Managing the Retreat from Rising Seas

Lessons and Tools from 17 Case Studies

GEORGETOWN CLIMATE CENTER

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(bottom row, left to right): Integration and Application Network, University of Maryland Center for Environmental Science; Betty Whetzel (Courtesy of U.S. Fish and Wildlife Service); Matt Green; Katie Spidalieri, Georgetown Climate Center.

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About This Report

As seas continue to rise and disaster events and extreme weather increase in frequency and intensity, climate change is driving state and local policymakers to evaluate strategies to adapt to various risks affecting many communities. In addition to protection (e.g., hard shoreline armoring) and accommodation (e.g., elevating or flood-proofing structures) measures, coastal governments and communities are increasingly evaluating managed retreat, where appropriate, as a potential component of their comprehensive adaptation strategies. Managed retreat is the coordinated process of voluntarily and equitably relocating people, structures, and infrastructure away from vulnerable coastal areas in response to episodic or chronic threats to facilitate the transition of individual people, communities, and ecosystems (both species and habitats) inland.

The aim of managed retreat is to proactively move people, structures, and infrastructure out of harm's way before disasters occur to maximize benefits and minimize costs for communities and ecosystems. For example, policymakers may maximize opportunities for flood and risk reduction by conserving wetlands and protecting habitat migration corridors and minimize the social, psychological, and economic costs of relocation by making investments in safer, affordable housing within existing communities.

This report is composed of 17 individual case studies. Each one tells a different story about how states, local governments, and communities across the country are approaching questions about managed retreat. Together, the case studies highlight how different types of legal and policy tools are being considered and implemented across a range of jurisdictions — from urban, suburban, and rural to riverine and coastal — to help support new and ongoing discussions on the subject. These case studies are intended to provide transferable lessons and potential management practices for coastal state and local policymakers evaluating managed retreat as one part of a strategy to adapt to climate change on the coast.

Collectively, these case studies present a suite, although not an exhaustive list, of legal and policy tools that can be used to facilitate managed retreat efforts. Legal and policy tools featured include: planning; hazard mitigation buyouts and open space acquisitions, as well as other acquisition tools like land swaps and reversionary interests; land use and zoning; and Transfer of Development Rights programs. The case studies also highlight various policy tradeoffs and procedural considerations necessitated by retreat decisions. Each jurisdiction is confronting different challenges and opportunities and has different, perhaps even competing, objectives for retreat. In addition, stakeholders in each of these cases are attempting to balance multiple considerations, including:

protecting coastal ecosystems and the environment; fostering community engagement and equity; preparing "receiving communities" or areas where people may voluntarily choose to relocate; and assessing public and private funding options and availability. The case studies included in this report were selected to reflect the interdisciplinary and complex nature of retreat decisions and underscore the need for comprehensive solutions and decisionmaking processes to address these challenging considerations.

Where possible, all of the case studies share a consistent organizational format to allow easier cross-comparison of strategies, processes, and takeaways:

- The **Background** section introduces state or local context for each case study, including the risks and hazards facing each jurisdiction and its road to considering or implementing managed retreat strategies.
- The **Managed Retreat Examples** section focuses on the legal and policy tools that have been designed and implemented to support managed retreat strategies on the ground.
- The **Environment** section highlights how floodplains and coastal ecosystems have been restored, conserved, and protected as a part of comprehensive managed retreat strategies to provide ecosystem and community benefits, like reducing flood risk and creating community assets such as parks and trails.
- The **Community Engagement** section summarizes how affected residents have been contributing to planning and decisionmaking processes for climate adaptation and managed retreat.
- The **Funding** section identifies how the programs, plans, and projects discussed have been funded by federal, state, and local government and private sources.
- The **Next Steps** section captures the anticipated future actions that jurisdictions may take in implementing these managed retreat strategies.
- The **Considerations and Lessons Learned** section concludes with the primary takeaways from each example that other coastal state and local policymakers and communities may consider when developing or implementing their own managed retreat strategies using these legal and policy tools.

The case studies in this report were informed by policymakers, practitioners, and community members leading, engaging in, or participating in the work presented in this report. No statements or opinions, however, should be attributed to any individual or organization included in the *Acknowledgements* section of this report. It is also important to note that the programs and planning processes described in each case study are ongoing and the content included in this report is current as of early 2020. Future updates about these case studies will be captured in Georgetown Climate Center's online resources on managed retreat.

These case studies were written to support Georgetown Climate Center's Managed Retreat Toolkit, which also includes additional case study examples and a deeper exploration of specific legal and policy tools for use by state and local decisionmakers, climate adaptation practitioners, and planners. For future updates about these and other case studies and the Managed Retreat Toolkit, please visit the **Managed Retreat Toolkit** and the **Adaptation Clearinghouse**.

Blackwater National Wildlife Refuge, Maryland: Blackwater 2100

Executive Summary

In 2013, The Conservation Fund, National Audubon Society, and U.S. Fish and Wildlife Service partnered to produce a "salt marsh persistence" report for Blackwater National Wildlife Refuge (NWR) titled *Blackwater 2100* to address marsh migration in response to sea-level rise and tidal erosion. Blackwater NWR is a wildlife sanctuary and wetland area of high ecological importance located in Dorchester County, Maryland. Since the 1930s, over 5,000 acres of marsh have been lost at Blackwater NWR. The objectives of the report are to identify areas of current tidal marsh most resilient to sea-level rise and of the highest value to salt marsh bird species as well as future locations that may support marsh migration corridors. The report's authors utilized several tools, including the Sea-Level Rise Affecting Marshes Model (SLAMM), to select one of three different adaptation strategies for wetland areas within Blackwater NWR to create a comprehensive management plan. The three adaptation strategies include: (1) in-place restoration actions targeted at improving existing tidal marsh health and productivity; (2) strategic conservation in priority marsh migration corridors; and (3) actions supporting the transition of uplands into marsh. *Blackwater 2100* can provide a useful example for natural resources, open space, and coastal managers to plan for minimizing coastal habitat loss due to sea-level rise by evaluating the tradeoffs of different adaptation strategies; and building partnerships with stakeholder groups and the community to examine marsh migration on an ecosystem scale that necessitates public and private land acquisitions and involvement. It may also serve as a model that can be adapted for other coastal locations with different management criteria or priorities.

Wetlands at Blackwater National Wildlife Refuge.

Wetlands cover Blackwater National Wildlife Refuge in Dorchester County, Maryland on June 5, 2018.

Credit: Will Parson, Chesapeake Bay Program, U.S. Fish and Wildlife Service.

Snow Geese.

Snow geese are one of several migratory bird species that visit Blackwater National Wildlife Refuge every winter as they migrate south from Canada.

Credit: Betty Whetzel (Courtesy of U.S. Fish and Wildlife Service).

Background[1]

Blackwater National Wildlife Refuge (NWR) — located in Dorchester County, Maryland — is a migratory bird sanctuary and ecologically important area spanning more than 29,000 acres. Blackwater NWR consists of three major habitats — forest, marsh, and shallow water — and contains one-third of Maryland's tidal wetlands. Blackwater NWR was established in 1933 as a waterfowl sanctuary for birds and continues to provide an important resting and feeding area for migrating and wintering birds including waterfowl and Canada geese using the Atlantic Flyway. Blackwater NWR also supports one of the largest natural populations of Delmarva fox squirrels and the largest nesting population of American bald eagles on the Atlantic coast. The U.S Fish and Wildlife Service (USFWS) manages the refuge with the goal of maintaining and enhancing productive habitat for a healthy diversity of wildlife species. Since the 1930s, over 5,000 acres of marsh have been lost at Blackwater NWR from a combination of factors including sea-level rise, saltwater intrusion, land subsidence, and invasive species. Maryland is particularly vulnerable to sea-level rise because of its geographic location, elevation, and geology; and these factors have influenced all actions related to adapting, preserving, and restoring marshes in the refuge under the marsh persistence strategy.

Managed Retreat Examples

Planning for Retreat

Blackwater 2100 is a strategic plan or guidance document created through a public-private partnership to comprehensively restore and manage migrating wetlands. In 2013, The Conservation Fund and Audubon Maryland–D.C., in collaboration with USFWS and Maryland

Department of Natural Resources, published the *Blackwater 2100* report on strategies to address marsh loss in an era of climate change. The *Blackwater 2100* report used science and predictive tools to outline key strategies to help slow the rate of marsh loss, improve marsh health, and ensure that marshes have room to migrate inland and reestablish with rising tides. Changes in tidal marsh area and habitat type were modeled using the Sea-Level Rise Affecting Marshes Model (SLAMM).[2] SLAMM shows a visual model of a marsh's future under different sea-level rise scenarios. SLAMM helped to identify which areas of current tidal marsh were most resilient to sea-level rise and which locations may support tidal marsh in the future as "marsh migration corridors." Modeling was also used to identify the marshes of highest value for seven focal salt marsh bird species so that wetland conservation strategies could be targeted to preserve the best habitat for salt marsh birds.

The report's authors acknowledge that, given the cost and logistical challenges of marsh restoration, such as large areas of already eroded marsh, dredging volume requirements, and accessibility issues, it would be infeasible to attempt to preserve all tidal marshes in Blackwater NWR. Instead, the report's authors identify key areas of existing marsh where management actions are likely to yield the greatest long-term conservation benefits, focusing primarily on enhancing areas of marsh that are still largely intact. To complement SLAMM projections, additional factors were also incorporated in designating desirable marsh migration corridors including road network density, current and future land use, water flow and ponding information, and protected land status.

As a result of these findings, a new conservation approach has been implemented in Blackwater NWR focused on supporting "salt marsh persistence," based on the *Blackwater 2100* report. The report identifies three different adaptation strategies to comprehensively manage wetlands in Blackwater NWR:

1. Build resilience of existing marsh areas;
2. Facilitate inland marsh migration; and
3. Support the transition of upland areas into marsh.

This three-pronged conservation approach, discussed in more depth below, is intended to collectively reduce tidal marsh loss in Blackwater NWR due to sea-level rise projected through the end of the century, improve marsh health, and support marsh migration and the transition of uplands into marsh as the tide rises.

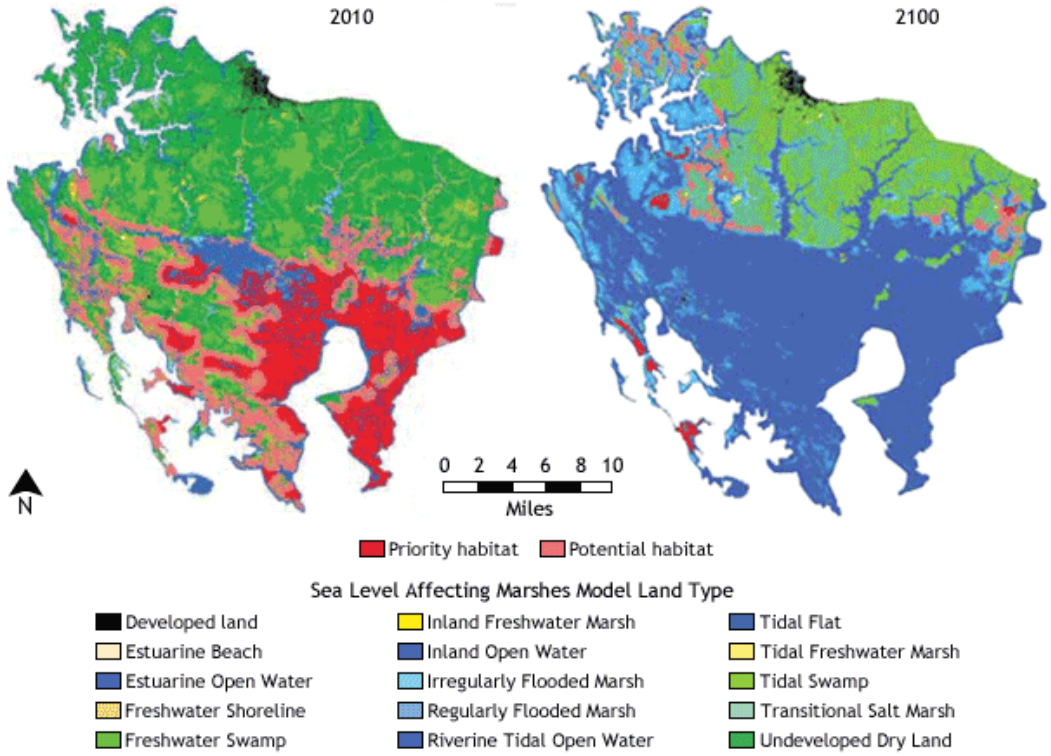
Build Resilience of Existing Marsh Areas

The first strategy in *Blackwater 2100* calls for efforts to preserve and build the resilience of existing, strategically selected marsh areas. Recommended actions include protecting and restoring brackish marsh habitat, using on-site material for marsh restoration, stabilizing shorelines, and reducing saltwater intrusion. The marsh areas targeted in this strategy were identified for their contribution to Blackwater NWR's wildlife protection mission, specifically, the salt marsh bird "specialists" — a suite of species that depend on high tidal marsh for a significant part of their life cycles. Protection efforts have also involved

American Bald Eagle.

Blackwater National Wildlife Refuge is home to the largest nesting population of American bald eagles on the Atlantic coast.

Credit: U.S. Fish and Wildlife Service.



Projected Impacts of Sea-Level Rise on Blackwater National Wildlife Refuge This Century.

By 2100, nearly all the tidal marshland (in blue on the 2100 map) in Blackwater National Wildlife Refuge could be submerged by a three-foot rise in sea level. A three-foot rise in sea level is notable because it would impact the refuge's priority and potential future bird habitat (in red and pink, respectively on the 2010 map).

Credit: Daniel Strain, *The Future of Maryland's Blackwater Marsh*, Climate.gov, Nat'l Oceanic & Atmospheric Admin. (Jan. 14, 2015), *available* **here** (Map adapted from *Blackwater 2100: A Strategy For Salt Marsh Persistence in an Era of Climate Change*).

wildlife management actions including reducing the population of resident Canada geese, which devour newly planted crops and marsh plants, controlling *phragmites*, and maintaining a program to eradicate the invasive species, nutria.

To implement this adaptation strategy, project partners established a Marsh Conservation Zone (MCZ) in the refuge that, among other factors: has a favorable underlying geology and important salt marsh bird habitat; is proximate to identified marsh migration corridors; is largely in protected land status; and where management intervention is most likely to secure additional decades of high quality tidal marsh habitat. It is important to note that the MCZ was determined based on these specific factors because the strategy of building existing marsh resilience is not suitable — or practical — for all areas of marsh within Blackwater NWR. This demonstrates the careful considerations about location and priority-based decisionmaking in the report that other resource, land, and coastal managers can consider when developing their own approaches to adapt coastal ecosystems to the effects of climate change.

During fall 2016, The Conservation Fund, National Audubon Society, and USFWS completed one large-scale adaptation project in the MCZ. This project saw 26,000 cubic yards of sediment taken from the Blackwater River and spread thinly across a 40-acre section of the salt marsh that showed signs of decline due to rising water levels. Most of the site was left to naturally regenerate vegetation via native marsh grass rhizomes in sediment. Marsh grasses were planted in former marsh "holes" — areas where vegetation had collapsed and become open water ponds — to hold the sediment in place and retain the increased elevation. Only native marsh grasses were utilized and a deliberate effort was made to restore *Spartina patens* high marsh vegetation that was most suitable for the desired salt marsh birds. The restoration experiment was designed to boost plant productivity and prolong the expected life of the marsh ecosystem and the habitat for birds. This project was the first "thin-layer" and revegetation project in the Chesapeake watershed and the largest wetland restoration effort ever undertaken in Blackwater NWR. As of 2019, the project outcomes are still being monitored and evaluated; however, initial results exceeded expectations with

added sediment settling out to targeted levels, existing native grasses flourishing, new plants taking root, and wildlife returning to the site.

Facilitate Inland Marsh Migration

For marshes not selected to be managed by in-place restoration to build their resilience (see above), the *Blackwater 2100* report includes recommendations for identifying and protecting areas for inland marsh migration, such as migration corridors. In Blackwater NWR, existing marshes cannot keep pace with sea-level rise by increasing their elevation through natural sediment supplies and have thus begun to migrate inland. As a result, some of the former agricultural fields and forested areas within Blackwater NWR have already transitioned into tidal marsh as rising bay waters inundate or increase the salinity of soils. Facilitating the migration of marsh habitats has become a management priority in Blackwater NWR and involves the acquisition and protection of priority marsh areas and adjacent upland buffers. SLAMM projections have been used to identify and assess potential marsh migration corridors, particularly those adjacent to conservation lands in and surrounding the refuge, allowing for consistent management of large, contiguous marsh areas.

To implement this strategy, USFWS, the state, and other nonprofit partners are working to acquire land and conservation easements in the two priority migration corridors. In 2016, USFWS acquired 410 acres of new land for Blackwater NWF from The Nature Conservancy to provide more habitat for bird species and space to accommodate projected future marsh migration. Thousands of acres have also been acquired through conservation easements in the two primary migration corridors. Conservation easements are owned by private landowners, Maryland Department of Natural Resources, and other entities. Strategic additions to these land conservation areas are planned to ensure that successful adaptation continues.

Support the Transition of Upland Areas into Marsh

For former agricultural fields and forests within Blackwater NWR that are already transitioning into tidal marshes, the *Blackwater 2100* report identifies a number of techniques to help these upland areas transform more rapidly and effectively into functioning tidal marsh. These techniques include *Phragmites* control using targeted herbicide application to prevent invasive plants from out-competing marsh grasses preferred by salt marsh birds, removing dead trees to increase the effective habitat area for salt marsh birds, and planting transition crops, such as salt-tolerant grass species, that can improve water quality by preventing nutrients and other pollutants from entering the Chesapeake Bay.

Community Engagement

To develop *Blackwater 2100*, The Conservation Fund, Audubon Maryland–D.C., Maryland Department of Natural Resources, and USFWS engaged the public to help assess the value of tidal marshes for different stakeholders. These entities have also engaged surrounding communities

Educating and Engaging Stakeholders at Blackwater National Wildlife Refuge.

In 2018, 33 participants from U.S. Fish and Wildlife Service, state agencies, nonprofits, and private landowners attended a workshop to learn about wetland management in the refuge. This is one example of how U.S. Fish and Wildlife and its partners work together to educate different stakeholders about the value of wetlands, in addition to the challenges of managing seasonally flooded and migrating wetlands. This level of engagement can create new stewards to protect and conserve these important resources into the future as the ecosystem changes due to climate change.

Credit: U.S. Fish and Wildlife Service.

to support wetland stewardship and climate adaptation projects including to replant marsh grasses. They have also organized several project tours at the thin layer marsh elevation project site and at Farm Creek Marsh, an Audubon-owned sanctuary nearby. Other public meetings have been held at the Refuge Visitors Center for a variety of stakeholders. A technical working committee was established to provide advice and feedback to further refine the report. While *Blackwater 2100* is primarily focused on preserving bird habitat and marsh persistence, the report also highlights the important cultural and economic values of Blackwater NWR and how management efforts should simultaneously benefit humans.

Funding

Early in the process to draft *Blackwater 2100*, project proponents determined that it would be too expensive to restore all of the wetlands threatened in Blackwater NWR. Funding for projects has thus been focused on activities that will allow marshes to persist (by building their resilience) and migrate inland. In-place marsh restoration has been funded with federal grants for coastal resiliency projects offered following Hurricane Sandy. Investments in restoring the marsh ecosystem will provide economic benefits including inland flood protection, habitat for commercial fish species, and filtering pollutants. The Migratory Bird Conservation Commission has also granted USFWS and its partners $2.2 million in funding for land acquisition projects.

Next Steps

The identification and implementation of future projects, including locating funding, will continue to proceed on an individual, project-by-project basis in coordination with all of the report's partners.

Considerations and Lessons Learned

Blackwater 2100 provides a useful example of an adaptation plan that addresses sea-level rise impacts to coastal habitats. Developed through a partnership with stakeholders and the community, the report evaluates the tradeoffs of different adaptation strategies for preserving marshes facing rising seas. First, adaptation plans and projects at Blackwater NWR involve ongoing efforts for in-place marsh restoration, marsh migration, and transition of uplands. These approaches may serve as a model for other land managers and policymakers weighing varying options for how to develop and use science-based, comprehensive strategies to prioritize marsh adaptation. This model may be replicated or adapted in other marsh locations depending on different management priorities and scales, among other factors like funding, land availability, and existing and future development.

Second, the *Blackwater 2100* report highlights that deploying this combination of strategies requires not only the collaboration of policymakers and state and federal agencies but the active engagement of private landowners and the public. This partnership approach has been critical to the success of the adaptation efforts underway at the refuge and ongoing project development. Moreover, partners are acquiring and adding land surrounding Blackwater NWR to the refuge by leveraging non-federal conservation efforts to address marsh migration on a larger ecosystem scale. In addition, project partners are actively pursuing funding collaboratively as a team and in accordance with the strategic plan set by *Blackwater 2100*. Reports or plans like *Blackwater 2100* can communicate a larger, cohesive vision to potential funders and ideally increase the success of efforts to preserve important coastal habitats in the face of rising seas.

Endnotes

1 Note that information and factual support for this case study was sourced from Audubon Md.–D.C. & The Conservation Fund, Blackwater 2100: A Strategy for Salt Marsh Persistence in an Era of Climate Change (2013), *available at* **https://www.conservationfund.org/images/projects/files/Blackwater-2100-report_email.pdf;** and interviews with representatives from The Conservation Fund and U.S. Fish and Wildlife Service.

2 Georgetown Climate Ctr., *Sea-Level Rise Affecting Marshes Model (SLAMM),* Adaptation Clearinghouse (Apr. 9, 2010), **https://www.adaptationclearinghouse.org/resources/sea-level-rise-affecting-marshes-model-slamm.html.**

State of Hawaii: Assessing the Feasibility and Implications of Managed Retreat Strategies for Vulnerable Coastal Areas in Hawaii

Executive Summary

In February 2019, the State of Hawaii Office of Planning, Coastal Zone Management Program (CZMP), published a report: *Assessing the Feasibility and Implications of Managed Retreat Strategies for Vulnerable Coastal Areas in Hawaii* (report). CZMP drafted the report in response to a request for the state to evaluate the potential for a managed retreat program in Hawaii. In developing the report, CZMP designed and implemented a three-phased approach that consisted of conducting background research; evaluating how retreat could apply in four different area typologies; and convening an interdisciplinary symposium to engage experts and stakeholders. As a result, CZMP concluded that it is not currently possible for Hawaii to develop a step-by-step plan to implement managed retreat for areas in the state threatened by sea-level rise and other coastal hazards; however, the report contains recommendations for potential next steps, including assembling an interdisciplinary committee to work towards achieving a statewide consensus about a managed retreat vision and efforts to formulate a retreat strategy. Both Hawaii's three-phased approach and the final report provide helpful examples of how one state designed and implemented a comprehensive process led by its CZMP to evaluate the potential for retreat. These examples may inform planning and policy actions for managed retreat in other jurisdictions.

Background

Since 2018, the State of Hawaii has been undertaking several evaluation studies and proposed policy actions relative to managed retreat. The Hawaii State Office of Planning, Coastal Zone Management Program (CZMP) designed a project to evaluate how and whether the state should establish a managed retreat program and policies to protect vulnerable people, properties, and resources threatened by sea-level rise and other coastal hazards. In February 2019, CZMP, under the parameters of the state's Ocean Resources Management Plan (ORMP)[1] from 2013 — a statewide plan that guides the state's ocean and coastal resource management priorities — published a report: *Assessing the Feasibility and Implications of Managed Retreat Strategies for Vulnerable Coastal Areas in Hawaii* (report).[2] The report aimed to assess the feasibility of managed retreat in Hawaii as an adaptation strategy to climate change, sea-level rise, and other coastal hazards.

COMMON THEMES IN MANAGED RETREAT PROGRAMS	TOP AREAS IDENTIFIED IN THE BACKGROUND RESEARCH NECESSARY FOR A MANAGED RETREAT PROGRAM
Social/Cultural/Historic/Education	Community Participation
Planning	Comprehensive Planning for Retreat
Resiliency	Determine whether to Retreat, Accommodate and/or Protect
Regulatory/Legal	Incorporate Retreat into State and County Land Use and Shoreline Management Laws
Economic	Need for Funding for Retreat
Shoreline Management/Public Access	Preservation of Open Space and Wetlands after Retreat Occurs

Crosscutting Themes for Managed Retreat Programs.

This table organizes the six common themes and top areas that, according to Hawaii's Coastal Zone Management Program, cut across all the diverse case study examples identified during the background research phase. The common themes and top areas were used as a common metric to compare different questions and retreat strategies for each of the four Scenario Profiles prepared.

Credit: State of Hi. Office of Planning, Coastal Zone Mgmt. Program, Assessing the Feasibility and Implications of Managed Retreat Strategies for Vulnerable Coastal Areas in Hawaii: Final Report 21 (Feb. 2019).

Managed Retreat Examples

Planning for Retreat

In the report, CZMP outlines actions Hawaii could consider in order to support managed retreat. The findings include both international and domestic managed retreat approaches and recommendations concerning the present feasibility of managed retreat in Hawaii. The report was the result of a three-phased approach:

1. Background research consisting of a literature review;
2. Development of four "Scenario Profiles" or area typologies to demonstrate the need for different retreat tools and considerations across the state; and
3. A symposium on managed retreat with keynote speakers and expert panelists.

Phase One: Background Research

The purpose of the Background Research phase was to explore and assess different examples of managed retreat and apply these to the specific context in Hawaii. CZMP consultants conducted a literature review of different domestic and international place-based examples to assess the applicability and feasibility of managed retreat in Hawaii (i.e., what examples are most instructive or transferable for Hawaii). From the literature review, CZMP identified six crosscutting common themes that are important to establish a successful managed retreat program and six corresponding top areas or actions necessary to implement those themes. For example, in order to effectively plan for retreat (Common Theme #3), the state and local governments should include retreat as a part of different comprehensive plans (Top Area #3).

Phase Two: Scenario Profiles

In the second project phase, CZMP consultants created four "Scenario Profiles" or area typologies (characterized based on differences in geography, environment, and human development or land-use features):

- Scenario Profile One: Resorts, Hotels, and Condominiums;
- Scenario Profile Two: Urban Areas;
- Scenario Profile Three: Single Family Homes; and
- Scenario Profile Four: Critical infrastructure.

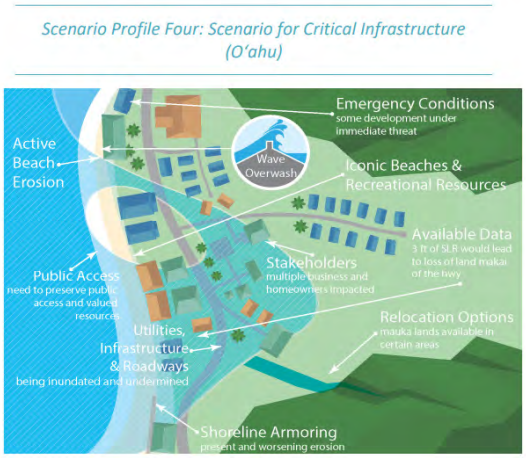
The purpose of this phase was to explore how managed retreat might be conducted in Hawaii given unique settings and different typologies. For example, the retreat strategies and timelines for unpopulated areas with open spaces might not be as effective for an urban area abutting cliffs with little space to relocate people and development.

Phase Three: Symposium

In January 2018, CZMP held an all-day symposium in Honolulu to further explore the potential for managed retreat in Hawaii. Among others, CZMP invited local speakers serving on four panels covering the topics (and mirroring the six common themes above) of: finance, tax, and economics; insurance; legal and policy; and open space, public access, and social justice. The purpose of this phase was to apply what was learned in the previous phases and engage various stakeholders to identify challenges and potential opportunities to inform any future state actions.

Community Engagement

The report was the result of an effort led by CZMP and an Action Team assembled under the ORMP to achieve two of the ORMP's management priorities or goals. Knowledge sharing was a key component of the process with more than 200 stakeholders, including decisionmakers, government agencies, private industries, researchers, community groups, and private citizens, contributing to each of the three project phases.



Scenario Profile Four: Scenario for Critical Infrastructure (Oahu).

This image illustrates one of the four Scenario Profile area typologies for critical infrastructure on the island of Oahu. Policymakers can create different typologies for their own jurisdictions to inform the development of potential strategies that account for the unique characteristics of an area, including geography and existing land uses.

Credit: State of Hi. Office of Planning, Coastal Zone Mgmt. Program, Assessing the Feasibility and Implications of Managed Retreat Strategies for Vulnerable Coastal Areas in Hawaii: Final Report 33 (Feb. 2019).

Next Steps

In the final report, CZMP states that, despite the state's current interest in managed retreat, it is not yet possible for Hawaii to develop a step-by-step plan to implement managed retreat due to various unknowns and competing priorities identified, including homelessness, food sustainability, and energy neutrality. Instead, CZMP acknowledges in the report that, in order to achieve a more detailed understanding of retreat and what it would entail, the state should continue efforts to evaluate and invest in the potential for a retreat program. For instance, CZMP recommends that the state, through the ORMP framework, continue to explore the possibility of managed retreat in Hawaii and work with other agencies at the state and county levels and interested stakeholders to develop "balanced approaches" that address the issues identified in the report. CZMP also recommends funding different place-based projects in areas representative of the four Scenario Profiles because there is not a one-size-fits-all solution to managed retreat.

Considerations and Lessons Learned

Hawaii's approach and report may be useful for other coastal policymakers considering retreat as they demonstrate how learning from other examples and the unique elements of different jurisdictions can be used to inform individual approaches for managed retreat. Overall, CZMP found that any future state actions on retreat should proceed in accordance with a clear strategic plan to maximize long-term goals to protect people, property, and the environment. The culmination of the three phases for this project revealed the complexities in creating managed retreat strategies and the need for leadership, cohesion, and thorough assessment, which can serve as a model for other jurisdictions.

Endnotes

1 Georgetown Climate Ctr., *Hawaii Ocean Resources Management Plan*, Adaptation Clearinghouse, **https://www.adaptationclearinghouse.org/resources/hawaii-ocean-resources-management-plan.html** (last visited Dec. 18, 2019).

2 State of Hi. Office of Planning, Coastal Zone Mgmt. Program, Assessing the Feasibility and Implications of Managed Retreat Strategies for Vulnerable Coastal Areas in Hawaii: Final Report 21 (Feb. 2019), *available at* **http://files.hawaii.gov/dbedt/op/czm/ormp/assessing_the_feasibility_and_implications_of_managed_retreat_strategies_for_vulnerable_coastal_areas_in_hawaii.pdf**.

