Realizing Climate-Resilient Communities: Managed Retreat as a Just Transition

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1. Introduction

As global temperatures increase at an alarming rate, both slow-onset and acute climate threats, such as hurricanes, sea-level rise, and recurring flooding threaten to render low-lying coastal communities uninhabitable. As an adaptation response, some communities have considered Managed Retreat - the strategic relocation of people and assets out of harm's way. However, existing literature shows that in the United States (US), the dominant practice of managed retreat is limited to post-disaster buyouts, a process proven to disproportionately impact low-income communities of color by perpetuating racial and wealth disparities in urban development and coastal adaptation. Grounded on the premise that managed retreat can be equitably achieved in cities, this research presents insights into how managed retreat can be a viable adaptation pathway that can serve as a just transition for historically underserved, urban-coastal communities.

The next section briefly summarizes current debates around equity issues in managed retreat. Section 3 describes the research design and methods of this study. In Sections 4 and 5, the context of applying managed retreat principles is discussed and findings from Edgemere, Queens are shared in narrative format. Section 6 presents recommendations for realizing climate resilient communities and concluding remarks.

This paper is a shortened version of a full original research manuscript titled, *Building Equity Through Managed Retreat: A Case Study on Edgemere, Queens***,** by Erica Asinas. For the long version of the study please reach out to the author.

2. Equity Issues in Managed Retreat

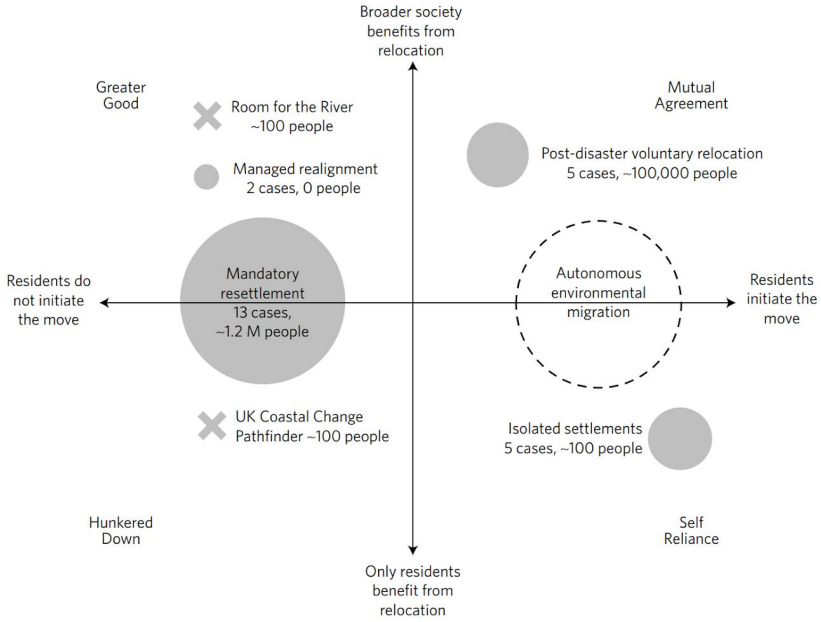
2.1 Inherent Power Dynamics in the Managed Retreat Process

In a seminal study on managed retreat, 27 global cases of past and ongoing efforts of the strategy were analyzed. In identifying common drivers and barriers present throughout all cases, managed retreat was essentially defined as a negotiation between two parties -- the residents and an implementing body, typically being governments (Hino et. al, 2017). The existing dynamics between the two shape the processes and outcomes of retreat.

In a conceptual mapping of the cases *(See Illustration 1.1)*, it was found that retreat has dominantly been practiced through the mandatory resettlement of communities, which is commonly seen as a contentious practice. When enacted with a top-down or technocratic approach, mandatory resettlements can undermine the agency of individuals and communities. In the case that mandatory resettlements are successful, it is because the government has

strong public trust or an alignment of values with its constituency. Meanwhile, the cases of "self-reliance", in which communities attempt to relocate autonomously, are few and far between. Despite communities' recognition of the climate risk and deeming this as no longer tolerable, they often lack the resources to successfully relocate (Hino et. al, 2017). Thus, these findings present a critical tension in the field of managed retreat.

