that combine to create risk

Reducing hazards is one way to reduce risk. Hazard refers to phenomena or conditions that present adverse effects to environments and ecosystems. Climate change has increased the number and severity of natural hazards over recent years and will continue as the causes of climate change persist. Climate-induced hazards include, sea level rise, drought and precipitation dumps, heatwaves, permafrost melt, and other adverse effects that impact both human civilization and ecological systems (IPCC 2022). There are also hazards that communities experience that have origins other than climate change. Human activities and behaviors have altered the natural environment in manners not related to carbon emissions: unsustainable land use practices, activities such as dredging or burn suppression, and other alterations of the natural environment have resulted in hazards such as flooding, fires, and extreme or concentrated heat. Further, there are non-human-induced hazards that may affect our environment: volcanic eruptions, earthquakes, etc. While attribution of hazards is not the

goal of this section, it is important to understand, to the extent possible, where and why hazards become prevalent. This helps to address their causes, correct or realign behaviors and activities, and ensure less hazardous outcomes. Other than preventing hazards by suppressing their origin, hazard mitigation actions will only contain the hazard to a certain degree, and often only temporarily.

By reducing exposure, the risk we face can also be reduced. Exposure describes the degree to which a system or structure is in the path of a hazard. Human populations are increasingly exposed to hazards via two avenues. The first avenue is by previously building in an area exposed to routine hazards, yet now the hazard is becoming more frequent or more severe. An example of this would be a riverside town established in a known floodplain that once experienced infrequent flooding but is now experiencing 100-year floods multiple times in a decade. The second avenue is by developing in an area with no history of routine hazards, yet now the area is exposed to and experiencing these hazards. This example would be a community that at the time of establishment was near but not in a floodplain. Over the years as geomorphic, lithospheric, atmospheric, and other conditions have changed, the floodplain has altered and now encompasses at least some parts of the community: infrastructure and hazards are encroaching on each other, exposing people to floods, fires, and other dangerous situations. Reducing risk by reducing exposure can be done through the relocation of the example community out of the floodplain, or by preventing further development in or around the floodplain. In either scenario, people and structures are dissuaded from occupying the area that experiences hazards.

As vulnerabilities increase, so does risk. Vulnerability outlines characteristics or circumstances of populations, infrastructure, or systems that are detrimental when exposed to a hazard. Characteristics can include poor health or mobility, low socioeconomic status, unreliable transportation and evacuation opportunities, or a lack of affordable or available insurance. Often, vulnerabilities are tied into systemic inequities. For example, historically redlined areas house predominantly minority demographics and are also the neighborhoods most exposed to urban heat effect (Hoffman 2020). This results in these communities experiencing the effects of heatwaves with less shade, more blacktop, and a greater risk of heat-related illnesses. Efforts to address climate vulnerabilities are fundamentally interdisciplinary and community-specific and play a role in reducing overall risk.

As resilience increases, risk decreases. A resilient community has the resources, infrastructure, and systems to recover quickly from hazards. Resilience is not just the absence of vulnerabilities, but an active, inclusive push to create a forward-thinking, adaptable community. Techniques to increase resilience often depend on resources and costs that communities are willing and able to invest upfront. Resilient systems often rely on diversification and redundancy of function.

1.2 Strategies for Adaptation

In the context of climate change, strategies to cope with this immense challenge are often delineated into two camps: mitigation and adaptation. In these discussions, mitigation often indicates the aim to reduce carbon emissions and therefore reduce the severity of climate

hazards, or in other words, take action against the root cause of climate change. Adaptation, on the other hand, often refers to "adjustments in ecological, social, or economic systems in response to actual or expected climatic stimuli and their effects or impacts" as stated by the United Nations (United Nations 2022).

Adaptation strategies are commonly divided into three categories: protect, accommodate, and retreat (PAR). Some frameworks may extend beyond these three and include categories such as "avoid" or "advance" (see Mach and Siders 2021 or Doberstein 2019), but PAR generally covers most methods. There is no "best" adaptation strategy, and each case will have varying needs that these categories may or may not be able to fulfill. What category an adaptive effort falls under is not always clear cut and adaptation frameworks will often pull from all categories to create a comprehensive approach. Traditionally, especially with sea level rise, the dominant strategy will change over time, starting with protective measures, then accommodating actions, then retreat. This fluctuation is in response to the varying levels of permanency, financial obligation, and degree of change that are associated with each of these categories.

The following descriptions are synthesized from aforementioned papers and the California Coastal Commission to depict a common understanding of each of these strategies.

Protect: With protection strategies, physical structures are engineered to prevent a hazard from reaching certain structures or assets in their current location. Such structures can include seawalls, sandbags, levees, or other physical barriers. Protective actions do not attempt to reduce hazards and do not address roots of vulnerability but instead aim to decrease risk by building a physical boundary to limit exposure. Protective strategies are generally unobtrusive to daily life and allow residents to remain in their communities and maintain their interpersonal and historic connections with that area. Protective measures are often one of the cheaper options at the outset: however, the costs of repairs may increase the total price of this effort over time. Long-term planning is helpful to understand if protective measures will be the most economical option over time.

Accommodate: Accommodation strategies aim to reduce risk by increasing the resilience of existing structures and assets in their current location. Accommodations include actions such retrofitting buildings to withstand hazards by elevating structures, creating ground floor modifications so that electrical and heating systems are on higher floors in case of floods, or reroofing with wind-resistant shingles (NYC Department of City Planning 2014). The decision to employ these accommodations can be individual or required through zoning or land use policies. Like protective strategies, accommodations allow residents to remain within their communities despite the presence of the hazard. Unlike protective strategies, accommodations are individually designed and implemented for structures and their tenants, not for general, community-wide application. Because of this, accommodations may be more expensive for individuals. Additionally, varying levels of vulnerability often exist within communities, creating unequal opportunities for available accommodations, financially or otherwise. Accommodations to individual structures also do not remove risk for utilities and publicly maintained systems. For example, while a structure such as a home may be elevated to avoid a flood, the roads, sewer systems, water systems, and other utilities or systems managed by Public Works may remain

exposed to the water. Discussions of elevation of public roads and other systems have been at the forefront in some municipalities, but challenges including cost have led to discussions over who should pay, especially in low density areas (Harris 2019).

Retreat: Retreat strategies involve removing and relocating people, structures, and assets from an exposed and vulnerable area in an effort to reduce risk. Retreat is historically a last-resort option when protective measures and accommodations do not reduce risk to an acceptable level, as defined by the community—not every individual or community will agree upon a standardized "acceptable" level of risk. Communities that experience repetitive loss and damages, thus dealing with consistent rebuilding, may find that relocating can be a choice dependent on economics or the willingness to accept the stress that accompanies living with a continual hazard. By choosing to participate in retreat, one will experience a physical separation from a location that can hold historic or cultural connections of significance. This experience may be more distressing to some communities than others, which is why any policies or decisions regarding retreat must be tailored closely to the local residents and include their voices throughout the entire decision-making process. As hazards (some associated with climate change and some compounded by additional anthropogenic interferences with the Earth system) become more frequent or damaging, the concept of retreat has gained media popularity. *A rise in conversation does not automatically mean that retreat is more commonly practiced, but that more resources, best practices, and tips for human-centric, successful retreat are being discussed with a wide range of stakeholders.* Under the umbrella of retreat strategies lies the concept of avoidance. Sometimes described as its own category of adaptation strategy, avoidance refers to efforts to prevent further development in areas exposed to a hazard. Avoidance often removes the need for future retreat and other adaptation strategies. Methods to implement avoidance often overlap with retreat methods, including policies focused on zoning, land use, and property ownership, many of which topics will be explored in section 6.

2.0 Introducing Managed Retreat

The severity and frequency of risk that numerous communities are facing complicate our collective understanding and practices of adaptation measures. More frequently, protection and accommodation strategies are insufficient in reducing risk to a manageable level. In 2020, the United States experienced over 20 disaster events with $1 billion costs associated, one of the latest examples of a rising average cost, exhibiting a large number of at-risk structures and populations (Figure 2). With potentially millions of affected individuals, not to mention at-risk infrastructure, systems, and assets, our adaptation responses need careful thought. Over the next couple decades, residents of affected communities will need to consider how to address these oncoming hazards based on the *merits and failings* of certain responses. The manner of relocation is shaped by the policies under which retreat is enacted. Understanding policy options and the incentives they create will empower individuals to choose and advocate for actions that will enable their vision of relocation.

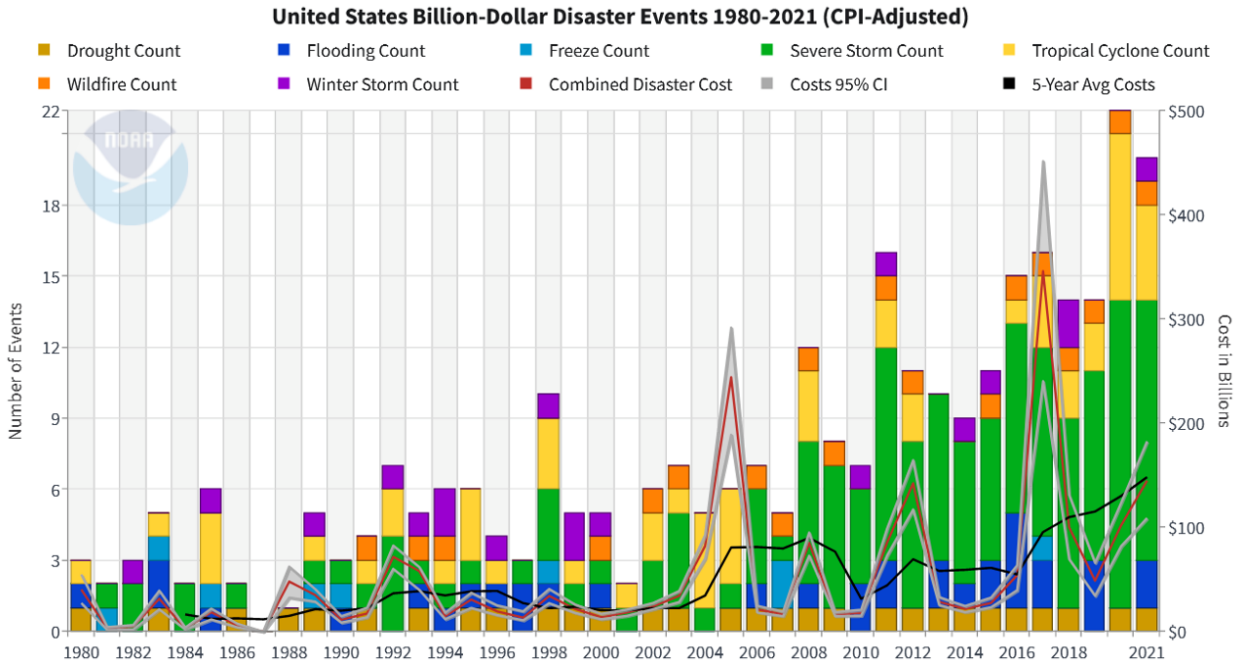

Figure 2: U.S. Billion-dollar Weather and Climate Disasters in Historic Context (1980-2021) by Adam Smith, NOAA National Centers for Environmental Information. Reproduced with permission.