Punta Gorda, Florida: Climate Adaptation and Comprehensive Plans and Updates

Executive Summary

The harborside city of Punta Gorda, Florida has responded to the threat of coastal storms and climate change impacts with two different plans — a Climate Adaptation Plan and a local comprehensive plan — to promote, manage, and protect the city's natural resources and plan for development in a way that minimizes risks to people and property and conserves ecosystems. The Adaptation Plan is unique because it was developed through a "citizen-driven process" designed to identify effective local responses to climate change and includes a variety of adaptation options that enjoy broad community support, including managed retreat or "planned relocation." The city incorporated the Climate Adaptation Plan into its comprehensive plan to ensure that climate change is considered in land-use decisionmaking efforts. In 2019, the city released an update to its Adaptation Plan that identifies the city's progress to date and future adaptation actions the city could consider implementing. Punta Gorda provides a useful example of how effective community engagement can enhance adaptation planning and build community support for managed retreat strategies and how adaptation plans can be used to inform future land-use decisions to ensure safer, more resilient development.

Background

Punta Gorda is a harborside city located in southwest Florida with a population of approximately 19,961 residents. Founded in 1887, the city is surrounded by Charlotte Harbor and has a unique layout of neighborhoods on waterfront canals. Neighborhoods, parks, and commercial areas are connected by a network of bicycle and pedestrian trails known as "Punta Gorda Pathways." The city's typography is generally flat with elevations ranging from sea level to approximately 15 feet above sea level.

Punta Gorda's system of waterfront canals leave the city vulnerable to both coastal storms and climate change impacts. The city has been affected by high tide flooding and damage from tropical storms and hurricanes. After being severely impacted by Hurricane Charley in 2004, the Punta Gorda City Council and residents made a commitment to maintain a livable, historic city while preparing for climate change impacts, like sea-level rise, by adopting an adaptation plan and incorporating the plan into the city's comprehensive plan, which informs land uses and development within the city.

Managed Retreat Examples

Planning for Retreat

Punta Gorda has embraced climate change adaptation planning to reduce vulnerabilities and increase the city's resilience to climate change impacts. Punta Gorda partnered with Charlotte Harbor National Estuary Program and Southwest Florida Regional Planning Council to develop a Climate Adaptation Plan.[1] The city and its partners engaged citizens in an extensive public process that resulted in the identification of 54 vulnerabilities and corresponding adaptation actions that the city could consider implementing. The city used data and forecasting models to assist planning for the long-term effects of shoreline changes in order to protect property and residents. Among the adaptation actions proposed, some included managed retreat or "planned relocation" (as referred to in the plan) in order to address shoreline and flooding issues. In 2009, Punta Gorda adopted the Adaptation Plan to promote, manage, and protect the city's natural resources and plan for development in a way that minimizes risks and conserves natural ecosystems. In addition, the City Council voted unanimously to incorporate the full Adaptation Plan (and future updates to it) into the city's comprehensive plan.

A decade later, the city updated its Adaptation Plan by identifying additional adaptation actions that could be implemented in three "focus" areas of the city that are most vulnerable to coastal impacts.[2] The update is consistent with the city's guiding objective to address climate change through an incremental, phased approach to save money and increase public safety over time. The 2019 update features a vulnerability analysis of city-owned critical infrastructure, a more prominent living shorelines component, and an assessment of the city's progress in implementing adaptation actions. For instance, the city implemented several managed retreat actions between 2009 and 2019 including:

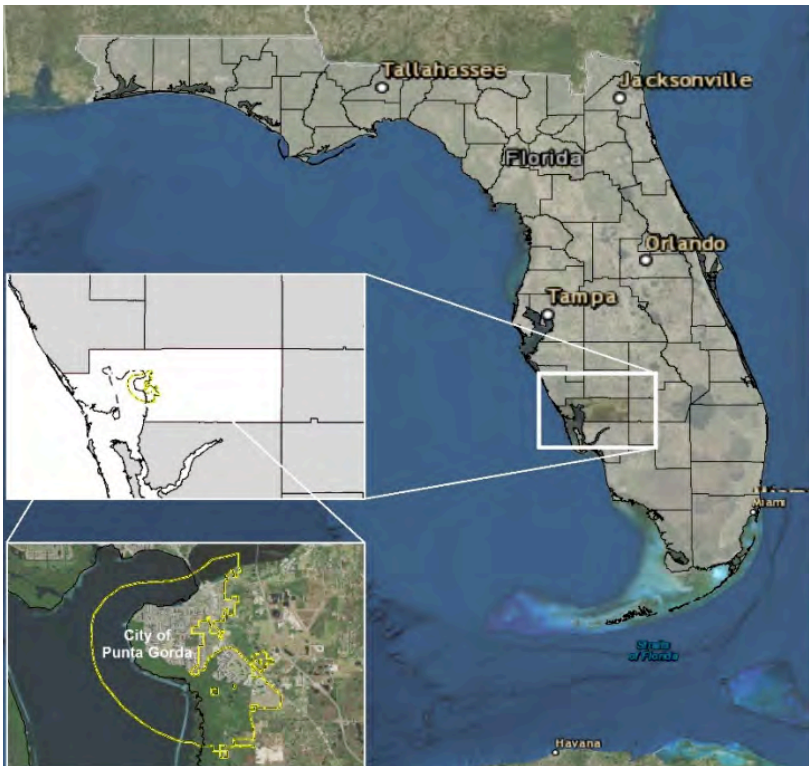
- Increasing sea grass acreage from 247 acres to 391 acres (a 58 percent increase);
- Installing living shorelines that can act as a flood buffer and facilitate the inland migration of coastal habitats due to sea-level rise better than hard armoring structures;
- Buying out properties with recurrent storm flood damage to help people move out of harm's way while restoring those areas to their natural conditions and creating public spaces for environmental and community benefits;
- Relocating the city's public works facility to a less flood-prone area further inland; and

- Building the city's new emergency management center (which was destroyed by Hurricane Charley) on higher ground with storm resistant and energy efficient features.

The 2019 update also highlights ongoing examples of managed retreat that have contributed to the city's overall adaptation efforts. First, the city relocated a limited number of other buildings in response to different threats, including a historic structure, the A.C. Freeman House, which has been relocated multiple times. Second, consistent with the city's founding principles that all waterfront blocks remain undeveloped, a large amount of the waterfront and low-lying areas have been designated as parks. This policy restricts public and private development in these flood-prone areas to preserve important coastal protection buffers. Third, the city has adopted a voluntary annexation policy to acquire higher and drier land that can provide the city with options to potentially relocate development and infrastructure locally and maintain tax bases as climate impacts occur.

Additionally, the 2019 update identifies potential strategies and actions that can enhance the city's long-term resiliency. Among other protection and accommodation strategies, the 2019 update includes legal and policy recommendations for facilitating managed retreat through zoning and land-use plans and regulations including:

- Limiting new development and redevelopment in flood-prone and environmentally sensitive areas;
- Prohibiting hard shoreline armoring;
- Proactively reviewing land-use plans in light of future development pressures and shifts in development patterns due to climate change; and
- Conducting "coastal realignment" planning to address the conversion of land to salt marsh and grassland to provide more sustainable and environmentally friendly coastal defenses.



Location of Charlotte County and the City of Punta Gorda.

The City of Punta Gorda is located in southwest Florida in Charlotte County.

Credit: City of Punta Gorda, City of Punta Gorda Adaptation Plan Update 2 (June 28, 2019).

Managed retreat could also potentially play a role in the city's work to identify and make key infrastructure and vulnerable areas more resilient before they are significantly threatened. The 2019 update recommends the city consider:

- Surveying vulnerable areas that are currently inhabited while developing relocation plans and contingency emergency measures;
- Developing strategies to address different examples of changing ingress/egress routes to properties as public support for access roads in areas vulnerable to sea-level rise and other flood hazards is possibly withdrawn or reduced overtime; and
- Investigating a range of potential legal tools, such as vesting, grandfathering, amortizing strategies, and rolling easements, that could be used to encourage relocation.

Community Engagement

The 2009 Adaptation Plan was developed through a "citizen-driven process." During the process, the city engaged directly with residents and state and local agencies to identify climate vulnerabilities and priorities and evaluate adaptation options. The city used public participation games, individual interviews, pre- and post-workshop surveys, and other tools. The city reports that community engagement produced a more effective local response and greater support for adaptation actions. For the 2019 update, the city conducted a survey to assess local awareness of risks and the city's Adaptation Plan as part of an ongoing effort to build a vision for adaptation that is informed by community needs and priorities.

Funding

The 2009 Adaptation Plan was funded through the city's partnership with Charlotte Harbor National Estuary Program and Southwest Florida Regional Planning Council. The 2019 update was funded by a Resiliency Planning grant from the National Oceanic and Atmospheric Administration and administered by the Florida Department of Environmental Protection. Individual projects, like infrastructure relocation and property acquisition, have been funded on a project-by-project basis, including through the use of municipal funds.

Next Steps

The city will consider adopting policies from the 2019 Adaptation Plan to update its next comprehensive plan. Punta Gorda aims to pursue and implement adaptation projects through its capital improvement program as resources, city priorities, and opportunities are evaluated. The city is also committed to continuing to educate and engage the community throughout this process.

Considerations and Lessons Learned

Punta Gorda presents an example for other municipalities considering long-term comprehensive planning approaches to adaptation and managed retreat that are informed by community engagement processes. The city's approach demonstrates how longer-term efforts to adapt to climate change can be integrated into short-term planning processes to create a vision for phasing in adaptation actions over many years. Moreover, recurring updates to adaptation and comprehensive plans can allow municipalities to modify their approaches as coastal impacts and other factors like funding and land-use patterns may change. Punta Gorda's efforts demonstrate how local governments can support "living" planning processes where plans are regularly updated (e.g., every ten years) to incorporate new information about vulnerabilities, take stock of implementation progress, and include new adaptation recommendations and actions.

Punta Gorda also provides an example of how adaptation plans can be used to inform land-use decisions and institutionalized through other local plans. The city incorporated the 2009 Adaptation Plan into its comprehensive plan to better coordinate land-use and climate adaptation policies and decisions. By incorporating adaptation recommendations in local land-use plans, municipalities can ensure that adaptation decisionmaking is coordinated across different agencies and sectors. Plans can also be an important first step in implementing legal tools for managed retreat that include land acquisitions, relocation of buildings and infrastructure, and living shorelines.

Community engagement has been instrumental in helping to build community and political support for public investment in local plans and adaptation projects that maintain Punta Gorda's small town character and preserve Charlotte Harbor's environment. Planning processes, especially for retreat, should take community priorities and needs into account to maximize potential opportunities for climate adaptation.

Endnotes

1 Georgetown Climate Ctr., *City of Punta Gorda, Florida Adaptation Plan*, Adaptation Clearinghouse (Nov. 18, 2009), **https://www.adaptationclearinghouse.org/resources/city-of-punta-gorda-florida-adaptation-plan.html**.

2 City of Punta Gorda, City of Punta Gorda Adaptation Plan Update (June 28, 2019), *available at* **http://www.ci.punta-gorda.fl.us/home/showdocument?id=9987**.

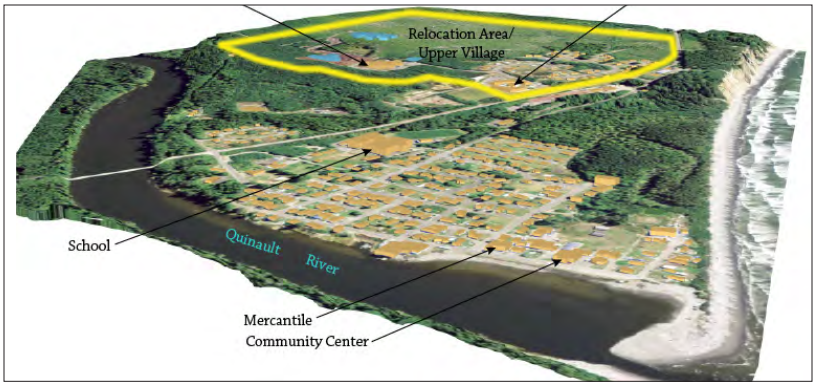
Quinault Indian Nation, Washington: Taholah Village Relocation Master Plan

Executive Summary

Quinault Indian Nation (QIN), a federally recognized tribe located in Washington state, is currently implementing a phased relocation plan as part of a managed retreat strategy in response to the impacts of sea-level rise, flooding, and concerns about the increased likelihood of tsunamis and storm surges attributed to climate change. In 2017, QIN adopted the *Taholah Village Relocation Master Plan* that outlines a vision and development plan for relocating a portion of QIN living in the Lower Village of Taholah to a higher ground location in the Upper Village Relocation Area. The Master Plan contains eleven chapters covering the history and the need to relocate, goals and principles of the plan, and different aspects of the Upper Village blueprint including appropriate community facilities, housing, infrastructure, culture, sustainability, and resilience. It also sets forth implementation steps for the project through phasing, necessary regulatory changes, and funding. QIN developed the Master Plan with significant community input. The community engagement processes and sustainable planning strategies can provide transferable lessons for other state and local jurisdictions considering similar questions of strategic planning for coastal retreat and relocation, even on a smaller scale.

Background

Quinault Indian Nation (QIN) is a federally recognized tribe with approximately 3,000 tribal members. The Quinault Indian Reservation is located on the southwestern coast of Washington State, at the confluence of the Quinault River and the Pacific Ocean, and contains two major villages: the Village of Taholah and the Village of Queets. The Lower Village of Taholah, home to one-fifth of the QIN population, is located approximately at sea level and is particularly vulnerable to flooding and tsunamis due to its proximity to the Cascadia Subduction Zone. In 2014, the QIN Community Development and Planning Department (department) began preparing the *Taholah Village Relocation Master Plan* (Master Plan) to plan for relocation to safer land that is less exposed to the threat of tsunamis and climate impacts including sea-level rise, storm surge and riverine flooding.[1] In 2017, the QIN Tribal Council adopted the Master Plan. As a result, QIN aims to construct new upland community facilities and infrastructure and phase-in new residences from the Lower Village over time to a new 200-acre, higher ground Village Relocation site.



Taholah Village.

This image depicts the existing conditions of the Taholah Village on the southeastern coast of Washington State, including the location of the Quinault River and the Lower and Upper Village Relocation areas.

Credit: **Taholah Village Relocation Master Plan**, Quinault Indian Nation (last updated Apr. 25, 2018).

Managed Retreat Examples

Planning for Retreat

Site Selection and Early Planning Phases

QIN conducted multiple public processes, including a General Council Resolution, and concluded that it was necessary to relocate residents, businesses, and other community amenities and infrastructure, including the early childhood education center and elder program center, from the Lower to the Upper Village of Taholah. To develop the Master Plan, QIN received a grant from the Administration for Native Americans — an office under the U.S. Department of Health and Human Services.[2] The grant enabled QIN to hire three new employees to work for the department and lead the planning process beginning in 2014.

QIN selected the Upper Village Relocation Area because the largely undeveloped site is at a higher elevation above the tsunami zone and outside of the 100-year (one-percent annual chance) floodplain. In proceeding with plans to relocate the Lower Village, it was important for the tribe to identify a site that was safer than its current location. To inform this decision, QIN conducted geographical and topographic studies to inform the best way to relocate people on the reservation while keeping them near their families and jobs. As of 2019, QIN has purchased most of the land in the Upper Village from individual landowners. QIN also owns much, although not all, of the land in the Lower Village and is currently leasing it to tribal members for housing and other uses.

When the department began this process, there were few large-scale relocation examples or plans. Currently, there are relocation efforts by other tribes in Washington State, Alaska, Louisiana, and the Pacific Islands that could serve as direct models for the tribe's work. The department started thinking about how to approach and organize the plan from a technical perspective in terms of the types of structures, infrastructure,

services, and community amenities tribal members have now and what they will need in the Upper Village. From there, the department initiated a community engagement process to inform priorities for the development of the Upper Village and the design of the Master Plan.

In addition, the department is pursuing ongoing plans for infrastructure and community buildings, like fire and police stations, in conjunction with a need for new and more housing outside of the evacuation zone to reduce risks to tribal members from a tsunami. The department is also evaluating the feasibility of a potential biomass facility for heat and solar microgrids. Local sources of energy can provide power before, during, and after a disaster event while reducing the greenhouse gas emissions that contribute to climate change. This comprehensive, local approach for managed retreat demonstrates how community priorities and needs can be reflected in long-term land-use planning and design.

Overview of the *Taholah Village Relocation Master Plan*

The department utilized the community engagement process (see below) to create a vision for a Relocation Village that is just as walkable as the existing Lower Village, but will be more densely developed and resilient. The Master Plan contains eleven chapters, beginning with a brief summary of the history of QIN at Taholah and how the tribal community arrived at the decision to relocate from the Lower to Upper Village Relocation Area. In the plan, the department then describes the tribe's overall goals and priorities that shaped the plan's development, including the guiding principles that informed the project blueprint. Through subsequent chapters, the department discusses different components of the relocation effort, including community facilities, housing, neighborhoods, culture, infrastructure, and sustainability.

In order to serve the varied needs of the community, the department recommended a range of housing types and lot sizes in Chapter Four of the Master Plan that should be constructed in each phase of development. In addition, the department also considers the importance of sustainability as a core facet of the new Relocation Village, and the Master Plan includes sustainability suggestions for energy efficiency and resiliency, native landscaping, and low-impact development. Relocation of the most vulnerable populations is highlighted as a priority. No residents will be forced to move from the Lower to the Upper Village as a result of the Master Plan and may remain in the Lower Village; however, in the Master Plan, the department suggests placing a moratorium on the development of new residential buildings on QIN-owned land in the Lower Village.

The Master Plan also includes a chapter on land-use code changes and text amendments that would have to occur in order for QIN to build the Relocation Village. By identifying necessary regulatory changes upfront in advance of development, QIN can ensure that there are no regulatory barriers to construction to ensure that projects are "shovel ready" when funding is secured. The final chapter of the Master Plan considers resilience and how QIN can prepare for the aftermath of an earthquake and tsunami to ensure a safe recovery before and after relief arrives.

Community Engagement

To create the Master Plan, the department carried out a variety of community engagement projects, including village-wide meetings, personal conversations, presentations at tribal dinners, door-to-door and online surveys, and convened stakeholder committees over a two-year period. The department also created an inventory of existing vulnerabilities to natural disasters and community requests for improved infrastructure, affordable housing, and recreational facilities currently lacking in the Lower Village. To encourage meeting participation, the department provided meals, which are very important to the tribal culture, and held raffles. These engagement efforts helped to ensure that tribal members were involved in the relocation process from the outset and that the plan identified critical community issues, concerns, challenges, desires, and partnerships. As a result, the Master Plan incorporates goals that reflect an understanding of current conditions and future aspirations and needs for the new Upper Village site, such as appropriate facilities, types of housing, and recreation requirements. In addition, one of the priorities for the Upper Village will be to create a sense of community, history, and culture through art and build a repository for tribal records to reflect the QIN's ties to the Quinault River in the Lower Village but at a higher elevation.

Throughout these multiple forms of community engagement, the department and the Tribal Council government played integral roles. First, the lead

department employees initially hired through the Administration for Native Americans grant were directly involved in working with and learning from tribal members. It is notable that these department leads have lived nearby since that start of the planning process in 2014. The daily physical presence of department leads on the Quinault Indian Reservation has fostered relationships and built trust in a meaningful way that is reflected in the relocation project plans. Compared to temporary, outside consultants, project leads who live in — or are present in — an area long term can better engage with community members. In addition, the department leads cultivate relationships and maintain trust by making regular project updates to the Tribal Council, publishing articles in the tribe's monthly newsletter, and taking meaningful steps towards implementing infrastructure projects in the Upper Village. This commitment to having regular face time with tribal members and the Tribal Council has deepened connections with the tribe and helps to keep the phased relocation on people's minds amidst other important issues confronting QIN and the reservation.

Second, the Tribal Council was instrumental in providing input and institutional support for the community engagement process. With the Council's involvement, general resolutions were passed to create hiring preferences for tribal members to implement the Master Plan. For example, QIN created a position for a tribal member who just graduated from college to serve as the contract officer for the first building being constructed in the Upper Village, the Generations Building. This position will train a Quinault member to manage future building projects by interfacing between the tribe, the tribe's construction management consultant, and contractors. It is the QIN's hope that the relocation process will build generational capacity and that construction in the Upper Village and throughout the reservation will support job creation.

Funding

Implementation of the Master Plan will require significant funding. Chapter Nine of the plan identifies funding sources for community facilities and infrastructure; and economic opportunities that could be supported by new development and resources available on the reservation. The plan lists a number of potential public programs and private funding opportunities including: tribal revenues; federal grants (e.g., U.S. Department of Agriculture, Federal Emergency Management Agency, U.S. Department of Housing and Urban Development); venture capital; private foundations, tax credits, and other instruments. The chapter then outlines how the different components of the Master Plan, such as community facilities, roads, utility infrastructure, and housing, might be implemented with different funding sources. The department suggests that each phase of development should be aligned with funding and financing so that neither outpaces the other.

Chapter Nine also outlines the potential economic opportunities that could be created for QIN tribal members throughout the relocation process including potential materials on the Quinault Indian Reservation that could be locally sourced, and different business development opportunities that QIN could invest in, such as construction-related plants and facilities.

Next Steps

Through the Master Plan, the QIN Community Development and Planning Department designed a phased program for building out the Village Relocation Area in a gradual, strategic manner, as funding allows. Despite the early phase of implementation in 2019, QIN has already started work on the Upper Village in accordance with the plan's phased priorities. In 2007, QIN identified a Generations Building as the first one that would be relocated. The tribe has provided $15 million of its own revenue to begin construction of the Generations Building, which will support early childhood education and elder programs and can give two of the more vulnerable segments of the community — children and the elderly — a safe place to stay during a potential tsunami. To date, QIN has not constructed any homes or infrastructure in the Upper Village; therefore, no one has relocated from the Lower Village yet. In addition, nothing has been established in terms of who — among those who choose to relocate — will receive new homes in the Upper Village, for example, through an application or some other type process. Regardless, once the move does begin, it is anticipated that uses more compatible with the Lower Village's low elevation, like sports fields and estuary conservation efforts, will be allowed in previously developed areas.

Considerations and Lessons Learned

The completion and adoption of the Master Plan has provided QIN with a blueprint for relocation to a site strategically studied and slated for development because it will be less vulnerable to flooding and tsunami risks. The Master Plan outlines an approach that can serve as an example for others to prioritize the relocation of structures and infrastructure and to align these phased action items with funding availability and needed regulatory changes. Phasing development and relocation provides time for the development of necessary infrastructure, prioritization of community needs, and continuity for residents and businesses of the Lower Village of Taholah relying on government services. Phased implementation processes allow for a gradual transition that may mitigate the social and psychological impacts residents might otherwise experience during a swift transition.

The community engagement and public participation process initiated to develop the Master Plan can also offer transferable lessons for other state and local jurisdictions evaluating similar questions about retreat and relocation, regardless of the scale. The Master Plan reflects the needs and vision of the community by incorporating sustainable practices, culture, and other amenities. The Master Plan calls for the Upper Village to include tribal art, culture, and history to create a sense of place for those who may choose to move away from the Quinault River. The QIN planning process could be considered by other planners and decisionmakers as a model for encouraging strong public participation in planning for relocation and building support for managed retreat proposals.

Moreover, the role played by the department leads and the Tribal Council highlights the value of institutionalizing support for managed retreat throughout the government. This type of support can help build and maintain long-term relationships and trust with community members to inform these inherently long-term processes. In addition, other governments can follow QIN's example to utilize relocation decisions as a catalyst for economic growth and build local capacities to address questions about climate adaptation, resilience, and emergency management as coastal impacts and disaster events occur with greater intensity and frequency.

Endnotes

1 Quinault Indian Nation Cmty. Dev. & Planning Dep't, The Taholah Village Relocation Master Plan (2017), *available at* **http://www.quinaultindiannation.com/planning/FINAL_Taholah_Relocation_Plan.pdf**.

2 *About*, Admin. for Native Americans, **https://www.acf.hhs.gov/ana/about** (last updated July 10, 2018). The goals of the Administration for Native Americans are to promote tribal self-sufficiency by providing funding and technical support for community-based projects.

Queens, New York: Resilient Edgemere Community Plan

Executive Summary

After Hurricane Sandy, New York City (NYC) engaged in a community-driven planning process and implemented multiple voluntary relocation projects in the Edgemere neighborhood of Queens to reduce flood risks and move people out of harm's way. In 2012, the low-lying urban neighborhood of Edgemere experienced severe wave action and storm surge from Hurricane Sandy. Widespread damage and regular tidal floods, coupled with longstanding public ownership of vacant land in the neighborhood, presented an opportunity to plan for a stronger, more resilient future. The NYC Department of Housing Preservation and Development (HPD) launched the Resilient Edgemere Community Planning Initiative in October 2015 as a collaboration between city agencies, community members, elected officials, and local organizations. The *Resilient Edgemere Community Plan* lays out a long-term vision for achieving a more resilient neighborhood with improved housing, transportation access, and neighborhood amenities. The plan was created in parallel with Build It Back, a citywide housing recovery program funded by the U.S. Department of Housing and Urban Development. One of the 65 distinct projects included in the plan was a "land swap" pilot project to provide buyout and relocation assistance to residents within a "Hazard Mitigation Zone" (HMZ), an area of Edgemere at risk of destructive wave action during storms. Through the land swap pilot project, Edgemere residents within a HMZ were eligible to receive a newly built, elevated home on safer ground. In exchange, residents would transfer title of their damaged, original homes to the city. The damaged homes will be demolished and the lots maintained as open space, which the plan envisions will enhance Edgemere's future flood resilience and may become part of passive recreational amenities in the future. The plan is notable for being developed through an 18-month public engagement process that placed residents, who best understand their community, at the center of an open and transparent neighborhood planning process. Resilient Edgemere can provide an example of how local governments can transition affected residents away from vulnerable areas by helping people relocate nearby and simultaneously build community resilience and help to maintain community cohesion and local tax bases.

Background

Edgemere, a waterfront community located in the New York City (NYC) borough of Queens, along the Rockaway Peninsula Barrier Island, suffered widespread damage after Hurricane Sandy. Even before Sandy, the neighborhood's low-lying geography and topography contributed to recurrent nuisance flooding and ponding from heavy rains and high tides, which is further exacerbated by sea-level rise. The city owns a significant amount of the land in Edgemere (more than 50 percent as of 2015)[1] — much of which was identified for potential investments in affordable housing and economic development opportunities as early as 1997 by the NYC Department of Housing Preservation and Development (HPD) as a part of the neighborhood's *Urban Renewal Plan*.[2] NYC HPD is the city's affordable housing agency, responsible for promoting the construction and preservation of affordable, high quality housing for low- and moderate-income families and ensuring sound management of the city's affordable housing stock and housing plans. After Hurricane Sandy, NYC HPD engaged with Edgemere's residents to create a community-driven vision for the area through a Resilient Edgemere Community Planning Initiative in 2015. Simultaneously, the city implemented a disaster recovery benefits program that implemented priority projects identified through the planning initiative. These two parallel processes resulted in the city piloting different buyout projects in Edgemere.

Managed Retreat Examples

Planning for Retreat

Significant damage from Hurricane Sandy and the city's ownership of many vacant parcels in the community that were prioritized for investment created an opportunity to combine the city's recovery efforts with a long-term vision for enhancing the quality of life for Edgemere residents. The result of this planning initiative was the *Resilient Edgemere Community Plan* (Resilient Edgemere or the plan).[3] Resilient Edgemere is a neighborhood-scale plan that presents clearly defined goals and strategies and identifies 60 recovery projects and planned investments to be implemented over the next 10+ years to enhance the community's resilience to extreme weather and climate change. The city led an 18-month community engagement process and released the plan in spring 2017. The plan aligned the neighborhood's long-term vision with ongoing planning and recovery work, including projects funded by the city, Federal Emergency Management Agency (FEMA), U.S. Department of Housing and Urban Development (HUD), and other public and private sources.

The plan articulates four main goals with accompanying strategies for implementing those goals (informed by the Community Planning Initiative, see next section):

1. Protect the neighborhood from flooding.
2. Create resilient housing and maintain low-density feel.
3. Improve streets and transportation.
4. Increase neighborhood amenities.

Each of the goals was broken down into strategies that could be implemented. For example, goal one — protecting the neighborhood from flooding — involves strategies to strengthen Edgemere's coastline, adapt to increased flooding, create waterfront connections, and improve drainage and water quality. By crafting a clear long-term community development framework, the plan can help the city address flooding and other economic challenges experienced by the Edgemere community.

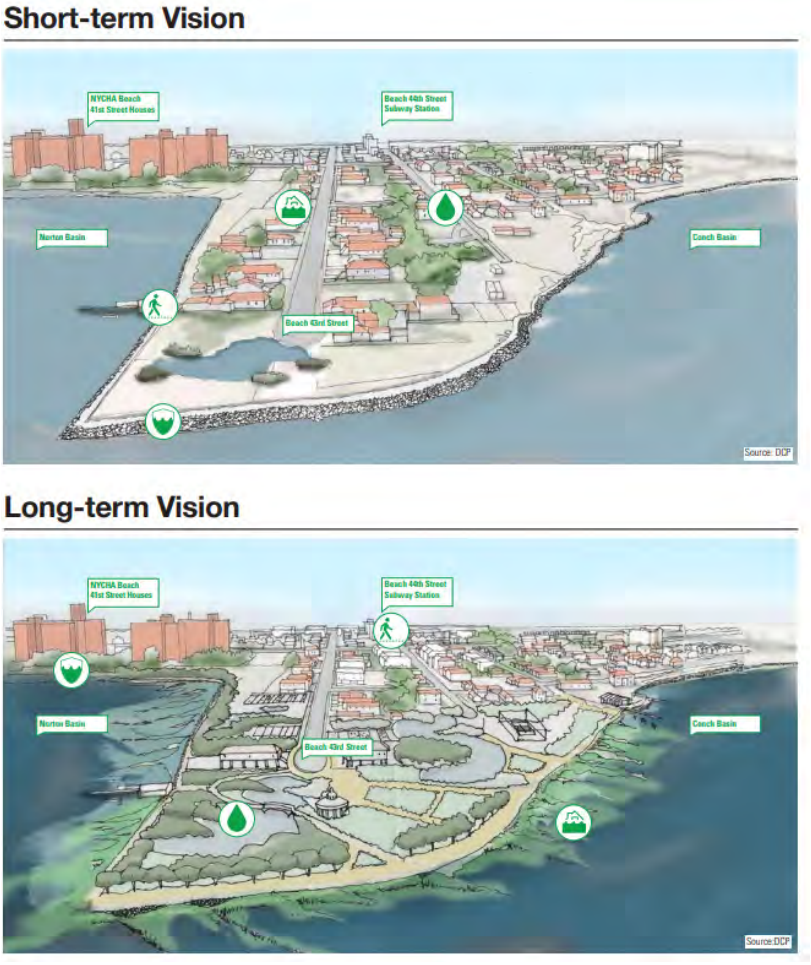
Community Engagement

Resilient Edgemere was developed through a robust Community Planning Initiative over the course of a year and involved workshops, open houses, small group meetings, and questionnaires. The initiative was led by NYC HPD in close collaboration with the NYC Department of City Planning (DCP), the NYC Mayor's Office of Housing Recovery Operations (HRO), and the NYC Mayor's Office of Recovery and Resiliency (ORR) (since mid-2019, renamed the Mayor's Office of Resiliency). By engaging directly with residents and stakeholders through the planning process, a number of problems and their impacts were identified, including flooding and ponding, the blight of vacant land, difficulties elevating homes, and poor public amenities including few sidewalks, poor street crossings, inadequate transit services, and poor beach and bay access. From May 2016 to February 2017, NYC HPD and partner agencies turned the draft strategies developed through the learning and creation phases into final strategies and projects. The Community Planning Initiative demonstrates how input from residents and stakeholders can help to inform the development of a final plan that reflects community knowledge, concerns, and long-term aspirations.