Figure 1. Conceptual Mapping of Past & Ongoing Efforts of Managed Retreat



Source: Managed Retreat as a Response to Natural Hazard Risk, Hino et. al, 2017.

While managed retreat has been defined as the "most effective way to eliminate risk", it inherently contains a prevalent power dynamic. It is a heavily resource-intensive pathway that is nearly impossible to achieve without the resources and support of large institutional actors; and the prevailing practice of mandatory resettlements indicates how communities are often not positioned to enact agency in the process. Despite this, it is a community's ability to enact their agency that plays a critical role in creating just outcomes.

2.2 Racial and Economic Determinants of Vulnerability

As the conversations around humanity's collective climate future deepen, adaptation to sea-level rise will eventually be a question all communities must tackle. However, there will be those who are systematically left out of conversations, while simultaneously being the ones experiencing the first and worst effects of climate change. While the environment does not discriminate, the ways cities adapt to it do. Frontline communities, low-income, communities of

color that have been historically underserved, will experience climate change as a threat multiplier as it will exacerbate existing public health, economic and racial injustices. In the US, the racial wealth gap cannot be separated from matters of land and even adaptation efforts hold a deep history of discriminatory outcomes.

Race and income predetermine a community's environmental vulnerability, within and beyond coastal hazards. In the last three decades, low-income African-American and Latino neighborhoods have consistently been prime locations for toxic landfills (Mock, 2017). Similarly, communities of color have historically been placed into lower, flood-prone areas in Atlantic coastal states (National Climate Assessment, 2014). Governments have given precedence to wealthy populations, evident in US flood protection patterns (Martinich et. al, 2013); leaving behind the most vulnerable segments of society to face disproportionate impacts of climate risk.

As governments' decision-making is based on cost-effectiveness, structural protections such as seawalls are placed in front of high-value assets. For example, New York City has a $10 billion plan to protect the Financial District, which is home to high-rises that are already built to updated, resilient design codes (Office of the Mayor, 2019). Low-income waterfront communities are given less structural protection, as they have lower property values. Their infrastructure is often less resilient, being unable to afford elevation upgrades on their own or to participate in expensive flood insurance policies.

Additionally, historically marginalized communities face challenges within broader systemic inequities. Generally, those with a lower socioeconomic standing may have discomfort and fear engaging with large institutional actors required to receive disaster relocation aid and the system is not designed to accommodate this: they may also lack the political power to advocate for solutions, outside of the bureaucratic protocol. Therefore, environmental justice and social justice are inextricably tied and while the linkage of social justice issues with managed retreat is starting to be explored in academia and the media, it is still an emerging body of work that could benefit from research on how these disparities are addressed in practice.

2.3 Bureaucratic Process

Managed retreat in the United States has dominantly been practiced through sporadic, small-scale, post-disaster buyout programs and has yet to be widely accepted as a viable adaptation pathway (Siders, 2019). In 1978, federal agencies began to formally sponsor small-scale buyout programs throughout the various states. Acquisition programs in Louisiana post-Hurricane Katrina in 2005, and in New York post-Hurricane Sandy in 2012, were the two of the largest federal buyouts in the nation (Governor's Office of Storm Recovery, 2017). These programs are sponsored by a combination of federal and state funds that are typically distributed during the aftermath of a disaster.

Two federal agencies responsible for funding are the Federal Emergency Management Agency (FEMA) and the US Department of Housing and Urban Development (HUD). However,

these entities' focus on buyouts and constraints presented by heavily bureaucratic processes that prove to be problematic to broader, more effective, and equitable implementations of retreat. FEMA programs favor buyouts of lower-income households, while HUD programs do not have any post acquisition of deed restrictions and allow for redevelopment on abandoned land (*See Illustration 2.1*). Additionally, 94 percent of buyouts are administered by city and county government (Mach et. al, 2019). While the federal policies may contain stipulations on post-acquisition requirements, these are under the discretion of local governments to enact, allowing climate adaptation decisions to be embedded into a city or county's nuanced political and urban development dynamics. Studies have also found that most cases of retreat were advocated for by communities that have been repeatedly hit by natural hazards, implying that it is dominantly practiced in a reactionary manner (Braamskamp and Penning-Roswell, 2018). Additionally, the federal buyout process also does not accommodate the varying social and cultural needs of communities.