The term "managed retreat" has recently gained traction in public discourse as a potential adaptation strategy. It is a complex and nuanced adaptation tool that may suit some communities better than others. By providing background information, a list of principles, policy examples, and funding resources, this study aims to aid in the decision-making process surrounding managed retreat.

2.1 Definition

Managed retreat references a planned relocation of people, structures, and systems away from an area that is experiencing risk. A single definition does not prevail in literature, but the idea remains consistent: A.R. Siders, a prominent academic in the realm of retreat, defines managed retreat as "the purposeful, coordinated movement of people and assets out of harm's way" (Siders 2019). Another definition, this time for "planned retreat" is put forth by Dr. Brent Doberstein, a climate change adaptation scientist: "the purposeful movement of peoples, infrastructure, or land use from areas at high risk . . . to areas that are at lower risk or are more resilient" (Climigration 2020).

The words, phrases, and terms we use to communicate complex topics are powerful. Communication is effective when all parties use terminology with a common understanding of intent as well as history behind these words. The phrase "managed retreat" follows common practice in the field, but the phrase does not always reflect the wishes and intentions of all those considering a planned, permanent relocation.

The deliberate use of "managed" is *intended* to portray a sense of a planned, coordinated, directed effort instead of an ad hoc flight. "Managed" retreat would have oversight and foresight with a constructed plan for people and assets. This is framed in opposition to "unmanaged" retreat that elicits the fear that systems, structures, and people, especially those with less resources, would be left behind and vulnerable to hazards. In an imaginative piece for climate magazine *Anthropocene*, journalist Elizabeth Rush depicts unmanaged retreat as a town's financial struggle with insurance companies and federal programs, resulting in wealthy residents fleeing, leaving behind a vulnerable population with a reduced tax revenue and not enough funding to fix failing infrastructure (submerged roads, leaking oil refineries and other destructions of the built coastline) (Rush 2020). She paints a bleak picture of unmanaged retreat strategies in order to argue for a coordinated effort to avoid this future. However, Rush declines the usage of the term "managed" and instead favors "planned." She is not alone in this choice, other experts and researchers express concern that usage of the term "managed" is inconsiderate of American historical context and carries assumptions and power imbalances of who is the "manager" and who are the "managed" (Maldonado et al 2020). Self-determinism should be a tenet of place-based decision-making in a country where marginalized groups and communities have historically been forcibly displaced by the government, as painfully exemplified by the Indian Removal Act and the forcible removal of Indigenous communities from their homes and land of which they have been stewards since time immemorial. The word "manage" can reflect a hierarchical system of decision-making that does not encourage an intentionally inclusive framework of change, which is why alternative terms such as "planned" or "community-led" have been proposed by social scientists in place of "managed" to reflect an inclusive vision of success.

The "retreat" aspect of the term reflects a physical move away from geographical locations that are increasingly exposed to hazards. While "retreat" may conjure visions of physical space between structures and the coastline or riverbed, it may also connote a sense of failure and surrender. We can choose to frame the term optimistically: "We're not retreating, just advancing in a new direction!" However, the connotation of surrender may linger and taint the support for the process, to the point where the phrase "managed retreat" has become politically unpopular and known to halt conversations surrounding coastal policies (Mulkern 2021). For this reason, "relocation" has been adopted by some policy officials as a common replacement to "retreat"—keeping the same intent to move elsewhere while shedding negative connotations.

What is the difference between Managed Retreat and Climate Migration?

It seems natural that managed retreat and climate migration would be referring to similar phenomena—the movement of people away from a climate-induced hazard to a safer location. While there are similarities in motivation for the move, historical and structural systems distinguish the two from each other. Climate migration focuses singularly on the movement of people away from a hazard, with climate migrants often leaving behind their homes and systems of support in search of a safer geographical location. This migration is often done without the support of governments or other institutions, and is usually an endeavor

undertaken on an individual basis (Gill and Laungani 2021). For this reason, climate migrants face vulnerabilities in the places they left as well as during their journey and at their new destinations. Migrants can become stranded in new locations for years with minimal resources, such as refugee camps. On the other hand, managed retreat systematically moves both people and structures with the assistance of community and government programs. Residents that engage with managed retreat are typically more supported and lack the extreme vulnerabilities that climate migrants face in new locations.

2.2 Influence of Policy

How (and if) a community or individual moves away from their home is characterized by multiple factors including type of hazard, financial incentives, and value-laden judgment of safety of life and property. Some of these factors can be influenced by policy, namely financial incentives.

Managed retreat is poised to be a proactive approach to disaster mitigation by removing at-risk populations and structures before damage occurs. However, the United States' federal approach to disaster is mainly reactionary and focused on recovery, as outlined by the 1988 Stafford Act. This piece of legislation relies on the president to make a major disaster declaration in response to a disaster in order to release funds for a response and future hazard mitigation. Additionally, when funding is released to rebuild homes and infrastructures such as roads and bridges, the Stafford Act does not require mitigation efforts to be included in these repair efforts (Maly and Ishikawa 2013). By allowing structures to be rebuilt to an "as-it-was" condition, these structures are still exposed and vulnerable to the hazard that damaged them. With the increase in frequency and intensity of acute events like hurricanes and floods, and with a steadily encroaching coastline and melting permafrost, structures that were once considered safe may be repeatedly damaged by these more incessant disasters.

The idea that a single structure may be repeatedly damaged by a disaster and need habitual repairs is called "repeat loss." This is becoming increasingly expensive for the federal government, which provides grants through the Federal Emergency Management Agency (FEMA) and other disaster relief institutions, and for the taxpayers that fund the government. One house in Houston, Texas, received $1 million in payouts from repeat flooding damages despite its assessed value of $72,000, an investment 15 times the value of the house. Dauphin Island, Alabama, has been damaged by dozens of hurricanes and storms since 1979 and has received over $80 million to repair these structures, without mitigation requirements. Over the years, these federal grants have valued over $60,000 per resident (Gillis and Barringer 2012).

The Stafford Act is not the only federal policy that allows residents to live and build in exposed locations. The National Flood Insurance Program (NFIP), an entity managed by FEMA, subsidizes flood insurance premiums for homes and commercial buildings that reside in flood-risk areas. The premium rates that NFIP sets are much lower than their market value. This allows lower-income households to afford this insurance, which is required in order to own a

home in high-risk areas. These artificially low rates also allow wealthier homeowners, often in coastal communities, to continue supporting high-value properties in high flood risk areas. By subsidizing the insurance, NFIP at most incentivizes people to live in exposed locations, and at the least does not dissuade people from building and living in these locations.

2.3 Two Parts

Managed retreat can be conceptualized as two parts: first, the movement away from the original area and secondly, the movement to a new location. The policies that a community enacts when engaging with retreat can often focus on one or both of these aspects (see Section 6). However, both are important to understand in order to ensure that residents are relocated away from dangerous situations and into a safe location.

2.3.1 Moving Away

Types of retreat can vary across time scales. The difference between managed retreat and other forms of relocation in response to hazards is the time it takes for the process to unfold and whether residents are reacting to an acute event (e.g., tornado or hurricane) or chronic conditions (e.g., sea level rise, seasonal wildfires, permafrost melt). Acute retreat, rapid relocation to a nonpermanent location, frequently unfolds in the form of evacuations. These are unplanned and sudden relocations of people with the intent to return, while infrastructure and built systems remain behind. On the other hand, managed retreat is a relocation that is prepared for and carried out over time in response to an ongoing, increasingly threatening hazard. This type of retreat operates on the assumption that there is no expectation of return and plans for the relocation of both systems and structures as well as populations.

In some instances, acute retreat can evolve into a chronic relocation as the expectation of return is impugned by the state of structures and systems in the wake of the hazard and while communities grapple with the resulting financial, social, and ecological challenges. When Hurricane Katrina hit in 2005, more than 1 million people were displaced and many residents fled to outlying cities such as Houston, where they remained after the immediate hazards dissipated. Some came back to live in the same community, but not necessarily in the same homes they lived before. One year after the hurricane, the population of New Orleans, Louisiana, was still half of what it was before the disaster (Plyer 2016).

2.3.2 Moving To

Retreat can also vary across geographical scales: relocation patterns range from pointed to dispersed. Pointed relocations occur when a community moves as a whole from a vulnerable, exposed location to a safer location. Whole community relocation was exemplified by Valmeyer, Indiana, a town that prioritized community buy-in and created communal processes to determine how to move structures, systems, and people together to a new plot of land. Conversely, dispersed relocation occurs when households decide to move independently to other locations, without neighbor input or collaboration. This is more likely to occur during decision-making processes that individualize the choice to move, such as a buy-out program which is an

opt-in system that accepts applications on a household base. As noted however, relocation patterns span a range and there are options between pointed and dispersed. In the Blue Acres Buyout Program in Woodbridge, New Jersey, households that were bought out were encouraged to stay within the community and were given priority applications for apartments in the un-damaged side of town (Section 6.1; Spidaliera 2020).

The areas that residents move to are often referred to as "receiving communities." Sometimes, these are new neighborhoods in the same afflicted town where residents are leaving their homes. Sometimes, receiving communities are a county or state away. Wherever the receiving community is, relocating residents should be sure that they are not trading one disaster-prone area for another. Residents fleeing seasonal wildfires may want to ensure that their new homes are not at risk of flooding from sea level rise. Some communities that are receiving communities will face challenges associated with managed retreat. An influx of people will affect a community's housing availability, infrastructure, and public services such as schools (Georgetown Climate). Gentrification is also a concern: residents with the resources to move may flock to areas set further back from the sea, or towns on higher ground. Residents of Liberty City, Florida, a predominantly Black community, fear that their town, which sits 6 inches above sea level, is already experiencing cultural change and increasing housing prices as wealthier residents from the coast move in (Boyd 2019; Smalls 2021). Proactively addressing concerns of housing, services, and other relevant resources can be achieved through local policy, including the organization of funding opportunities and investments. Preparing a community's capacity for population growth is a task not just for policy makers but community members as well: understanding how to support a community's culture in tandem with those of incoming residents will be a multistakeholder process.