Adapting to Increased Flood Risk Through Post-Disaster Recovery Processes

To implement the plan's first goal to protect the neighborhood from flooding, the city offered voluntary post-disaster buyouts, including through land swaps, to homeowners along the low-lying waterfront. Through the planning process, the community created a long-term vision to transform this flood-prone land to a recreational open space amenity to serve residents.

The city began strengthening relationships with residents and community stakeholders through the Resilient Edgemere community engagement



Resilient Edgemere Short- and Long-Term Visions.

This drawing illustrates the short- and long-term visions for the Edgemere neighborhood in Queens, New York City that resulted from the Resilient Edgemere Community Planning Initiative.

Credit: N.Y. City Dep't of Hous. Pres. & Dev., Resilient Edgemere Community Plan 21 (2017).

process. Simultaneously, the city was implementing components of the plan through post-Sandy disaster recovery programs. The citywide Build It Back program[4] was a federally funded housing recovery program created for homeowners, landlords, and tenants after Hurricane Sandy to allocate and manage a HUD Community Development Block Grant for Disaster Recovery (CDBG–DR).[5] In partnership with Build It Back, NYC HPD established a Hazard Mitigation Zone (HMZ) in Edgemere's area of greatest flood risk. The HMZ was defined by the Coastal A Zone (a flood-area classification designated by FEMA for coastal areas with a one-percent or greater chance of flooding and an additional hazard of storm waves of 1.5 to 3 feet that has a higher likelihood of causing structural damage to buildings).

The city modified disaster recovery aid benefits and changed its development plan in several ways within the Edgemere HMZ. First, Build It Back applicants in the HMZ were not eligible to receive funding for in-place reconstruction or repair of their storm-damaged house. Instead, the program offered eligible homeowners a "land swap" opportunity to relocate further inland to less vulnerable city-owned properties (see next section). Second, future development on the storm-damaged, buyout sites is prohibited by federal grant requirements and is codified locally through deed restrictions. Third, where housing was planned within the HMZ, HPD will seek to amend Edgemere's current Urban Renewal Plan to designate these sites for open space uses through a public process.

Land Swaps

One unique aspect of how the Build It Back program was administered in Edgemere was that HPD led a pilot project to buyout residents in the HMZ and help them relocate upland through a "land swap" arrangement. In 2016, NYC HPD and HRO collaborated to pilot a relocation program called "Edgemere Rebuild–Relocation" for homeowners who owned substantially damaged homes within the HMZ.[6] Through the Rebuild–Relocation program, the city would provide participants with a new, comparable replacement home on city-owned land outside of the HMZ in Edgemere through a "land swap." Land swaps are a legal tool that enable two actors — here the City of New York and private property owners in Edgemere — to exchange or trade title to their properties. In exchange for acquiring a resident's property through Rebuild–Relocation, the city would give that resident title to a city-owned property further inland (outside of the Coastal A Zone) and then construct a new home on that lot. The home and structures on a resident's original lot would then be demolished and the property converted to open space under the city's ownership. For HUD compliance purposes, the property owner's benefit is comprised of the construction costs for the new home. No funds are exchanged between the program; instead, the homeowner exchanges the storm-damaged property in a transaction with the city and receives a new home on a new property in a safer location. The city's intention behind Rebuild–Relocation was to provide a smooth and quick transition to a safer, more resilient home within Edgemere in order to maintain community ties and local tax bases.

Nonetheless, as the city implemented Rebuild–Relocation, both the city and participating homeowners encountered several challenges that made it difficult to expand the pilot on a larger scale. Specifically, due to a housing shortage and construction backlog throughout the city, residents were not able to move into their new homes quickly and remained in storm-damaged homes longer than anticipated. In addition, it proved legally and financially complicated to work with attorneys and lenders to transfer clear titles and mortgages (i.e., property titles and mortgages free of liens or other encumbrances) between the two properties. Ultimately, only three homeowners participated in Rebuild–Relocation. Other residents in Edgemere's HMZ who participated in buyouts through the Build It Back program did not relocate through the land swap pilot program.

Funding

Post-Sandy recovery efforts in Edgemere, including for the Resilient Edgemere planning process and buyouts through Build It Back, were funded through the city's CDBG–DR grant. The plan also identifies other funding sources that could be used to implement additional projects, including from FEMA and other public (U.S. Army Corps of Engineers, U.S Department of Transportation, and National Park Service) and private entities; however, funding for individual projects has yet to be determined and will need to go through a public approval process or the city will need to secure outside funding before they can be implemented.

Next Steps

The *Resilient Edgemere Community Plan* is viewed as a living document and demonstrates that engaging local residents can result in community-supported solutions to complex challenges. Through effective public participation and partnership, the plan has allowed Edgemere residents to take a leading role in the development and improvement of their neighborhood — not only on resiliency, but also on other elements that improve quality of life in a neighborhood, from resilient housing to transportation access and neighborhood amenities. The city plans to continue engaging the Edgemere community as the *Resilient Edgemere Community Plan* is implemented to ensure that the community involvement that was a part of developing the plan is maintained. In the long-term, these resilience projects will help the community reduce coastal flood risk, improve neighborhood ecology, and provide neighborhood amenities.

Considerations and Lessons Learned

The *Resilient Edgemere Community Plan* can serve as a model for other planners and decisionmakers for how to work effectively and collaboratively with communities to create a shared vision for building resilience. The Resilient Edgemere planning process enabled communities to have a voice in aligning multiple objectives, programs, and projects with a long-term vision. Resilient Edgemere also serves as an example of local retreat strategies that can help people transition from areas of higher flood risk, here hazardous coastal wave action areas, to less vulnerable areas. Here, a land swap pilot project provides lessons about how governments can work with residents to enable them to remain within their existing neighborhood rather than relocating further away, which can minimize the economic, social, psychological, and other costs of retreat. In addition, the neighborhood plan aligns resiliency planning and disaster recovery with New York City's overall affordable housing and climate adaptation goals.

Other local governments and communities might consider implementing similar community-driven planning processes to set goals for post-disaster recovery when redevelopment and community transformation opportunities align with a long-term vision to enhance community resilience. Such an approach may also be useful as part of pre-disaster or proactive planning processes where a municipality is undergoing significant new development or cities similarly own a lot of blighted or abandoned properties that can support broader affordable housing and redevelopment needs.

Pilot programs like Rebuild–Relocation can offer lessons for other jurisdictions helping people retreat from vulnerable areas. Land swaps are challenging where there are existing mortgages or debts; to date, there are few mortgage tools or services to facilitate a mortgage swap from one site to another. In this example, success depended on early and extensive housing and financial counseling, as well as close coordination with mortgage lenders. More broadly, Rebuild–Relocation highlights possible opportunities for local governments to proactively invest in more affordable housing that could support people moving in response to hazard events or gradual impacts from climate change, like sea-level rise, flooding, and coastal erosion. In addition, local governments and communities considering retreat can evaluate how to better align climate adaptation with housing and community development plans.

Endnotes

1 FAQ: Finalize; Developing the Plan, Resilient Community Edgemere Planning Initiative, *available at* **https://www1.nyc.gov/assets/hpd/downloads/pdf/community/overview-faq-workshop-4.pdf** (last visited Dec. 9, 2019).

2 *Urban Renewal: Edgemere*, N.Y. City Dep't of Hous. Pres. & Dev., **https://www1.nyc.gov/site/hpd/community/urban-renewal-area-details.page?areald=138** (last visited Dec. 9, 2019).

3 N.Y. City Dep't of Hous. Pres. & Dev., Resilient Edgemere Community Plan (2017), *available at* **https://www1.nyc.gov/assets/hpd/downloads/pdfs/services/resilient-edgemere-report.pdf**. The plan aligns with *One NYC* and *Housing New York*, both citywide plans created under Mayor Bill DeBlasio. *OneNYC* is a larger comprehensive citywide plan to increase the city's resilience and adapt to climate change through equitable processes, and was supported by post-disaster funding following Hurricane Sandy. Georgetown Climate Ctr., *One New York: The Plan for a Strong and Just City (One NYC*), Adaptation Clearinghouse, **https://www.adaptationclearinghouse.org/resources/one-new-york-the-plan-for-a-strong-and-just-city-one-nyc.html** (last visited Nov. 11, 2019). *Housing New York* is a plan to create and preserve 200,000 high-quality affordable homes over 10 years to address the city's affordable housing crisis and retain the diversity and vitality of its neighborhoods. *Housing New York*, N.Y. City Dep't of Hous. Pres. & Dev., **https://www1.nyc.gov/site/housing/index.page** (last visited Dec. 9, 2019).

4 Georgetown Climate Ctr., *New York City Build It Back Program*, Adaptation Clearinghouse, **https://www.adaptationclearinghouse.org/resources/new-york-city-build-it-back-program.html** (last visited Nov. 11, 2019).

5 Georgetown Climate Ctr., *HUD Community Development Block Grant–Disaster Recovery*, Adaptation Clearinghouse, **https://www.adaptationclearinghouse.org/resources/hud-commun ity-development-block-grant-disaster-recovery.html** (last visited Nov. 11, 2019).

6 N.Y. City Dep't of Hous. Pres. & Dev., Resilient Edgemere Community Plan 25 (2017), *available at* **https://www1.nyc.gov/assets/hpd/downloads/pdfs/services/resilient-edgemere-report.pdf**.

San Diego, California: ReWild Mission Bay

Executive Summary

In San Diego, California, the city and various stakeholders are evaluating different land-use and planning alternatives to conserve and restore migrating wetlands in Mission Bay as a part of local decisionmaking processes. Mission Bay in San Diego was previously a 4,000-acre wetlands complex located near the mouth of the San Diego River. Since the 1950s and 60s, Mission Bay's natural resources have been altered by climate change and human activities, and today only one percent of the original wetlands — 40 acres — remain. To conserve and restore Mission Bay, San Diego Audubon and other partners started an initiative called "ReWild Mission Bay" that evaluated different alternatives for protecting wetlands through a feasibility study. One of the feasibility study's alternatives aims to relocate Campland on the Bay, an existing RV campground on land owned by the city, inland. By moving Campland on the Bay inland, the city could address wetland migration while providing community resilience and environmental benefits. The alternative to relocate the location for Campland on the Bay, if implemented, would be aligned with and build on other local planning efforts to convert a part of the surrounding Mission Bay Park into a regional amenity that accommodates both public and private uses. In July 2019, the San Diego City Council approved a lease extension and expansion for Campland on the Bay that has delayed any potential implementation of the ReWild Mission Bay wetland alternatives until after the term of the lease expires. Proponents of the City Council's decision are in favor of maintaining this existing land use to support the maintenance of affordable travel accommodations. The ongoing work in Mission Bay can serve as an example for other coastal jurisdictions addressing the tradeoffs raised in land-use and planning efforts for coastal retreat and the challenges that can arise in balancing competing stakeholder interests to achieve both human and environmental priorities. ReWild Mission Bay also shows how nongovernmental stakeholders can conduct planning processes to help government agencies make decisions about long-term land uses and restoration activities.

Background

San Diego's Mission Bay was a 4,000-acre wetland complex located near the mouth of the San Diego River. Today, only one percent of the original wetlands — 40 acres — remain. Since the 1950s and 60s, much of Mission Bay's natural resources have been altered by climate change and human activities to convert the area into Mission Bay Park, the largest aquatic park of its kind in the county.[1] Mission Bay Park hosts a variety of recreational and commercial activities, including Campland on the Bay (Campland) — an existing campground located on parkland being leased from the city, which provides accommodations for over 500 RVs, some tent sites, and a small marina. Campland is located between the Kendall–Frost Marsh Reserve/Northern Wildlife Preserve and De Anza Cove. De Anza Cove is a smaller recreational area within the larger park that contains a beach for swimming and boating and other amenities like a volleyball court and jogging and bike path.[2]

In 1994, San Diego issued the Mission Bay Park Master Plan Update, which outlines the city's course for the park's continuing development in a way that enhances sustainability, quality of recreation, and the bay's environment.[3] The Master Plan does not specifically mention sea-level rise but calls for the relocation of the current Campland site in order to facilitate wetland restoration.[4] In 2016, the City of San Diego launched a three-year effort to update the Mission Bay Park Master Plan that expands on this 1994 recommendation to relocate Campland, among other facilities. The planning effort aims to develop revitalization plan alternatives, amend the Master Plan (the De Anza Cove Amendment), and update an Environmental Impact Report. Building on the goals outlined in the original Master Plan, the De Anza Cove Amendment and Revitalization Plan will provide a plan to restore wetlands and relocate Campland.[5]

ReWild Mission Bay Study Area.

This image depicts the different land uses that are being evaluated and considered for zoning and leasing changes as a part of the ReWild Mission Bay wetlands restoration feasibility proposals.

Credit: San Diego Audubon Et al., ReWild Mission Bay Wetlands Restoration Feasibility Study 5 (2018).

Managed Retreat Examples

Planning for Retreat

While the city was in the process of developing the De Anza Cove Amendment to the Mission Bay Master Plan, ReWild Mission Bay led a complementary technical planning effort to inform how wetlands would be addressed in the plan's next iteration. Specifically, ReWild Mission Bay, an initiative led by San Diego Audubon and partners, aims to address the negative consequences of wetland alterations by creating a new vision for Mission Bay focused on environmental protection and wetland restoration.[6] In 2018, ReWild Mission Bay published a *Wetlands Restoration Feasibility Study Report* (feasibility study) that outlines a potential future for Mission Bay.[7] The feasibility study was the result of five years of transparent stakeholder outreach and public engagement and led to the development of three final conceptual plans, or "restoration alternatives" for Mission Bay, that include plans for site-specific restoration of the northeastern corner of Mission Bay. The

three proposed alternatives — "Wild," "Wilder," and "Wildest" — offer varying levels of sea-level rise resilience. The alternatives were selected based on the likelihood of ensuring long-term habitat and water quality benefits, the ability to garner public support, obtaining state agency and local government approvals, and the availability of implementation funding. The feasibility study was funded by the California State Coastal Conservancy and U.S. Fish and Wildlife Coastal Program.

The feasibility study provides one example of a site-specific or place-based plan that can be implemented along with other local plans to promote comprehensive decisionmaking efforts to facilitate retreat. Building on the current 1994 Mission Bay Park Master Plan, the ReWild project proposes to discontinue Campland's lease on the existing site (by not extending the lease's current term) and to relocate this revenue-producing use to city land further inland. The proposal to relocate and terminate the Campland lease would protect public investments as sea levels rise, create open space for wetland restoration, and enhance community and ecosystem benefits. The city would retain title to the land and support the land's restoration into wetlands and upland habitat, with ReWild Mission Bay and the San Diego Audubon Society supporting the restoration and helping to obtain funding. As a result, the city would have the opportunity to expand the existing wetland habitat area by approximately 200 acres, with approximately 80 acres remaining in 2100 with 5.5 feet of sea-level rise. Given that the land Campland is leasing is publicly owned, this change would not require San Diego to voluntarily buy out private property owners (or acquire land through eminent domain); instead, the city would be changing the location of different private and public land uses.

ReWild Mission Bay Projected Habitat Distributions

Habitat/ Recreational Use	Year 2020 (No SLR)	Year 2050 (2.0 ft of SLR)	Year 2100 (5.5 ft of SLR)
		Area (Acres)	
"Wild" Alternative			
Passive and active recreation with appropriate buffer	97	97	97
Habitat total*	214	184	84
Salt Marsh to Upland Total	172	94	45
"Wilder" Alternative			
Passive and active recreation with appropriate buffer	144	144	144
Habitat total*	235	180	75
Salt Marsh to Upland Total	164	80	40
"Wildest" Alternative			
Passive and active recreation with appropriate buffer	94	94	94
Habitat total*	315	254	117
Salt Marsh to Upland Total	227	134	75

*Habitat total = sum of mudflat, salt marsh, transitional, and upland habitats

ReWild Mission Bay Wetlands Restoration Alternatives.

This table from the ReWild Mission Bay Wetlands Restoration Feasibility Study Report shows the amount of habitat and human-focused recreation space available under each restoration alternative. It highlights how, even under the Wildest alternative, sea-level rise will greatly reduce the amount of habitat available to the birds, fish, invertebrates, and plants that rely on this remnant wetland area.

Credit: San Diego Audubon Et al., ReWild Mission Bay Wetlands Restoration Feasibility Study, Executive Summary p. 10 (2018).

Relocating Existing Development

To facilitate retreat for coastal wetlands, local governments, like San Diego, may have to consider relocating existing development and altering existing land uses. The ReWild Mission Bay proposal recommends relocating Campland, which has been operating in the area for 50 years, to make way for an expanded wetland reserve while allowing Campland to lease land from the city at a new site in the same corner of Mission Bay Park. The expansion of this wetland area into the existing Campland site would increase the habitat for species from the adjacent Kendall–Frost Marsh Reserve/Northern Wildlife Preserve.

Debate about relocation of the Campland site demonstrates the policy tradeoffs that decisionmakers may need to navigate when phasing out land uses to restore coastal habitats. Some environmental stakeholders opposed the relocation of Campland and instead called for Mission Bay Park to be zoned only for natural environmental restoration and restored, as

much as possible, to wetland habitat to facilitate sea-level rise adaptation. The differences in opinion raise a question about whether environmental restoration should be inclusive or exclusive of human development. Land-use planners will likely need to balance interests in preserving traditional park recreational uses in their current state against the benefits of maximizing restoration further inland to prepare for climate change impacts.

Next Steps

In June 2019, the San Diego City Council approved a lease extension and expansion for Campland in a 6-to-3 vote. The extension will allow Campland to continue operating at its current site for five to eight years. In addition, the lease extension will allow Campland to take over the lease of a neighboring mobile home park (Mission Bay RV Resort on De Anza Point, which is in need of repair and environmental remediation work) for an initial period of five years to 2026, giving the city time to decide on long-term land-use options under the future De Anza Cove Amendment. As part of the lease agreement, Campland will spend $8 million removing derelict mobile homes (some with asbestos), making small repairs to a public bike path, making 150 new RV sites, and upgrading a clubhouse and pool for its guests. Campland will receive credits towards its lease payments to the city as reimbursement for the $8 million in expenses.

Not all stakeholders supported the City Council's decision. The differences in opinion highlight the challenges of reaching a consensus in land-use planning processes, particularly for plans that include elements of coastal retreat. Some environmental organizations, such as the San Diego Audubon Society, raised concerns about whether the process thoroughly considered issues of conservation, water quality, and climate adaptation and whether there had been sufficient community input and transparency to inform the City Council's decision. Proponents of the City Council's decision argued that extending and expanding the Campland lease would improve public access to Mission Bay by upgrading the area and offering more affordable coastal accommodations. While many of California's beaches are open to the public, traveling to the beach may not be affordable for everyone due to the high cost of hotels in many coastal areas. The proposal now requires approval from the California Coastal Commission and if approved, wetland restoration at the Campland site, as first outlined in the 1994 Master Plan and the ReWild feasibility study, will be delayed until at least 2026.

Considerations and Lessons Learned

Updating the Mission Bay Park Master Plan and potentially implementing one of the proposed recommendations in the *ReWild Mission Bay Wetlands Restoration Feasibility Study* report is ongoing. The differences in stakeholder perspectives presented are examples of the kinds of policy tradeoffs inherent in local planning efforts. In particular, this example raises questions about relocating existing development and public amenities in the face of sea-level rise and habitat migration to enhance flood resilience, water quality, and the ecological benefits of wetlands. In evaluating the potential for coastal retreat strategies, local governments should seek to account for different stakeholder interests between private and public land uses and human development versus environmental restoration and conservation when diverse interest groups and stakeholders are involved. These decisionmaking efforts may require local governments to think about creative investments in and planning for parks to ensure that low-cost accommodations in coastal areas are not prioritized to the exclusion of natural ecosystems restored for climate adaptation and mitigation purposes.

In addition, governments should engage residents and other partners like nonprofits in transparent decisionmaking processes to ensure that land-use plans and changes reflect community priorities and guide the allocation of funding and other resources. Regardless, it is important to acknowledge that these processes can take multiple years to complete and therefore necessitate a long-term commitment of resources from both local governments and affected residents.

Endnotes

1 *Mission Bay Park*, City of San Diego, **https://www.sandiego.gov/park-and-recreation/parks/regional/** (last visited Dec. 12, 2019).

2 *De Anza Cove*, City of San Diego, **https://www.sandiego.gov/park-and-recreation/parks/regional/missionbay** (last visited Dec. 12, 2019).

3 City of San Diego, Mission Bay Park Master Plan Update (adopted Aug. 2, 1994; last amended July 9, 2002), *available at* **https://www.sandiego.gov/sites/default/files/mb_park_master_plan.pdf**.

4 *See Mission Bay Park Master Plan Update* p. 10, "An 80-acre saltwater marsh is proposed west of Rose Creek adjacent to the existing Northern Wildlife Preserve. This recommendation requires the relocation of the Recreational Vehicle Park (Campland on the Bay), possibly to the east side of the Creek as a potential use in the proposed De Anza Special Study Area." and p. 170. City of San Diego, Mission Bay Park Master Plan Update (adopted Aug. 2, 1994; last amended July 9, 2002), *available at* **https://www.sandiego.gov/sites/default/files/mb_park_master_plan.pdf**.

5 *De Anza Cove Amendment to the Mission Bay Park Master Plan*, City of San Diego, **https://www.sandiego.gov/planning/programs/parkplanning/deanza** (last visited Dec. 12, 2019).

6 ReWild Mission Bay, **https://rewildmissionbay.org/** (last visited Dec. 12, 2019).

7 San Diego Audubon et al., ReWild Mission Bay Wetlands Restoration Feasibility Study (2018), *available at* **https://missionbaywetlands.files.wordpress.com/2018/12/rewild-mb_feasibility-study-report_final-december-2018_with-preface-and-es.pdf**.

Charlotte-Mecklenburg County, North Carolina: Floodplain Buyout Program

Executive Summary

Charlotte-Mecklenburg Storm Water Services (CMSS) — a county-wide regional utility in North Carolina — has been administering a Floodplain Buyout Program to relocate vulnerable residents out of floodplains and reduce long-term flood damage. The buyout program is focused on risk reduction and flood mitigation best practices, where once bought out, properties are returned to open space uses to restore their natural beneficial flood retention and water quality improvement functions and provide other community amenities, like parks and trails. CMSS has purchased more than 400 flood-prone homes and businesses and enabled over 700 families and businesses to relocate to less vulnerable locations outside of the floodplain. CMSS has also supported a number of leaseback arrangements on a case-by-case basis with property owners to increase participation in the buyout program and reduce the county's property maintenance costs. As a result of the floodplain buyouts, the community has gained an additional 185 acres in open space and recreational assets and encouraged the development of newer, more resilient buildings in less vulnerable locations within Mecklenburg County. The program has been funded through a combination of federal and local government sources, with leasebacks also supporting the recapture of some costs. CMSS has invested more than $67 million to acquire flooded properties. As a result, the county estimates it has avoided an estimated $25 million in property damage and related losses to date, and prevented $300 million in future losses. Charlotte-Mecklenburg's Floodplain Buyout Program is an example of a nationally recognized approach to supporting voluntary retreat in a riverine floodplain. Other local governments could consider adopting a comprehensive buyout program like Charlotte-Mecklenburg's or individual program elements, like local funding options or leasebacks, to help support voluntary retreat decisions in coastal areas experiencing sea-level rise, impacts from disaster events, and land loss.

Background

Mecklenburg County, which includes the City of Charlotte, is located in southwestern North Carolina. The county has a population of over one million people and is the state's most populated county. More than 5,000 individual properties are located within Mecklenburg County's regulated floodplain.[1] Charlotte-Mecklenburg Storm Water Services (CMSS) provides floodplain services and acts as a regional entity for the entire county by collecting utility fees. After two 100-year (one-percent annual chance) flood events occurred in the 1990s, CMSS implemented a Floodplain Buyout Program in 1999 to acquire repetitive loss structures and restore natural floodplain functions. CMSS's program model now combines several unique features, including a local funding source, non-disaster related buyouts, and post-acquisition leasebacks, that can provide transferable lessons for other state and local governments and stormwater, floodplain, and coastal agencies.

Managed Retreat Examples

Buyout Program

The Floodplain Buyout Program is a voluntary buyout program and properties are not acquired through eminent domain. CMSS prioritizes eligible properties for the Floodplain Buyout Program according to two primary factors: (1) a property's overall flood risk (based on the future likelihood of flooding and damage and financial impacts); and (2) the long-term cost effectiveness of a buyout (i.e., benefit-cost analysis). CMMS scores, ranks, and prioritizes properties according to the methodology provided in the Storm Water Services' *Flood Risk Assessment and Risk Reduction Plan* for public transparency and consistent project implementation.[2] All of the properties located within Charlotte-Mecklenburg's regulated floodplain are included in the plan and help CMSS to prioritize and group properties that are volunteered to be bought out.

Leasebacks

As a part of the program, CMSS has also allowed some participating property owners to "leaseback" acquired properties for a set period of time and on a case-by-case basis. A leaseback is a legal tool where a property owner sells his/her property to a buyer; once the property's title has transferred, the seller or a new lessee (e.g., an adjoining property owner) leases the property back from the buyer. As a condition of a leaseback, the lessee must pay rent (either monetary or in-kind services) to the buyer or lessor, here CMSS; in exchange for rent, the lessee can use his/her property according to the terms and conditions of the lease, but does not own it.

CMMS considers leasebacks to maximize the scale and timing of area-wide buyouts to reduce the number of holdouts and project inefficiencies from pursuing one-off rather than a collective number of buyout offers. CMSS has implemented leasebacks since 2008; however, as of 2019, only approximately a dozen have been used — around one per year — mostly in cases where CMSS has encountered difficulties with otherwise interested property owners, like the elderly who may want to stay in their homes until they pass away or people who need gap time to find or buy a new home at a price they can afford. Leasebacks can allow CMSS to better balance the needs and concerns of individual property owners and long-term flood mitigation benefits for communities. To those ends, CMSS is utilizing two types of leasebacks: triple net leasebacks and orphan parcel leasebacks, which are discussed below.

Triple Net Leaseback

A triple net leaseback option provides an innovative funding source to offset some of the costs of buyouts and maintains a person's ability to stay in his/her own home longer; this in turn reduces relocation costs and supports community cohesiveness. In a triple net leaseback, the lessor is not responsible for any costs or services associated with maintenance or improvements to the property beyond those required to ensure decent, safe, and sanitary conditions. The lessor's limited legal obligations are reflected in a reduced rental price for the lessee because the lessor is not providing any services or guarantees.

CMSS works with individuals participating in the program to determine the length of their leases on a case-by-case basis. Generally, CMSS avoids long-term leasebacks to ensure that floodplain management objectives are ultimately met and people are not kept in a vulnerable situation any longer than necessary. A triple net lease may also contain certain "triggers" or precipitating events that can end the lease, such as the death of the homeowner or a major flooding event. These leases are not transferable and do

not allow a lessee to make substantial improvements to the property or accept any government funds to make repairs for future flood damages.

Orphan Parcel Leasebacks

CMSS also utilizes orphan parcel leases, in which a nearby property owner is willing to maintain a bought-out property in exchange for exclusive use of the property. Specifically, lessees provide in-kind services, like yard maintenance, in exchange for the use of a property and are not charged any monetary rent. In a limited number of instances, orphan parcel leases have reduced maintenance costs for CMSS. CMSS conducts periodic inspections of orphan parcels to ensure that the properties are being maintained according to the terms and conditions of the lease and, if bought-out with funds from the Federal Emergency Management Agency, not violating federal requirements.

Environment

Once acquired, physical structures are removed from the properties, which are then converted to and preserved as open space, providing a community asset and environmental and species benefits and allowing the floodplain to act as a natural buffer during heavy rain and storm events. Examples of the final uses for acquired properties include community gardens, greenway trails and paths, and floodplain restoration areas. In certain circumstances, after buyouts within a given large-scale area are completed, streets and utilities may also be removed or left unmaintained to further restore the floodplain and reduce costs to the county.

Community Engagement

CMSS engages Mecklenburg County's residents throughout all stages of the buyout process from initial education and outreach to finalizing a property's transfer. The Floodplain Buyout Program has seen high participation rates from eligible property owners, which has allowed more than 400 floodplain homes and businesses to be acquired.[3] Around 85 percent of property owners within priority flood-risk reduction areas have elected to participate in the Floodplain Buyout Program after taking part in the property appraisal and offer process.[4] CMSS also works with community members to design and realize a vision for each large-scale bought-out area once all homes are purchased and demolished. CMSS hopes that bought-out properties become community assets, in addition to serving as natural floodplains and providing ecosystem benefits.

Funding

CMSS utilizes three funding sources to buy out different types of properties; together they comprise a comprehensive local program.

- **Federal Emergency Management Agency (FEMA) Hazard Mitigation Grant Buyouts** (1999–present): These buyouts are funded by FEMA Hazard Mitigation grants.[5] To qualify for a FEMA grant, the property must meet eligibility and priority criteria set by the federal and/or state governments. CMSS has used this option less frequently since 1999; as more buyouts are completed, fewer and fewer remaining properties meet the federal and state criteria, including for FEMA's benefit-cost analysis.
- **Local Risk-Based Buyouts** (2012–present): CMSS funds these buyouts through a local storm water fee and prioritizes properties based on local risks and needs. One subset of local risk-based buyouts includes an "orphan" property program for properties that do not meet federal grant criteria but that are adjacent to other properties that are being bought out with federal funds. The goal of the orphan property buyout program is to encourage the last homeowners living in a high risk neighborhood to move so that the site can be restored to its natural floodplain functions and services can be discontinued to the area, increasing cost savings to the city and county.
- **Quick Buys** (2003–present): Quick Buys allow CMSS to acquire significantly damaged properties in the immediate aftermath of a flood or storm event, before substantial repairs are made, through "rainy day" funds allocated by the Mecklenburg Board of County Commissioners.

Since the program was established in 1999, CMSS has invested more than $67 million to acquire flooded properties.[6] As of 2019, CMSS invests $4 million annually in buyouts and most buyouts are funded completely by local government funds.[7] Using both local and federal funding sources, CMSS can buy out properties on a larger scale to restore the floodplain and reduce human and

property risks in a pre-disaster context and work with property owners who are otherwise ineligible for post-disaster buyouts. As a result, the county estimates it has avoided an estimated $25 million in property damage and related losses to date, and prevented $300 million in future losses.[8] For example, by purchasing homes in the floodplain and allowing water to flow more naturally, other downstream areas can be preserved.

Considerations and Lessons Learned

Charlotte-Mecklenburg Storm Water Services has successfully implemented a comprehensive and strategic voluntary buyout program to reduce the impact of flooding events on people and property located within the floodplain. Charlotte-Mecklenburg's model leverages both federal grants and local stormwater utility fees to fund an increased number of buyouts in the county's floodplain and provides support to interested property owners in both disaster and non-disaster recovery contexts.