Table 1. Sources and restrictions of federal funding for floodplain acquisition

Source		Type	Federal Contribution	Post-Acquisition Deed Restrictions	Other Restrictions	Legal Authority	Purchase Price
FEMA	HMGP	Voluntary	75% of project cost; other 25% from non-FEMA sources	acquired properties deed-restricted for open space, recreational, or wetlands management in perpetuity; properties may not be sold or transferred to private ownership		Robert T. Stafford Disaster Relief and Emergency Assistance Act; National Flood Insurance Act; CFR 44 Part 80, Property Acquisition and Relocation for Open Space	Pre-disaster fair market value (FM) (possible incentive or relocation bonuses)
HUD	CDBG	Voluntary or Non-voluntary	25% match paired with FEMA as cost-share or up to 100% independent	no deed restrictions; redevelopment possible	70% of CDBG funds expended must benefit low to moderate income persons (LMI)	Housing and Community Development Act (HCDA); Uniform Relocation Assistance and Real Property Acquisition Policies Act (URA)	Pre- or post-disaster FMV (possible incentive or relocation bonus)
	CDBG-DR	Voluntary	25% match paired with FEMA as cost-share or up to 100% independent	· within 100-year floodplain: deed-restricted to remain undeveloped; may be sold or transferred to private owner with deed restrictions; · outside 100-year floodplain: no deed-restriction required; redevelopment possible	Appropriation may reduce or waive LMI requirements	Disaster Relief Appropriations Act (Specific to each disaster: allows HUD to waive HCDA provisions and add alternatives to tailor to specific disaster recovery needs)	Pre- or post-disaster FMV (possible incentive or relocation bonus)

Source: The Social Justice Implications of Managed Retreat in the US, A.R Siders, 2019.

A 2019 study found that wealthy counties are more likely to apply and receive federal aid post-disaster as they have higher income, education, and population density. However, within these wealthy counties, buyouts have primarily occurred in areas with lower income, education, population density, as well as lower language proficiency and greater racial diversity (Mach et. al). The Union of Concerned Scientists also found that in communities where the poverty level is above the national average, managed retreat's potential erosion of the property tax base could have severe consequences for marginalized residents (2018). The mass exodus out of vulnerable areas can result in property tax decline, weakening public services in neighborhoods that are already lacking resources (Plastrik and Cleveland, 2019). Abandonment of land could also result in blight, disinvestment, and the hollowing out of neighborhoods. As another potential consequence, buyouts funded through HUD offer no protections against new development and the waterfront then becomes a place only for those who can afford to build higher, more resilient homes or purchase other forms of non-structural protections.

Ultimately, government resources are necessary for managed retreat, but public trust in the US required to make it successful is lacking. These bureaucratic processes are inherently flawed and are not designed for efficient, and equitable resilience planning. While FEMA & HUD's block-grant programs allow some local flexibility in how these funds are used, State and City governments allow reconstruction and densification in areas that have been repeatedly damaged, subsidizing this with federal disaster funds (Siders, 2019). Governments' recovery and resiliency policies are canceling one another out. This is symptomatic of the lack of guiding, overarching policy on managed retreat.