Kristina Peterson of the Lowlander Center in Louisiana published a chapter titled "Sojourners in a New Land: Hope and Adaptive Traditions" in a 2020 book *Louisiana's Response to Extreme Weather*. This chapter focuses on the challenges that both receiving communities and new residents may have to face together, referencing the carrying capacities of rural towns, tensions that arrive with an influx of newcomers, and potential shifts to community culture, especially communities of place (Peterson 2020). Her chapter highlights three key components to creative solutions for these concerns: 1) finding and addressing root causes of tension or problems, 2) sharing of cultural experiences to build relationships, and 3) providing attention and support to the vulnerable. Using these, and other principles outlined in Section 4, the process of managed retreat may take on an empathetic and successful approach.

3.0 Tools, Goals, and Decision-Making

"Retreat is not a goal in and of itself but a means of contributing to societal goals"

- Siders, Hino, and Mach (2019)

As alluded to by Siders, Hino, and Mach, managed retreat can be framed as a tool to achieve a *goal* or *vision* set by a community, an individual, or society broadly. Determining the intent and contents of this goal are central to the subsequent implementation of a tailored course of action.

To start, communities must understand what the goal is and whose voices were involved in the outlining of the goal. The process of goal making can benefit from 1) a vision for the future, 2) input provided by various stakeholders, and 3) an analysis of baselines and needs.

Not all goals serve the same purpose: visions and goals can span a range from specific to conceptual, from person-oriented to environmentally oriented, and beyond. Whatever goals an individual, community, or society may set, employing the most efficient tools to achieve these ideals is key. Managed retreat is not the most useful tool to achieve all or even most resilience goals. However, for certain goals that aim to reduce the risk a repeated hazard poses to populations, structures, and systems, it may be the most useful tool to ensure success.

Managed Retreat as a Tool

How can managed retreat assist in achieving the following goals? How might managed retreat not address these goals?

- Goal 1: Bring harmony between human populations and our environment.
- Goal 2: Be able to live in your home without the fear or stress of flooding.
- Goal 3: Preserve a certain natural resource such as wetlands, a native plant, or clean water.

The individuals and perspectives that are included in the process of goal-making can drastically shape the course of action that follows and influence the impact these actions have on fellow community members. For this reason, it is important that a diverse and representative group of people are included and are vocal in the goal-making process. Without input from all members of the community, concerns specific to demographics, socioeconomic classes, or geographic locations may be overlooked.

The creation of a shared goal or vision benefits from community input from stakeholders with a variety of perspectives: residents, business owners, homeowners, taxpayers, and more. A search for a common objective would benefit from the collaborative nature of networks to connect stakeholders and begin the process of bringing people together to the table and to hold space for a variety of voices.

However, communities will not likely be homogenous entities. There will be disagreements and differing opinions among individuals that influence the effectiveness of a sweeping goal or action. A shared vision for a community can be a valuable, specific ideal to strive towards, but reaching a community consensus with complete buy-in may not always be possible.

Individuals may reach a different conclusion or opinion even when provided the same scientific or economic data for a variety of reasons. While scientific and economic information can inform decision-making, one's life experiences, priorities, values, ethics, and propensity for risk-aversion will also influence one's choice. Additionally, the manner in which scientific

information is communicated and made available can influence who is more amenable to prioritizing this data. Complex, jargon-filled information that is hidden behind paywalls or only shared within an academic community is not likely to influence the wants or needs of the average individual. Scientific outreach that is aimed to inform the public about how sea level rise, flooding, wildfires, permafrost, or other threats can directly and indirectly affect individuals' daily lives may be more widely accepted and incorporated into decision-making. Additionally, it is important that there is equity in access to information in order to mitigate effects of systemic inequality and ensure that all members of a community are well equipped to make the most informed decision for themselves.

Community input via iterative processes may yield consensus-driven action points. This is well visualized by cycles that depict the decision-making and action-implementing process, progressing through stages that repeat in order to create adaptable, perceptive, and useful actionable steps. A chapter in the 2014 IPCC report outlines tenets of decision-making, specifically in the face of climate hazards (Jones et al 2014). The four-stage cycle is a mechanism to achieve good climate decisions through both internal and external factors: internal processes and frameworks of decision making entail stakeholder involvement, best practices, iterative discussion, and attributes of complex risk, while external factors include outside elements that will shape the outcomes such as scientific data and policy. The cycle stages include 1) decision scoping, 2) decision analysis, 3) decision implementation, and 4) decision review, cycling back up again to stage 1. This is not the only decision wheel available in the risk reduction literature, but it outlines the process in clear steps that can be further developed with supplemental readings.

An analysis of baselines and needs is helpful for a community to understand what steps are necessary to take in order to reach the goal they have set. Understanding the distance between current situation and ideal situation, whether it requires a few adjustments to policies or whether it requires large overhauls of systems, will inform the course of action, timeline, and budget for the community vision to be realized.

Each community's situation remains unique with challenges and opportunities for measures of resilience. What troubles one community may not elicit concern in another, thus differently shaping the pathways forward for both. For this reason, it may be beneficial for relocation-related policies to be flexible and adaptable to each unique situation: a one-size fits all approach will not adequately address both the threats to the borough of Manhattan and provide needed assistance to Newtok, Alaska.

4.0 Principles and Best Practices

The following principles and best practices were collected from conversations with and presentations by city officials, coastal managers, adaptation scientists, and social scientists. Many of these identified principles are universal across case studies, illustrating that a compassionate, holistic, self-determining approach to this complex enviro-societal issue buttressed with sound scientific information can achieve a community's shared vision. An

adherence to these historically useful principles and best practices may supplement an already strong response or rally community support and trust for a truly collective course of action.

1. Champion community led efforts and encourage community buy-in

Community led efforts are better received and celebrated than decisions that are made through solely top-down processes. Voices from the people who live and work in an area are often well versed in and represent the community's needs and wants. These individuals can inform the vision of success and method to achieve this goal, of which retreat may play a role. Success can be achieved, especially if the community buys into the process and rallies behind the effort.

2. Listen

Making listening a focal point in the decision-making process can build trust within the community, and between the community and external stakeholders. Active listening on the part of any decision-maker can illuminate key perspectives, priorities, and concerns to be addressed.

3. Operate with voluntary participation

Voluntary participation is crucial to the practice of managed retreat. Though voluntary relocation may take longer to organize and may leave some checkerboarded neighborhoods, a forced relocation would erode trust in government, resilience work, and climate conservation while inflicting hardship on residents.

4. Frame the process with human rights in the forefront of decision-making

When self-determination, self-agency, and other tenets of human rights are used as a framework for managed retreat, the community will benefit. In opposition to the historical forced relocation of oppressed peoples, a process of decision-making and action implementation centered on community self-agency benefits the community's health and acknowledges the human experience of those affected by risk. Of course, there may be instances where the self-agency of individuals conflict: one resident wants to move, and another resident does not. Accommodating for these different choices may be necessary. Efforts to provide the most recent and relevant information on the pros and cons of staying versus leaving may or may not sway decision-making.

5. Support a holistic approach

A holistic approach to managed retreat accounts broadly for a wide range of issues associated with people and the environment and across scales. Ecosystems and services are also affected by risk as well as our response to hazards, exposure, and vulnerabilities. Consideration of the ecosystems people co-inhabit and their role as life support systems will create a well-rounded environmental response to risk.

6. Embrace local knowledge and the co-production of knowledge

Attention to and acceptance of local knowledge better informs the understanding of a community's risk and the appropriate response. The role data play in forming a response to risk is great, but an incorporation of local knowledge will fill in gaps that scientists have been unable to measure. These gaps include cultural and historical factors, priorities, and a close and sustained experience of living in the environment alongside risk. Embracing this co-production of knowledge, or integration of multiple information systems and methodologies, is a step towards building community trust and buy-in.

7. Disseminate knowledge

Effectively communicating relevant information in an easily digestible format to a broad audience can further build trust in the scientific community and process. This may encourage community participation and initiate decision-making and actionable steps.

8. Pursue innovation and embrace big thinking

The pursuit of innovation will allow for the exploration of new opportunities to respond to risk. Unimpaired creativity and outside-of-the-box thinking may provide novel solutions to complex enviro-social issues. Working only within strict regulations and status quo runs the risk of ignoring an opportunity for success: there are still ideas to be explored and things to be created.

9. Identify and understand all perspectives

Acknowledging the variety of perspectives involved in high-impact decisions will bring more voices, opinions, and options to the table. Though many perspectives exist, they do not all carry the same weight: a resident's voice will be more important than an out-of-county taxpayer's opinion on policy and funding options for resiliency efforts.

10. Accept that there is no "right" answer

No one absolute right answer exists to such complex situations as those that involve managed retreat. We hope to do the best we can with the resources and time we have available.

For this reason, the stages of decision-making exist in a cycle: once a solution is implemented, monitor it, gather new and evolving data, and adjust based on the emerging information.

5.0 Stakeholder Identification

The various actors or stakeholders involved in resilience work as a whole—and managed retreat specifically—are numerous. The extent of stakeholders involved in decision scoping, analysis, implementation, and monitoring is large and varies depending on courses of action, making a comprehensive roster of all possible and potential players difficult to gather. This section lays out a smattering of voices that have commonly played a role in managed retreat. Each of the following categories has their own perspective and opinions on the matter, and each individual placed into these categories is even more independent, making each of these attributions a

generalization. However, sometimes generality allows for large-picture thinking, especially when visualizing how each identified stakeholder can contribute and collaborate with others.

5.1 Community-level stakeholders

Residents are central to discussions surrounding managed retreat because they are the individuals most directly affected by a physical relocation of houses and infrastructure. Residents' concerns span safety, cultural ties, economic factors, and more. Some individuals and communities are looking for aid in the form of relocation when their homes are repeatedly exposed to environmental hazards such as flooding. Residents can be their own advocates, using their voices to demand action and policy changes, whether in favor of managed retreat or not. In Newtok, Alaska, villagers have been fighting for years for federal support for a relocation program as their houses and businesses continue to face flood and damages from melting permafrost (Kim 2019). In Nashville, Tennessee, individual homeowners gladly and eagerly accept buyout offers for houses that face repeated flooding instead of living with the demanding yet necessary repairs that cause continual economic and emotional strain (Schwartz 2019). However, not all residents are as eager to consider relocation as a solution to reduce risk. Some communities have extensive historical and cultural ties to the land they live on, especially Indigenous communities. Members of the Shinnecock Nation in Southampton, New York, are facing threats of erosion and coastal flooding but push back against the concept of retreat. Instead, the Shinnecock fight for restoration and protective measures such as the construction of oyster reefs in the bay to dissipate wave energy and other nature-based solutions (Smith and Bullock 2019; Sengupta and Lawal 2020). Shinnecock residents are intent on preserving their land and history for future generations, and relocation is not compatible as a tool for successfully achieving this goal. Other communities push back against retreat due to fears of a decline in the economic value of their high-value properties: residents of Del Mar, California, fear that property values on their homes will fall if managed retreat was enacted in their city. By removing or heavily regulating beach-front homes, the city could lose tax revenue from these wealthy residents, money that may have been spent on seawalls or other protective structures (Harold 2020; Mulkern 2019).