Leaseback arrangements may be a valuable tool for planners and policymakers to reduce the costs of buyout programs and support increased flexibility in buyouts. Although the Charlotte-Mecklenburg program uses leasebacks in a relatively small number of cases, the leaseback option has provided additional benefits to individuals and the larger community by enhancing community cohesiveness, offsetting acquisition costs, reducing property maintenance costs, and addressing the specific needs of property owners.

Based on up-to-date property data and buyout criteria that evaluate flood risk and cost effectiveness, the county estimates the acquired properties have provided high returns on investment relative to other flood mitigation and resilience tools. The program models flood mitigation best practices by supporting maintenance of acquired properties (either directly or through orphan parcel leasebacks) to boost natural floodplain functions and improve community flood resilience. Other local governments or stormwater, floodplain, or coastal agencies could consider adopting Mecklenburg County's model as part of their riverine and coastal retreat strategies.

Endnotes

1 *Floodplain Buyout (Acquisition) Program,* City of Charlotte, **https://charlottenc.gov/StormWater/Flooding/Pages/FloodplainBuyoutProgram.aspx** (last visited Dec. 17, 2019).

2 Charlotte-Mecklenburg Storm Water Services, Flood Risk Assessment and Risk Reduction Plan (Jan. 2012), *available at* **https://charlottenc.gov/StormWater/Flooding/Documents/Flood_RARR_Plan-Final.pdf.**

3 *Floodplain Buyout (Acquisition) Program,* City of Charlotte, **https://charlottenc.gov/StormWater/Flooding/Pages/FloodplainBuyoutProgram.aspx** (last visited Dec. 17, 2019).

4 *Id.*

5 Georgetown Climate Ctr., *FEMA Hazard Mitigation Grant Program*, Adaptation Clearinghouse, **https://www.adaptationclearinghouse.org/resources/fema-hazard-mitigation-grant-program.html** (last visited Nov. 11, 2019).

6 *Floodplain Buyout (Acquisition) Program,* City of Charlotte, **https://charlottenc.gov/StormWater/Flooding/Pages/FloodplainBuyoutProgram.aspx** (last visited Dec. 17, 2019).

7 *Id.*

8 *Id.*

City of Austin, Texas: Flood Risk Reduction Buyout Projects

Executive Summary

The City of Austin, Texas has adopted a model to provide consistent relocation benefits for voluntary home buyouts in the city's floodplains as a part of its "flood risk reduction projects." In addition to the cost of a person's original home, the city will provide homeowners with moving and closing costs, and a replacement housing payment if the cost of a new comparable home (located outside of the city's 100-year floodplain) is more than the original home. Floodplains cover nearly ten percent of Austin's land area. This policy encourages owner participation in the buyout program and helps to minimize the economic and social costs of relocation. Since the 1980s, the city has implemented ten buyout projects, with each project encompassing anywhere from a handful to more than 800 properties. The city's Watershed Protection Department prioritizes buyouts in accordance with a *Watershed Protection Master Plan* that strategically guides related city actions, including potential buyouts, to reduce the risks associated with erosion, flooding, and poor water quality. A mix of municipal bonds, federal grants, and local funds (primarily through a drainage fee paid by owners of properties based upon impervious surface cover) have been used to fund the buyouts. Austin's example is noteworthy for its emphasis on implementing buyouts in accordance with a comprehensive flood mitigation program and facilitating transitions for people located in floodplains through relocation assistance. Other jurisdictions considering managed retreat could implement an interdisciplinary buyout approach across different sectors and government agencies (e.g., floodplain and emergency management and housing and community development). An integrated local response can reduce flood risk in a riverine or coastal context and also minimize the social and economic costs of buyouts.

Localized flooding in South Austin.

Local flooding occurs in South Austin's Del Curto area due to heavy rainfall events.

Credit: **Watershed Protection Master Plan "Problem Score" Viewer**, Watershed Prot. Dep't, City of Austin (last visited Dec. 12, 2019).

Background

Austin, the state capital, is located in Central Texas. The city's population is growing — it increased 20 percent from 2010 to a population of over 960,000 in 2018.[1] The median home value in Austin is $285,900.[2] The city is susceptible to extreme fluctuations in precipitation that require planning for impacts from both droughts and serious flooding. Floodplains cover nearly ten percent of Austin's land area and a number of creeks are subject to flash flooding. For example, in Fall 2018, Austin experienced a flash flood emergency from Hurricane Sergio. The city seeks to restore natural floodplain functions to protect people and property through a variety of flood risk mitigation projects, including voluntary buyouts, and provides relocation assistance to help residents transition to less vulnerable areas.

Managed Retreat Examples

Austin's Flood Risk Reduction Projects

Buyouts in Austin currently occur on a project-by-project basis through multi-faceted "flood risk reduction projects" managed by the city's Watershed Protection Department (WPD). The city guides selection of flood risk reduction projects according to a *Watershed Protection Master Plan* developed by WPD.[3] The master plan provides an assessment of Austin's erosion, flood, and water quality problems and prioritizes solutions, like buyouts, that can be implemented to address those problems in targeted areas across the city, including residential areas.[4] Engineering studies are used to evaluate potential options available for WPD to reduce erosion, flooding, and/or water quality impairment at each location. If buyouts are the preferred options to advance the master plan's objectives — minimizing risk and maximizing community benefits — a buyout project will proceed, contingent on whether funding can be secured. The speed of project implementation depends on multiple factors including the level of risk assigned to the property. Projects that encompass multiple buyouts may be phased over time to account for total project costs, available funding, and real estate market conditions.

Relocation Assistance

Homeowners participating in Austin's buyout projects are generally eligible for the following home purchase and relocation expenses:

- Original home payment (determined by a property's fair market value);
- Moving and closing costs;
- Appraisal costs (to determine an original home's fair market value) and inspection costs (for a replacement home); and
- Replacement housing payment: A replacement housing payment is determined by what the city considers to be a "comparable home" — a home in Austin that is functionally equivalent to the original home but is not located in Austin's 100-year floodplain. Rental assistance may also be available for tenants as well as business reestablishment assistance for landlords. In addition, internal city relocation guidance, managed by WPD, only looks at the price of comparable homes both within 50 miles of the original home and within Austin's city limits, which can indirectly encourage people to stay

in Austin and help to maintain the city's tax base in less risky areas. As needed, Austin may also consider updates to its 100-year floodplain maps (and thus where replacement homes may be located) as new scientific data becomes available (e.g., new precipitation projections).

Austin's model is noteworthy for providing full replacement housing assistance for voluntary buyouts, in contrast with programs in other municipalities that may provide no relocation assistance at all, or may set a limit or cap on the assistance available to property owners. The Austin flood buyout process often lasts approximately nine months per home and involves four key steps:

1. An independent appraisal to determine the original home's fair market value;
2. A purchase offer to the homeowner based on the original home's fair market value;
3. Assistance (both financial and city staff support) for the displaced owner to buy and move into a new home; and
4. Demolition of the original home and maintenance of the land as open space or other floodplain-compatible uses desired by the surrounding neighborhood.

A new property will be inspected for health and safety standards before being approved, and a relocation benefit is then provided once a replacement house is purchased.

The city modeled its relocation assistance benefits after a federal law, the Uniform Relocation Assistance and Real Property Acquisition Act of 1970 (URA),[5] that provides predictable real property acquisition and relocation expenses for homeowners and tenants of land acquired through eminent domain. Specifically, URA ensures consistent treatment for people displaced through federal programs or with federal funding. Austin has exceeded federal and state requirements[6] and adopted URA's relocation assistance model for voluntary buyouts, in addition to those implemented through eminent domain, for flood risk reduction projects.[7]

Large-Scale Flooding in Onion Creek.

This image depicts large-scale flooding, known as the "Halloween Flood of 2013," in Austin's Onion Creek neighborhood. As a result of incidents like this one, Onion Creek has also been the site of several buyouts by the city's Watershed Protection Department.

Credit: **Watershed Protection Master Plan "Problem Score" Viewer**, Watershed Prot. Dep't, City of Austin (last visited Dec. 12, 2019).

Although Austin is not legally required to provide relocation assistance for voluntary buyouts (in contrast to compensation requirements under eminent domain), WPD nonetheless routinely provides relocation assistance to minimize the social consequences of buyouts for participating landowners. Currently, like URA, the City Code section that provides relocation benefits only applies to eminent domain and not voluntary projects. When WPD wants to offer relocation benefits as part of a voluntary buyout project, it must seek exceptions from City Council on a project-by-project basis to waive the code's application to voluntary buyouts. Although there is no citywide comprehensive or standalone buyout program, the expenses and relocation benefits offered to property owners are nevertheless consistently applied, according to internal WPD guidance and reference to URA.

Environment

Post-buyout land uses are determined by the city with the support of the community. The city may use the land to maximize flood reduction benefits. Alternatively, the community may take ownership of smaller areas for local neighborhood gardens or maintain land as open space with native grasses and wildflowers. The final uses of bought-out land depend on different factors including community preference and funding.

Community Engagement

Austin has taken a hands-on approach to helping residents relocate. WPD consults with residents early-on in each project, beginning with community education and outreach during the initial engineering study phase, and concluding with a successful relocation and restoration of the original property to natural conditions. For example, if a resident decides to participate in a buyout and is eligible for relocation assistance, WPD conducts an initial interview with property owners to learn about their housing needs and priorities. Following that interview, a real estate expert from the city is assigned to work closely with individuals and families as they search for a comparable property on the market. This commitment to public service helps residents interpret and understand engineering studies, creates understanding of flood risks, and ensures community engagement throughout the buyout process.

Funding

The majority of Austin's flood risk reduction projects are funded by a "drainage fee," which is calculated individually for each property in Austin, based on the amount and percent of impervious cover on a property.[8] This funding for capital improvement projects has been supplemented by municipal general obligation bonds, bond elections, and Federal Emergency Management Agency grants. U.S. Army Corps of Engineers funding has also been used for civil works projects in partnership with Austin, such as for the acquisition and conversion of flood-prone land into public recreation areas.

Next Steps

In 2016, the Office of the City Auditor audited the city's buyout program to evaluate whether management of flood buyout projects was efficient and cost-effective. The audit report, released in February 2017, found that the decision to provide full replacement housing assistance for voluntary home buyouts had resulted in significant costs for the city, particularly given the increasingly expensive housing market in Austin.[9] The audit report recommended that future policy discussions focus on developing a citywide relocation benefits policy for voluntary flood buyout projects rather than relying on a project-by-project model.[10] As of 2019, Austin is in the midst of considering developing a citywide voluntary buyout program for individual properties that may not rank as high priorities in the *Watershed Protection Master Plan*, but would nonetheless contribute to the comprehensive restoration of Austin's floodplains. The city may also consider amendments to the City Code that would enable WPD to streamline the administrative process for providing voluntary relocation benefits without having to apply to City Council for an exception for each project.

Considerations and Lessons Learned

Austin's example is noteworthy for its process to implement buyouts in accordance with a comprehensive flood mitigation plan, the *Watershed Protection Master Plan*, and facilitate the transition of residents outside of floodplains through relocation assistance. Relocation benefits can increase participation in buyouts and enable people to afford safer, comparable homes. Austin also demonstrates how decisionmakers can start with existing laws and guidance, like URA or state complements, to build retreat strategies in other jurisdictions in lieu of expending limited resources to "reinvent the wheel." The city, however, has balanced its approach to adopt federal and state standards by managing its watershed protection and relocation assistance programs to respond to local context and needs. Overall, models like Austin's seek to work across multiple government agencies for floodplain and emergency management and community development and housing to reduce local flood risk in a riverine or coastal context and minimize the personal and economic costs of buyouts. All of these lessons could inform buyout or retreat programs or policies at the state and local levels in other jurisdictions.

Endnotes

1 *QuickFacts: Austin City, Texas,* U.S. Census Bureau, **https://www.census.gov/quickfacts/fact/table/austincitytexas/LND110210** (last visited Aug. 27, 2019).

2 *Id.*

3 Watershed Prot. Dep't, City of Austin, Watershed Protection Master Plan (Aug. 19, 2016), *available at* **https://www.austintexas.gov/watershed_protection/publications/document.cfm?id=261630&id2=%20**.

4 *Id.*

5 Uniform Relocation Assistance and Real Property Acquisition Act of 1970, 42 U.S.C. §§ 4621 *et seq.* (2019).

6 Tex. Prop. Code § 21.046 (2019), *available at* **https://statutes.capitol.texas.gov/Docs/PR/htm/PR.21.htm**.

7 Austin Code of Ordinances ch. 14-3 (2019), *available at* **https://library.municode.com/tx/austin/codes/code_of_ordinances?nodeId=TIT14USSTPUPR_CH14-3REBE**.

8 Austin Code of Ordinances § 15-2-4 (2019), *available at* **https://library.municode.com/tx/austin/codes/code_of_ordinances?nodeId=TIT15UTRE_CH15-2DRUT_S15-2-4DRCHES**.

9 Office of the City Auditor, City of Austin, Audit Report: Flood Buyout Program (Feb. 2017), *available at* **http://www.austintexas.gov/sites/default/files/files/Auditor/Audit_Reports/Flood_Buyout_Program__February_2017_.pdf**.

10 *Id.* at 8.

Harris County, Texas: Flood Control District Local Buyout Program

Executive Summary

Harris County, Texas, established a voluntary home buyout program through the regional government agency, the Harris County Flood Control District (HCFCD), that can serve as an example for other local jurisdictions considering retreat from coastal and riverine flood-prone areas. As a result of the program, more than 3,000 properties (as of 2019) have been purchased to remove residents from flood-prone areas and prevent future flood damage to people, property, and the environment. The buyout program is focused on risk reduction and flood mitigation best practices, where once bought out, properties are returned to open space uses to restore their natural beneficial flood retention functions. HCFCD has developed an effective communication and outreach strategy to educate the public and encourage program participation. Historically, properties have been acquired with grants from the Federal Emergency Management Agency's Hazard Mitigation Assistance program, Department of Housing and Urban Development's Community Development Block Grant program, and local funding from a dedicated ad valorem property tax (i.e., a tax based on a property's assessed value). Other state, regional, and local jurisdictions considering managed retreat could implement a similar buyout model that operates in both a pre- and post-disaster context and engages the community throughout the entire process.

Background

Harris County, Texas — which includes the City of Houston — is located in the southeastern part of the state near Galveston Bay. Both the county and Houston have been experiencing population growth and, at the time of the 2010 U.S. Census, Harris County was the third highest populated county in the United States. In 1985, the Harris County Flood Control District (HCFCD), a regional government agency, established a voluntary home buyout program. As a result of the program, more than 3,000 properties (as of 2019) have been purchased and restored to relocate residents from flood-prone areas and prevent future flood damage to people, property, and the environment.

Managed Retreat Examples

Buyout Program

HCFCD has developed a comprehensive approach to buying out homes in the county for the purpose of reducing local and regional flood risks. The home buyout project timeline typically occurs over an eight- to 12-month period, but may take up to two years from a flood event (if a buyout is occurring post-flood):

1. Property owners volunteer
2. Eligible properties are identified
3. HCFCD secures funding
4. Property is appraised (based on [pre-disaster/flood] fair market value)
5. Agreement for sale and relocation benefits determined
6. Closing and move-in to new home

The buyout program is designed to prevent future flood damages where structural projects to reduce flooding are not cost effective or beneficial. Single-family homes, multi-family residences, commercial buildings, and churches are all eligible; however, residential structures are assigned a higher priority.

Participation is strictly voluntary and acquisitions under the buyout program are heavily influenced by the availability of federal funds. To effectively allocate buyout funding, the program uses "ideal buyout criteria," prioritizing homes to be bought out in relation to their depth in the floodplain and risk of flooding. To be eligible, properties must meet at least two of the following three criteria to identify whether they are:

- Located at least two-feet deep within the 100-year floodplain (i.e., two feet of depth during a 100-year rain event);
- Located in flood way; or
- Located in a 10-year floodplain.

Additionally, buyouts will typically only occur if individual properties are a minimum of five acres in size; or if ten contiguous properties of any size can be acquired at once. This allows properties to be successfully converted to another use, reduces maintenance costs, and avoids checkerboarding within buyout areas. HCFCD also assesses if a property acquisition is cost effective by evaluating buyouts based on engineering studies and benefit-cost analyses to show that the cost of acquiring a property and demolishing structures is less than the estimated costs from a future flood.

Environment

Once properties are acquired by HCFCD, structures are demolished, and properties are restored to natural and beneficial ecosystem functions including to widen bayous, create recreational green spaces, and enhance stormwater

drainage. Restoration and construction activities may require that HCFCD seek approval from relevant federal agencies to ensure that a project's design is consistent with current funding and permitting laws and policies. As of 2019, more than 1,000 acres of bought-out land have been cleared and restored or are in the process of being restored.[1] One unique feature of the Harris County program is that, since 2015, HCFCD has utilized Geographic Information Systems (GIS) analysis to validate the success of buyouts, tracking the number of homes that would have flooded had they not been acquired. HCFCD would like to expand the use of GIS and map every buyout and flood event from 1985.

Community Engagement

The HCFCD buyout program has a robust education and outreach program and community engagement strategy. HCFCD has established a strong online presence with a user-friendly website offering detailed information about the voluntary buyout process. The website includes testimonials from previous program participants,[2] infographics, and easy-to-follow videos specific to Harris County covering both general program information and the actual buyout process.[3] The availability of these resources allows people to become familiar with buyouts and weigh the advantages and disadvantages of volunteering their properties for the program. HCFCD supplements its online resources with targeted mail campaigns and in-person resources, such as door-to-door visits and community meetings in high flood risk priority areas. This dual communications approach has given the buyout program traction during non-disaster periods and allows HCFCD to actively disseminate accurate information, avoid misconceptions about buyouts, and incentivize participation.

Funding

Between 1985 and 2017, HCFCD has spent $342 million to purchase properties; however, more than 100,000 residential properties still remain in the 100-year floodplain.[4] HCFCD primarily utilizes three sources of funding for its buyout program: (1) federal funding from the Federal Emergency Management Agency (FEMA) Hazard Mitigation Assistance program;[5] (2) federal funding from the Department of Housing and Urban Development Community Development Block Grant–Disaster Recovery program;[6] and (3) local funding through property taxes. On average, the Harris County Commissioners Court allocates $60 million to HCFCD in annual capital improvement project funds through a dedicated ad valorem property tax.[7] In 2019, the tax rate was 2.877 cents per $100 of the property valuation.[8] A portion of these funds is used annually to cover the local match for federal grants.

Next Steps

In 2017, Hurricane Harvey hit Harris County and caused considerable flood damage. All of Harris County's 4.7 million residents were either directly or indirectly affected. HCFCD received approval from the Texas Division of Emergency Management — utilizing FEMA's Hazard Mitigation Grant Program — to initiate a home buyout response to Hurricane Harvey. Texas Division of Emergency Management initially approved at least 965 homes at a federal cost share (75 percent) of over $159 million from FEMA.

On August 25, 2018, Harris County residents approved a ten-year, $2.5-billion bond for HCFCD to implement over 200 flood risk reduction studies and projects, including buyouts, across the county, in partnership with different federal agencies.[9] As of 2019, approximately 146 of these projects are active in stages ranging from feasibility assessment to construction.[10] The bond is notable because it increased HCFCD's local funding stream for capital projects that was historically limited to $60 million per year.

Considerations and Lessons Learned

Harris County's flood buyout program is a notable model due to its comprehensive approach that other regional and local jurisdictions can evaluate as a part of riverine and coastal retreat strategies. HCFCD utilizes consistent buyout criteria to prioritize projects and maximize flood reduction benefits on a larger scale by identifying properties or collections of properties that are a minimum of 5-10 acres in size. Moreover, HCFCD's work to restore bought-out properties and quantify the benefits of the program through GIS could be replicated by other jurisdictions to demonstrate the return on investment for buyouts, which could be used to generate political and community-level support for this acquisition tool. In addition, HCFCD's dual in-person and online efforts to engage communities enable HCFCD to maintain a presence in the region throughout disaster and non-disaster periods to increase awareness and potential participation in the program. Regardless, as Harris County increasingly faces potential impacts from disaster events, such as recovering from Hurricane Harvey in 2017 and Tropical Storm Imelda in 2019, additional opportunities for local revenue sources could help supplement federal funding to expand the program and get more people out of harm's way on a consistent basis.

Endnotes

1 Harris Cnty Flood Control Dist., 2019 Federal Briefing: Following Through (2019), **https://www.hcfcd.org/media/3570/hcfcdfederalbriefing2019.pdf**.

2 *Benefits and Accomplishments*, Harris Cnty Flood Control Dist., **https://www.hcfcd.org/hurricane-harvey/home-buyout-program/benefits-accomplishments/** (last updated Aug. 28, 2019).

3 *Video: Home Buyout Program*, Harris Cnty Flood Control Dist., **https://www.hcfcd.org/hurricane-harvey/home-buyout-program/videos-home-buyout-program/** (last updated Dec. 18, 2018).

4 *Lisa Song, Al Shaw, & Neena Satija, After Harvey, Buyouts Won't be the Answer for Frequent Flood Victims in Texas*, Tex. Tribune (Nov. 2, 2017), **https://www.adaptationclearinghouse.org/resources/fema-hazard-mitigation-grant-program.html**.

5 *Georgetown Climate Ctr., FEMA Hazard Mitigation Grant Program*, Adaptation Clearinghouse, **https://www.adaptationclearinghouse.org/resources/fema-hazard-mitigation-grant-program.html** (last visited Nov. 11, 2019).

6 *Georgetown Climate Ctr., HUD Community Development Block Grant–Disaster Recovery*, Adaptation Clearinghouse, **https://www.adaptationclearinghouse.org/resources/hud-community-development-block-grant-disaster-recovery.html** (last visited Nov. 11, 2019).

7 Harris Cnty Flood Control Dist., 2019 Federal Briefing: Following Through (2019), **https://www.hcfcd.org/media/3570/hcfcdfederalbriefing2019.pdf**.

8 *Id.*

9 *Id.*

10 *Id.*

New York City, New York: Land Acquisition and Flood Buyout Programs

Executive Summary

The New York City Department of Environmental Protection (NYC DEP) offers flood mitigation buyouts within the NYC watershed, in cooperation with the state, through a Flood Buyout Program that can serve as a model for other coastal and riverine jurisdictions considering retreat. These buyouts are part of a comprehensive flood hazard mitigation program that relies on scientific studies termed Local Flood Analyses (LFA). LFA enable NYC DEP to identify solutions to reduce flooding that may involve buyouts, and then to fund and implement recommended projects. NYC DEP's buyouts are primarily funded by local sewer and water bills and may be supplemented by grants from the Federal Emergency Management Agency. NYC's work is also supported by the Catskill Watershed Corporation (CWC) (a locally based nongovernmental organization), Cornell Cooperative Extension, and a network of Soil and Water Conservation Districts. Communities completing a LFA can apply to CWC for planning grants to help identify areas in local plans, codes, and maps where bought-out residents may relocate to minimize the social and economic costs of buyouts, including loss of local tax bases. In addition, NYC provides a range of effective flood hazard mitigation tools, such as floodplain restoration projects, that can complement buyouts by lowering flood elevations and future repair costs for remaining improvements. Notably, NYC DEP administers a Land Acquisition Program — in addition to its Flood Buyout Program — with a focus on conserving land within the NYC watershed to protect water quality. This dual approach to both buyouts to mitigate flood risk and open space acquisitions to enhance water quality is a unique model that other state and local governments can replicate to achieve co-benefits through land acquisitions. Collectively, NYC's multiple programs and projects can provide an example for other land-use planners and decisionmakers on how managed retreat through buyouts can be supported through a science-based, comprehensive approach that aims to maximize floodplain hazard mitigation and community resilience.

Background

The 2000-square-mile New York City (NYC) watershed is located in the southeastern part of New York State (NYS) and includes the Catskill and Delaware and Croton watershed to the north of NYC. The watershed consists of 19 reservoirs and their major tributaries and more than eight million residents in NYC and more than one million residents located in surrounding counties.[1] The NYC watershed is managed through a partnership between federal, state, and local government agencies and nongovernmental entities to protect the largest unfiltered water supply in the United States.[2] In January 1997, federal, state, city, and environmental entities and watershed municipalities signed the NYC Watershed Memorandum of Agreement to establish CWC.[3] CWC is a nongovernmental, cross-jurisdictional body created to implement watershed protection programs that protect the water quality of the NYC drinking water supply, promote economic development within the Catskill region, and help property owners prepare for the next flood.

Among other management strategies led by NYS and CWC, NYC first developed a Land Acquisition Program to ensure a sustainable drinking water supply. Over time, some watershed communities have expressed additional concerns regarding flooding from more frequent and intense storms. In response, NYC supplemented its Land Acquisition Program with a Flood Buyout Program that uses best available science to respond to flood hazard threats and views buyouts within a broader mitigation context.

Managed Retreat Examples

Acquisition and Buyout Programs

NYC identifies areas for buyouts according to causes of flood risk. The NYC Land Acquisition Program (LAP) is administered by the NYC Department of Environmental Protection (DEP). LAP operates throughout NYC's entire watershed as part of a larger comprehensive long-term program with a focus on conserving land within the watershed to protect water quality. LAP has allowed NYC DEP to avoid the multi-billion-dollar cost of constructing a drinking water filtration plant by enhancing surface drinking water supplies through priority land acquisitions.[4] As of 2019, LAP has secured over 152,000 acres including streams and riparian buffers, floodplains, and wetlands vital to maintain high water quality and protect the watershed.

LAP has also expanded to support Flood Buyout Programs for privately-owned properties within the watershed to remove flood-damaged or vulnerable structures. Three local counties requested that LAP partner with them to implement buyouts funded by the Federal Emergency Management Agency (FEMA) after storms in 1996 and 2011. In 2016, following a sequence of major storms and to be responsive to requests from west-of-Hudson-River watershed communities, NYC implemented a Flood Buyout Program with $15 million expected to result in roughly 100-150 buyouts with the aim of reducing flood vulnerabilities and improving community resilience.

Through the LAP core programs, NYC DEP works directly with interested landowners on a willing seller/willing buyer basis to acquire vacant land. Under the NYC-Funded Flood Buyout Program and buyouts funded by FEMA, local governments must pre-approve which properties can be considered for buyouts. The combined

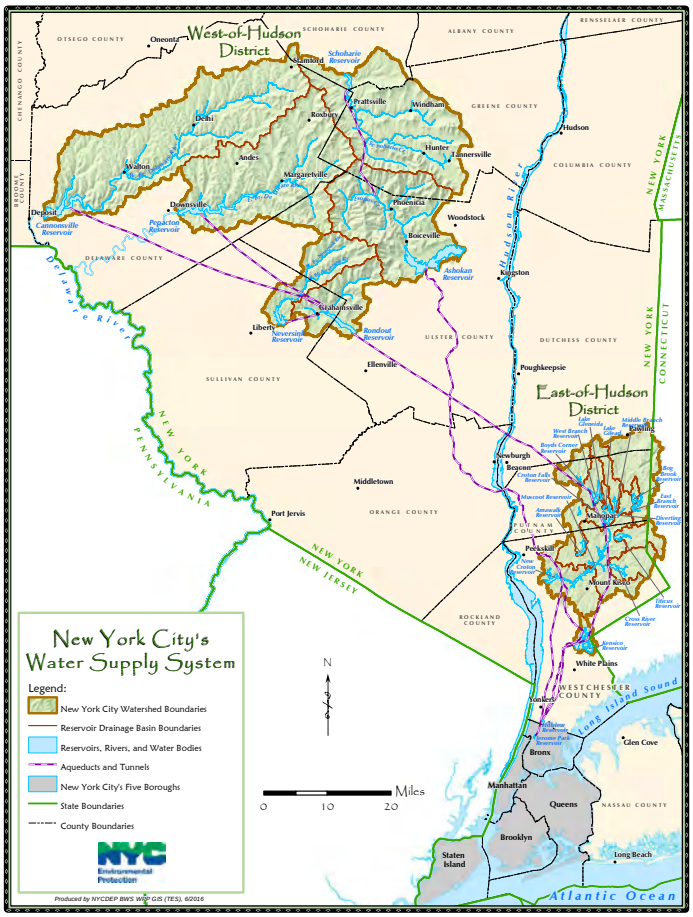
effect of acquiring large tracts of vacant land and relatively small parcels whose structures are removed to restore floodplain benefits has allowed NYC to protect water quality within its watershed while mitigating flood hazard risks for local residents. This dual land acquisition and flood hazard mitigation program implemented through a community-led process has helped maximize co-benefits for the environment and communities.

State, Local, and Community Coordination

To implement the locally led Flood Buyout Program, NYC DEP works in partnership with the state and other local governments and communities within the NYC watershed on a buyout model that can provide support for — and potentially be replicated by — other municipalities. As a first step, NYC DEP works with county Soil and Water Conservation Districts, Cornell Cooperative Extension, and local governments in the NYC watershed to develop Local Flood Analyses (LFAs). LFAs are aimed at identifying projects to mitigate flood impacts on communities, including priority areas for buyouts.[5] This partnership approach involves using FEMA's flood study hydraulic models to test the effectiveness of flood mitigation projects identified by communities.

Under the NYC-Funded Flood Buyout Program, eligible property owners identified through the LFA process — including those who are either not eligible for or choose not to participate in a federal flood buyout program — can offer to sell their property either to NYC DEP or their local municipality (the purchase price is funded by NYC DEP regardless). The NYS Department of Environmental Conservation (DEC), through its issuance of a Water Supply Permit to NYC and its acceptance of a conservation easement on each property acquired, has created template terms and conditions that are included in legal agreements with participating municipalities within the NYC watershed. These template terms and conditions essentially function as programmatic requirements to consistently apply this state–local partnership within the west-of-Hudson portion of the NYC watershed. Specifically, the permit requirements function as programmatic guidance for local municipalities to administer and lead buyouts after LFAs have been conducted.

Municipalities must pass a legal resolution in order for specific properties to participate in the NYC-Funded Flood Buyout Program. Accordingly, a local government or its designated outreach lead is the primary actor interacting with individual property owners to refer properties to the NYC-Funded Flood Buyout Program. This framework allows elected municipal officials and communities themselves to have the power to integrate their knowledge of the area and the flood risk into their program. In addition, NYC DEP



Map of New York City's Water Supply System.

This map shows the boundaries of the New York City Watershed — which affects New York City's water supply system — within the state's larger geography.

Credit: New York City Department of Environmental Protection.

possesses the staff support and resources necessary to implement real estate services for buyouts, which rural communities typically lack. NYS DEC also provides guidance and technical assistance to local governments statewide that may not have to establish a long-term buyout program but may have a need for a few acquisitions tied to a specific flood risk.