3. Research Design & Methodology

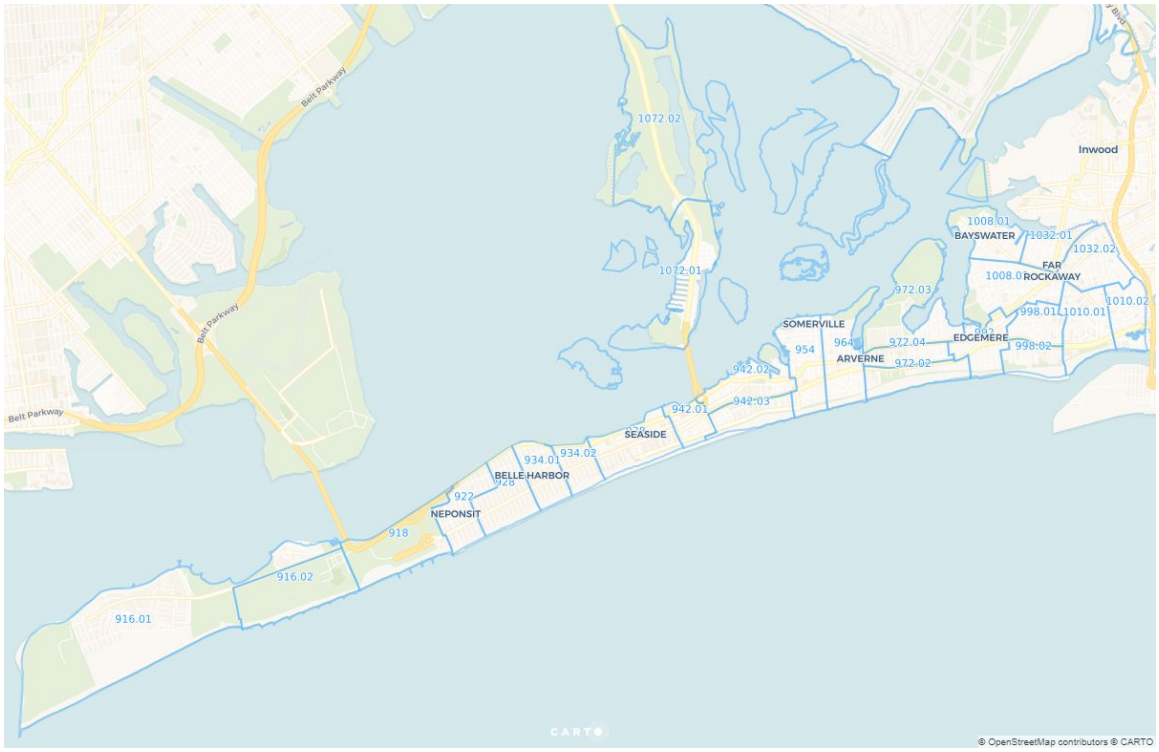
The findings from this paper were a result of a comprehensive literature review and intensive fieldwork from May - December 2019, leveraging community consultations and key-informant interviews to generate qualitative data. To start, a comprehensive literature review was used to understand the broad landscape of Managed Retreat, the strategy's history and implementation in the US, and any gaps and equity issues that must be addressed in its practice.

Next, a case study of Edgemere, Queens was developed to provide a place-based understanding of the issues identified in the literature review. The unit of analysis for the case study is the community of Edgemere, Queens located in New York City. Existing conditions analysis was used for understanding the context of the study area by investigating the existing conditions of its natural, built, social and economic environment. Data for this analysis was obtained through US Census Data, NYC Open Data, policy documents, planning documents, and official reports. A review of online articles and media coverage was also used to support findings from the initial research.

The Rockaway Peninsula is a 11-mile long barrier island located on the southern end of Queens. It is enveloped by two bodies of water — Jamaica Bay and the Atlantic Ocean (See Figure 2). Edgemere is located on the eastern end of the peninsula, and is composed of a majority-minority population, with African Americans composing 55.3 percent of the population, while Hispanic or Latino's make up 31.3 percent. Edgemere is also a low-income renter population, with the Median Household Income in the neighborhood being $36,588 and a quarter of all households requiring federal assistance to maintain their day-to-day expenses. Of all occupied housing units, 78 percent are renter-occupied; this high amount of renters could be attributed to the presence of multiple public and subsidized housing developments in the area[1]. Alongside its unique attributes, Edgemere was primarily selected for this research due to the strong presence of common challenges found in urban-coastal communities.

[1] *For this section, demographic data was retrieved from US Census Data, American Census Survey 2017 5-Year Estimates for the census tracts 964, 972.03, 972.04, 992, 972.02.*

Figure 2. Map of the Rockaway Peninsula



Simultaneous to the existing conditions analysis, semi-structured interviews were conducted with members of government agencies (N=4) and community-based organizations (N=7) involved in recovery, resiliency, and community development work in the study area. Respondents were selected through purposive and snowball sampling, targeting content-rich and relevant data sources. A focus group (N=11) was also conducted with public housing residents. The personal accounts and insights of these stakeholders ground-truthed the findings from the existing conditions analysis, as well as provided insights for community-focused recommendations.

Most, if not all, retreat efforts have focused on assistance provided to homeowners and there is an extensive body of work surrounding buyouts and acquisitions. However, there is a gap in understanding how renters and residents of public housing could be supported through relocation. The only existing support for public housing residents is only made available if they are displaced by a federal project. Additionally, both homeowners and renters cannot directly apply for federal assistance, and require state or local authorities to request retreat funds on their behalf (Siders, 2018).