Residents may have different motives and opinions on managed retreat depending on socioeconomic status, geography, historical or cultural ties to the land or community, and perception of threats, thus making collective action difficult to achieve at times. However, as previously mentioned, giving a voice to the members of the community, listening to their concerns, and creating a community vision for the future can lead to a successful solution.

Business owners face many of the struggles that residents do when considering resilience strategies, including managed retreat. In addition to concerns of safety concerns echoed by residents, businesses must contend with the fact that economic viability is at the forefront of their survival—they must exist in an area where clients exist, and they have the capacity to meet client needs. Businesses that are geographically bound, such as fisheries and other harbor-related businesses, may be particularly interested in on-site accommodations instead of retreat.

Community leaders in nonpolitical roles such as pastors, educators, heads of organizations, coaches, and other fixtures in the community often have strong relationships and lines of communication with other residents. As such, these trusted individuals may wield influence in any decision-making process. They may be points of contact to pass information and resources through, to help organize meetings, or otherwise assist in community-building.

5.2 Government

The Federal Government can make policies that are large and sweeping but lack tailored attention to the nuances that each retreat endeavor requires. There is no single federal government entity or program under whose jurisdiction "managed retreat" lies. The Federal government, as currently situated, provides funding for retreat and other adaptation activities primarily through **FEMA** and **HUD**. **FEMA** is tasked with "helping people before, during, and after disasters." **HUD,** the Department of Housing and Urban Development, has oversight over "provid[ing] housing and uplift[ing] communities." These two programs provide the lion's share of funding for disaster recovery as pertains to managed retreat activities (see more in section 7: Funding). FEMA also produces flood maps through its Flood Map Service Center and heads floodplain management. FEMA additionally is in charge of the National Insurance Flood Program, or NIFP. The Flood Maps and NIFP in conjunction are policy tools that intend to assist homeowners in making decisions regarding the level of risk, financial and physical, they are willing or able to bear through homeownership. **NOAA**, the National Oceanic and Atmospheric Administration, includes a Coastal Zone Management Program under the Office for Coastal Management (OCM) that aims to "protect, restore, and responsibility develop" coastal geographies, and is capable of working with local communities and governments on managed retreat and adaptation at large. Additionally, NOAA provides interactive tools and data to inform the public about sea level rise. The OCM's Digital Coast interface provides users with visuals, projections, and other sea level rise information that can be specified to their location. The **U.S. Army Corps of Engineers** (USACE) is another federal agency that is heavily involved in flood risk management, often involved in projects such as building levees but also assisting in retrofitting, elevation, or retreat. Similar to other federal programs, the USACE can also offer funding opportunities for municipalities that are looking to take action against flood risk. However, unlike FEMA, USACE reserves the right to use eminent domain in any of its funded projects (USACE 2015; Cheng 2021). Eminent domain allows the government to acquire private property despite the residents wishes, making any adaptation efforts with this stipulation nonvoluntary.

State governments are able to direct a more tailored focus to the specific exposures and hazards of their geographical areas than the Federal government. In this capacity, states act as program managers, directing funding and resources to necessary recipients, whether through state or federal funding processes. State governments can also take on the role of liaison, frequently acting as the entity that submits a funding application to FEMA or HUD on behalf of local municipalities. States can help direct money and resources for pointed projects as well as broad, dispersed efforts. For example, the state of Louisiana won a federal grant from HUD to relocate the residents of Isle de Jean Charles, a small, Indigenous community threatened by sea level rise. Participants in this program, though funded through federal grants, must follow state

guidelines as Louisiana was the project manager of the grant. State governments can also enact state-wide programs that aim to assist adaptation or retreat over time through multiple disasters. The New Jersey Blue Acres Program is an example of such a program that facilitated the buyout process for hundreds of households after Hurricane Sandy. State coastal zone management agencies may also provide funding, resources, and other information to support communities on the coast and the challenges they face regarding sea level rise, subsidization, and other threats to lives and property.

Tribal Governments and Councils hold great significance in managed retreat processes when Indigenous communities are the focus of relocation efforts. Exemplified in communities such as the Isle de Jean Charles Band of Biloxi-Chitimacha-Choctaw Tribe in Louisiana, the Quinault Indian Nation in Washington, as well as the Native Village of Newtok in Alaska, Tribal Councils and leadership spearhead and directly influence efforts to relocate. These community leaders organize funding, create planning groups, collaborate with local, state, and federal agencies, and treat community input as a vital aspect of the process.

Local government plays a pivotal role in the bottom-up approach to implementing adaptation strategies such as managed retreat. Instead of top-down, more generalized policies that come from federal or state-level governments, local rulings are more attuned to the specific circumstances of the municipality including demographic, socioeconomic, or environmental factors at play. Local governments have the power to convene community meetings to discuss goals and visions for the future with residents. They can also communicate with other municipalities that may face similar geographical or ecological challenges, such as neighboring coastal towns that both face sea level rise. Local governments can make meaningful impacts through local policy including zoning, urban development and planning, water management, or other place-oriented policies. While these small-scale policies may not be as broad as federal legislation and will not affect nearly as many people, their effects can still have a substantial and potentially life-saving impact on those who live in the community. Policies that dictate funding for certain activities such as beach nourishment or elevating a roadway will influence many residents' decision to relocate depending on the success of these actions. Policies that regulate zoning activities in and around floodplains or coastal zones will greatly affect *where* and *how* houses can be built, directly impacting the physical safety and financial stability of residents. Local policy is a powerful tool for targeted change.

Members on the Board of Selectmen, Town Committees, local Coastal Officers, or Sustainability Officers may be equipped to engage in conversation and action related to managed retreat and other adaptation measures. Additionally, local governments have a pivotal role to play in funding mechanisms. Similar to state governments, local governments can be involved in the application for funding from FEMA or HUD. Local offices can apply for grants from state and federal agencies to conduct needs assessments, gather community input, and implement adaptation projects. More information on funding can be found in section 7.

5.3 Nonprofit Organizations

Nonprofit organizations act adjacent to government agencies in their goal to enact change, sometimes providing resources and information that the government cannot and sometimes providing similar services but in varying capacities. This functional redundancy, or multiple versions of a similar tool or resource, is helpful when decision-makers want to gather as much information as they can from diverse sources to make a well-informed choice.

First Street Foundation is a nonprofit that provides flood risk projections through its model Flood Factor. The information this group is providing is similar to FEMA's flood map in which the purpose of each service or tool is to inform a homeowner of their relative risk of flooding. However, the degree of risk varies between these two sources. Especially in inland counties, Flood Factor maps demonstrate a larger percentage of American households as "at-risk" than FEMA's maps (American Flood Coalition 2020). This is important information for homeowners to have access to so they can consider what actions to take based on risk assessments from multiple sources. Another nonprofit example, **Climigration**, is a network built by the nonprofit **Consensus Building Institute (CBI)** that aims to build relationships between frontline communities and practitioners in order to "create new community-led, safe and equitable models for assisted relocation." The services and resources that Climigration offers centers around creating community dialogue and ensuring that best practices are followed, especially when working with vulnerable communities. The **American Meteorological Society (AMS)** is a nonprofit science society with a Policy Program that aims to provide resources and information about science policy and the public policy process in order to enable decision-making. The Policy Program regularly publishes studies that inform the broader society and policy makers about efforts to reduce society's vulnerability to climate and weather events.

5.4 Academia

Traditionally, academia does not incentivize interdisciplinary research and separates researcher from practitioner. However, modern academics are making strides to better engage with communities, especially when their research pertains directly to community challenges, opportunities, and needs. The research being conducted around managed retreat has involved academics from a wide variety of disciplines that range from public policy and law to marine and atmospheric science, ecology, economics, and urban planning. *This blend of sociology with the natural and physical sciences is imperative to creating holistic solutions for challenges that operate in the human–environment interface*. Climate data such as sea level rise predictions provided by atmospheric and marine researchers can aid urban planners and community leaders in their policy decisions now and in the future. In turn, sociologists can help climate researchers understand what data would be most useful to a community and understand how to connect with the community in productive and effective manners, particularly through the co-production of knowledge. Co-production of knowledge is a practice that centers equity through the purposeful integration of different streams of knowledge throughout the entire process of creating, researching, or implementing a project. Co-production of knowledge is particularly important when engaging with Indigenous communities (Kawerak 2022).

Two academic institutions have been instrumental in providing resources for this report: the **Columbia Earth Institute Climate Adaptation Initiative** and **Georgetown Climate Center**. The Columbia Earth Institute has now hosted two conferences on managed retreat. These conferences invite academics as well as community members, activists, frontline residents, Indigenous residents, and local, state, and federal government officials. Together, they discussed their recent work, highlighted challenges and opportunities, presented resources, and networked to make progress in finding the best solutions possible for as many people as possible. Georgetown Climate Center has constructed a Toolkit specifically focused on legal and policy aspects of retreat with an eye towards equitable adaptation. In both cases, academic institutions have gathered helpful resources for practitioners and community members alike to understand the current dialogue surrounding managed retreat and create central locations for the collection of relevant information.

5.5 Private Sector

Sometimes the capacity needed to relocate communities exceeds the roles and responsibilities of governments, academia, and nonprofits. Members of the private sector have been necessary in aiding retreat programs in the past and may potentially be brought into future conversations. Banks and financial institutions are positioned to assist in loans related to the acquisition, buying, and selling of land, houses, and businesses. Insurers and reinsurers shape homeowners' perception of risk: the rate of insurance can incentivize a resident to stay and rebuild a damaged house in place or persuade a homeowner to relocate. However, it should be noted that a low rate of insurance does not necessarily mean low risk—flood insurance through the NFIP is subsidized (see more in section 7). The real estate sector is heavily involved in the process of buying homes and can influence how or why people choose their homes. Lawyers may assist in understanding how the interplay of policy works these larger economic and ownership principles. Engineers, environmental and civil specifically, may inform decisions on protective strategies and accommodations, projects whose degrees of success may then influence the decision to retreat or not.