Nonprofit Support for Buyouts

In addition to the coordination between the state and the city, local governments in the NYC watershed are aided by nonprofits like CWC to fund and plan for the relocation impacts of buyouts. Among its many functions, CWC offers grants to municipalities to support comprehensive buyouts throughout the watershed by accounting for where people and structures can be relocated. Specifically, CWC administers a Flood Hazard Mitigation Implementation Program.[6] Under the Flood Hazard Mitigation Implementation Program's Sustainable Communities Planning Program, CWC provides grants to local governments to amend their local land-use laws, comprehensive plans, and floodplain maps to identify areas where FEMA- and NYC-bought-out structures and people could be relocated.[7] This example of funding assistance demonstrates how local governments can proactively update local plans, codes, and maps to account for the long-term impacts of buyouts, including where people and structures can be moved out of harm's way. Local governments can also apply for funding from NYC that is provided through CWC to purchase land to relocate businesses and critical facilities a part of the NYC Flood Buyout Program (although, as of July 2019, no successful relocations have occurred). Other types of grant opportunities can facilitate and support local government efforts to engage in similar longer-term planning exercises.

Environment

NYC aims to restore and conserve floodplains post-buyouts in order to maximize the ecosystem and community benefits of these retreat strategies. First, one novel feature of flood buyout programs in NYC's watershed is that regardless of whether funds derive from FEMA or the city, local communities are encouraged to own the properties. After a property is bought out and structures are demolished, either NYC or other municipalities take ownership of and manage the properties; however, NYS DEC reserves a conservation easement to ensure that the land is held in perpetuity to restore floodplain benefits. For properties owned by a local government, a "reuse plan" can be created for each bought-out property. Reuse plans encourage local governments to consider how bought-out properties might be used to mitigate future flood risk — and also to consider potential development opportunities for areas that are higher than flood zones.

In the NYC watershed, NYS supports floodplain restoration projects that are identified by the LFA process and have the goals of reducing flood damages and protecting water quality. NYS works with Soil and Water Conservation Districts to leverage flood mitigation dollars from the NYC DEP Stream Management Program as a match for state and federal funds for restoration projects. For example, in the Village of Walton, the Delaware County Soil and Water Conservation District removed over 42 thousand cubic yards of floodplain fill to restore a floodplain within the village's business district. The project will lower flood elevations and reduce future damages, helping main street businesses to reduce the impact of flood events and facilitate their recovery. Local communities — using the state, city, and county resources through the LFA process — can create solutions that are deemed best for their specific hydrological conditions, real estate market, and social preferences.

Funding

The NYC LAP and Flood Buyout program are almost entirely funded by NYC ratepayers through water and sewer bills. In addition, some buyouts implemented under NYC DEP's Flood Buyout Program are funded by grants from the FEMA Hazard Mitigation Grant Program.[8]

Considerations and Lessons Learned

NYC's Land Acquisition and Flood Buyout programs represent a comprehensive, data-driven approach to buyouts that involves coordination across different agencies, levels of government, and public-private partners. NYC DEP's partnership with the state and local governments in the NYC watershed can serve as a model to encourage state support for community-driven buyout processes that could be introduced and replicated throughout a state, based on local need. Here, local governments lead these inherently local decisions, but the state can account for oversight and consistency across watersheds to ensure that buyouts achieve their intended purpose of mitigating future flood risk. In addition, other local governments could consider adopting a similar dual land acquisition and flood hazard mitigation program like NYC's Land Acquisition and Flood Buyout programs if the co-benefits and geographic context of different projects align. This extensive work through state-local coordination and public-private partnerships can be instructive for other jurisdictions regarding how to incorporate long-term considerations to plan for — and make investments in — potential relocation areas and environmental restoration and conservation into the design and implementation of buyouts.

Endnotes

1 *New York City Water Supply*, N.Y. State Dep't of Envtl. Conservation, **https://www.dec.ny.gov/lands/25599.html** (last accessed Dec. 19, 2019); *see also About the Watershed*, N.Y. City Dep't of Envtl. Prot., **https://www1.nyc.gov/site/dep/environment/about-the-watershed.page** (last accessed Dec. 19, 2019).

2 *New York City Water Supply*, N.Y. State Dep't of Envtl. Conservation, **https://www.dec.ny.gov/lands/25599.html** (last accessed Dec. 19, 2019).

3 Catskill Watershed Corp., **https://cwconline.org/** (last accessed Dec. 19, 2019).

4 *New York City Water Supply*, N.Y. State Dep't of Envtl. Conservation, **https://www.dec.ny.gov/lands/25599.html** (last accessed Dec. 19, 2019) ("The [NYC watershed] partnership was organized to protect and to ensure that New Yorkers continue to enjoy high quality, affordable drinking water and to avoid the need for costly filtration — a cost estimated at between $8.0 to $10.0 billion to construct the facility and approximately $1.0 million each day to operate and maintain the filtration plant.").

5 LFAs are also are very similar to Flood and Ice Jam Mitigation Studies being conducted through the Resilient NY program at the state level. Georgetown Climate Ctr., *New York State Resilient NY Flood Mitigation Studies, Buyouts, and Floodplain Restoration Projects*, Adaptation Clearinghouse, **https://www.adaptationclearinghouse.org/resources/new-york-state-resilient-ny-flood-mitigation-studies-buyouts-and-floodplain-restoration-projects.html** (last visited Jan. 21, 2020).

6 *Flood Hazard Mitigation Implementation (FHMI) Program*, Catskill Watershed Corp., **https://cwconline.org/** (last accessed Dec. 19, 2019).

7 *Id.*

8 Georgetown Climate Ctr., *FEMA Hazard Mitigation Grant Program*, Adaptation Clearinghouse, **https://www.adaptationclearinghouse.org/resources/fema-hazard-mitigation-grant-program.html** (last visited Nov. 11, 2019).

State of New Jersey: Blue Acres Buyout Program

Executive Summary

Established in 1995, the New Jersey Blue Acres Buyout Program is a nationally recognized example of a longstanding, state-run buyout program. Blue Acres works closely with municipalities throughout the state to identify privately owned properties that are routinely threatened or flooded due to sea-level rise and more frequent weather events. The program's experience with buyouts positioned the state to respond quickly to purchase properties from willing residents in the wake of Hurricane Sandy. The program works directly with local governments to prioritize comprehensive buyouts of affected neighborhoods, instead of individual properties, and restores and protects the properties to maximize the flood and cost-reduction benefits for communities and the environment. To accomplish effective state-local coordination, the program has a diversified staff that meets local needs including case workers who work directly with participants in each buyout area, and a financial team that negotiates mortgage forgiveness with banks and other financial lenders on behalf of homeowners. Blue Acres was established with $15 million in funding from the Green Acres, Farmland, and Historic Preservation and Blue Acres Bond Act of 1995. Additional funding was provided in two different bond acts in 2007 and 2009. In the wake of Hurricane Sandy, Blue Acres secured nearly $300 million in federal funding from the Federal Emergency Management Agency's Hazard Mitigation Grant Program and Department of Housing and Urban Development's Community Development Block Grant–Disaster Recovery program. In 2019, the New Jersey Legislature passed a constitutional measure to provide a sustainable source of funding for Blue Acres from a portion of the state's Corporate Business Tax. As climate change worsens and makes extreme weather events more common, other states and local governments may increasingly evaluate the potential for buyouts, particularly in coastal jurisdictions. Decisionmakers could consider institutionalizing buyouts as a part of comprehensive climate adaptation and coastal and floodplain management strategies to encourage neighborhoods to relocate to safer, higher ground areas and restore ecosystems to attain flood, natural resources, and other community benefits.

Background

New Jersey Green and Blue Acres Programs

New Jersey is a northeastern state bordering the Atlantic Ocean with more than 1,800 miles of tidally influenced shoreline impacted by environmental threats including sea-level rise, flooding, and erosion.[1] New Jersey is the nation's most densely populated state with a total population of 8.9 million, of which seven million live along the coast. In addition to the coastal population, communities throughout the entire state are being disproportionately affected by climate change and sea-level rise.

Housed under the Department of Environmental Protection's (DEP) Green Acres Program — which was created in 1961 to meet the state's mounting recreation, conservation, and preservation objectives[2] — the Blue Acres Buyout Program was established through the Green Acres, Farmland, and Historic Preservation and Blue Acres Bond Act of 1995. The Green Acres Program acquires and preserves undeveloped land to advance open space and recreation in the state through an interconnected system of land.[3] In contrast, the Blue Acres program buys developed properties that have been or will be damaged by storms or storm-related flooding, or that buffer or protect other lands from flooding.[4] The Blue Acres Program allows the state to purchase privately owned land from willing sellers, demolish those structures, and prohibit future development for the purpose of reducing future flood risks.[5] Combined, New Jersey's Green and Blue Acres programs enable the state to comprehensively acquire lands to preserve open space, expand passive recreation areas, and enhance flood hazard mitigation.

Increased Buyouts After Hurricane Sandy

Blue Acres received renewed attention in October 2012 in the aftermath of Hurricane Sandy, which caused significant damage to the state's residential, commercial, and infrastructure sectors.[6] More than 300,000 housing units were impacted and a preliminary post-storm figure estimated damage repair and recovery costs in New Jersey at $30 billion.[7] In 2018, the National Oceanic and Atmospheric Administration's National Hurricane Center ranked Hurricane Sandy the fourth worst storm in U.S. history in terms of total economic damages (including but not limited to New Jersey) in excess of $65 billion.[8]

Given Blue Acres's deep experience as DEP's conservation real estate arm for the state's Parks and Forests and Fish and Wildlife divisions, the program was well-positioned to quickly mobilize after Sandy and work with local governments and residents interested in voluntary buyouts. While many states focus buyouts on just one area in their state, typically after a disaster declaration, Blue Acres has purchased properties across 16 municipalities throughout New Jersey. Seven years after Hurricane Sandy, Blue Acres has spent approximately $190 million to acquire more than 700 properties and demolish 665 homes. Today, the New Jersey Blue Acres Program is completing post-Sandy buyouts and turning its attention to inland riverine communities that are experiencing more frequent and heavy rain events. As flooding becomes more widespread due to climate change, Blue Acres continues to evolve to meet the state's growing need to increase overall resiliency.

Managed Retreat Examples

Voluntary Buyout Program

The program applies a voluntary, willing-seller approach and, beginning with an informational meeting, works to obtain both residential and municipal support. Each municipality is assigned a Blue Acres Town Liaison who serves as a conduit between the program, the state, municipality, and local community throughout the entire process to keep information flowing and prevent bottlenecks. To make homeowners financially "whole" and enable them to relocate, homes are purchased at their pre-storm fair market value whenever possible, in compliance with federal funding criteria. Following the state's purchase of a property, all remaining structures are demolished and the land is restored to its natural state in perpetuity. In order to improve flood reabsorption, the program focuses on blocks of contiguous homes for buy out and demolition, as opposed to individual "checkerboard" buyouts.

Staffing and Leadership

Notably, the Blue Acres Program has been led since 2004 by one director, Fawn Z. McGee, and this continuity has resulted in the building of long-standing relationships with, and a well-known presence in, municipalities throughout New Jersey. Such continuity has resulted in strong relationships at the local, state, and federal levels. In addition, an extensive track record has enabled the state to create, make the case for, and implement a long-term, comprehensive vision that positions the program to play a leading role in flood mitigation planning in New Jersey.

While the program started with three staff members, it grew considerably in the aftermath of Hurricane Sandy. From the beginning, staff members had to employ a diversity of skills to accommodate the criteria involved in a federal-, as opposed to a state-, funded buyout process. Additional staff capabilities were added as new challenges arose.

In addition to individual case managers, Blue Acres required a financial and project management expert to work side-by-side with the Federal Emergency Management Agency (FEMA) to modify its existing benefit-cost analysis (BCA) formula to fit the realities of New Jersey's housing stock. Because FEMA requires a separate funding application for each individual buyout community, the first BCA would become the foundation for future buyout efforts in every other New Jersey community. In addition, the finance team expanded its duties to work with banks and other financial lenders to secure debt forgiveness for homeowners with "upside-down mortgages."[9] Without such forgiveness, approximately 15 percent of eligible participants would be unable to accept the state's offer. Any financial issue that blocks participation affects the program's goal of creating large-scale land buffers between rivers and homes. The program's experience with short sales, loan forgiveness, and simultaneous closings enhances its ability to move more people out of harm's way and deliver broader floodplain benefits for the greater community.

Another noteworthy aspect of the Blue Acres program is its role in tenant relocation. Under federal funding requirements for the U.S. Department of Housing and Development's Community Development Block Grants–Disaster Recovery (CDBG–DR) program,[10] any tenant displaced by either a disaster event, or by the buyout of their rental property, must be given help in locating and paying for a comparable and livable housing unit. In 2017, in order to serve renters more quickly, Blue Acres added a tenant relocation capability and hired a team to work directly with renters and landlords. Since then, the program has distributed more than $1 million in relocation assistance to 44 households.

Environment

The New Jersey Blue Acres Program is also unique because it works with municipalities and other partners after demolition to restore and conserve bought-out land. The program's commitment to prioritizing larger neighborhood-wide buyouts can help maximize environmental and hazard mitigation benefits. In Woodbridge Township, the state and township are partnering with The Land Conservancy of New Jersey and Rutgers University to design a flood buffer with passive recreational amenities for residents, like trails and a kayak launch, that can also become community assets.[11] The Blue Acres Program believes that Woodbridge can serve as one example of long-term land restoration and management for other municipalities. In addition, the revitalization of empty lots suggests that, through active ecosystem restoration and management, a community can potentially work to minimize the overall tax loss from buyouts by potentially increasing surrounding property values.

Community Engagement

While the buyout program is voluntary, Blue Acres employs several strategies to educate communities about buyouts including by hosting informational meetings in communities that are staffed by the full Blue Acres team and participating in door-to-door outreach campaigns. In addition, the program has witnessed greater success in communities where one resident becomes an advocate for buyouts and moves to engage and educate his or her neighbors. Success is multiplied whenever residents engage with each other and encourage others to participate in the buyout program.

Funding

Blue Acres was established with funding from the Green Acres, Farmland, and Historic Preservation and Blue Acres Bond Act of 1995. A second bond act in 2007 allocated $12 million to acquire land in the Delaware, Passaic, and Raritan River floodplains, while in 2009, a third bond act allocated $24 million to be used statewide for recreation and conservation purposes. State buyouts were 100 percent state-funded before 2010, when the program secured its first competitive FEMA grant. In the wake of Hurricane Sandy, Blue Acres secured nearly $300 million additional funds from FEMA's Hazard Mitigation Grant Program[12] and HUD's CDBG–DR program[13] to fund post-storm buyouts.

Next Steps

In June 2019, the New Jersey Legislature passed a constitutional measure — Senate Bill No. 3920 — setting aside a portion of the state's Corporate Business Tax (CBT) to provide funding for the Blue Acres program and open space, farmland, and historic preservation.[14] Now, under New Jersey's Constitution, six percent of the total money collected through the CBT is reserved for these purposes on an annual basis.[15] Compared to individual bond measures, Senate Bill No. 3920 provides the Green and Blue Acres programs with a more sustainable, consistent source of funding. Moreover, this law will enable the state to design and implement longer-term, multi-phased plans for buyouts not tied to disaster events.

Considerations and Lessons Learned

The New Jersey Blue Acres Program is a rare example of a state-run buyout program that actively advances climate change adaptation and resilience. Moreover, by operating under the Green Acres Program, the state can maximize the benefits of land acquisitions by having programs for both open space and flood mitigation. Based on its longevity and experience, the New Jersey Blue Acres Program can serve as a model for other state and local governments to initiate or update their own programs, even if that means starting small as Blue Acres did back in 1995.

Blue Acres demonstrates the importance of human interaction in a buyout program. Successful buyout programs — whether managed at the state or local level — require people who can build long-standing relationships with communities and adapt to a range of obstacles that arise. For jurisdictions interested in creating a buyout program to respond to sea-level rise, chronic flooding, and long-term land loss, Blue Acres shows that it is key to have the right human infrastructure in place — from effective, visionary leaders to diverse case managers — to facilitate and support residents navigating these complex decisions.

Through state bond measures and the Corporate Business Tax set aside, the New Jersey Blue Acres Program has steady sources of funding that make buyouts more attractive to municipalities and homeowners as a climate adaptation or flood mitigation strategy. When the state acts to ease the financial and procedural burdens on local governments and residents, buyout programs are more likely to be implemented. Local governments could similarly appropriate their own money for buyouts or generate an independent source of revenue like the Corporate Business Tax, for example, through stormwater fees.

Endnotes

1 Dep't of Envtl. Prot., State of N.J., *Background Information: Coastal Resiliency and Building Ecological Solutions*, SEEDS–The State Environmental Education Directory, **https://www.nj.gov/dep/seeds/bescch/2_bkgrdinfo.htm** (last updated Oct. 18, 2017).

2 Press Release, *Armato Bill Providing Funds for Acquisition of Lands for Recreational and Conservational Purposes Clears Assembly to be signed by Governor Murphy Friday August 10th*, Insider N.J. (Aug. 10, 2018), **https://www.insidernj.com/press-release/armato-bill-providing-funds-acquisition-lands-recreational-conservational-purposes-clears-assembly-signed-governor-murphy-friday-august-10th/**.

3 Dep't of Envtl. Prot., State of N.J., *Welcome to Green Acres!*, Green Acres Program, **https://www.nj.gov/dep/greenacres/** (last updated Dec. 13, 2019).

4 *Id.*; Assembly Agriculture and Natural Resources Committee Statement to S. 3920, 218th Leg. p. 2 (N.J. 2019), *available at* **https://www.njleg.state.nj.us/2018/Bills/S3000/2920_S3.PDF** ("The Blue Acres program is administered as a component of the [Department of Environmental Protection's] Green Acres program. 'Blue Acres' is the term used to refer to properties that have been damaged by storms or storm-related flooding, that appear likely to incur such damage, or that may buffer or protect other lands from such damage. Structures on a purchased property are demolished, the debris is removed, and the land is preserved as open space.")

5 *See supra* n.4.

6 Governor's Office of Recovery & Rebuilding, New Jersey Five Years Post-Sandy: Stronger Than the Storm 6 (2017), *available at* **https://www.renewjerseystronger.org/wp-content/uploads/2015/06/Sandy_5_Years_After_10_13_17_v3-2.pdf**.

7 *Id.*

8 Nat'l Hurricane Ctr., Nat'l Oceanic & Atmospheric Admin., Dep't of Commerce, Costliest U.S. Tropical Cyclones Tables Updated 2 (Jan. 26, 2018), *available at* **https://www.nhc.noaa.gov/news/UpdatedCostliest.pdf**.

9 An "upside-down mortgage" is when a homeowner owes more on his/her home than it is worth. While Blue Acres offers people the pre-storm fair market value of their homes, an upside-down mortgage can decrease the value of their homes and therefore the market price they can receive for the buyout, which can act as a financial barrier to their participation.

10 Georgetown Climate Ctr., *HUD Community Development Block Grant–Disaster Recovery,* Adaptation Clearinghouse, **https://www.adaptationclearinghouse.org/resources/hud-community-development-block-grant-disaster-recovery.html** (last visited Feb. 3, 2020).

11 *See* Georgetown Climate Ctr., *Managing the Retreat from Rising Seas — Woodbridge Township, New Jersey: Post-Hurricane Sandy Buyouts,* Adaptation Clearinghouse (2020), *available at* **https://www.adaptationclearinghouse.org/resources/managing-the-retreat-from-rising-seas-eo-woodbridge-township-new-jersey-post-hurricane-sandy-buyouts.html**.

12 Georgetown Climate Ctr., *FEMA Hazard Mitigation Grant Program*, Adaptation Clearinghouse, **https://www.adaptationclearinghouse.org/resources/fema-hazard-mitigation-grant-program.html** (last visited Feb. 3, 2020).

13 Georgetown Climate Ctr., *HUD Community Development Block Grant–Disaster Recovery*, Adaptation Clearinghouse, **https://www.adaptationclearinghouse.org/resources/hud-community-development-block-grant-disaster-recovery.html** (last visited Feb. 3, 2020).

14 Tom Johnson, *New Law Simplifies How State Allocates Funds to Preserve Open Space*, NJSpotlight (June 28, 2019), **https://www.njspotlight.com/2019/06/19-06-27-new-law-simplifies-how-state-allocates-funds-to-preserve-open-space/**.

15 N.J. Const. art. VIII, § II, ¶ 6(a) (2019), *available at* **https://www.njleg.state.nj.us/lawsconstitution/constitution.asp** ("Commencing July 1, 2019, there shall be credited to a special account in the General Fund an amount equivalent to six percent of the revenue annually derived from the tax imposed pursuant to the 'Corporation Business Tax Act (1945),' P.L.1945, c.162 (C.54:10A-1 et seq.), as amended and supplemented, or any other State law of similar effect. . . . Commencing July 1, 2019, seventy-eight percent of the amount annually credited pursuant to this subparagraph shall be dedicated, and shall be appropriated from time to time by the Legislature, only for: providing funding, including loans or grants, for the preservation, including acquisition, development, and stewardship, of lands for recreation and conservation purposes, including lands that protect water supplies and lands that have incurred flood or storm damage or are likely to do so, or that may buffer or protect other properties from flood or storm damage; providing funding, including loans or grants, for the preservation and stewardship of land for agricultural or horticultural use and production; providing funding, including loans or grants, for historic preservation; and paying administrative costs associated with each of those efforts.").

Woodbridge Township, New Jersey: Post-Hurricane Sandy Buyouts

Executive Summary

Woodbridge Township, New Jersey is working with the New Jersey Blue Acres Program to implement a neighborhood-wide buyout that can serve as an example for other jurisdictions considering larger-scale retreat from coastal areas. Following significant damage from Hurricane Sandy in 2012, Woodbridge applied to participate in the New Jersey Blue Acres Buyout Program. The Blue Acres Program uses federal and state funding to voluntarily purchase privately owned properties that are routinely threatened and flooded. With the support of the state, local elected officials in Woodbridge, including the mayor, committed to a community-based approach and prioritized flood mitigation and future safety and emergency management benefits over potential tax base losses if residents relocated outside of the township. As a result of this approach and an extensive community engagement process, nearly 200 property owners accepted a buyout offer. Once structures are demolished, the township is restoring bought-out land to create a natural flood buffer. The township established an Open Space Conservation/Resiliency Zone to institutionalize protections for this area by prohibiting new development and discouraging redevelopment. As a result of the buyouts and land restoration, the township is achieving multiple benefits, including reduced flood insurance premiums for its residents by participating in the federal Community Rating System. Woodbridge's example demonstrates how comprehensive, community-based approaches to buyouts can maximize long-term benefits for communities and the environment. Other local governments can consider partnering with their states and residents, among others, to use buyouts as a retreat strategy to make communities more resilient.

Flooding During Hurricane Sandy.

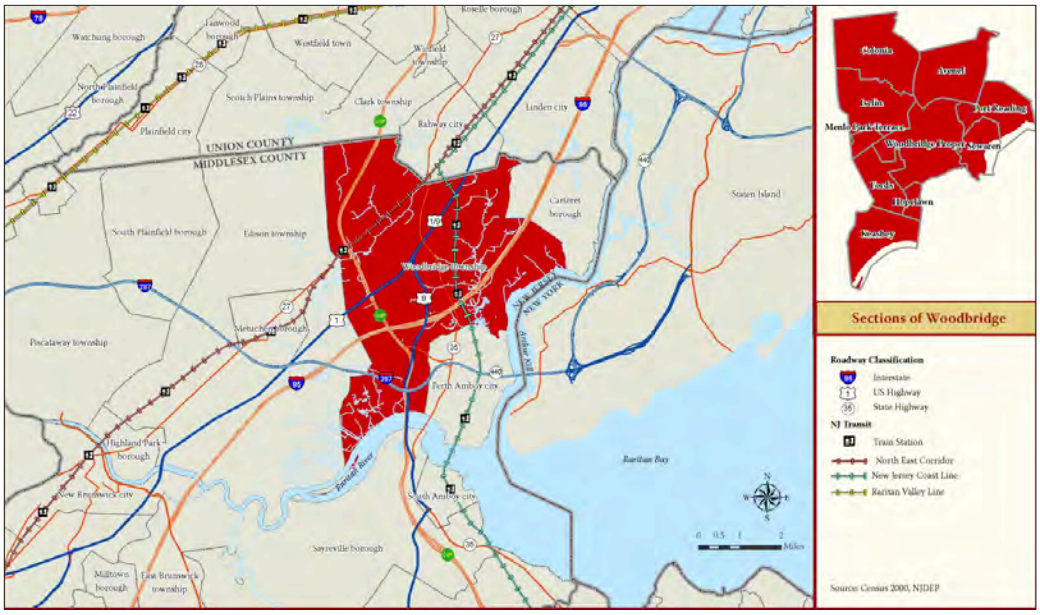
The lighter color of wood on the bottom of the telephone poll (in contrast to the darker color on top) is a visual reminder of the height of the flood waters that overflowed from the tidally influenced Woodbridge River during Hurricane Sandy in 2012.

Credit: Katie Spidalieri, Georgetown Climate Center.

Background

Woodbridge is a township in Middlesex County, New Jersey with a population of nearly 100,000 residents. Woodbridge covers an area of approximately 25 square miles and is both the oldest and sixth largest township in New Jersey. It is bordered to the east by the Arthur Kill tidal strait and to the south by the tidal Raritan River. The Woodbridge River extends from the northeastern corner of the township to Arthur Kill.

The township has a history of tidal and fluvial flooding in low-lying areas adjacent to these waterways and is vulnerable to coastal storms. Flooding vulnerabilities are exacerbated by the township's large amount of impervious surface cover and limited availability of open spaces. Woodbridge experienced its most severe flooding impacts during Hurricanes Irene and Sandy in 2011 and 2012, respectively. After Hurricane Sandy, the township worked with the state to apply for grants from the Federal Emergency Management Agency (FEMA) to help residents recover and make its community more resilient to future flood events.



Map of Woodbridge Township.

This map provides a regional context for Woodbridge relative to surrounding municipalities, highways, and water bodies.

Credit: Woodbridge Township, New Jersey Master Plan I-3 (Feb. 2009).

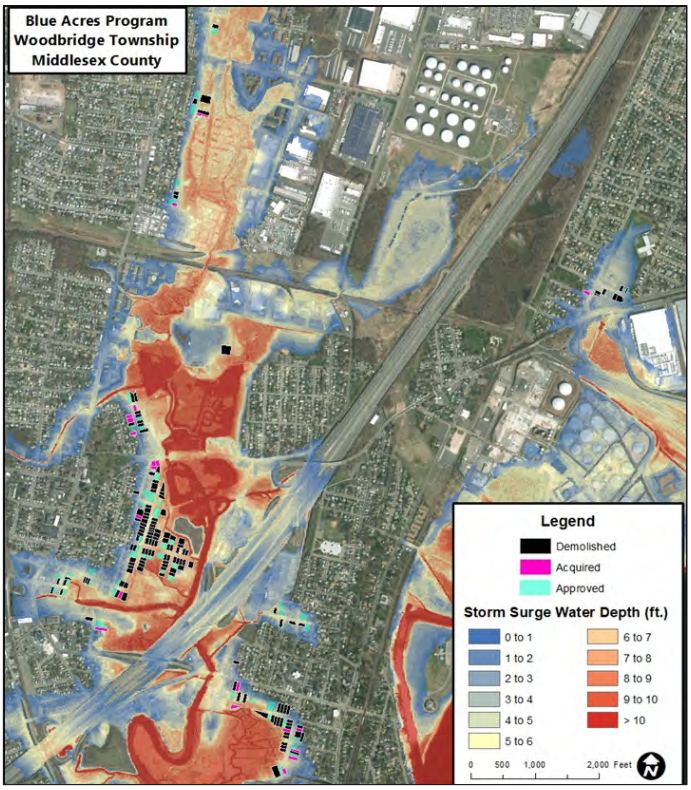
Managed Retreat Examples

State-Local Coordination

In 2013, Woodbridge applied to the New Jersey Blue Acres Buyout Program for funding and assistance to conduct voluntary buyouts. Woodbridge focused on an approximately 120-acre area adjacent to the Woodbridge River that contains the 200 homes most significantly affected or damaged by flooding during Hurricane Sandy. The Blue Acres Program accepted Woodbridge's offer to pursue buyouts for those 200 homes and worked closely with the township throughout the entire process to leverage state expertise and experience with local staff resources and ties to the community.

At the start of this process, Woodbridge, through its mayor, made a public commitment that any buyouts would be voluntary and that neither the state nor the township would use its power of eminent domain to acquire homes. This commitment enabled the township to have a more trusted, open, and productive dialogue with interested residents. In addition, the township aimed to provide people with an option to recover post-Hurricane Sandy and mitigate future flood risk despite potential losses to Woodbridge's tax base if bought-out residents relocate outside of the township. Given that Woodbridge is an urban-suburban township and the sixth largest in New Jersey, future growth projections in Woodbridge may help offset or minimize any potential losses.

By the summer of 2014 — less than two years after Hurricane Sandy — 142 homeowners in Woodbridge accepted buyouts through the Blue Acres Program. To make the buyout process more manageable and efficient, homes were divided into three phases for close out and demolition. Woodbridge has a staff member trained in Geographic Information Systems (GIS) who is tracking the number, location, and status of buyouts to aid the township in working with and being responsive to requests for information from the state and residents.



GIS Map of Buyouts in Woodbridge.

The township and the state have been working together to map and track buyouts throughout all three phases of this process. The storm surge overlay corresponds with the 200 homes most significantly affected or damaged by flooding during Hurricane Sandy.

Credit: Woodbridge Township and New Jersey Blue Acres Program.

Among other factors, the state-local partnership between Woodbridge and the Blue Acres Program was integral to attaining such a large number of buyout participants. One example of cooperative action illustrates the positive impact of this partnership. Within the buyout area, there were a number of abandoned properties foreclosed by private banks. Since the state is not able to purchase properties that have been foreclosed, these bank-owned properties could be resold and redeveloped within the floodplain. In turn, new development would produce a "checkerboard" effect throughout the larger buyout area that would decrease the economic and environmental returns on investment for the rest of the neighborhood. In response, the township worked with banks and used local funds to acquire approximately three homes at a cost of

Top:

Homes Elevated in the Open Space Conservation/Resiliency District.

Although this home was elevated prior to when the Open Space Conservation/Resiliency District was established, it shows how high some homes in the district will have to be elevated if there is any application for new development or redevelopment or a change in occupancy or tenancy.

Credit: Katie Spidalieri, Georgetown Climate Center.

Bottom:

Restoring Bought-out Properties.

Bought-out properties like this one are being restored to natural conditions to enhance floodplain and community benefits.

Credit: Katie Spidalieri, Georgetown Climate Center.

approximately $25,000 each; these properties were then transferred to the township for structural demolition and open space conversion. The township's willingness to purchase foreclosed properties supplemented buyouts funded by the state to maximize the scale of these buyouts.