Thus, the last segment of stakeholder outreach involved a focus group discussion, with public housing residents across the east-end of the Peninsula. The participants were members

of NYCHA Ocean Bay's Women Circle, which is hosted and facilitated by Ocean Bay Community Development Corporation (OBCDC). The overarching characteristics of the participants were as follows:

- All Black or African-American women, aged 30-60
- All currently living or have previously lived in one of the six public housing complexes the Hammel-Arverne-Edgemere area
- All long-standing residents of the neighborhood, ranging from 28-45 years of residency
- All present during Hurricane Sandy in 2012

The results section of this paper focuses on the local level policy evaluation and results from semi-structured interviews with various stakeholders. Complete results from the comprehensive literature review and contextual analysis can be found in the full manuscript.

4. Results

The exploration of the New York City government's involvement and perspective on managed retreat is done through the analysis of official documents and reports that discuss the City's strategies on climate resiliency, waterfront development, and long-term plans for Edgemere. Aggregate information is supported by interviews with employees of city agencies that have directly worked in the study area, but more specifically, on the Resilient Edgemere plan that was released in 2017. Apart from providing insights based on their professional experience, the participants also provided clarification and further details on strategies that were mentioned in the documents.

NYC's Comprehensive Waterfront Plan: Vision 2020

In Chapter 3 of New York City's Comprehensive Waterfront Plan, the City's stance on retreat as a strategy for building resilience is stated:

> *"In New York City, retreat from the shoreline, considered as a broad strategy, would not only be expensive to implement, but it would also have a wide range of other costs: It could displace residents and neighborhood institutions, disrupt transportation and business activity, and* ***impede the*** city's achievement of its PlaNYC goals for sustainable, dense development to accommodate a growing population (p. 109)"

This plan was created prior to Hurricane Sandy, and NYC's Comprehensive Waterfront Plan 2030 is currently being formulated. In a November 2019 meeting that discussed the upcoming Vision 2030, local leaders of frontline waterfront communities stated "developers are the largest threat to our waterfront", strongly holding opposing feelings to the densification of the shoreline as pushed for by the City (personal communication, November 12, 2019).

NYC's Build It Back Program & The Resilient Edgemere Community Plan

In 2013, the Mayor's Office of Housing Recovery (HRO) launched the Build It Back program which assisted New Yorkers through reimbursement checks or construction services to repair, rebuild, or elevate their Sandy-damaged homes. Homes that saw the most damage and would continue to experience extreme coastal risk were either bought out or acquired by the government. These forms of 'retreat' were administered by either the City or State, and were financed with federal disaster recovery funds disbursed by FEMA or HUD. There were approximately 800 acquisitions city-wide (Mayor's Office of Housing Recovery, 2019).

The Resilient Edgemere Plan was devised for the recovery and sustainable development of coastal neighborhoods that were particularly devastated during Hurricane Sandy. Community outreach for the plan began in 2015, and was primarily conducted through a series of public workshops. In 2017, the plan began implementation and is currently still ongoing. HPD is the primary agency responsible for the plan, and is supported by 13 other city agencies (Resilient Edgemere, 2017).

Figure 3. Diagram of proposed Hazard Mitigation Zone and Build It Back relocation process