6.0 Policy

6.1 Buyouts/Acquisition and Demolition

Buyouts are a common mechanism of managed retreat that are enacted post-disaster, often structured through policies that outline the acquisition and demolition of houses. Since buyouts tend to occur in bursts, after severe floods, storms, or other natural disasters, they are often organized by state or federal programs. In the buyout process, neighborhoods that sustained damage from a natural hazard are identified and invited to apply to the buyout program. If a homeowner's application to the program is accepted, their houses will be bought from them at or near pre-disaster value and become property of the state or federal government as per the program's policy. The acquired houses are then often slated for demolition and in some cases the local government will rezone the plot of land from "residential" to "open space" in order to prevent future development. NGOs can collaborate with the local government to restore these

open spaces to a natural state so that ecosystem services and functions may resume. Especially in coastal areas where the plot of land can be restored into wetlands, this will serve as a natural buffer between the water and any remaining structures as wetlands can protect the shoreline from excess wave energy and help drain stormwater.

Buyouts are appealing in a managed retreat context because they reduce risk at a minimal cost to the homeowner, even if the home is damaged. While there may be some loss of equity, this allows homeowners to move away from a damaged property without taking an undue financial loss that selling a damaged property would guarantee. This model also incentives homeowners to relocate instead of rebuilding and using insurance (which can be subsidized by FEMA with taxpayer funds) to repair a structure without retrofitting or protecting the house from future repeat damage. Repairing these structures to their pre-disaster state does not account for the hazards that structure was exposed to and may be exposed to again. Buyouts also prevent the passing on of risk from one homeowner to the next. By repairing or keeping the exposed structure on the housing market, this scenario exposes homeowners and families to potential weather or climate disasters and saddles them with the financial responsibilities of caring for a home that has been exposed to disaster before and has a likelihood of being exposed again.

Inequities in past housing opportunities and valuations may contribute to inequities in buyout payment for various communities or individuals. Buyout programs may not guarantee safety or support to move to a new, hazard-free location. Buyouts strictly focus on the first phase of managed retreat, the removal from unsafe or exposed areas, these programs do not account for the second phase, the move to a new area. There is no policy preventing homeowners from receiving a buyout to move away from one home in a floodplain and using those funds to resettle in another floodplain. Additionally, some residents may find that the money they receive for the preexisting value of their home is not enough to purchase *safe* residence elsewhere, especially if their existing home was originally valued for less due to its inherent risk.

Buyout models do not support renters as these programs center around the exchange of ownership of the house and surrounding land, resources that renters do not possess. Residents of low income or with transitory lifestyles may be more inclined to rent than own a home. This may expose vulnerable residents in a community to nonvoluntary retreat if their housing is accepted into a buyout program per decision of the landlord, rather than the renters themselves. Supplemental housing policies may be needed to provide renters with assistance for retreat (Morris 2021).

Proponents of buyout policies assert that this model reduces risk to zero. In some respects, this view of success is true: the structure is no longer a liability that keeps people tied to a geographically exposed area and requires money for repairs. However, as demonstrated, inequities exist in the current housing system and buyout systems that prevent a complete elimination of risk, and to frame buyouts as such would be misleading. Understanding that the goal of buyout and acquisition policies is to reduce risk both physically and economically will better inform decision-making.

While buyout policies have favorable aspects in regard to reduction of risk, there are conversely unpopular factors of the mechanism. The buyout process is individualized and does not require

community buy-in. Unfortunately, this can mean that individual sales and acquisitions may uproot and fragment communities. This can be especially visible in situations where the buyout process results in the checkerboarding of a neighborhood when some but not all households take the opportunity to move. The result is a mix of occupied houses and vacant lots, an undesirable situation for both community-building and ecological restoration. The individualized nature of the decision to apply to and accept buyout offers is inherently not a communal activity: when the household accepts the buyout offer, there is no stipulation that they must remain within and a part of the community.

Further concerns with buyout include historical ties to the eviction and exclusion of communities of color, especially Black and Indigenous communities, through mechanisms such as eminent domain (Flavelle 2020). Such instances include the forced buyout of homes from Black communities by the federal government in order to build highways or other major infrastructure systems in their place. For this reason, the act of the federal government supplying funds to buyout individual houses may not be welcome or may be politically unpopular.

For buyout programs to be done with the most community engagement, cooperation, and support, they must be voluntary. Buyout programs forced through eminent domain will disenfranchise populations and halt progress and trust in other conservation or adaptation measures. Buyouts should be human-centric and should look to the participating community to set program priorities, rather than using predetermined priorities to weed out certain communities or individuals from participating. For example, will houses be accepted for buyouts based on the amount of property damage? If so, more expensive houses will experience higher costs of damage for potentially the same functional disruptions as lower-income households: will this prioritize affluent residents? What will make an applicant eligible for buyout and who will these stipulations exclude? Recently, FEMA announced that the number of types of documents proving homeownership will be expanded to promote equity in the application process. This includes the acceptance of public official letters, receipts of major repairs, and nontraditional documentation for mobile homes and heirship properties in an effort to support applicants of all income levels and those whose property has been passed down many generations (FEMA 2021a) To ensure human-centric buyout programs, the application process needs to be people-friendly. Currently, the application process is long and complicated.

These concerns regarding buyout should not prevent this model of retreat from being enacted but rather should encourage a deeper look into the benefits of such a model and how it can be improved or tailored to suit community needs.

Case Study: Woodbridge, New Jersey

Hurricane Sandy hit New Jersey, New York, and Connecticut in October 2012, causing damage with high winds, flooding, and storm surge. New Jersey was especially hard hit with damages so extensive that managed retreat policies were enacted after the disaster. The New Jersey Blue Acres Program, created in 1995, was infused with $300 million from the federal government for the buyouts of 1,000 Sandy-wrecked homes. The preexistence of this program allowed buyouts

to be a readily available option for Woodbridge residents immediately following the disaster. Many stakeholders were involved with the Blue Acres program and the resulting effect it had on the relocation of residents. Community members themselves, local governments, NGOs, and private companies all played a role.

Through the Blue Acres program, the state bought homes directly from the residents and slated them for demolition. Requirements for a buyout necessitated that houses must be in a flood-prone zone and a cluster of homes had to apply for buyout. Local governance in the town of Woodbridge assured that any participation in the buyout program would be voluntary only, assuaging fears of residents and earning public trust. Applications for buyout were only available for houses within certain neighborhoods that were especially hard hit. This sectioning off of eligible neighborhoods aimed to avoid checkerboarding of buyouts and to provide aid to neighborhoods that need it most. Individual residents spearheaded educational campaigns to inform residents about the buyout process. In the end, 187 out of 200 available houses chose to apply for a buyout. For eligible but foreclosed houses, the township worked with the bank to buy the house off of them through an alternative method since Blue Acres was designed to only purchase from private sellers. Hurricane Sandy took place in 2012 and as of 2019 all offers were finalized but the process was still ongoing regarding the actual buyouts and demolitions, over 7 years later.

Apart from the buyout program, the town council rezoned the neighborhoods targeted for the buyout program and declared them “Open Space Conservation” instead of “Residential” in an effort to prevent future development in that zone. Additionally, zoning laws were added to convey that any homes existing within the eligible buyout area must be elevated one foot above FEMA guidelines when certain “triggers” occur, including the sale of property or any reconstructions or renovations. When all residential buildings are gone, the town will remove the roads to reduce liability and maintenance costs.

The town paired with a nonprofit The Land Conservation New Jersey to restore the natural ecology barrier in lots where homes had been demolished. This in turn reduced flood insurance premiums for the remaining residential buildings. Efforts to restore the lots were in-part a response to remaining residents’ complaints about unkempt spaces and potential devaluation of their homes.

Funding was only provided as a buyout of the house itself and no funds were available from the town or state to assist with relocation effort. However, local charities and parishes attempted to create collection funds to assist with extraneous costs. The town also worked with apartment building leadership to create housing solutions for Woodbridge residents to stay within the town. The mayor did consider stalling the buyout program due to potential tax base losses but instead worked to find solutions that would be beneficial for multiple stakeholders.

Woodbridge, New Jersey, is only one case study of the Blue Acres program assisting with managed retreat. The New Jersey Department of Environmental Protection reported 14,655 cases of repeat loss since 1978, with instances of repeat loss defined as houses that accumulated over $1,000 in flood damages in a span of 10 years. Through the Blue Acres program, 967 houses throughout New Jersey have been made offers for predamage value for acquisition and

demolition. Residents often choose this option because selling the house on an open market with its vulnerabilities to flooding is difficult due to decreased value, rising insurance rates, and the passing on of risk to a new owner.

Source Materials

Georgetown Climate Center, 2020: Woodbridge Township, New Jersey: Post-Hurricane Sandy Buyouts, Georgetown Climate Center, https://www.georgetownclimate.org/files/MRT/GCC_20_Woodbridge-4web.pdf.

Hurdle, J., 2019: Blue Acres Makes a 'Good Start' at Removing Flood-Prone Properties. *NJ Spotlight News*, https://www.njspotlightnews.org/2019/10/blue-acres-makes-a-good-start-at-removing-flood-prone-properties/.

6.2 Whole Community Relocation

The whole community relocation model of retreat maintains the benefits of safely moving residents out of their risk-exposed houses while addressing the concern that such processes would fragment the community and social or cultural connections. The opportunity for whole community relocation hinges on community-led, community-centered action that prioritizes processes based on shared community values and needs. Whole community relocation also relies on individual buy-in, directing organizers of retreat to encompass the wills and participation of most, if not all, community members.

Whole community relocation focuses more on the second aspect of retreat, finding a new place to live, than the buyout model. In this relocation process, a large tract of land is bought communally, often with funding from a federal grant, and this land is designated as the "new town." Acquisition and demolition of the "old town" is also organized through buyout policies (see above) for those who opt to relocate, but focus is generated on the new land and new life that the relocated community designs for themselves. This model may be better at reducing risk than the buyout model because it takes into account the safety of the new area. For example, the town of Valmeyer, Illinois, moved out of a floodplain and to higher elevation after experiencing repeated riverine flooding, ensuring that their new plot of land would not be flooded.

Isle de Jean Charles is another example of a community seeking to relocate as a whole in response to persistent flooding. In this case, the community consisted of Indigenous people with cultural and historical ties to the land they were leaving. While many communities may have meaningful ties to the land on which they live, Indigenous people have lived on their land since time immemorial and have historically faced involuntary, forced evictions from their land by Federal forces. For these reasons, to relocate an Indigenous community, the process must support self-determination and community-centered priorities.