Zoning

As a part of the buyout process, Woodbridge amended its zoning ordinance to facilitate a community-scale buyout and minimize the number of "holdouts" to maximize ecosystem restoration and flood risk reduction benefits. In 2016, Woodbridge's mayor and City Council rezoned the 120-acre buyout area from Residential to Open Space Conservation/Resiliency to prohibit new development and only allow for passive recreational amenities like trails and open space uses to preserve the floodplain.[1] In addition, existing homes in the Open Space Conservation/Resiliency Zone have to be elevated at least one foot above federal requirements set by FEMA when "building design standards" are triggered including any proposed: "demolition, addition, reconstruction, renovation, sale or conveyance of the property, or change in tenancy."[2] Specifically, homes in this zone must be elevated if any redevelopment or structural changes above ordinary maintenance are planned, in addition to any property transfers or changes in occupancy or tenancy. By establishing the Open Space Conservation/Resiliency Zone, the township's aim is to protect its bought-out area as natural flood buffers by encouraging people to sell their homes to the state in lieu of investing in expensive home elevations. Moreover, this zoning ordinance can also discourage private developers from quickly purchasing properties at a low cost after a disaster and then rebuilding in vulnerable floodplains.

Environment

Woodbridge is working to restore bought-out properties to mitigate flood risk and provide natural resource and passive recreation benefits for surrounding residents. Initially, the town hired an ecologist to study the need for a floodplain restoration plan that would safeguard against flooding for community residents living further inland.[3] The township has also partnered with a nonprofit, The Land Conservancy of New Jersey[4] and Rutgers University on land restoration and conservation. As a part of this plan, the land will be restored to serve as a flood buffer for the Woodbridge River. Residents adjacent to the bought-out properties initially expressed concerns that they did not want to have unmanaged or unkempt wetlands and forests growing near their properties for purposes of preserving curb

appeal and neighborhood character. In response, the township developed a strategy for a gradual restoration buffer, where shorter varieties of vegetation will be planted closer to residents and taller forms of vegetation will be planted closer to the river, so there will be a height gradation. The new vegetation is natural to the area and consists of water absorbing plants and trees. This strategy will have a positive impact on the quality of the floodplain and also help to increase community support for maintaining this important area because it will be viewed as a natural asset in lieu of a nuisance.

In 2018 alone, the township and its partners planted hundreds of trees and examined soil quality, all to increase the area's flood storage capacity and facilitate faster growth of a biodiverse salt marsh ecosystem.[5] Once entire areas are bought out, Woodbridge is also removing roads for purposes of reducing government liability and maintenance costs. The aim is that the restored parcels will convert back to a natural state through active management and monitoring and also provide a place for the public to interact with nature through installations, such as trails or a kayak launch.

As a result of these buyouts and restoration efforts, Woodbridge is already realizing economic benefits. In 2018, Woodbridge began participating in the Community Rating System (CRS). CRS is a voluntary program administered by FEMA under the National Flood Insurance Program that allows participating municipalities to earn discounts on their residents' flood insurance premiums.[6] On a CRS Class Scale from one to ten — with Class One providing the highest insurance premium discount and Class Ten the lowest — Woodbridge entered CRS as a Class Six community. Woodbridge is continuing to evaluate additional opportunities to improve its rating and increase premium discounts including for buyouts that have been approved by the state but have not yet been completed.

Removing Infrastructure.

This image from June 2019 shows where the city removed part of a road in the Phase One bought-out area after homes were demolished. A city's ability to remove or abandon roads can eliminate the need for continued maintenance and enhance ecosystem restoration as the land naturally regenerates. Note, however, that utility lines are still present.

Credit: Katie Spidalieri, Georgetown Climate Center.

Community Engagement

The buyout process in Woodbridge greatly benefited from significant public engagement. Overall, the community-based effort in Woodbridge looked comprehensively at using a public-private partnership to work with residents in response to their individual and evolving needs throughout this process. This approach allowed the township to simultaneously achieve the community, environmental, and economic benefits of a large-scale buyout while minimizing the potential costs associated with a person's decision to participate in a buyout program.

After Woodbridge identified buyouts as a potential disaster redevelopment strategy through the Blue Acres Program, one resident living in the area affected by Hurricane Sandy spearheaded an education and outreach campaign with the support of the state, the township, and The Land Conservancy of New Jersey. Collectively, the team conducted both door-to-door outreach and held public meetings to educate residents about the New Jersey Blue Acres Program and the

Community Engagement in Woodbridge.

Here, the head of the New Jersey Blue Acres Program and one buyout participant embrace one another. The two worked together throughout this process.

Credit: Courtesy of Woodbridge Township, New Jersey.

community and environmental benefits that could result from a neighborhood-scale buyout. Public officials, like the mayor and the head of the New Jersey Blue Acres Program, were also present at public meetings to answer questions, correct any misinformation, and underscore the voluntary nature of these buyouts. Over time, most of the residents in the projected buyout area — all but 13 out of 200 — chose to participate in the New Jersey Blue Acres Program. New participants even broadcasted their decision by putting signs on their lawns that read, "Blue Acres For Sale: We have submitted our Blue Acres application. Have you?" to encourage others to apply as well.

After residents applied to the New Jersey Blue Acres Program, both state and local staff helped walk them through the complex process and worked to get to know participants on a personal level in an attempt to mitigate the potential economic and social tradeoffs of a buyout. For example, neither the state nor Woodbridge provided financial or other types of relocation assistance for bought-out homeowners.[7] In an attempt to fill that funding gap, the township aimed to connect people with different organizations like Catholic charities that could gift small sums of money to offset expenses like moving or closing costs not included in the price of a buyout. In addition, the township worked with local apartment complexes to try to get bought-out residents off of waiting lists for new rental units so they could relocate within Woodbridge.

Funding

After Hurricane Sandy, the state received Hazard Mitigation Assistance grants from FEMA for buyouts throughout the state, including in Woodbridge.[8] Woodbridge also leveraged other smaller pots of funding for discrete purposes. For example, the township drew on its local appropriations to purchase homes that were foreclosed by banks and to mow or maintain properties post-demolition but prior to restoration. In addition, the township benefited from monetary and in-kind support from partners like The Land Conservancy of New Jersey and Rutgers University to facilitate large-scale community engagement and restoration plans and efforts.

Next Steps

As of 2019, the New Jersey Blue Acres Program has finalized offers on and demolished several properties in Woodbridge, although the buyout process is ongoing. Although the state will own the bought-out land in perpetuity, Woodbridge will continue to work with its partners to restore the area through plantings and monitoring activities, remove unnecessary roads as homes are demolished, and protect the land's floodplain and conservation benefits through enforcement of the Open Space Conservation/Resiliency Zone.

Considerations and Lessons Learned

Woodbridge, New Jersey's large-scale buyout demonstrates how leveraging partnerships, local political support, and comprehensive approaches to hazard mitigation acquisitions can result in long-term benefits for communities and the environment.

First, a variety of partners aided the township in this process. Most notably, Woodbridge's partnership with the New Jersey Blue Acres Program was integral. When Hurricane Sandy hit, the New Jersey Blue Acres Program was already in place to provide staff support for local buyouts and was eligible to receive FEMA Hazard Mitigation Assistance grants. After Hurricane Sandy, Woodbridge was able to draw on the Blue Acres Program's existing expertise to "hit the ground running," fund buyouts for interested property owners, and build local capacity for potential future buyouts and federal grants. In addition, Woodbridge's partnership with The Land Conservancy of New Jersey and local residents helped spearhead and then grow a community-based effort to maximize the risk reduction and environmental benefits of neighborhood-wide buyouts. Community leaders who experienced property damage after Hurricane Sandy were able to have a dialogue with similarly situated residents, which likely increased buyout participation compared to if the township had conducted outreach on its own. Also, The Land Conservancy of New Jersey and Rutgers University are playing an important role in designing, restoring, and maintaining bought-out properties in ways that are responsive to community concerns and will simultaneously enhance long-term flood retention in Woodbridge. Other coastal states, municipalities, nonprofits, and universities could similarly seek to contribute their respective expertise and resources to local, neighborhood-scale buyouts as a hazard mitigation and retreat strategy.

Blue Acres For Sale.

Many residents that chose to participate in the Blue Acres program placed this sign on their lawns with the aim of encouraging their neighbors to consider a buyout as well.

Credit: Sandy Urgo, The Land Conservancy of New Jersey.

Second, the buyouts in Woodbridge were successful in part due to support from local elected officials and staff, especially the mayor. Here, the mayor publicly expressed his support for a large-scale buyout in the township, but only if residents themselves chose to participate in the New Jersey Blue Acres Program. The mayor's position that buyouts would be strictly voluntary and that eminent domain would not be used enabled residents to have a more open dialogue with one another and the township without fear that the government would force them to leave their homes. Moreover, the mayor was willing to supplement the state's efforts where local action was needed to fill in gaps, for example, by purchasing foreclosed properties with local funds. Notably, the mayor did not allow a potential loss in Woodbridge's tax base to act as a barrier to the township's participation in the Blue Acres Program; the mayor found that ongoing development in other parts of Woodbridge would likely offset any property tax losses for the township overall. In contrast, other municipalities, particularly those in rural areas, may not similarly have positive future growth projections and might weigh potential property tax losses differently. Regardless, the

example set by Woodbridge's mayor demonstrates the important role elected officials can play in setting expectations about retreat strategies for staff and residents and also how those expectations may shape or influence project scale and outcomes.

Third, Woodbridge's comprehensive approach to buyouts will enable the township to achieve more enduring benefits. From robust community engagement to long-term plans for ecosystem restoration and protection through zoning amendments and road removals, Woodbridge viewed the buyout process as beginning with conversations with individual residents and continuing after homes are demolished. Specifically, Woodbridge is using buyouts to realize a more resilient future for part of its community by offering residents the opportunity to relocate and prioritizing flood risk mitigation through environmental restoration and conservation. The township's Open Space Conservation/Resiliency Zone will help to protect the bought-out neighborhood along the Woodbridge River by prohibiting new development and discouraging redevelopment. Even though the state will own the bought-out land, the township is seeking ways to improve its community through continued restoration and protection efforts and simultaneously earning other financial benefits by participating in the Community Rating System. Woodbridge is showing how other municipalities can work across sectors and agencies — like for community development and outreach, floodplain regulation, natural resources and emergency management, and land use and zoning — to utilize buyouts as an opportunity for community redevelopment in response to sea-level rise, flooding, and land loss. Local retreat strategies necessitate coordinated interdisciplinary approaches to maximize long-term benefits and minimize costs for people and the environment.

Endnotes

1 Woodbridge Land Use and Development Ordinance, OSC/R Open Space Conservation/Resiliency Zone § 150-41.1.A-B. (2019), **https://clerkshq.com/Woodbridge-nj**.

2 Woodbridge Land Use and Development Ordinance, OSC/R Open Space Conservation/Resiliency Zone § 150-41.1.C. (2019), **https://clerkshq.com/Woodbridge-nj** ("Building design standards are triggered at any proposed demolition, addition, reconstruction, renovation, sale or conveyance of the property, or change in tenancy. Reconstruction and/or renovation work that is limited to 'ordinary maintenance' as set forth in Section 150-4 shall not trigger building design standards. Where building design standards are triggered due to a sale or conveyance of the property, or due to a change in tenancy, the buyer or the new tenant of the property will not be permitted to occupy the property until it is brought into compliance with all provisions of this section.").

3 Jen Schwartz, *Surrendering to Rising Seas,* Scientific American (Aug. 2018), **https://www.scientificamerican.com/article/surrendering-to-rising-seas/?amp**.

4 "The Land Conservancy of New Jersey preserves land and water resources, conserves open space, and inspires and empowers individuals and communities to protect our natural land and environment." *About Us,* The Land Conservancy of N.J., **https://tlc-nj.org/About-Us-3/** (last visited Nov. 18, 2019).

5 *Id.*

6 *See National Flood Insurance Program Community Rating System,* Fed. Emergency Mgmt. Agency, **https://www.fema.gov/national-flood-insurance-program-community-rating-system** (last updated Nov. 5, 2019).

7 Note, the New Jersey Blue Acres Program currently provides relocation assistance for renters but not private homeowners.

8 Georgetown Climate Ctr., *FEMA Hazard Mitigation Grant Program*, Adaptation Clearinghouse, **https://www.adaptationclearinghouse.org/resources/fema-hazard-mitigation-grant-program.html** (last visited Nov. 11, 2019).

Long Beach, California: Los Cerritos Wetlands Restoration and Land Swap

Executive Summary

The Los Cerritos Wetlands Oil Consolidation and Restoration Project (project) provides an example of how public-private land swap arrangements can be aligned with environmental restoration and protection plans, and used to advance long-term visions for managed retreat. The Los Cerritos Wetlands Complex, located in Long Beach, California, has faced decades of degradation from human activities and development. As a result, the original 2,400 acres of wetlands on the site have been reduced to a few hundred acres of wetlands today. Much of this remaining wetlands area is privately owned and used to conduct oil operations. The proposed project would transfer 154 acres of privately owned wetlands to public ownership as part of a land swap arrangement. Specifically, as a part of the land swap, the 154 acres currently used for oil production will be exchanged for five acres of wetlands currently owned by the Los Cerritos Wetlands Authority. The land swap will facilitate restoration of a major portion of the wetlands via a mitigation bank, increase public access, and reduce the oil production footprint and consolidate operations. The land swap plan also involves a number of environmental and social tradeoffs, however. For example, state and local decisionmakers have had to address an expanded lifespan for the oil production facilities, a continuing or increased amount of greenhouse gas emissions, and risks for potential oil spills. These considerations can provide lessons and recommendations for other local governments studying land swaps as a legal tool to facilitate retreat in coastal areas.

Background

The Los Cerritos Wetlands Complex — located on the border of Los Angeles County and Orange County in California in Long Beach — once encompassed more than 2,400 acres of tidal salt marshland, lagoons, bays, and alkali meadows.[1] The wetlands consist of two functioning marshes and several seasonal brackish ponds that are home to a number of endangered species. Approximately 500 acres remain of the original wetlands area, much of which is privately owned and used for oil operations.[2] This loss of wetlands has increased coastal vulnerabilities posed by sea-level rise, coastal erosion, and flooding. Despite this loss in acreage, the current size of the Los Cerritos Wetlands Complex presents a rare opportunity in California to preserve a coastal wetlands ecosystem on such a large scale.

Currently, the Los Cerritos Wetlands Authority (LCWA) is leading the development of a land swap arrangement — the Los Cerritos Wetlands Oil Consolidation and Restoration Project (project) — that will restore significant portions of the Los Cerritos Wetlands owned by Synergy Oil and Gas.[3] The project will assist LCWA to accomplish its mission to enhance the Los Cerritos Wetlands area. LCWA is a governmental entity established in 2006 by an agreement between the California State Coastal Conservancy, the San Gabriel and Lower Los Angeles Rivers and Mountains Conservancy, and the cities of Long Beach and Seal Beach focused on conservation and restoration of the Los Cerritos Wetlands. The land swap will help LCWA to implement its Conceptual Restoration Plan
(CRP) by restoring a portion of the Los Cerritos Wetlands in a manner that will adhere to the restoration principles contained in the CRP.

Managed Retreat Examples

Land Swaps

The project proponents aim to use a legal tool called a land swap to facilitate the transfer of land and enable restoration of important coastal habitats. Land swaps provide a way to facilitate the gradual retreat or upland migration of those coastal habitats in the face of rising seas while enhancing environmental, economic, and community benefits. As a part of the land swap, multiple parties plan to transfer ownership of 154 acres of the Los Cerritos Wetlands, currently owned and operated by Synergy Oil and Gas, to LCWA. The 154 acres will be exchanged for a five-acre site owned by LCWA. In addition, ongoing oil production at an adjacent 33-acre site owned by the City of Long Beach will be phased out, and that site will be restored to tidal wetlands. Synergy will replace 74 old wells with 120 new wells at the five-acre LCWA site and a seven-acre site already owned by Beach Oil Mineral Partners, which includes Synergy. The wells on the five-acre and seven-acre sites will be connected by a 2,200-foot above-ground oil pipeline.

LCWA will acquire title to all of the privately owned properties excluding subsurface mineral rights that will be retained by Synergy. The overall project, including the consolidation of oil operations, relocation of existing structures, and wetlands restoration, will be phased over the long term. For instance, title to the southern portion of the 154 acre site will not transfer to LCWA for 20 years and Synergy can continue oil and gas operations over that time period as a part of the current agreement (as proposed, in 10 years, 50 percent of the active wells have to be removed; all operations have to cease in 20 years). In addition, Synergy must meet many environmental remediation and other criteria, like the removal of existing infrastructure, before it will transfer those lands to LCWA.

Map of Los Cerritos Wetlands Project Site.

This map illustrates the different properties and property owners that would be involved in the Los Cerritos Wetlands land swap in Long Beach, California if the project is implemented.

Credit: **Project Site**, Los Cerritos Wetlands Oil Consolidation & Restoration Project (last visited Sept. 6, 2019).

Several factors may have influenced LCWA's and Synergy's decision to pursue a land swap. First, LCWA and its governmental members have limited public funds to acquire the wetlands complex. This land swap presents an opportunity to voluntarily acquire a large, environmentally valuable coastal ecosystem. Second, technological advancements for oil and gas operations through Horizontal Directional Drilling (HDD)[4] made it feasible for Synergy to physically consolidate its activities on a smaller footprint and participate in the land swap.[5] Third, the five-acre parcel owned by LCWA was not suitable for other uses (e.g., a visitors center) and swapping this smaller parcel with Synergy enabled LCWA to pursue a much larger scale restoration project that would maximize environmental benefits for the area. Although these factors are context specific, they illustrate the creative and opportunistic thinking that precipitated and contributed to a complex land swap arrangement that can result in multiple public and private benefits and tradeoffs.

Policy Tradeoffs

The state and local decisionmakers involved in this project have had to navigate challenging and competing policy tradeoffs raised by different stakeholders. Specifically, the land swap plan has been controversial due to split opinions over the benefits of wetlands restoration and wildlife protection compared to increased oil production. As a result, there are diverging views regarding whether the overall anticipated benefits of the land swap will exceed potential costs.

To address environmental benefits, 76 acres of degraded wetlands in the northern end of the 154-acre site will be restored via a mitigation bank. Synergy seeks to establish and operate a wetlands mitigation bank (pending federal and state approvals) to fund its restoration efforts on this part of the complex through the sale of "credits" to mitigate or offset wetlands losses from new development in other locations. LCWA is also working with Synergy and the City of Long Beach to plan the restoration of tidal wetlands on the 73 acres at the southern end of the Synergy Oil Field and on the 33-acre city-owned property, including through a potential second wetlands mitigation bank, once existing wells and other oil production facilities are removed. In addition, the land swap will allow new public access and recreational opportunities including a visitors' center and perimeter trial and consolidate oil production — which will reduce the oil operations' footprint from 187 acres to 10 acres.

Although implementation of the land swap plan would reduce the amount of land owned by Synergy, it is estimated that oil production could increase 80-fold if all necessary permits are issued. Furthermore, as previously stated, part of the land swap will not occur for 20 years and oil and gas operations can continue over that period. Some environmentalists, area residents, and local tribes have expressed concern over continued greenhouse gas emissions due to the extended lifespan of oil production, and the potential risk of spills, particularly given seismic activity in the area.

Funding

As with many land swap arrangements, the project would be implemented through in-kind exchanges of land compared to money. The plan, however, includes a discussion of long-term restoration and site remediation funding sources (e.g., 76-acre wetlands mitigation bank to fund restoration), and the possibility of establishing an endowment fund with Synergy Oil for long-term wetlands maintenance and monitoring.

Next Steps

In August 2018, the California Coastal Commission (CCC) — the state's regulatory coastal management agency — approved the project concept. In December 2018, CCC held a second hearing, which granted LCWA a Coastal Development Permit for the project; however, CCC conditioned its permit upon other studies that must be completed and permits being obtained from the U.S. Army Corps of Engineers, California Department of Fish and Wildlife, and the Regional Water Quality Control Board. As of September 2019, the project has not been implemented and is undergoing permit and environmental compliance review, which may take several months to a few years.

Considerations and Lessons Learned

The Los Cerritos Wetlands Project highlights some of the policy tradeoffs posed by land swaps and the viewpoints presented by different stakeholders. The City of Long Beach's role as a landowner and convener may have helped to facilitate this process in a more comprehensive way than if it had been led by a single agency or another entity with a specific or more focused mission or mandate (e.g., economic development, natural resources management). Depending on local context, cities may be uniquely positioned to balance various interests on behalf of the public-at-large, which could result in bringing more people to the decisionmaking table. The City of Long Beach's experiences can inform how other municipalities define their respective roles in land swap arrangements.

In addition, land swaps may necessitate multiple "swaps within a swap" and creative thinking to find properties that are attractive to private property owners with different interests (e.g., corporation, homeowner) and encourage them to participate in the process. For a land swap to be successful, the swap must be mutually beneficial to the participating parties. The more parties that are involved, however, can make the process more difficult to administer. Project proponents should consider these types of factors upfront to best navigate land swaps.

If final studies are completed and permits are granted, the land swap arrangement will result in a substantial portion of the Los Cerritos Wetlands Complex currently held in private ownership restored and conveyed to public ownership. The Los Cerritos Wetlands Project demonstrates how land swaps can be used to acquire, restore, consolidate, and preserve wetlands habitat areas that would otherwise be too expensive to purchase outright. Local governments may use this example to align land swaps with existing or future plans, and implement longer-term, comprehensive visions for managed retreat in coordination with public-private partnerships.

Endnotes

1 Los Cerritos Wetlands Authority, Los Cerritos Wetlands Stewardship Program 4 (Dec. 2011), *available at* **http://www.tidalinfluence.com/uploads/1/6/2/7/16274920/lcwastewardshipprogram_2012.pdf**; *see also* Deborah Schoch, *Tension Over Wetlands,* L.A. Times (July 29, 2007), **https://www.latimes.com/archives/la-xpm-2007-jul-29-me-marshes29-story.html**.

2 *See supra* n.1.

3 *Reducing Our Footprint, Restoring Our Wetlands*, Los Cerritos Wetlands Restoration Plan, **http://loscerritoswetlandsrestorationplan.com/the-plan-los-cerritos-wetlands-restoration/** (last visited Feb. 18, 2020).

4 Horizontal Directional Drilling (HDD) is a method of installing underground pipelines or cables by drilling horizontally below the surface through a single vertical well, which avoids the need to trench or dig up as much ground compared to traditional drilling methods.

5 The advent of HDD was important in designing the land swap and ultimately removing privately owned infrastructure from the wetlands complex that would otherwise prevent the implementation of restoration and retreat efforts.

Hampton, New Hampshire: Community-Driven Climate Adaptation Planning Process

Executive Summary

The coastal town of Hampton, New Hampshire has identified the need for long-term climate adaptation planning to address the impacts of sea-level rise and improve community resilience to coastal flooding through a state-local, public-private partnership. This ongoing adaptation planning process that started in 2018 is being led by the Seabrook–Hamptons Estuary Alliance (SHEA) — a local conservation nonprofit — with support from others including the New Hampshire Department of Environmental Services Coastal Program (NH Coastal Program) and town officials and staff. The approach taken by SHEA and the NH Coastal Program offers a unique example of community-driven, multifaceted planning focused on informing and educating the community through a series of workshops and surveys to gauge awareness and opinions across a range of different adaptation strategies. The adaptation strategies presented to the community for consideration include: protection ("keep water out"), accommodation ("live with water"), and managed retreat or relocation ("get out of the water's way"). The results of these efforts are being used to inform local actions going forward, including potentially adding climate adaptation planning for coastal hazards in the town's master plan or considering implementation of a voluntary buyout program. Policymakers and planners in other municipalities may find Hampton's work instructive for how to increase awareness of the benefits and tradeoffs of retreat across a spectrum of adaptation strategies at the outset of community-driven, public-private decisionmaking processes.

High Tide Flooding in Hampton.

This image depicts high tide flooding on properties adjacent to Brown Avenue in Hampton in March 2019. Brown Avenue is on the salt marsh side of Hampton Beach (which is a barrier beach) and is more frequently impacted by tidal fluctuations than storm surges.

Credit: Jay Diener, Seabrook–Hamptons Estuary Alliance.

Background

Hampton, New Hampshire is a coastal town in southeast New Hampshire, covering an area of approximately 14 square miles, with a year-round population of nearly 16,000 residents. The town is located at the confluence of where the Hampton River enters into Hampton Bay and the Atlantic Ocean. Hampton is home to a number of wetlands, rivers, and Hampton Beach, a popular summer tourist destination that can attract over 80,000 people in the summer months.

The highest elevation in Hampton is around 140 feet above sea level. Low-lying areas of the town on the Atlantic Ocean coast are increasingly vulnerable to the impacts of flooding from sea-level rise and storm surges, especially during high tides. Although many properties along the barrier beaches in Hampton are protected from high tides and storms, low-lying parts of the town located along the Atlantic coast and along the town's salt marsh and rivers are increasingly affected by high tide flooding due to rising seas. In 2014, the regional Rockingham Planning Commission developed a *Tides to Storms* vulnerability assessment for Hampton.[1] In 2018, two Nor'easter storms catalyzed some local responses to flooding. For example, the local government passed a high tide parking ordinance that allows flood-prone residents to park in higher elevation lots at no charge when high tides are ten feet or greater in height. Regardless, these types of action have not been implemented as a part of comprehensive efforts to adapt to current and future flooding impacts. As a result, the town has identified the need for a longer-term plan.

Managed Retreat Examples

Community Engagement

In order to address coastal flooding and adapt to the impacts of climate change, the Seabrook–Hamptons Estuary Alliance (SHEA) — a local conservation nonprofit — is leading a local effort to plan for, manage, and guide long-term adaptation in Hampton.[2] This work is being supported by the New Hampshire Department of Environmental Services Coastal Program (NH Coastal Program), among others, and being implemented through a multi-phased approach. During Phase One, SHEA and NH Coastal Program developed and held a series of workshops — called Building a Flood Smart Seacoast — to provide information to property owners and town officials about the impacts of coastal flooding on properties and structures.[3] The workshops aimed to help affected property owners become more resilient. During the workshops, residents brought up questions about managed retreat and buyouts, especially in the context of having difficulties selling their homes as insurance premiums increase due to more frequent and intense flooding and storms. These concerns, raised by residents themselves, allowed SHEA and NH Coastal Program to facilitate discussions on these topics.

In addition, SHEA and NH Coastal Program carried out a Situation Assessment to survey and interview Hampton residents and property owners about flooding impacts, costs, concerns, and experiences.[4] One of the objectives of the Situation Assessment was to gain a better understanding of people's awareness and perception of voluntary buyouts and managed retreat in Hampton. The Situation Assessment identified Hampton's need to reduce flooding impacts and vulnerabilities of people and property, and the range of strategies available to adapt. These strategies were grouped into three categories: protection ("keep water out"), accommodation ("live with water"), and managed retreat or relocation ("get out of the water's way").

Ultimately, the survey found that 94 percent of respondents believed that Hampton needs a long-term approach to adapt to sea-level rise, and 71 percent agreed or strongly agreed that managed retreat could be one component of a long-term adaptation strategy. In addition, over two-thirds of participants agreed or strongly agreed that they would participate in future discussions about managed retreat or voluntary buyouts. In contrast, opinion questions highlighted some concerns about a managed retreat program and buyouts, particularly regarding how they could change the sense of community in Hampton. Overall, however, the responses indicated a desire among participants to learn more about managed retreat and voluntary buyouts.

After the workshops and Situation Assessment, SHEA and NH Coastal Program proceeded into Phase Two in January 2019 by establishing the Coastal Hazards Adaptation Team (CHAT).[5] CHAT is comprised of different state and local stakeholders (e.g., members of the Hampton Board of Selectmen, Planning Board, Zoning Board of Adjustment, Budget Committee, Department of Public Works, Hampton Beach Village District, Hampton Beach Area Commission, and the Hampton Town Planner and the Hampton Conservation Coordinator). CHAT will assess Hampton's vulnerabilities and the Situation Assessment's results and seek to inform local adaptation actions going forward, including the possibility of drafting a Coastal Management section chapter in Hampton's Master Plan as a part of its five-year update. CHAT had its first meeting in January 2019 and will potentially consider creating a local buyout program, among evaluating other options to adapt to coastal flooding and become more resilient.

The overarching goal of this local effort supported by the state is to empower Hampton to effectively plan for and adapt to coastal flooding through a community-driven, multifaceted approach. The workshops, Situation Assessment, and CHAT are educating property owners and local officials about voluntary buyouts and managed retreat. Ongoing Flood Smart Roundtable discussions enable residents to raise specific concerns and have them addressed, as well as provide opportunities for local/regional experts to provide more information about specific flood-related issues. Education and community engagement efforts have increased awareness of the benefits and reasons for "getting out of the water's way" to ensure that Hampton considers retreat, particularly in the town's most vulnerable areas.

Funding

The Hampton team has been utilizing different sources of government and nongovernmental funding to support its work. The first phase and the Situation Assessment were funded by a Climigration grant (to fund community-led processes considering managed retreat)[6] from the nonprofit Consensus Building Institute,[7] and provided by the Lincoln Financial Group. CHAT and the comprehensive plan evaluation are being funded, in part, by the National Oceanic and Atmospheric Administration's Office for Coastal Management under the Coastal Zone Management Act in conjunction with the NH Coastal Program. Future funding may be identified as potential adaptation actions and projects are advanced at the local level.

Next Steps

Since January 2019, CHAT has been meeting on a monthly basis and has reviewed other coastal towns' and cities' adaptation approaches including voluntary retreat or relocation incorporated into their master plans; has reviewed and updated local maps to identify streets and neighborhoods most vulnerable to flooding; and is looking at a new methods to increase a property's flood resilience. CHAT will continue convening into 2020 to consider potential next steps including identifying different adaptation strategies and projects. CHAT's outputs will also help inform the development of the new Coastal Management section of Hampton's Master Plan.

In late 2019, the town approved a Letter of Intent to apply to the Federal Emergency Management Agency (FEMA) for funding through the Pre-Disaster Mitigation grant program.[8] The town came to this conclusion after evaluating different potential funding sources. The town envisions that Pre-Disaster Mitigation grants would pay the regional planning commission to apply for and manage FEMA-funded projects, including structural elevations and voluntary buyouts. CHAT found that this regional approach to funding was a better alternative, at least in the short-term, than hiring additional local staff to manage these responsibilities.

Considerations and Lessons Learned

The ongoing work in Hampton is notable for its phased, locally led approach to educating and engaging residents about potential options to adapt to coastal impacts from climate change. Other municipalities could consider adopting a similar approach for facilitating discussions about climate adaptation and managed retreat in their own communities. In particular, it is important to empower and put local residents and decisionmakers at the center of these processes. As demonstrated by the results of the Situation Assessment, surveying local attitudes and opinions across the spectrum of adaptation strategies — protection, accommodation, and retreat — can help local governments prioritize actions and policies. As residents' responses revealed in Hampton, surveys can serve as the foundation to start a dialogue at the local level even on more complex subjects like managed retreat and buyouts. The Hampton team responded to people's questions about buyouts and flood insurance, which allowed the community to consider the benefits and tradeoffs of retreat at the outset of this process in lieu of solely viewing it as a post-flood option of last resort.

In addition, the state and local partnership led by Seabrook–Hamptons Estuary Alliance is helping to ensure that any potential adaptation responses are coordinated across various government and nongovernmental entities that are involved. Coastal states and municipalities can seek opportunities to partner with nonprofits, regional planning commissions, universities, and others as they work to evaluate climate adaptation and managed retreat in their own communities. Partnerships can help distribute costs among partners but require a long-term commitment of funding and staff time that should be established upfront to set expectations and project objectives. Regardless, phased approaches conducted in collaboration with a broad cohort of public and private partners can support robust community engagement and ensure that adaptation initiatives are in step with community priorities.