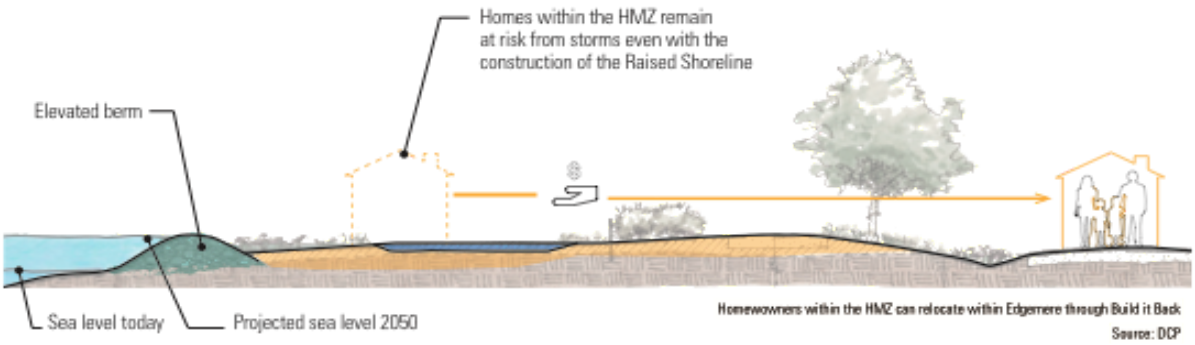


Image Source: Resilient Edgemere Plan, 2017

In the plan, a Hazard Mitigation Zone was identified, wherein the Build It Back pathways were limited to acquisition or relocation within the neighborhood. These were high-risk areas, where adaptation in place was no longer an option and would later be converted into open space that would assist with stormwater management. While the plan did not offer any further details on its implementation, interviews were conducted with four respondents from City agencies who worked directly in Edgemere on these programs. These interviews provided in-depth information on the retreat, as well as personal insights on the future of resiliency in New York City.

Past Efforts of Retreat in Edgemere

Based on interviews with members of HPD, MOR, and HRO who were directly involved in the development of both programs, the relocation program was a pilot conducted within Build It Back. What made this pilot different from acquisitions is that the government did not only purchase at-risk properties, but also provided direct relocation assistance. The City identified government parcels of similar size and took full responsibility of constructing a new, similarly valued home, of which the ownership would later be transferred to the participant. The outreach consisted of door-knocking on 38 homes within the HMZ and resulted in six sign-ups. Only a total of three participants completed the program in 2019. As federal HUD dollars were used to conduct these recovery initiatives, the City was also legally obligated to provide relocation assistance to renters by the Uniform Relocation Assistance Act (URA), encompassing advisory services, payment for moving expenses, and replacement housing assistance to those who have been displaced by a federally funded project. However, these efforts have also been limited.

4.2 Community Consultations

For community-based organizations, the greatest barrier to retreat is clear. All seven respondents have voiced concerns that, between the interplay of City's incongruous investments and the increasing development of high-rise housing along the vulnerable waterfront, retreat would result in unjust outcomes for the most marginalized groups in Edgemere.

> *"The largest concern is where are investments being spent... We are building not only in the Rockaways, but other areas that are directly on the coastline are being overrun by new construction. None of that from my observation is really aligned with a city that is thinking about climate change and resiliency in a serious way.*
>
> *The problem is that what's happening is that those communities that are poor are the ones that are being told that they need to move.* ***And it's going to become a waterfront that's only for those privileged enough to afford it"***

Especially when retreat is understood within New York City's long history of disinvestment and inequitable real estate development in the Rockaways, CBOs perceive it as a tool that can perpetuate the existing disparities present in the neighborhood. Respondents referenced discriminatory outcomes of rehabilitation in New Orleans, Louisiana post Hurricane Katrina.

The threat of rising seas, matched with land speculation, and the City's encouragement of increased density in a vulnerable area increase fears of displacement of a low-income community that feels it has been neglected and failed by the City for decades. In a sense, for the community of Edgemere, retreat could largely be seen as a defeat -- it is a surrender not

only to the water, but to the institutional and market forces that have pushed them in and are now seeking to push them out:

> *"The main emotional response I've seen is defeatism… and anger... anger at anybody in particular. Not like anger at the city, not anger at the government or programs, but just feeling like it's a continuation of basically racial prejudice throughout US history, New York City history."*

In the case that there are government efforts towards retreat, they may not receive support from local actors who feel that they have been used to further political motives. There is a feeling that community-based organizations are used to do outreach and gain support from residents, but the lack of follow-through in efforts perpetuates the planning fatigue in the neighborhood, undermines their work, and diminishes their credibility:

> *"The hardest part is that I think a lot of people have lost faith and I'm certainly one of them who felt used and felt that the government has a certain way of working that I'm just like, I'm just a pawn. I see how things operate and I don't want to be involved in it. Even with the Edgemere plan, I said I don't want to be involved in this because I felt it was using people"*

Additionally, as the City primes the peninsula for an influx of new residents, as part of an effort to alleviate the housing crisis, creating an illusion of security amongst its existing population that also decreases the likelihood of people relocating on their own.