Case Study: Valmeyer, Illinois

Valmeyer, Illinois, is an oft-referenced case study of a successful whole community retreat and is even cited as a "best practices" example by FEMA (FEMA 2021b). After experiencing repeated flooding over the years, Valmeyer was subject to the destructive Mississippi flood of 1993, which made the village virtually uninhabitable. With careful deliberation and community engagement, the town decided to move the entire community as a unit, a population of about 900 at the time, to a parcel of land away from the river and above the floodplain.

The town used buyout policies to acquire and demolish some unusable buildings through funds from state and federal agencies. Other properties were acquired by the NFIP for demolition. "Old Valmeyer" is now used as open space for recreation and agriculture.

Local officials gathered $22 million to buy the new site and start construction, and $23 million was used to buy out damaged buildings (acquisition fees).

The mayor of the town at the time, Dennis Knobloch, explained that the retreat was only a success because members of the town were involved and committed time and effort from the very beginning. Community members quickly formed committees with assigned responsibilities and timelines. Residents were invested and bought into the idea of retreat, sticking together and living in temporary towns during the process of relocation. Congregations, schools, and other community organizations were important for keeping people together; however, some individuals did leave during this transition period. Small business owners were especially vulnerable to leaving due to the decreased economic viability of their livelihood during the transition time.

The difficulties of this operation of whole community retreat lay in communicating and working with over 25 different local, state, and federal agencies. Some of these agencies' policies and eligibility criteria for funding or other assistance contradicted each other due to lack of standardization across agencies, creating many levels of red tape. Knobloch lamented that one of the largest barriers to this relocation effort was the lengthy time in which working with these agencies required. Knobloch also remarked that reactionary plans for relocation are more readily agreed upon but are inherently more expensive. It may be difficult for communities to plan a whole relocation before disaster strikes for many reasons, primarily the disbelief that such an emergency will happen to them, but in having such plans prearranged, there would be less of a transition time to the new location.

Source Materials

FEMA, 2021: Valmeyer acquisitions buyouts create open space. Federal Emergency Management Agency, https://www.fema.gov/case-study/valmeyer-acquisitions-buyouts-create-open-space.

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Leonard, M. D., 2013b: Valmeyer's relocation moved quickly as people took matters into their own hands. St. Louis Public Radio, https://news.stlpublicradio.org/government-politics-issues/2013-08-01/valmeyers-relocation-moved-quickly-as-people-took-matters-into-their-own-hands.

Case Study: Isle de Jean Charles, Louisiana

Residents of Isle de Jean Charles, a parish in southern Louisiana, can voluntarily apply to be included in the first federally funded managed resettlement program. The resettlement program is funded by a $48.3 million Community Development Block Grant from the Department of Housing and Development. This money was awarded to the State of Louisiana after the Louisiana Office of Community Development submitted a winning application to HUD's National Disaster Resilience Competition.

Isle de Jean Charles is home to the Isle de Jean Charles Band of Biloxi–Chitimacha–Choctaw Tribe. The community has been planning a Tribal Resettlement for years while facing eroding lands and sea level rise. Isle de Jean Charles has lost 98% of its land since 1955 forcing many residents to leave and disperse. The community is seeking to relocate as a whole to a safer location with the capacity to join together as a Tribe.

This new location is on higher ground, 40 miles north of Isle de Jean Charles and encompasses 515 acres. Plans for the "New Isle" include residential neighborhoods, parks and playgrounds, wetlands, walking trails, and spaces for community gathering. Though the Resettlement operation has its difficulties integrating government and Tribal processes—which may have been exacerbated by the lack of Isle de Jean Charles Band of Biloxi–Chitimacha–Choctaw Tribe's lack of Federal recognition—it was heavily informed by community engagement. The Resettlement plan was split into four phases. The first phase consisted of data gathering and engagement, focused on initial outreach and surveys, revealing resident's priorities and concerns. The second phase focused on reflecting those priorities and addressing concerns in site selection and master planning. Phase three includes the development and construction of about 120 homes, commercial and retail spaces, a community center, and walking trails. The last phase, not yet achieved, ends with the Tribe living in the "New Isle."

The process of community engagement and working with partners has been consistent. Even before the grant was awarded the Tribe worked with a nonprofit organization the Lowland Center to imagine what a relocation would look like. With the grant secured, a project team that included the Louisiana Office of Community Development, two private engineering companies and a nonprofit facilitation organization, began weekly conversations with Tribal leadership leading up to the first community meeting. By the end of the second community meeting,

attended by island residents and stakeholders, the project team had acquired information about some of the most detailed aspects of the New Isle: how far the residents wished to be to the nearest town (about a 25-min drive), a requirement for fishing, gardening, and homes with a spare room to house a guest. The final report notes that honoring the vision of the Isle de Jean Charles residents is crucial to the success of the project.

While this new location can provide safe housing, the act of retreat can decontextualize a community from its historical Tribal homelands. The involvement of non-Indigenous organizations and agencies have left a mark on the New Isle, rejecting cultural context instead for more standardized language and processes. For example, the "festival grounds" as it's labeled on the Louisiana state government map of the new Isle is contradictory to the language that the Tribe uses, which would be "Pow Wow grounds" (Comardelle 2021). With whole-community relocation, the needs and wants of the community in question are central to the success of the resettlement: too much external influence may sway resident's opinions of the new locale and erode trust in these external agencies.

Source Materials

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6.3 Buy-to-Rent

A buy-to-rent program (also known as leasebacks) set up by local governments might appeal to residents that do not want to immediately move out of their homes but are wary of future hazards and are looking for a potential out. This type of program could be set up to allow cities or counties to purchase a home and subsequently rent it out to the current resident. A buy-to-

rent policy would be based on a revolving loan. In this scenario, the local government would use the rent payments it collects to repay the loan it took on the house. This would occur until the loan is repaid, at which point the structure could be phased out, likely demolished. This would allow residents of these homes to be flexible in their relocation plans, alleviate them of the burden of selling the home to incomers that may also face future hazards, and allow the city or county to demolish the structure once it is deemed dangerous. In this model, demolition can be done without needing to go through the buyout application process, which are funded by FEMA only after a presidential declaration of emergency. This buy-to-rent could be initiated in response to chronic events such as sea level rise or erosion, instead of waiting for an acute natural disaster to strike for funds to appear.

Current property valuation does not consider growing hazards such as sea level rise, erosion, wildfires, etc. This buy-to-rent model is aimed at disrupting positive feedback cycles that encourage continued investment in exposed or at-risk properties. It acts to acquire structures proactively while property values are still high and plan to phase them out as property values and taxes eventually fall. Additionally, this proactive approach would be poised to enact all changes before, not after, a disaster, which would alleviate the burden of organizing and communicating a potentially emotionally charged change during a time of crisis. When decisions regarding retreat can be made before disaster strikes, the process may take less of a toll on the communities involved.

Case Study: California Senate Bill 1293

State Sen. Ben Allen introduced the Sea Level Rise Revolving Loan Program to the California legislature in 2020. Co-written by Julia Stein, project director at the Emmett Institution on Climate Change and the Environment at the UCLA School of Law, it outlines how this buy-to-rent program could work. In this bill, the state of California would provide low-interest loans to designated local governments to purchase at-risk coastal properties, and then collect rent on the property until the loan is repaid and the structures can be demolished. In California, approximately $10 billion in properties will be underwater in 30 years, the length of a standard mortgage. This bill aims to rid the private sector of the burden of caring for and investing in properties that are at-risk. This tactic could prevent the public from paying for protective measures such as seawalls or beach replenishments, mechanisms that will only delay an encroaching sea, not prevent it.

The bill passed the state Senate Natural Resource and Water Committee but is now dead in the Senate Rules Committee.

Source Materials

Allen, B., 2019: SB01293 California Infrastructure and Economic Development Bank: Sea Level Rise Revolving Loan Program. California State Legislature, https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201920200SB1293.

Rott, N., 2021: California has a new idea for homes at risk from rising seas: buy, rent, retreat. All Things Considered, NPR, https://www.npr.org/2021/03/21/978416929/california-has-a-new-idea-for-homes-at-risk-from-rising-seas-buy-rent-retreat.

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6.4 Permitting

New or amended permitting policies may not facilitate the relocation of people or structures that already exist in a certain exposed area but may prevent future development in these locations. This adaptation strategy is known as avoidance and can prevent the need for retreat in the future by not allowing structures to be in vulnerable areas in the first place.

The process of permitting allows local governments to put requirements or restrictions on new or existing-but-modified construction. Residents must apply for and comply with permits in order to continue development plans, and therefore this form of policy can be used as a tool to enact certain standards regarding adaptation and resilience. Permits can require that applications for new coastal development must show plans that account for sea level rise or require that certain environmental conditions trigger retrofitting, elevation, or even retreat. Through the use of permits, local governments can put stipulations on certain structures and plots of land that will either 1) preclude the need for retreat or 2) facilitate the process of retreat when chronic hazards overwhelm the developed areas.

Case Study: Rhode Island

The Rhode Island Coastal Resources and Management Council released a Specialized Area Management Plan (SAMP) that outlines addendums for existing coastal permitting rules. With this addendum, both new development and work being done on existing constructions must undergo a Coastal Risk Assessment. This assessment process includes 5 steps to analyze the costs and benefits of building a coastal structure as sea levels continue to rise and applies to every application seeking a coastal permit. The steps include determining a lifespan for the project/construction and ensuring that projected sea level rise and future high tides will not endanger the structure for the duration of its proposed existence. Additionally, the applicant must include an assessment of exposure and potential risk in order to outline what hazards the structure may be in danger of experiencing. Finally, a design evaluation must be included to determine how to structurally mitigate the risk of loss associated with projected hazards.

The combination of these requirements for the permit are designed to force permit applicants to carefully consider the risk that their proposed structure will experience if allowed to be constructed and provide plans to reduce that risk via accommodation or retreat if hazards become overwhelming.

Source Materials

RI Coastal Resources Management Council, 2019: Beach SAMP: Rhode Island Shoreline Change Special Area Management Plan. http://www.beachsamp.org/wp-content/uploads/2019/02/RI-Shoreline-Change-Special-Area-Management-Plan.Singlepages.pdf.

RI Coastal Resources Management Council, 2018: Shoreline change special area management plan, Volume 1. http://www.crmc.ri.gov/samp_beach/SAMP_Beach.pdf.