Endnotes

1 Rockingham Planning Comm'n, Tides to Storms: Assessing Risk and Vulnerability to Sea-Level Rise and Storm Surge — A Vulnerability Assessment of Coastal New Hampshire (2014), *available at* **https://www.therpc.org/regional-community-planning/climate-change/tides-storms**.

2 Seabrook–Hamptons Estuary Alliance, **http://shea4nh.org/** (last visited Oct. 30, 2019).

3 *Building a Flood Smart Seacoast*, Seabrook–Hamptons Estuary Alliance, **http://shea4nh.org/floodsmart-seacoast/** (last visited Oct. 30, 2019).

4 Seabrook–Hamptons Estuary Alliance, Flooding in Hampton, NH Situation Assessment (Jan. 2019), *available at* **http://shea4nh.org/wp-content/uploads/2019/08/SHEA_SituationAssessment_Final.pdf** (prepared by EF Design and Planning, LLC in collaboration with the Seabrook–Hamptons Estuary Alliance and the New Hampshire Coastal Program).

5 *Coastal Hazard Adaptation Team*, Seabrook–Hamptons Estuary Alliance, **http://shea4nh.org/2019/08/01/coastal-hazards-adaptation-team-chat/** (last visited Oct. 30, 2019).

6 *Climigration Awardees Named*, Climigration: Should We Stay or Should We Go? (Oct. 2018), **http://www.climigration.org/awards**.

7 Consensus Building Institute, **https://www.cbi.org/** (last visited Oct. 30, 2019).

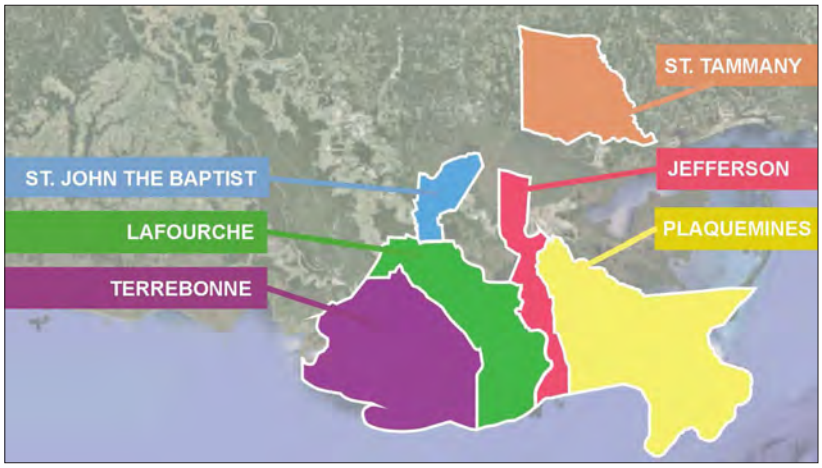
8 Georgetown Climate Ctr., *Pre-Disaster Mitigation Grant Program*, Adaptation Clearinghouse, **https://www.adaptationclearinghouse.org/resources/pre-disaster-mitigation-grant-program.html** (last visited Nov. 12, 2019).

State of Louisiana: Louisiana Strategic Adaptations for Future Environments (LA SAFE)

Executive Summary

Louisiana Strategic Adaptations for Future Environments (LA SAFE) is a community-based planning and capital investment process that will help the state fund and implement several projects, including for managed retreat, to make its coasts more resilient. In 2016, Louisiana's Office for Community Development–Disaster Recovery Unit (OCD) received a nearly $40 million grant from the U.S. Department of Housing and Urban Development through the National Disaster Resilience Competition. With this grant and by leveraging additional state and nongovernmental funds, the state implemented LA SAFE and supported the design and implementation of resilience projects to address impacts in Louisiana's coastal parishes. LA SAFE is aimed at addressing the impacts of coastal land loss, sea-level rise, and land subsidence in the six coastal parishes most hard-hit after Hurricane Isaac in 2012: Jefferson, Lafourche, Plaquemines, St. John the Baptist, St. Tammany, and Terrebonne.

Facilitated through a public-private partnership between the state and the nonprofit Foundation for Louisiana, LA SAFE funded ten projects across all six parishes after an extensive, year-long community engagement process. The selected projects address goals, opportunities, and needs that were identified over multiple rounds of resident and stakeholder engagement. The projects were also designed to meet other regional priorities, including for housing, transportation, infrastructure, and economic development. Finally, projects were designed to address different adaptation goals in three different areas based upon flood risk: low flood risk areas that will receive populations migrating away from higher risk areas; moderate flood risk areas that will focus on measures to accommodate increasing flood risk; and high flood risk areas that anticipate future losses of land and population. LA SAFE provides a model that other states and local governments may consider for engaging communities in efforts to make long-term adaptation and resilience investments including for managed retreat.



LA SAFE Parishes.

This map shows the location of the six Louisiana parishes eligible to participate in LA SAFE.

Credit: State of Louisiana Office of Community Development.

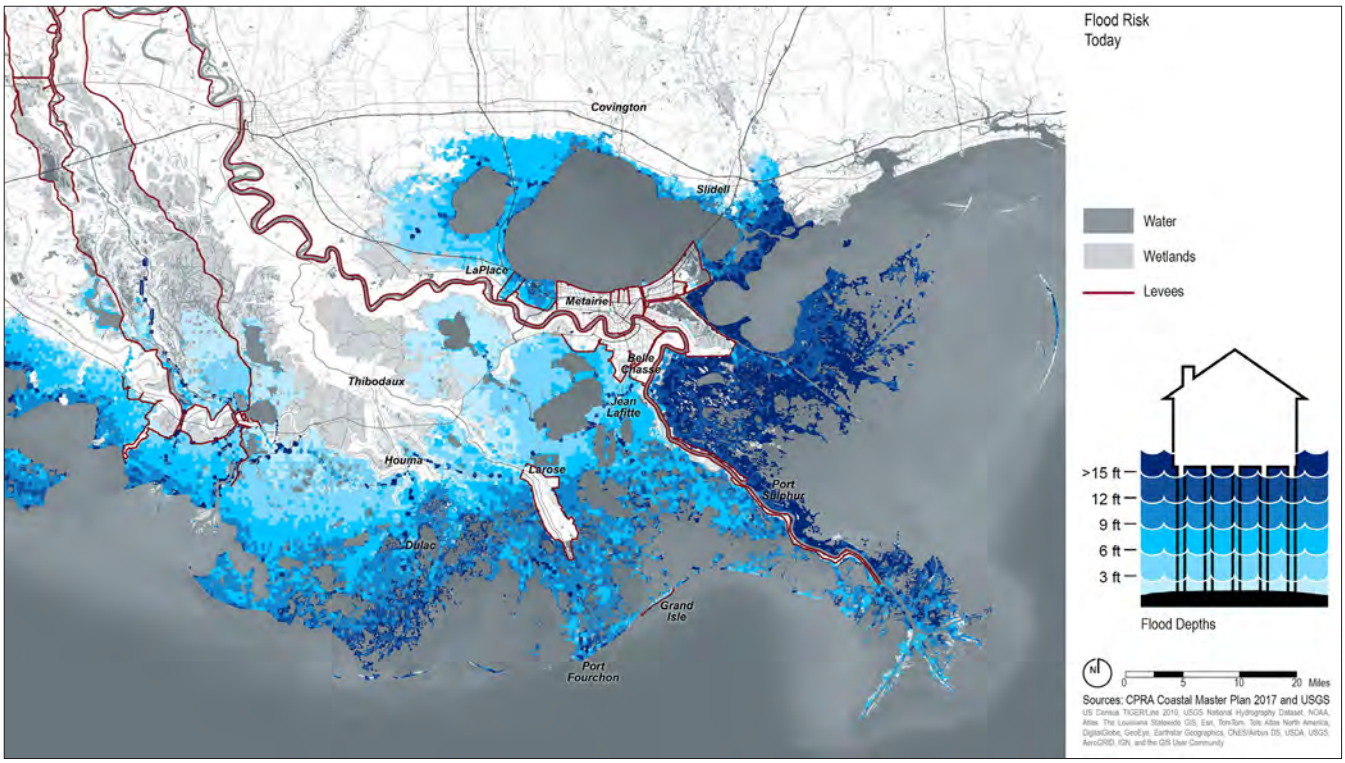
Background

Louisiana's coast is home to more than two million residents and supports nationally significant commercial industries for shipping, oil and gas production, and fishing.[1] The State of Louisiana is facing ongoing challenges protecting its coastal communities and industries against physical threats from sea-level rise, land subsidence, and flooding. Between 1932 and 2016, Louisiana lost over 2,000 square miles of its coastal plains; as much as an additional 2,250 square miles could be lost over the next 50 years.[2] These threats have been exacerbated by hurricanes and human coastal land uses and incidents like the BP Deepwater Horizon Oil Spill in 2010.[3]

In response to these ongoing challenges, some residents have already begun the process of migrating from the low-lying coast to safer, higher ground areas further inland.[4] In addition to physical risk, population changes raise additional social and economic challenges. Generally, inland areas have insufficient affordable and mixed-use housing stocks and critical infrastructure capacity to support population increases.[5] Individuals and businesses who choose to move may also face social (e.g., cultural, psychological) and economic impacts from leaving their original communities behind.[6] For example, tribal communities with cultural and economic ties to the water face unique challenges when deciding whether to relocate inland.

To make Louisiana's coast more resilient and help support population shifts, the state partnered with a diverse set of public, private, philanthropic, and nonprofit stakeholders to implement Louisiana Strategic Adaptations for Future Environments (LA SAFE) to adapt its vulnerable coastline to these impacts. LA SAFE is a planning and capital investment process designed to address coastal impacts and other community needs in six coastal parishes. Following Hurricane Isaac in 2012, the state developed LA SAFE to support disaster recovery efforts in Jefferson, Lafourche, Plaquemines, St. John the Baptist, St. Tammany, and Terrebonne parishes.[7] Four of the parishes (Jefferson, Lafourche, Plaquemines, and Terrebonne) extend inland from the Gulf of Mexico and have coastal communities that are experiencing high rates of land loss and increasing flood risk. In comparison, St. John the Baptist and St. Tammany parishes are located further away from the coast and adjacent to job centers in Baton Rouge and New Orleans.[8] In August 2012, Hurricane Isaac brought heavy rainfall and an 11-foot storm surge that inundated communities along Louisiana's coast that caused severe flooding across the parishes resulting in an excess of $600 million in damages across the state.[9] Impacts from Hurricane Isaac enabled Louisiana to participate in the National Disaster Resilience Competition (NDRC). Through NDRC, the state advanced the LA SAFE initiative and was one of thirteen winning applicants that received funding to implement innovative resilience projects in the six Isaac-affected parishes.

LA SAFE provides a model for regional approaches to address flood risks and shifting populations through public-private partnerships and robust community engagement.[10] In developing and implementing LA SAFE, the Louisiana Office



Regional Flood Risk in Coastal Louisiana (as of 2017).

This map shows the low (0–3 feet), moderate (3–6 feet), and high (over six feet) flood risk projected for Louisiana's coast as of 2017.

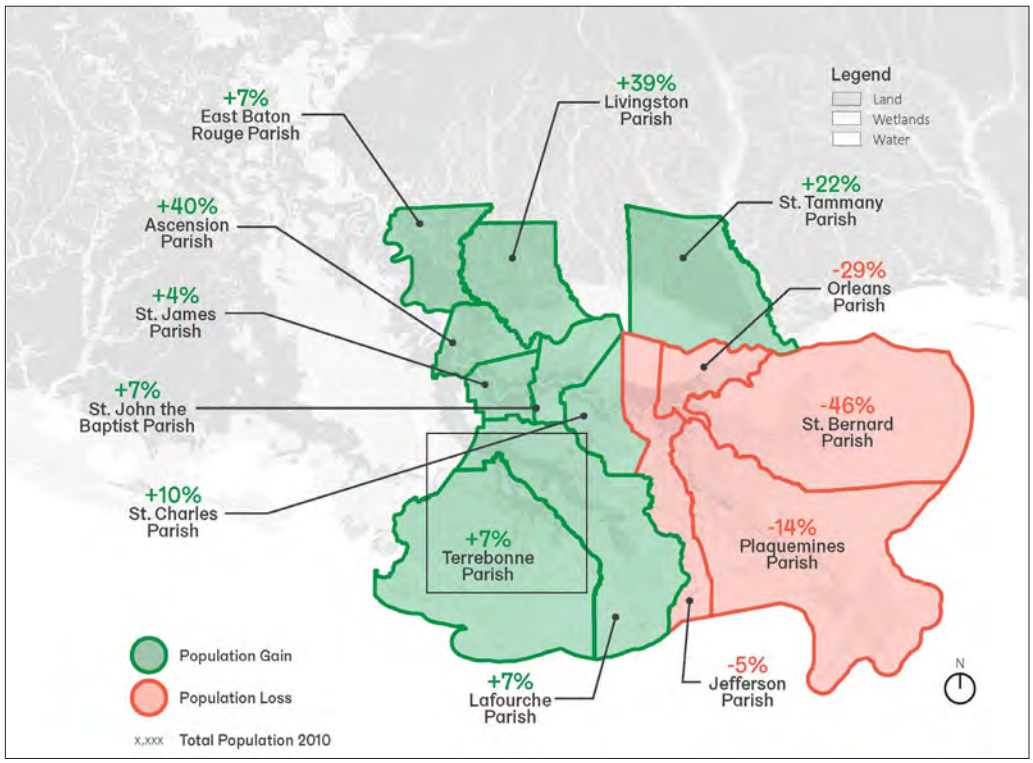
Credit: State of Louisiana Office of Community Development (The map is based on the Louisiana Coastal Protection and Restoration Authority's Medium Environmental Scenario, which projects 2.07 feet of sea-level rise and full implementation of the state's 2017 Coastal Master Plan).

for Community Development–Disaster Recovery Unit (OCD) partnered with Foundation for Louisiana (FFL) (a local nonprofit), and other local stakeholders who brought additional capacity and resources to the process. The community was engaged throughout all stages of the process including in developing plans and designing and selecting projects that, once implemented, will demonstrate how capital investments on a regional scale can be designed to accomplish different risk-based adaptation goals. Three primary goals guided the process:

- Develop strategies to enhance the resilience of coastal parishes against future flooding and environmental changes in the next 10, 25, and 50 years;
- Design community-driven development plans that are sensitive to the communities' cultural and social assets;[11] and
- Provide funding to increase the resiliency of at-risk communities and identify and design resilience-building models that are scalable and transferable.[12]

Managed Retreat Examples

In terms of managed retreat, LA SAFE developed a regional approach that addresses the needs of communities facing different physical risks and demographic changes. The LA SAFE framework shows how areas designated using flood risk and data on demographic and economic changes, community engagement, and project selection criteria — each of which are discussed in the following sections — can be used to plan for and develop projects that enhance overall coastal resilience across a broad geography. The process is helping the state make proactive investments in higher ground "receiving areas" to support and manage the ongoing and future transition of people away from vulnerable coastal communities. LA SAFE can serve as a model for other states, regions, and municipalities on how to empower residents to play an active and informed role in planning for retreat; and how to make proactive investments in projects to address population shifts in response to climate change and minimize the social and economic costs associated with relocation.



Population Changes Across the LA SAFE Parishes Between 2000–2010.

According to the state, upper parishes (in green) experienced a population increase while coastal parishes (in red) had a decrease in population. For that period, however, there are exceptions for two coastal parishes — Lafourche and Terrebonne — which each had a population increase of seven percent.

Credit: State of Louisiana Office of Community Development (Data prepared by ESRI and sourced from U.S. Census Bureau).

Flood Risk Areas

The LA SAFE process adopted a flood risk classification system to structure discussions with the community and to identify projects that could address the unique needs of communities in different areas of the Louisiana coast. To inform project selection, three typologies or areas were identified aligning with varying levels of flood risk (i.e., low, moderate, and high).[13] These areas helped residents inform the development and design of different types of projects, including for managed retreat, that would support thriving communities over longer-term 10-, 25-, and 50-year time horizons. By grounding project design and selection using a risk-based classification system, OCD and FFL could better facilitate meetings with residents while simultaneously advancing state and local coastal resilience goals.

Based on physical risk, demographic, and economic data, the state identified three levels of flood risk that correspond with different development principles to adapt to that flood risk:[14]

1. **Low risk areas.** Areas with relatively favorable future flood risk projections for 0–3 feet in a 100-year or one-percent-chance flood event in 2067. Low risk areas present new development opportunities, and have the capacity to receive populations and businesses supporting economic activities that are relocating away from moderate and high risk areas. Development principles guiding low risk areas include:

    a. Eliminate existing barriers to future development and future growth.[15]

    b. Adopt best practices for water management, energy conservation, wetlands restoration, and habitat preservation in order to prepare for future population and economic growth.[16]

    c. Account for the needs of local, existing populations, including communal and social interests.

2. **Moderate risk areas.** Areas with flood risk projections of 3–6 feet in a 100-year flood event in 2067. Moderate risk areas are expected to sustain current population levels and economic activity. Development principles guiding moderate risk areas include:

    a. Attempt to preserve current population levels and economic activity.[17]

    b. Consider the needs of industries to preserve their ability to operate under normal, emergent, and recovery conditions.[18]

    c. Adopt green or nature-based infrastructure practices to help reduce flood risk.[19]

3. **High risk areas.** Areas with flood risk projections over six feet in a 100-year flood event projected in 2067. High risk areas are likely to experience losses in population and economic activity. Development principles guiding high risk areas include:

    a. Resettle only when community-driven and voluntary, absent a clear and present risk to life.[20]

    b. Encourage resettlements within jurisdictional boundaries (i.e., same municipality or parish), when possible.[21]

    c. Envision conditions under which resettled communities retain access to abandoned lands in high risk zones for cultural, social, or economic reasons.[22]

The three flood risk areas provided OCD and FFL with a scientifically informed classification system to organize the community engagement and project selection components of the LA SAFE framework.

How LA SAFE Addresses the Development of Receiving Communities

Generally, receiving communities are areas to which individuals are relocating from flood-prone and otherwise vulnerable coastal communities in response to physical impacts like sea-level rise and coastal erosion. Neither the state nor FFL have developed a formal definition of "receiving communities" for purposes of implementing LA SAFE. Regardless, the state considers low risk areas that are predicted to have 0–3 feet of future flood risk and experience population growth in the future to be "ideal" receiving communities.[23] The state envisions supporting adaptation efforts in low risk areas, especially those that are underdeveloped, to accommodate anticipated growth in population and economic activity.[24] For example, St. John the Baptist is a parish with low flood risk where economic and population growth is anticipated over the next 50 years, due in part to its abundant natural resources and potential for job opportunities.[25] Similarly, St. Tammany is one of the state's fastest growing parishes, and has increased in population given the movement of people from other parishes after recent hurricanes.[26]

Meeting in Lafourche Parish.

Residents actively participated throughout all five rounds of the meetings held in each parish.

Credit: State of Louisiana Office of Community Development.

Project Voting in Lafourche Parish.

During the fifth and final round of parish meetings, residents voted for the projects they wanted the state to fund. Every person was given a first, second, and third choice token to indicate their top three project preferences, which allowed voting to remain anonymous. After everyone had a chance to vote, the results were revealed, as seen here in Lafourche Parish. LA SAFE also had an online poll available for three weeks after each parish meeting so that those who were unable to attend in-person could provide their input. In the end, resident preferences accounted for 20 percent of the weight of the final project selection criteria.

Credit: State of Louisiana Office of Community Development.

Community Engagement

In addition to the flood risk classification system, the LA SAFE framework drew upon extensive community engagement to integrate public preferences in project design and selection. In nine months, OCD and FFL convened over 3,000 participants in 71 meetings facilitated by community leaders and attended by residents, community stakeholders, and government officials. The 71 meetings were held over the course of five rounds in each of the six parishes. Collectively, the five rounds covered all stages of project design and selection, including interactive activities and roundtable discussions on social opportunities and community development needs. Government officials and community-based organizations participated in later rounds by guiding discussions on project feasibility and community impacts. During the final round of community meetings, residents ranked project options in each of the six parishes according to personal preferences. The community's preferences for project proposals were one of the six criteria used by the state to select the ten projects for funding, as described in the next section.

LA SAFE organizers were intentional about ensuring that meetings were accessible to all community members. Extra meetings and translated education materials were provided for Vietnamese and Cambodian residents, and welcome tables and stations were set up at each meeting to help situate both new and returning participants with foundational knowledge about the history of their communities as well as current and future flood risks. This commitment to providing foundational materials better enabled all residents to actively participate in and contribute to the process despite language differences. In addition, FFL offered childcare and held meetings after work hours to make it possible for more people to attend, and created a welcoming environment with local foods, music, and crafts.

In addition to maximizing meeting accessibility, FFL also sought to build local capacity to support adaptation decisionmaking and project selection in each parish. The meetings were facilitated by community leaders and residents, including over 60 participants from LEAD the Coast, a training program organized by FFL to build local knowledge and leadership. Through LEAD the Coast, FFL trained local community leaders to facilitate discussions with residents on coastal resilience issues and build resident capacity for residents to engage with and influence policymakers. FFL offered facilitators stipends to demonstrate the value of their contributions of time and skills to the LA SAFE process.

Project Selection

The five rounds of community engagement helped inform the design and selection of ten projects, which were finalized by a project selection committee composed of OCD and other LA SAFE team members.[27] The project selection committee finalized the project portfolio based upon a defined set of baseline criteria to qualify for Community Development Block Grant–Disaster Recovery

capital investments.[28] Projects were further narrowed according to weighted criteria, including public preference (as described in the preceding section), benefits to low-to-moderate income (LMI) populations, and a project's ability to decrease future flood risk.[29]

The selection committee was also intentional about attempting to fund projects evenly across all three flood risk areas to facilitate implementation of demonstration projects that could be replicated in other parishes with similar risks.[30] Finally, the project selection committee factored in the importance of funding a diverse portfolio of projects across several program areas, ensuring that projects could address multiple community needs and meet the goals established for each flood risk area.[31] Specifically, each of the ten awarded projects was required to address at least one of eight thematic program areas: (1) resilient housing; (2) resilient transportation; (3) resilient energy; (4) resilient infrastructure; (5) economic development; (6) community nonstructural mitigation/flood risk reduction; (7) planning; and (8) public services/education.[32] In the end, all of the priority projects selected for funding by individual communities were funded; the project selection committee largely helped to ensure that funding was equally distributed across the six parishes and project types. By factoring program priorities into project selection, OCD and FFL created a process to support adaptation projects that consider both physical risks and improve community well-being.

Funded Projects

In selecting the final projects, the project selection committee gave priority to the top scoring projects in each parish and projects that could demonstrate a diversity of resilience approaches to achieve goals for each type of flood risk.[33] Funding for each of the ten projects ranges from $475,000 (Louisiana Wetland Education Center in Jefferson Parish) to $7 million (Resilient Housing Prototype in Lafourche Parish).[34]

Each of the six parishes have areas with different flood risks and potential for new development. In terms of facilitating managed retreat, many of the projects chosen for funding were designed to accommodate resettlement of populations migrating from high to low flood risk areas (for more information about individual projects, see Table 1).

- **Jefferson Parish** projects focus on enhancing green and recreational space through green infrastructure projects and increasing environmental education and addressing wetland loss with a wetland education center.
- **Lafourche Parish** projects focus on expanding economic development initiatives to diversify the local economies affected by hurricanes and the BP oil spill. The selected projects (a Business Incubator and Resilient Housing Prototype) are responsive to community concerns about flood risk, changing populations, decreasing home values, and the need for affordable housing.
- **Plaquemines Parish** has experienced severe repetitive flooding along its low-lying communities near the Gulf of Mexico. Projects focus on maintaining the economic viability of the area's seafood industry through investments in fishing infrastructure (Harbor of Refuge project) and addressing mental and public health consequences from repetitive flood events and declining populations.
- **St. John the Baptist Parish** projects focus on enhancing stormwater infrastructure and transportation options in low flood risk areas that are already seeing gains in populations as residents migrate inland for jobs in the parish's chemical, petroleum, and agricultural industries.
- **St. Tammany Parish** projects will focus on accommodating the growing need for housing and social infrastructure in this fast-growing parish that has already taken in individuals and businesses migrating away from more vulnerable parts of the coast.
- **Terrebonne Parish** projects focus on accommodating seasonal workforce housing needs in a part of the state that is experiencing both rapid land loss and a booming economy due to the presence of oil and gas, fishing, and agricultural industries. The two funded projects include buyouts for a select number of homeowners outside of flood protection levees and large-scale marsh restoration to protect vulnerable residents from future 100-year floods.

LA SAFE PARISHES						
	Jefferson	**Lafourche**	**Plaquemines**	**St. John the Baptist**	**St. Tammany**	**Terrebonne**
Population	440,00 (est.)	98,500 (est.)	23,000 (est.)	43,500 (est.)	256,000 (est.)	112,000 (est.)
Local industries	Seafood, tourism	Oil	Oil, natural gas, seafood	Chemical, petroleum processing facilities	Healthcare, retail trade, construction	Oil, natural gas, seafood, agriculture
Challenges	**Physical challenges:** Flooding, stormwater management	**Physical challenges:** Subsidence, saltwater intrusion, flooding **Economic stagnation:** Lack of opportunity for young people, decrease in job opportunities due to oil and gas downturn	**Physical challenges:** Subsiding uplands and wetland areas, diminishing shorelines **Population loss:** Nearly 14 percent decrease between 2000–2010	**Underdevelopment:** Abundant low-risk areas that require planning and development in anticipation of population growth	**Spontaneous migration:** Receiving individuals and businesses **Sustained growth:** Growing need for housing and infrastructure	**Coastal erosion:** The major barrier islands protecting the parish interior are predicted to disappear within 50 years
Selected Project(s)	**Gretna Resilience District Kickstart:** $5.61 million to install green infrastructure and stormwater improvements and enhance recreational amenities **Louisiana Wetland Education Center:** $475,000 to promote education on coastal ecology in the town of Lafitte. The center will include research and meeting facilities, and outdoor recreation space	**Emerging Industry Business Incubator:** $3.5 million to create a program to develop new businesses, pair entrepreneurs with mentors, and provide co-working facilities **Resilient Housing Prototype:** $7 million to develop affordable, elevated housing resistant to flooding and wind damage to promote the development of medium-density, affordable residences in areas with low flood risk	**Harbor of Refuge:** $4.77 million to create a parish-operated harbor of refuge with docking facilities for distressed vessels to shelter in place during storms **Mental Health and Substance Abuse Program:** $1.87 million to maintain/expand existing programs for mental health and substance abuse services in order to alleviate the emotional impact of disaster events and anxiety about future increased flood risk	**Airline and Main Complete Streets:** $6.05 million to implement resilient street design improvements (green infrastructure and other enhancements to improve access for pedestrians and bikers) along the main commercial corridors in the town of LaPlace, which has various levels of flood risk	**Safe Haven Blue-Green Campus Trails:** $5.3 million to install green infrastructure and improve mental health and substance abuse services in the City of Mandeville	**Buyouts for Permanent Resident Households:** $2.85 million in relocation assistance to households in the high-risk area outside the levee system. **Lake Boudreaux Living Mitigation:** $3.6 million to create 300 acres of terraces and marshland within the levee system protecting the low-to-moderate income communities in Dulac and Grand Caillou (Morganza to the Gulf Flood Risk Reduction Project) from a 100-year/ Category 3 storm

LA SAFE Parishes.

For each of the six parishes that participated in LA SAFE, this table breaks down population, local industries, challenges, and projects selected for funding.

Credit: Jennifer Li, Georgetown Climate Center.

Funding

In 2016, following a series of federally declared disasters, the U.S. Department of Housing and Urban Development provided $1 billion in Community Development Block Grant–Disaster Recovery funding through NDRC to eligible state and local governments to stimulate the development of innovative resilience projects.[35] Louisiana received $39.75 million from NDRC and the state pledged an additional $250,000 during the application process, bringing the total to $40 million.[36] Later, the state added additional funds that totaled $47.5 million. FFL also contributed financial support to the process, which demonstrates LA SAFE's ability to leverage nongovernmental sources of funding to support community engagement processes.

Next Steps

Building on LA SAFE's community-driven framework for adaptation and the ten state-funded projects, the state is continuing to work with the six parishes to mainstream and institutionalize adaptation and resilience at both the regional and parish levels. In May 2019, the state released a regional adaptation strategy and six parish-level strategies to support long-term adaptation planning.[37] Each strategy follows LA SAFE's framework for identifying projects to meet different adaptation and development goals based on flood risk to ensure that future regional and local projects are similarly designed to advance comprehensive approaches. The strategies' goals include water management, housing and development, transportation, education, economies, jobs, and culture and recreation.[38]

Notably, to support parishes in reaching their housing and development goals, the strategies identify projects that direct growth to low risk areas and prepare receiving communities.[39] These strategies will assist the parishes to develop and invest in additional projects that will be more resilient to coastal impacts over the state's 50-year planning horizon and achieve multiple benefits for communities.

In September 2019, St. John the Baptist Parish was the first of the six parishes to adopt its adaptation strategy.[40] St. John aims to integrate its LA SAFE strategy into local policies and future development decisions.[41] The state is working with the five other parishes to officially codify their strategies as well. In 2020, the state anticipates beginning to construct the ten funded projects. Other projects included in the adaptation strategies may be implemented in the future based upon different factors like government prioritization, resident support, and funding availability.

Considerations and Lessons Learned

The LA SAFE framework can serve as a model for other state and local governments and regional entities contemplating long-term adaptation plans and investments to make coastal areas more resilient to the impacts of sea-level rise, flooding, and land loss. OCD and FFL developed a comprehensive approach to design projects to address varying degrees of flood, social, and economic risk and achieve different adaptation goals across multiple sectors. Other jurisdictions could benefit from similar comprehensive approaches to attain and leverage benefits for communities, the environment, and economies. Regardless, it is important to note that LA SAFE was funded through the National Disaster Resilience Competition, which was a one-time post-disaster funding opportunity. States and local governments seeking to replicate the LA SAFE framework will have to consider other potential funding sources for both community engagement and project design and implementation.

A comprehensive approach requires the development of different strategies that meet the needs of communities based upon flood risk and demographic changes over time. Different adaptation strategies are needed for low risk areas with growing population and high risk areas that may be losing population. LA SAFE shows how projects can be designed to accomplish these goals and proactively help communities adapt to flood risk as well as demographic changes. Early investments in low flood risk areas that can serve as receiving communities — for example in affordable housing, green space, and economic development — can facilitate easier transitions for coastal residents to safer, higher ground areas. Additionally, measures are also needed to help residents and businesses that will continue to live in higher flood risk areas. The moderate and high flood risk areas show how policies and programs can be designed to help communities transition and mitigate impacts from population losses and reduced tax bases — for example, by making investments to sustain communities by enhancing the resilience of homes and infrastructure (e.g., floodproofing or elevation).