Perception of Resiliency Efforts

A community workshop was held in NYCHA Ocean Bay, which received one of the largest resiliency investments that the City has made in public housing to date. The workshop was a starting point to begin conversations about resiliency efforts across the peninsula as a whole. When asked if they have felt the effects of these investments in their neighborhood, all participants answered with a resounding no.

Despite the dollar amount and long list of resilience plans, residents felt that these were inadequate and were not truly created for them; there is a large focus on homeowners in existing plans. There was a strong expression that the race and income divide largely impacted the lack of support in Edgemere, and the city's assets were prioritized over people. Even those that participated in the range of outreach efforts felt they were not heard or respected:

All the things they are implementing are to save THEIR structures, they aren't to save people. There's nothing to save human life.

All their plans are for single-family homes. Most of us here are living in apartments. If you walk around it's all apartments. No one has a plan for us. Where is the plan for the projects? The actual residents?

We need a plan where nobody gets left behind.

They probably say, we are not dealing with these crazy brown people. After they are gonna go home, kiss their kids, and tell their wives "thank god we're not on that peninsula"

The problem with all these workshops and activities that happened is they just bring stuff here and have meetings, but they don't respect us.

In later comments, participants implied that the neighborhood had changed for the worse over the past two decades.

Perception of Retreat

Residents were asked if they would stay or leave the peninsula. Despite attempts to lead the conversation towards a long-term and future scenario of managed retreat, the participants based answers on either past or current experiences.

Table 2. Comparative Visual of Community Viewpoints

Leaving:	Staying:
They don't understand we live on a peninsula.	*I would stay, because where would I go?*
Everybody has to leave, all these buildings are built on water.	*And, for some people, this is their livelihood - you got nothing.*
When the next storm comes, this would all disappear.	*You only got you. Not everyone has family. Not everyone has a father on Jamaica Bay.*
I would leave. Last time, I lost everything. I just can't go through that again.	*What about those people who haven't talked to their mother in 10 years? You got no kids, no parents, no family. What about them?*
I would leave. I have family I could go to. I raised all my kids here, and they all left New York City. They don't want to be here.	*Maybe if we found ways to have more money in our pockets, we can have more options*

Insightful themes revealed themselves between the two responses -- to stay or to go. Those who said they would leave found that risks and losses associated with coastal hazards are intolerable, and had family living outside of the City they could seek support from in their decision to leave.Those who said they would stay implied that this decision was based on a lack of options -- of where to go, who to go to, and how they would get there. This affirms an insight earlier stated by a CBO member -- defeatism is the dominant emotional response he has seen when working with people in the Rockaways.

Contrary to the popular notion that retreat signals defeat, insights from local stakeholders reveal that it is actually defeatism that motivates people to stay in high-risk situations. The

neighborhood's history of inequality, and the scarcity that has resulted from it permeates residents' psyches. Socioeconomic disparities do not only create a logistical barrier but a psychological one as well. It is then important to delineate those who want to stay, purely because they are unwilling from those who do not have the socioeconomic capacity to do so.

5. Discussion: Managed Retreat as a Just Transition

An analysis of the Managed Retreat landscape in the US revealed that discriminatory policies of the 20th century, driven by racial segregation and class divide, have long-lasting effects on American cities and such inequities are being reverberated in adaptation practices in this present era of climate crisis. Historic injustices have led to the placement of low-income, communities of color in the most hazardous and unprotected segments of the US coastline, and existing bureaucratic processes and large institutional actors either provide inadequate support in their transition or perpetuate cycles of disinvestment and displacement.

The case study of Edgemere, Queens affirmed these findings: the New York City barrier island is a microcosm of the extractive practices that have plagued frontline communities through past and present.Today, urban development trends support uneven flood protection patterns and give way to slow-onset gentrification on the peninsula. This perceived potential for economic growth has resulted in low political will to pursue more resilient pathways.

Through interviews with local stakeholders, there is an underlying knowledge in the community that t retreat will be inevitable; yet this knowledge is faced with denial and more so, a refusal to admit defeat - not only to rising seas but to the political and market forces that they have long resisted. In contrast, insights from public housing residents reveal that the decision to stay may be symptomatic of a more internalized type of defeat, stemming from decades of inequality that have systematically prevented more sustainable pathways for the most underserved in society.