6.5 Land Trusts

Both conservation and community land trusts have been established, protective practices aimed at the rejuvenation of ecosystems or the preservation of cultural and historical heritage. The system of land trusts allows certain blocks of land to be protected from development and often are held by the government or a government–NGO combination.

Working off the basis of *community* land trusts, Shirley Laska, a social scientist at the Lowlander Center, raises the idea of *climate* land trusts. She advocates for areas of land to be blocked off as land trusts and set aside, ready for citizens to move to when they decide that their original homeland is unsafe (Laska 2020). This model addresses the second stage of retreat: moving to a new area, though does not necessarily propose solutions for the departure from the original land. Land trusts may provide a permanent refuge if the allocated area is appropriately assessed to be safe from flooding or other climate or weather-related hazards. If the land trust is just as exposed to sea level rise, riverine flooding, wildfires, permafrost melt, or other hazards that populations have been attempting to mitigate for or adapt to, this model will not succeed in reducing risk.

Case Study: Hamilton, Washington

Eighty percent of the small town of Hamilton, Washington sits in the floodplain of the Skagit River. NFIP has spent over $3.3 million in losses in Hamilton since 1995, and many houses have been bought out by FEMA. After experiencing over a century of repeated flooding, the local government is partnering up with the conservation nonprofit Forterra to support a relocation project. Forterra has purchased a 40-acre land trust outside of the 100-year floodplain many residents currently reside in with the hopes of using this land to develop a green, sustainable new option for the Hamilton community. The vision of a town relocation onto higher ground bought by Forterra includes a conservation aspect as well: when residents leave the floodplain, restoration and rejuvenation of the river can begin, with benefits for the Chinook salmon, a species that has seen many conservation challenges in the past decades.

Source Materials

Laska, S., 2020: *Louisiana's Response to Extreme Weather: A Coastal State's Adaptation Challenges and Successes*. Springer Open, 361 pp., http://alessandrajerolleman.com/wp-content/uploads/2020/06/2020_Book_LouisianaSResponseToExtremeWea.pdf.

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6.6 Zoning

The ability of city or community planners to update zoning codes is a useful tool to protect people, structures, and the environment from harm. Along the coast, in floodplains, or in the wild–urban interface—areas especially exposed to the risks of flooding and wildfires—rezoning can disincentivize building in risk-prone areas. Instead, this policy can redirect residential zoning to higher ground or outside of floodplains.

Zoning is often a tool used to increase a community's capacity for resiliency through various measures (NYC 2021). Retrofitting, the act of adding protective measures such as special roofing or insulation to a structure already in place, may provide some adaptive measures. Likewise, elevating buildings, moving electrical components above the ground floor, implementing only salt-resistant landscaping, and other adaptive measures to buildings in place are also able to be designated by zoning laws. In either case, zoning laws may not directly support managed retreat, but can offer potential temporary solutions to allow postdisaster recovery.

Case Study: Norfolk, Virginia

The City of Norfolk, Virginia, created a new zoning ordinance (City of Norfolk 2022) that rehauled the city's zoning policies in an effort to reduce flood risk to people and properties. This ordinance directs new development to higher ground and enforces standards for flood risk resilience, stormwater management, and energy resilience. While these three basic standards apply to the whole city, there is the creation of two distinct zones, one to disincentive building in coastal areas, and one to incentivize development of higher ground.

Development in the Coastal Resilience Overlay (CRO) zone in the floodplain must meet additional standards in order to be in compliance with code. These standards include elevating existing homes by three feet and prohibiting basements. New construction must also be elevated three feet, or 1.5 feet above the 500-year floodplain mark, whichever elevation is greater. In contrast, development in the Upland Resilience Overlay (URO) zone is encouraged. There are no strict resilience measures that structures must meet as long as property owners give up rights to development in the CRO where flooding is more prominent. This policy encourages the relocation of assets from within a flood-risk area to a less risk-prone location.

Source Materials

NYC Planning, 2021: Zoning for Coastal Flood Resiliency. City of New York, https://www1.nyc.gov/site/planning/plans/flood-resilience-zoning-text-update/flood-resilience-zoning-text-update.page.

PEW, 2019: Norfolk's Revised Zoning Ordinance Aims to Improve Flood Resilience. The PEW Charitable Trusts, https://www.pewtrusts.org/-/media/assets/2019/11/norfolks_revised_zoning_brief_final.pdf.

City of Norfolk, 2022: Norfolk's Zoning Ordinance. https://www.norfolk.gov/3910/Zoning-Ordinance-Rewrite.

6.7 Setback Ordinance

Similar to zoning, setback ordinances place restrictions on the construction or development of structures within a certain area. However, in contrast with zoning policies that allow modified construction, setback ordinances prohibit the development of structures within a designated property line. Many setback ordinances draw a property line in relation to the shoreline, defining a certain distance from the water in which structures are not permitted (Siders 2013, Chapter 2). In a managed retreat context, this policy tool may not be of assistance when moving existing structures out of harm, but this policy will prevent more structures from being developed in risky and exposed locations. This could be viewed as another avoidance strategy.

Case Study: Kauaʻi, Hawaii

In 2009, the county of Kauaʻi Hawaii created a new shoreline setback policy. Instead of continuing with the state's ordinance that designated a setback line to be at least 20 feet away from the shoreline, but no more than 40 ft, Kauaʻi reconceptualized the calculation of this seemingly arbitrary distance from shoreline. Kauaʻi instead determines the shoreline setback based on the depth of the lot that abuts the sea, starting with a minimum of 40 feet for a 100-ft-deep plot of land. As the plots of land get deeper (expanding further away from the shoreline), the setback line recedes higher inland, maxing out at 100 feet from the shoreline. In addition to this baseline distance, a coastal erosion rate is taken into account and adds distance to the shoreline setback for certain structures. Structures with a larger building footprint must comply with a setback line that is set at a distance of 40 ft plus 100 x coastal erosion rate while smaller building footprints need only setback by 40 ft plus 70 x coastal erosion rate. In either case, the setback ordinances prevent the development of structures in areas that experience coastal flooding or erosion, therefore preventing the need for these structures to retreat in the future.

Source Materials

Siders, A. J., 2013: Managed Coastal Retreat: A Legal Handbook on Shifting Development Away from Vulnerable Areas. Columbia Law School Center for Climate Change Law, https://climate.law.columbia.edu/sites/default/files/content/docs/others/Siders-2013-10-Managed-Coastal-Retreat.pdf.

County of Kauaʻi, Ordinance No 979: A bill for an ordinance to amend Chapter 8, Kauaʻi County Code 1987, as amended, relating to the comprehensive zoning ordinance. https://www.kauai.gov/Portals/0/Planning/Ord_979_Shoreline_Setback.pdf.

O'Connell, J., I. Aiu, L. Milnes, and L. E. Smith, 2022: The island of Kauai, Hawaii's progressive shoreline setback and coastal protection ordinance. https://aquadocs.org/bitstream/handle/1834/21601/O%27Connell_papers.pdf?sequence=1&isAllowed=y.

7.0 Funding

Collecting the money to fund managed retreat programs can be a major obstacle for communities and can slow down the process of relocating residents. As the previous case studies demonstrate, funding for a single managed retreat effort can come from multiple sources. Here, we lay out various agencies, departments, and organizations that have provided grants or funding for retreat in the past.

7.1 Federal

A major challenge facing communities that pursue managed retreat is the lack of a single federal entity that can guide the funding of such an endeavor. A mix of grants or other funds are allotted through HUD, FEMA, USCAE, or insurance paid out by the NFIP. Within each of these entities, there are separate—and sometimes contradictory—application eligibility requirements, processes, and timelines. This can make the process of sourcing money for time-sensitive moves an undertaking that requires communication and collaboration amongst multiple communities and organizations.

Often, federal funding is only released after a presidential declaration of emergency has been issued in response to a particular disaster. The Disaster Assistance government tool can help residents understand if their area is included within the bounds of the declared disaster and are therefore eligible for grant assistance.

7.1.1 Department of Housing and Urban Development

HUD offers **Community Development Block Grant: Disaster Recovery (CDBG-DR)** programs that aim to support communities rebuild after natural disasters. The CDBG-DR program is not a standing, budgeted program with a set amount of funds to spend per fiscal year. Instead, the monetary resources for these grants are available only after the president has declared an emergency and Congress has appropriated funds to the specific disaster. HUD must then create program guidelines and identify what grantees can do with the funds, which are released as a notification in the federal reserves.

Grantees for CDBG-DR programs are not individuals but rather state, county, and local governments. When notified that they are eligible for CDBG-DR awards, grantees must submit an action plan, an outline of what the grantees will do with the award, compiled with input from

community members. HUD will review the action plan and with approval the grantees can begin implementing the plan.

When the grant is awarded, the funds can be used for economic revitalization (job training, business loans), disaster recovery, housing (new construction and reconstruction), long-term recovery and infrastructure restoration (roads, bridges, water, and waste services). Grantees (the local and state governments) create programs to allocate the funds to various subrecipients, which can be state agencies, citizens, and businesses.

There are a few characteristics of the CDBG-DR program that may make it difficult to finance managed retreat. First, the average amount of time between the onset of the disaster and the first spending of the award is 20 months. This gap can be attributed to the policies that dictate the process through which HUD grants are allocated: first the need for presidential declaration of emergency, and the Congressional allocation of money to HUD, which then needs to organize the program outlines for that specific disaster. Second, the chronic hazards that managed retreat are suited to respond to such as sea level rise or permafrost melt are not acute disasters and there are no presidential declarations of emergency for such slow-moving hazards. As such, no CDBG-DR grant, as the policies stand, can be allocated for the damages inflicted by these ongoing and worsening hazards.

HUD also has a **Community Development Block Grant–Mitigation (CDBG-MIT)** program where eligible grantees can use funds to "increase resilience to disasters and… less[en] the impact of future disasters." Awardees of this grant will need to be eligible for CDBGs as per HUD's requirements and submit a Mitigation Needs Assessment and Action Plan with community input. Again, this program only provides funds for presidentially declared emergencies, thus making it difficult to proactively mitigate against a chronic hazard. However, the difference is that CDBG-DR funds can be used to rebuild a neighborhood or structure to the state it was in before the hazard struck while these CDBG-MIT funds are focused on rebuilding the community with new adaptive measures in place, thus proactively mitigating risks from future acute hazards.

7.1.2 FEMA

FEMA offers a variety of programs under their Hazard Mitigation Assistance (HMA) grant program including the Hazard Mitigation Grant Program (HMGP), Flood Mitigation Assistance (FMA) and Building Resilient Infrastructure and Communities (BRIC). These grant programs are focused on long-term sustainable mitigation actions to save life and property and break the cycle of damage, rebuild, and redamage.