An equitable approach to managed retreat necessitates that communities have an active role and voice in decisionmaking. The LA SAFE example shows how policymakers can engage communities in difficult conversations about managed retreat across multiple stages of the planning process for long-term adaptation projects. States, regions, and municipalities designing comprehensive adaptation approaches or long-term plans for retreat could deepen public engagement by training community members to facilitate public meetings, translating materials for non-English speakers, and offering childcare and other resources to increase the accessibility of the meetings for all community members. Meetings are also an opportunity to directly engage elected officials and government representatives, who could provide input on the feasibility of proposed programs or policies.

In addition to community engagement, the LA SAFE process benefitted from being administered through a public-private partnership. State and local governments should aim to work collaboratively to coordinate state, regional, and local actions and maximize government resources to achieve mutually beneficial coastal initiatives. Governments can also partner with nongovernmental organizations, like nonprofits and religious organizations, with existing ties in communities in order to increase resident participation and buy-in to support the implementation of important adaptation policies and projects going forward.

Endnotes

1 La. Office of Cmty. Dev.–Disaster Recovery Unit, LA SAFE: Louisiana's Strategic Adaptations for Future Environments 2-3, *available at* **https://s3-us-west-2.amazonaws.com/resilience-exchange/attachments/uploads/1024/original/LASAFE_Report_Final.pdf**. Louisiana is considered to be a working coast, which supplies 90 percent of the nation's oil and gas on the Outer Continental Shelf, handles 20 percent of the nation's annual waterborne commerce, and produces 26 percent (by weight) of the continental U.S. commercial fisheries landings. In addition, 500 million tons of cargo pass through the state's deep-draft ports and navigation channels, ranking first in the U.S. in total shipping tonnage. *Id.*

2 *USGS: Louisiana's Rate of Coastal Wetland Loss Continues to Slow*, U.S. Geological Survey, U.S. Dep't of the Interior (July 2017), **https://www.usgs.gov/news/usgs-louisiana-s-rate-coastal-wetland-loss-continues-slow**; Coastal Prot. & Restoration Authority of La., Louisiana's Comprehensive Master Plan for a Sustainable Coast ES-7 (June 2, 2017), **http://coastal.la.gov/wp-content/uploads/2017/04/2017-Coastal-Master-Plan_Web-Book_CFinal-with-Effective-Date-06092017.pdf** ("2,250 square miles could be lost if we take no additional action over the next 50 years.").

3 La. Office of Cmty. Dev.–Disaster Recovery Unit, LA SAFE: Louisiana's Strategic Adaptations for Future Environments 2-3, *available at* **https://s3-us-west-2.amazonaws.com/resilience-exchange/attachments/uploads/1024/original/LASAFE_Report_Final.pdf**.

4 Ted Jackson, *On the Louisiana Coast, A Native Community Sinks Slowly into the Sea*, Yale Environment 360 (Mar. 2018), **https://e360.yale.edu/features/on-louisiana-coast-a-native-community-sinks-slowly-into-the-sea-isle-de-jean-charles**; La. Office of Cmty. Dev.–Disaster Recovery Unit, LA SAFE: Louisiana's Strategic Adaptations for Future Environments 7-8, *available at* **https://s3-us-west-2.amazonaws.com/resilience-exchange/attachments/uploads/1024/original/LASAFE_Report_Final.pdf**.

5 LA SAFE Program Guidelines Operational Version 1.0 §1.3.1, p. 7-8 (Sept. 2018), *available at* **https://lasafe.la.gov/wp-content/uploads/2018/09/LASAFE_Guidelines_Operational_v1_09162018.pdf**.

6 *See* La. Office of Cmty. Dev.–Disaster Recovery Unit, LA SAFE: Louisiana's Strategic Adaptations for Future Environments 3, *available at* **https://s3-us-west-2.amazonaws.com/resilience-exchange/attachments/uploads/1024/original/LASAFE_Report_Final.pdf**.

7 *Frequently Asked Questions: Why These 6 Parishes?*, LA SAFE, **https://lasafe.la.gov/faqs/** (last visited Nov. 13, 2019).

8 Note that while these two parishes are located further away from the coast, they were two of the most heavily impacted parishes in Hurricane Isaac. St. John, specifically, was the most heavily impacted parish in the state, proportionally.

9 Robbie Berg, Nat'l Hurricane Ctr., Tropical Cyclone Report: Hurricane Isaac (AL092012) 21 August–1 September 2012 (Jan. 28, 2013), *available at* **https://www.nhc.noaa.gov/data/tcr/AL092012_Isaac.pdf**.

10 To confront the physical challenges facing the state's coastline, the Louisiana legislature created the Coastal Protection and Restoration Authority in 2005 as a means to develop, implement, and enforce a comprehensive coastal protection and restoration master plan. This mandate led to the development of the Coastal Master Plan (CMP); the most recent version of CMP was released in 2017. Updated every five years, CMP identifies coastal restoration and resilience projects the state is either implementing or seeks to develop and articulates the state's long-term program and adaptive management strategy. *See* Georgetown Climate Ctr., *Louisiana 2017 Coastal Master Plan,* Adaptation Clearinghouse (June 2, 2017), **https://www.adaptationclearinghouse.org/resources/louisiana-2017-coastal-master-plan.html**.

11 The first phase of LA SAFE discussed in this case study did not include the release of the community development plans noted for this goal; the state released these plans or what were eventually termed "strategies" (one regional and one for each parish for a total of seven) in 2019. For more information, see section on Next Steps, *infra,* and Georgetown Climate Ctr., *Louisiana Strategic Adaptations for Future Environments (LA SAFE) Adaptation Strategies,* Adaptation Clearinghouse (May 2019), **https://www.adaptationclearinghouse.org/resources/louisiana-strategic-adaptations-for-future-environments-la-safe-adaptation-strategies.html**.

12 *See Learn About Who We Are: Our Mission*, LA SAFE, **https://lasafe.la.gov/about-us/** (last visited Nov. 13, 2019).

13 In implementing LA SAFE, OCD and FFL abandoned terminology (as proposed during early phases of LA SAFE's design) that would have labeled each flood risk area as a different type of zone: "Reshape Zones" for low flood risk areas; "Retrofit Zones" for moderate flood risk areas: and "Resettlement Zones" for high flood risk areas. *See* LA SAFE Program Guidelines Operational Version 1.0 (Sept. 2018), *available at* **https://lasafe.la.gov/wp-content/uploads/2018/09/LASAFE_Guidelines_Operational_v1_09162018.pdf**. In modifying the LA SAFE framework to meet local needs, OCD and FFL found that a purely zonal approach to managed retreat is not viable because physical risks, land uses, and development patterns, among other factors, can vary within a larger spatial zone and adaptation strategies in any given place require more nuanced discussions. For purposes of this case study, guiding development principles for Reshape, Retrofit, and Resettlement zones were incorporated under their corresponding flood risk area and will not be referred to independently as "zones."

14 OCD used the Coastal Protection and Restoration Authority analytical model, the Coastal Louisiana Risk Assessment (CLARA), to estimate future flood risk over the next 50 years (i.e., from 2017 to the year 2067). LA SAFE Program Guidelines Operational Version 1.0 p. 5-6 (Sept. 2018), *available at* **https://lasafe.la.gov/wp-content/uploads/2018/09/LASAFE_Guidelines_Operational_v1_09162018.pdf**.

15 *Id.* at 9.

16 *Id.*

17 *Id.* at 12.

18 *Id.*

19 *Id.*

20 *Id.* at 15.

21 *Id.*

22 *Id.*

23 *Id.* at 7, 9.

24 *Id.* at 8.

25 *St. John the Baptist Parish Projects Selected for 2018 Funding*, LA SAFE, **https://lasafe.la.gov/engagement/st-john-baptist-parish/** (last visited Nov. 13, 2019).

26 *St. Tammany Parish Projects Selected for 2018 Funding*, LA SAFE, **https://lasafe.la.gov/engagement/st-tammany-parish/** (last visited Nov. 13, 2019).

27 LA SAFE Program Guidelines Operational Version 1.0 p. 22 (Sept. 2018), *available at* **https://lasafe.la.gov/wp-content/uploads/2018/09/LASAFE_Guidelines_Operational_v1_09162018.pdf**.

28 The proposed project must have been a Community Development Block Grant National Disaster Resilience Competition (or Disaster Recovery, as applicable) eligible activity, in addition to having met other baseline criteria specified in the LA SAFE program guidelines. *Id.* at 21.

29 The full list of scoring criteria included: (1) public preference for the proposal; (2) ability to supplement Community Development Block Grants with other funding; (3) benefit to low-to-moderate income (LMI) populations; (4) quantitative public benefit (e.g., number of jobs created); (5) qualitative public benefit (e.g., ability to be scaled or replicated in other localities); and (6) potential Community Rating System (CRS) score.

30 LA SAFE Program Guidelines Operational Version 1.0 p. 21 (Sept. 2018), *available at* **https://lasafe.la.gov/wp-content/uploads/2018/09/LASAFE_Guidelines_Operational_v1_09162018.pdf**.

31 *Id.* at 20.

32 *Id.* at 6-7.

33 For example, two of the final projects — the Wetland Education Center and Emerging Industry Business Incubator — were not among the highest scoring projects, but selected instead to diversify the project portfolio in observance of the additional criteria listed above.

34 *Gov. Edwards Awards Over $41 Million to Coastal Parishes for LA SAFE Flood-Resilience Projects*, St. John the Baptist Parish (Sept. 11, 2018), **http://www.sjbparish.com/news_details.php?id=2599**.

35 The National Disaster Resilience Competition was a year-long funding competition for states, like Louisiana, and local applicants that received presidential disaster declarations from 2011–2013. The competition was structured in two phases for applicants to develop innovative approaches to reduce future risks to natural hazards and build long-term resilience. In January 2016, thirteen winning projects were selected for funding. Georgetown Climate Ctr., *HUD National Disaster Resilience Competition*, Adaptation Clearinghouse (June 14, 2014), **https://www.adaptationclearinghouse.org/resources/hud-national-disaster-resilience-competition.html**; The Rockefeller Found., Program Overview Packet 1 (Dec. 2014).

36 LA SAFE Program Guidelines Operational Version 1.0 p. 5 (Sept. 2018), *available at* **https://lasafe.la.gov/wp-content/uploads/2018/09/LASAFE_Guidelines_Operational_v1_09162018.pdf**. The impacts of sea-level rise, subsidence, and erosion have already caused Isle de Jean Charles — a narrow strip of land located in the southern wetlands of Louisiana — to lose 98 percent of its land mass. In 2016, Louisiana received $48 million from the U.S. Department of Housing and Urban Development to relocate the members of the Biloxi-Chitimacha-Choctaw tribe still residing on the island. *See* Ted Jackson, *On the Louisiana Coast, A Native Community Sinks Slowly into the Sea*, Yale Environment 360 (Mar. 2018), **https://e360.yale.edu/features/on-louisiana-coast-a-native-community-sinks-slowly-into-the-sea-isle-de-jean-charles**.

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38 *See Regional and Parish Adaptation Strategies*, LA SAFE, **https://lasafe.la.gov/** (last visited Nov. 13, 2019).

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Staten Island, New York: Oakwood Beach Buyout Committee and Program

Executive Summary

Following Hurricane Sandy in 2012, Oakwood Beach on Staten Island in New York City became the first community to take advantage of New York State's post-Sandy buyout program to plan for retreat in a model that could be replicated in other vulnerable coastal locations. The members of the small community formed the Oakwood Beach Buyout Committee, and petitioned the state government to buy out entire neighborhoods, which resulted in large-scale risk reduction and cost-saving benefits compared to individual buyouts. Less than three months after Sandy, Governor Andrew Cuomo announced a state-funded buyout program, pledging upwards of $200 million in funding and financial incentives to relocate families in high flood risk areas in places like Oakwood Beach.[1] One year later, 184 out of 185 homeowners applied to the program — and by 2015, 180 of those homeowners were accepted to participate in the state's voluntary buyout program.[2] This process can serve as an example of a successful, community-led voluntary buyout effort that can be supported by state and local government retreat programs or projects in other jurisdictions.

Background

Oakwood Beach is located on the eastern shore of Staten Island — one of New York City's five boroughs — facing Raritan Bay. Staten Island's position on the New York Bight makes it more susceptible to experiencing the worst and most intense storm waters that funnel into Raritan Bay.[3] Staten Island's flood risk is further compounded by a large amount of development that is located in or near floodplains. Specifically, a lot of the residential development on Staten Island was constructed on filled wetlands that, in their natural state, would have otherwise served as a buffer.[4] When Hurricane Sandy traveled through Raritan Bay in 2012, it produced tides on Staten Island measuring as high as 16 feet that increased the amount and severity of damage in built areas like Oakwood Beach.[5]

Because the community of Oakwood Beach had long dealt with flooding issues, its response to Hurricane Sandy was quick and decisive, and came from the community itself. In the early 1990s, a powerful storm struck, inundating the community in upwards of five feet of water.[6] In response, community residents formed a committee to study the effects of flooding on the area and advocate for better coastal protection.[7] This initial committee was essentially reformed two decades later in response to Hurricane Sandy as the Oakwood Beach Buyout Committee, which worked with the State of New York to implement a large, neighborhood-scale buyout through a community-led process.

Managed Retreat Examples

Community Engagement

The Oakwood Beach Buyout Committee (committee) and process started with one person gaining information that benefited the broader neighborhood in evaluating post-Sandy disaster recovery options, namely retreat through voluntary buyouts. Specifically, one community member, Joseph (Joe) Tirone, Jr., learned about the potential for a government-funded buyout for his rental investment property in discussions about disaster relief funding with the U.S. Small Business Administration. Mr. Tirone shared information about the potential for buyouts at an initial meeting of Oakwood Beach residents who were trying to collectively assess neighborhood damage and identify recovery resources. A few people at this initial meeting expressed interest in buyouts, some who did not even know about the possibility of government-funded buyouts. Eight residents, including Mr. Tirone, initially formed the Oakwood Beach Buyout Committee to educate residents and coordinate efforts. Oakwood Beach residents were informed about the committee and its objectives through monthly meetings, outreach, and word-of-mouth that government buyouts were a viable option for homeowners.[8] As a result, the committee developed a buyout plan that had the support of nearly 200 Oakwood Beach households.[9] After developing the plan, committee members directed their efforts towards educating state and local officials about interest in voluntary property buyouts.[10] The state responded to the committee's requests, launching a program three months after Sandy.

Buyout Program

The committee's partnership with the State of New York led to the development of a buyout program that was designed to be responsive to community requests for relocation assistance. The goal of the state buyout program was to return bought-out properties to their natural state and prohibit future development. Homeowners accepted into the buyout program could have their properties purchased at their appraised pre-storm fair market value. To further encourage comprehensive community participation, the

state also created financial incentives. The State of New York offered residents in an "Enhanced Buyout Area" on Staten Island — which included Oakwood Beach — a ten-percent incentive above the pre-storm fair market value of their homes to increase the number of volunteers to maximize flood risk reduction on a neighborhood scale.[11] In addition, the state offered a five-percent incentive for participants who would relocate within the same five boroughs of New York City or county to maintain local tax bases.[12]

Environment

The promise of comprehensive ecosystem restoration in Oakwood Beach was largely the result of and a motivating factor for residents to participate in the state's buyout program instead of the City of New York's program — and is an important takeaway from this example of retreat. After Hurricane Sandy, the city launched its own buyout program shortly after the state program commenced. Under the city plan, the municipality of Oakwood Beach would retain ownership over bought-out properties and allow for their potential redevelopment.[13] In contrast, under the state plan, all existing structures would be demolished, and the land would be rezoned and restricted to open space uses, barring any further development on the property.[14] As a result of this difference in property disposition, over 180 residents of Oakwood Beach ultimately chose the state-led program.[15] Specifically, residents preferred the state buyout program to the city's largely to protect future buyers from the same flood risks they experienced. One explained, "[I]f this is an area that takes in water, that becomes a sponge, that goes back to nature. Everybody wins. It's a hell of a sacrifice for the greater good."[16]

Bought-out neighborhoods have been replaced with natural flood and coastal buffers, which include maritime forests, tide gates, tidal wetlands, breakwater reefs, and earthen levees.[17] Moreover, portions of the land have been converted to hiking trails, walkways, and wildlife observation areas, making up at least two miles of trails.[18] In addition to ecosystem restoration, some properties may also be converted to community assets, such as sports fields. As of June 2019, however, there is no comprehensive or long-term management plan from the state or city for these bought-out properties. The U.S. Army Corps of Engineers is also evaluating project plans — the South Shore of Staten Island Coastal Storm Risk Management Project[19] — to build a 5.3-mile coastal barrier from Fort Wadsworth to Oakwood Beach that will include the bought-out properties.[20]

In September 2017, the city rezoned residential areas in Oakwood Beach that are located near the homes bought out by the state to minimize risks for future development. Specifically, the New York City Council established a special district, the East Shore Special Coastal Risk District, in the city-bought-out areas of Oakwood Beach, Ocean Breeze, and Graham Beach to decrease density and protect the environment restored as part of the state's program in accordance with open space and infrastructure plans.[21] Through the special district, the city will prohibit all new residential development and community facilities with sleeping accommodations, except single-family detached houses, and require authorization from the City Planning Commissions for all new development and horizontal enlargements to limit impacts on wetlands.[22] Zoning amendments can be designed and implemented to support public investments to relocate people away from vulnerable areas.

Funding

The state-managed buyouts in Oakwood Beach were funded by U.S. Department of Housing and Urban Development Community Development Block Grants (CDBG).[23] The state, under Governor Cuomo's leadership, chose to use CDBG to expedite buyouts for affected residents in need of immediate assistance. The governor announced buyouts in January 2013, a few months after Hurricane Sandy hit in October 2012, and most

buyouts in Oakwood Beach occurred within one year. After Hurricane Irene in 2011, the state received funding from the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Grant Program (HMGP) to conduct buyouts in upstate New York.[24] In upstate New York, it took more than four months for the state to receive HMGP funds from FEMA to implement these buyouts. In addition, the scale of buyouts in upstate New York was smaller than in New York City. Comparing the two experiences, the state decided to utilize CDBG because the availability of funds was not contingent upon a presidential disaster declaration or supplemental appropriations by U.S. Congress.

Considerations and Lessons Learned

The Oakwood Beach example is notable for several reasons, including three primary factors that other jurisdictions and community leaders and residents can consider when designing and implementing buyouts and other retreat tools. First, the state's relocation financial incentives helped to increase participation in the buyout program and keep people local to maximize environmental and local benefits, including minimizing impacts to New York City's tax base. Second, members of the Oakwood Beach Buyout Committee cite the state's use of CDBG rather than disaster recovery funds and commitment to maintaining bought-out properties as open space as the keys to gaining such a large number of volunteers on Staten Island. The willingness of residents to accept buyout offers may have otherwise decreased if they had to wait a longer period of time for relief after Sandy or had not received assurances that the land would not be redeveloped. Third, and most important, the process in Oakwood Beach demonstrates the need for — and value of working with — people through community-led organizations to navigate difficult and complex decisions to relocate away from vulnerable coastal areas. Both state and local governments should evaluate opportunities for integrating community engagement into all stages of climate adaptation and retreat decisionmaking efforts. In particular, members of the Oakwood Beach Buyout Committee recommend several engagement strategies to achieve more widespread support for buyouts:

- Hold some meetings open only to residents and experts providing necessary information for group consideration. Having the opportunity to meet in private — without government officials and media — can promote more candid conversations and build relationships among community members without fear of public retribution, loss of privacy, or misrepresentation.

- Take every effort to provide people with accurate information and correct rumors or mistruths as soon as possible. Inaccurate information can discourage otherwise interested residents from participating and disrupt community processes.

- Design community processes to be inclusive and involve people in active roles, including by offering volunteers different duties or tasks (e.g., outreach lead, meeting organizer). Delegating responsibilities beyond a small leadership team can have many benefits including: promoting community cohesion; developing and deepening community relationships; increasing buy-in for the process; increasing the number of people who can correct public misperceptions or misinformation; reducing negative psychological impacts, like stress, by allowing people to have some control in a chaotic disaster recovery context; and expanding the program's reach. Volunteers can also help to reduce administrative burdens often placed on leaders, which could potentially encourage more people to take on leadership roles if they know they will be supported by a team.

Endnotes

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2 *Id.*

3 A bight is defined as a curve or recess in a coastline. "Staten Island sits right in the crook of the New York Bight, the slight indentation in the Atlantic coastline from the northeastern tip of Long Island to southern New Jersey. The bight forms a sharp angle at Staten Island, which means the island, along with adjacent segments of New Jersey and Long Island, bears the brunt of surging storm waters." Crystal Gammon*, Why Hurricane Sandy Hit Staten Island so Hard*, LIVESCIENCE (Nov. 7, 2012), **https://www.livescience.com/24616-hurricane-sandy-staten-island-effects.html**.

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King County, Washington: Transfer of Development Rights Program

Executive Summary

The King County Transfer of Development Rights (TDR) Program in Washington State uses a unique market-based tool to achieve long-term planning goals and incentivize development in strategic areas that can be coupled with other legal and policy tools as a part of comprehensive coastal retreat strategies. King County created the TDR Program in response to state growth area management requirements and objectives. Municipalities and unincorporated areas across the county can voluntarily choose to participate in and integrate the necessary provisions into their local codes. Municipal programs are then administered individually according to local laws and an interlocal legal agreement with King County. Participating local governments designate two areas "sending areas" — typically farmland, forest, open space, or priority natural resources areas — where they want to limit new development; and "receiving areas" in mostly urban areas where existing services and infrastructure can accommodate growth. Landowners in sending areas can sell their development rights to project proponents in receiving areas who can then use those rights to increase the size or density of a development project. Between 2000 and July 2019, 144,290 acres of rural and resource lands were conserved and protected through the King County TDR Program. As a result, 2,467 potential dwelling units have been relocated from rural to urban areas. Washington State created the Landscape Conservation and Local Infrastructure Program to support TDR Programs like King County's by financing infrastructure development and other improvements in receiving communities to ensure these areas can keep pace with population growth. The King County TDR Program provides one example of how several types of land acquisition programs and funding sources can be leveraged to achieve the benefits of both conservation and new, more resilient development. In a managed retreat context, TDR Programs modeled after King County can be used to preserve lands for ecological benefits through conservation easements, while ensuring new development is concentrated in areas that are less vulnerable to flooding and coastal hazards, such as sea-level rise and storm surges.

Background

King County is located in the northwestern corner of Washington State off Puget Sound and borders the Cascade Mountain Range to the east. King County is home to the City of Seattle and encompasses both incorporated and unincorporated areas. As of 2018, the county's estimated population was approximately 2.2. million, making it the most populous county in Washington.[1] Generally, development in the western part of the county is more urban while development becomes gradually sparser to the east, with suburban developments, then rural residential lands, and farms and forestlands.[2] Eastern King County is mountainous, and primarily consists of wilderness areas, forestlands, or restricted watersheds to protect and sustain the region's drinking water.[3]

In 1988, King County implemented a three-year pilot Transfer Development of Rights (TDR) program to support land conservation and steer development away from rural and natural resource lands in the east into higher density urban areas in the west.[4] In 2001, the TDR Program was incorporated into the County Code.[5] The TDR Program is voluntary and uses a market-based approach to allow landowners to separate the right to develop from their bundle of property rights into a tradable commodity. King County has used the TDR Program as a tool to promote rural and natural resource land conservation by transferring development out of rural "sending areas" — which are a priority for preservation as natural areas or floodplains (e.g., areas with current or future high-flood risk, valuable natural resources, or high potential for future development or subdivision) — and into urban "receiving areas" that are appropriate for additional growth or increased density (e.g., areas with lower flood risk and ideally affordable housing and existing supporting infrastructure and services).

Managed Retreat Examples

Transfer of Development Rights Program

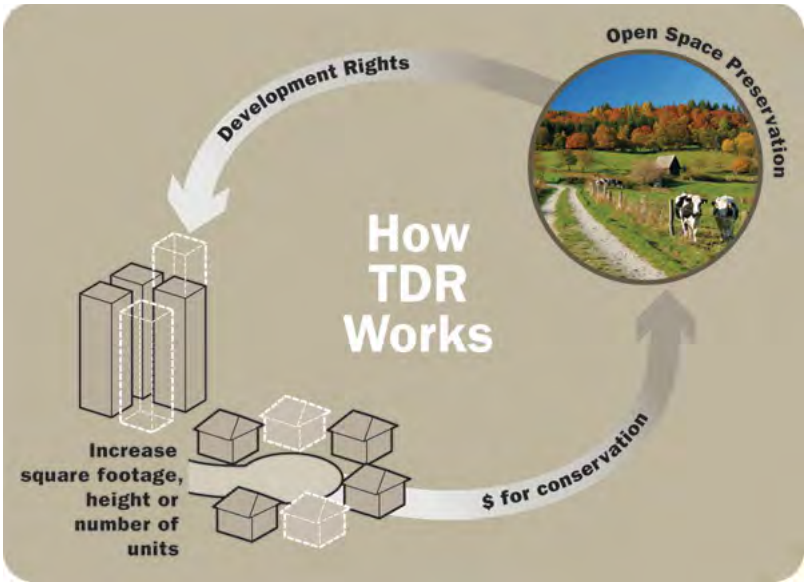
King County's TDR Program could serve as a model approach for using market-based tools as a part of comprehensive managed retreat strategies to encourage the preservation of sensitive coastal ecosystems while reducing development in vulnerable coastal areas. Under the King County TDR Program, qualifying landowners can choose to separate some or all of their unused development rights from their property. Development rights can be bought and sold as a tradable commodity separate from the land itself. Separated development rights are typically sold to developers in receiving sites, such as designated urban areas eligible for increased density. By acquiring TDR credits, developers can increase the density of proposed development above base zoning standards in receiving areas, while the original sending parcel is preserved through a conservation easement. King County has two TDR models to acquire development rights. In the first, King County pays property owners for conservation easements and the King County TDR Bank (see description below) then holds the development rights. In the other model, landowners voluntarily place a conservation easement on their land and the development rights are made available for the landowner to sell. In the second model, there are fewer upfront costs for the county. Under both models, property owners are ultimately compensated for their development rights and are also eligible for reduced property tax rates for lands protected by conservation

easements. Landowners who qualify to send or sell TDRs must own property located within one of six designated rural, agricultural, or forest zones, and the land must provide at least one of the following public benefits:

- Agricultural potential
- Forestry potential
- Critical wildlife habitat
- Open space
- Regional trail connectors or urban separators

The number of development rights for a given property is calculated based on existing and remaining development potential (using a qualification process involving the location and size of the parcel, minus the amount of any submerged lands or land being retained for development on the site).

King County administers and provides regional support for TDR Programs implemented at the local level in participating municipalities.[6] King County's model is a voluntary program that allows municipalities within the county, like Seattle, to adopt a TDR Program through local ordinance and incorporate it into their codes according to a county-city interlocal agreement. King County and participating municipalities jointly evaluate and determine individual sending and receiving site designations, developer benefits (such as increasing density), and revenue-sharing agreements with the county depending on the terms of these interlocal agreements. The county operates and maintains a TDR Bank that acquires and holds credits to provide ongoing access to "banked" credits for developers. By providing a stable market for banked credits, the TDR Bank eliminates the need for developers to find new credits on an as-needed basis, removes certain administrative barriers that can slow project implementation, and enables more developers to participate in the TDR program. In addition, the county eases administrative burdens on municipalities by leading the TDR Bank on behalf of all the participating jurisdictions.



How Transfer of Development Rights Programs Work.

This illustration from King County presents a simplified overview of Transfer of Development Rights transactions.

Credit: **Program Overview: Transfer of Development Rights**, King Cnty. (last updated Aug. 19, 2019).

Funding and Financing

In addition to the King County TDR Program, King County and the State of Washington provide innovative examples of funding and financing tools to support and implement retreat decisions on the ground.

Open Space Acquisitions and Conservation

King County has leveraged work across different types of state, regional, and local land acquisition programs to achieve co-benefits and combine multiple funding sources for land purchases. The main source of funding for the purchase of conservation easements and fee simple interests in King County is the Washington State Conservation Futures Tax (CFT), a local property tax.[7] Applications for CFT funds are reviewed by a citizen advisory committee that makes recommendations to the King County Executive and Council on how funds should be allocated. Awarded projects require municipalities to supply a 100 percent funding match equivalent to the

amount of the CFT identified for a project. For purposes of leveraging different public and private funding sources, the TDR Program is often capable of providing the 100 percent match to support mutually beneficial land acquisition projects at the municipal level. Since 1982, King County has used funds from CFT to protect more than 111,000 acres of land, forests, and other conservation parcels from development. CFT is an useful example of a local funding source that provides more flexibility for conservation land acquisitions than other sources, such as the federal government, that carry more restrictive post-acquisition land-use requirements (e.g., Federal Emergency Management Agency Hazard Mitigation Grants).

Preparing Receiving Areas

To complement the TDR Program, the State of Washington developed a tool for counties and cities to minimize the funding challenges associated with preparing receiving areas to support increased development and housing. In 2011, the state passed legislation to create the Landscape Conservation and Local Infrastructure Program (LCLIP) to provide funding to offset the cost of infrastructure and other community services in King, Pierce, and Snohomish counties.[8] By adopting a TDR Program and agreeing to accept a specified amount of regional (as opposed to only municipal) development rights, municipalities within these three counties are eligible to receive a bonus portion of their county's property tax revenues to finance investments in receiving areas, such as transportation and water and sewer system repairs and upgrades, construction of public transit, community amenities like parks and trails, and electric, gas, and other utility infrastructure.[9] LCLIP only reallocates a portion of the incremental property taxes that result from new development and does not impose any new tax burden on residents or businesses.

As of 2019, Seattle is the only city that has created a "Local Infrastructure Project Area" tax financing district for its Downtown, Denny Triangle, and South Lake Union neighborhoods. The tax district is an interlocal agreement between Seattle and King County[10] and amends the city's municipal code through a local ordinance.[11] LCLIP provides a unique example of a financing tool to support comprehensive investments in infrastructure development in receiving areas.

Considerations and Lessons Learned

The King County TDR Program demonstrates how growth management and land conservation goals can be achieved through implementing innovative planning, land-use, and funding and financing tools. First, the TDR Program provides two primary benefits to King County and local residents: (1) ecologically and culturally important land and resources are protected at little or no public expense; and (2) future growth is concentrated in urban areas. Between 2000 and July 2019, 144,290 acres of rural and resource lands were conserved and protected through the King County TDR Program. As a result, 2,467 potential dwelling units have been relocated from rural to urban areas. A similar approach could be adapted for a coastal retreat context to support development patterns in less vulnerable, inland areas.

Second, King County and the state's use of diverse funding sources provide cost-effective ways to acquire and conserve lands for environmental benefits while preparing receiving areas with infrastructure investments. By allowing landowners to sell conservation easements, the county is able to avoid the costs of buying land outright and is not burdened with the long-term management costs of land preservation. Other jurisdictions may also consider adopting the state's Landscape Conservation and Local Infrastructure Program model to make funding available to support the new infrastructure demands TDR Programs generate in receiving communities.

Endnotes

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