Thus, in order for retreat to be possible, it must be a strategic process that addresses the anticipated economic loss and social disarticulation of relocation. At the same time, in order for retreat to be just, it must reconcile a history of racial and economic injustice that has brought frontline communities to their current states of environmental vulnerability. Through an equity lens, managed retreat can serve as a just transition for communities when it fulfills these two conditions. Below are three potential pathways in which

5.1 Participatory and healing-informed approaches to resilience planning

Historical erasure affects the resiliency of the present, and the past forces that have shaped present situations and stark projections of the future must be addressed with honesty. All actors involved must center the lived experience of residents, and institutional actors must reckon with the past to build trust. Equitable managed retreat is healing, when multi-level social dialogue is deeply embedded into the process, and informed participation is strengthened.

People must not only be given a seat at the table, but should not be tokenized and be equal partners in decision-making.

Community engagement can provide a pathway for healing, through the acknowledgment of past injustices and traumas and reclaiming local narratives around climate, development, and community. When healing-informed strategies are used in community planning, this can promote just process outcomes. Some strategies include: Using participatory action research techniques to conduct a public evaluation of risk and identify local adaptation needs, Providing a safe platform for consensus-building, conflict management, and community planning, and developing emotional & psychological support networks for relocating residents.

5.2 Shared ownership models of wealth-building to support communities' economic and adaptive capacity through relocation

A Community Land Trust (CLT) is one method of shared, democratic ownership of land that exists in New York City. CLTs have traditionally been used in cities to ensure housing affordability in rapidly developing neighborhoods. However, as a managed retreat strategy suggests residential use will be heavily limited or removed in the area, a CLT for housing may not be appropriate in the context. Community Development Corporations (CDC) also exist with a similar function, but do not necessarily own land and have a greater focus on local economic development.

Community Development Trusts (CDT) provide a similar approach to local ownership of assets present in a CLT but with the economic development focus of a CDC. Some CDTs are registered as LLCs or private entities, which allow them to invest in private projects or infrastructure that would generate supplemental income for residents or funding for local projects. A CDT in Edgemere could be developed with existing residents so that they can retain ownership of retreated land and, subsequently, proprietorship over non-residential local assets that may be built on that land in the future. This mitigates the threat of disinvestment and displacement during managed retreat, and develops community-owned assets that residents can benefit from even as they relocate.

5.3 Distributive land use and coastal management tools that support thriving ecologies and sustainable economies.

Managed retreat can serve as a just transition when retreated land is adapted for ecological restoration and sustainable economic use which can support relocating communities through neighborhood transition. By providing early support to relocating communities through jobs training in green enterprise and conservation work, this strategy could mitigate the economic losses of relocation as well as close the loop between climate mitigation and adaptation practices. In the context of

Renewable energy would be a viable industry for an Edgemere CDT to invest in. As residents move out of the vulnerable waterfront, these vacated residential parcels could be transferred to management of a CDT and rezoned so they can host solar, wind, or hydropower generation. Through a CDT, Edgemere residents who have relocated could be equal shareholders of this new infrastructure, with public or private actors as equity partners. Equity from the CDT could be passed on from generation to generation, creating a source of transgenerational wealth and connection to land that will be more sustainable than homeownership in a high flood-risk area.

6. Conclusion

The recommendations for an equitable managed retreat in Edgemere are exploratory ideas, with some being actionable today while others require robust community organizing and a shift in political will to implement. However, deep stakeholder engagement and the difficult conversations about climate adaptation must begin immediately, and the rapidly changing environment underscores this can no longer be delayed. Additionally, residents' reception and acceptance of managed retreat plans and supporting adaptation interventions are also contingent on unpredictable variables. Natural disasters also play a role; relocation may not be seriously considered today, but the occurrence of another hurricane or superstorm may trigger a widespread desire for a strategic managed retreat plan. A just managed retreat process is also contingent on the actors driving its implementation. Who is at the table during the plan's creation largely determines its outcomes. Public trust is also critical, and the local government must have a stronger internal motivation to restore just relationships with its constituency. What is perceived as equitable is also nuanced and will vary by community. Ultimately, residents must create their own definitions of just adaptation to guide the process.

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