HMGPs are available only with a presidential declaration of emergency. Local communities can apply for this grant in order to rebuild in a manner that "reduces, or mitigates, future disaster losses." HMGPs can support managed retreat in the form of buyouts, or the acquisition of hazard-prone homes and businesses.

FMA grants are available to structures insured under the NFIP and are used to reduce or eliminate the risk of repeat flood damage. As a grant that can be awarded in the absence of a

presidential declaration of emergency, FMAs require the applicant to submit and adopt a hazard mitigation plan that includes the identification of natural hazards and vulnerabilities alongside long-term strategies to mitigate the risk associated with such threats for the protection of life and property.

The **BRIC** is used for capacity building projects to expand the scope of knowledge and expertise, mitigation, and management. It replaced the Pre-Disaster Mitigation program that was enacted by the Stafford Act. Unlike the HUD CDBGs, which draw on funds allocated postdisaster, the money supporting BRIC is a standard 6% set aside in federal postdisaster recovery funds. This money is then distributed across states, territories, and Tribal nations, with some money set aside for National Mitigation Project Competitions.

FEMA also provides funding for programs that do not specifically address rebuilding structures. The **Acquisition for Open Space** program funds buyout programs with the goal of removing flood-prone structures and returning the plot of land to open space. This program will fund either structure demolition or structure removal, creating flexibility for applications. However, all participants must meet HMA requirements and apply with sponsorship by local governments. With this funding, FEMA will pay 75% of the project but the remaining 25% is up to the homeowners or some pay sharing program with the sponsor/applicant.

Not all disasters are the result of flooding. FEMA also offers a **HMGP Post Fire** program to help a community build resilience and implement mitigation factors after a fire.

As explained in some of the above-mentioned grant programs, individuals cannot be listed as applicants for a FEMA grant. Instead, state or Tribal governments must submit the application for funding. When awarded the funds, these applicants then delegate money to subapplicants, the local governments, state agencies, or Tribal governments or agencies that then use the funds to enact disaster recovery or mitigation programs. These programs can then include individual participants such as homeowners looking to participate in a buyout (Figure 3). FEMA designated each state and territory a State Hazard Mitigation Officer to act as official point of contact for potential subapplicants. Due to the number of individuals, agencies, and levels of government involved in the submission, review, and acceptance of each application, it can take years for communities to experience the effects of the FEMA funds.

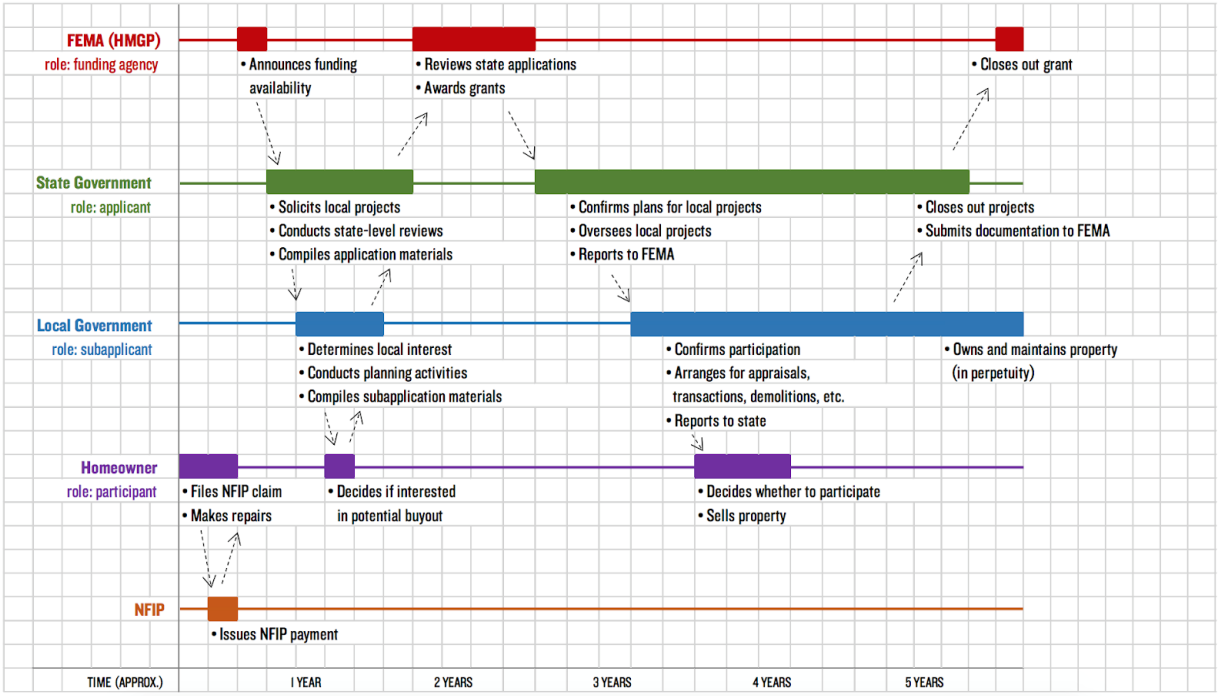

Figure 3: From "Going Under: Long wait time for post-flood buyout" by Anna Weber and Rob Moore at NRDC. Describes application timeline and process for FEMA HMGP. Reproduced with permission.

7.1.3 National Flood Insurance Program

FEMA has managed the NFIP since it was established in 1968. Most homeowners' insurance does not protect against flood damage, and so the government created a program to assist homeowners with affordable flood insurance. To apply to the NFIP there are two requirements. First, a homeowner must reside in a participating community, which can be found across 56 states and territories. Second, the home must comply with FEMA ordinances, which are mostly building regulations informed by FEMA flood maps, that mitigate flood risk. NFIP insurance is required if a home is located in a designated high-risk flood area: without this insurance government lenders and banks will not authorize a mortgage. If flood damages do occur and a home is not NFIP protected, the homeowner will receive no federal assistance for lost property value.

Currently, NFIP premiums for insurance are artificially low, keeping flood insurance affordable for houses that are required to possess it. However, this subsidization of flood insurance does not reflect the actual cost of damages caused by flood. The price of NFIP premiums do not dissuade homeowners to leave or sell their homes, therefore not reducing the risk to their lives and properties if they stay in an area that is exposed to flooding.

The NFIP is in debt because its rates are below market value. Policy has been introduced to gradually raise premiums to market value: the Biggert-Waters Flood Insurance Reform Act of 2012 (Maly and Ishikawa 2013). Though unpopular with many Congressional Representatives on both sides of the aisle because it increases insurance rates for constituents, the increased

prices will force residents to confront the risk they accrue when living in floodplains or in coastal sea level rise zones.

Starting in October 2021, the rates of NFIP premiums are rising in accordance with Risk 2.0, a formula that takes into account the size of the house and the risk that it faces when calculating new premium prices (FEMA 2022). Since FEMA cannot raise insurance prices more than 18% per year, the true market cost for some homeowners will not be reached for many years, sometimes over decades (Flavelle, 2021a). This policy will have ramifications for the over 3.4 million homeowners that own NFIP policies, affecting where people build, buy, and live, especially along the coastline.

In an effort to reduce the price of premiums as well as increase resilience amongst exposed communities, NFIP employs the Community Rating System (CRS). The CRS rewards communities for enacting more mitigation strategies than the bare minimum required by FEMA with discounted premiums. Awarded efforts include mitigation of existing buildings as well as new development, collecting flood mapping data to assess risk, and preserving or restoring floodplains and their functions (FEMA 2017).

7.1.4 NOAA Office for Coastal Management

Though more specific and less common than FEMA or HUD, NOAA's Office for Coastal Management does offer funding for certain retreat-related efforts. For example, a call for applications in 2022 is aimed at land acquisition in estuaries to prevent development and promote conservation and restoration of biodiverse habitats. Though not quite focused on the relocation of people and structures, this funding opportunity is another mechanism for the acquisition of coastal land as an avoidance strategy.

7.1.5 Bureau of Indian Affairs

In 2021, the BIA's Tribal Climate Resilience Program (TCRP) awarded $13.8 million to 15 Alaskan Native Villages and 2 Tribal Nations for adaptation efforts including managed retreat. Alongside funding, the program provides Tribal managers with tools and information to help facilitate projects and programs designed to protect livelihoods.

7.2 Regional

In addition to acting as the applicant for federal funding programs, states can provide grants for adaptation efforts, including managed retreat. Within each state, territory, or region, funding opportunities can be found to support vulnerability assessments, community engagement efforts, or other processes and tools that aid decision-making regarding retreat.

Regional agencies such as the Metropolitan Area Planning Council (MAPC) in Massachusetts can be sources of funding for feasibility assessments or sustainability master plans. These entities may not be a large enough source of funding for enacting retreat policies; instead, their strength lies in funding projects that enable communities to gather information on the situation and determine if retreat will be a tool used to reach their vision of success. The Georgetown

Climate Toolkit Economic section also highlights regional funding opportunities for funding across the country from Harris County, Texas, to Long Beach, California.

7.3 Private

The **Enterprise and Morgan Stanley Disaster Recovery Accelerator Fund** was created in an effort to provide funds to disaster-stricken areas during the gap in time between disaster and federal monetary relief (about 20 months for HUD's CDBG) (Flavelle 2021b). This fund provides loans to multifamily apartment complexes to assist in rebuilding postdisaster. Creators of the fund state that the goal is to specifically help renters and low-income families recover, aiming to provide the most vulnerable residents with assistance while federal applications are reviewed. Enterprise and Morgan Stanley will front money to residents and this loan will be repaid with interest (as of publication an undisclosed amount) by HUD, which itself is funded by taxpayer money (Enterprise Community Partners 2021). This use of public funds to pay a private company to do the work that federal programs are already directed may raise concerns, but the capacity of these federal programs are limited in scope by the policy that dictates the sequence of events that need to occur before funding can be released.

8.0 Managed Retreat in Media: Additional Resources

Newspaper Articles

Politico

New York Times

Podcasts

Warm Regards: Adapting and Moving in a Warming World, with Beth Gibbons and Jola Ajibade

This American Life: Episode 762, Apocalypse Creep

99% Invisible: Episode 293, Managed Retreat

America Adapts: Everything You Wanted to Know about Managed Retreat (but were afraid to ask) with A.R. Siders

America Adapts: Flood, Rebuild, Repeat- a Podcast with NRDC's Rob Moore

Resources Radio: Episode 73: Managing Flood Risk under Climate Change, with Carolyn Kousky

Short Videos

Science Magazine

University of Delaware

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