Urban Land Institute

ON SAFER GROUND

Floodplain Buyouts and Community Resilience

COVER PHOTOS: Charlotte-Mecklenburg Storm Water Services

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About the Urban Land Institute

The Urban Land Institute is a global, member-driven organization comprising more than 45,000 real estate and urban development professionals dedicated to advancing the Institute's mission of shaping the future of the built environment for transformative impact in communities worldwide.

ULI's interdisciplinary membership represents all aspects of the industry, including developers, property owners, investors, architects, urban planners, public officials, real estate brokers, appraisers, attorneys, engineers, financiers, and academics. Established in 1936, the Institute has a presence in the Americas, Europe, and Asia Pacific regions, with members in 80 countries.

Drawing on the work of its members, the Institute recognizes and shares best practices in urban design and development for the benefit of communities around the globe.

More information is available at uli.org. Follow ULI on Twitter, Facebook, LinkedIn, and Instagram.

About the Urban Resilience Program

ULI's Urban Resilience program is focused on how buildings, cities and communities can be more resilient to the impacts of climate change and other environmental vulnerabilities. The program works with ULI members to provide technical assistance, advance knowledge through research, and catalyze the adoption of transformative practices for real estate and land use policy.

On Safer Ground: Floodplain Buyouts and Community Resilience is the first publication in the Climate Risk and Land Use series, which aims to foster an understanding of land use tools that can be used to address physical climate risk.

Acknowledgments

ULI is grateful to The JPB Foundation for its support of this publication and ULI's Urban Resilience program.

The Urban Resilience program led this project to better understand how floodplain buyout programs are being used to advance community resilience, and how these programs are affecting the real estate and land use sectors.

To better understand how floodplain buyout programs are affecting real estate and land use, as well as opportunities to leverage these programs to both enhance community resilience and offer green infrastructure and open space, ULI's Urban Resilience program interviewed more than 25 real estate developers, designers, land use policymakers, nonprofit leaders, community leaders, and climate adaptation experts.

ULI greatly appreciates the participation of many ULI members and experts in this project. ULI member and partner advisers reviewed versions of this publication and provided strategic direction and guidance to ensure that the findings are accurate and inspiring for the ULI audience. ULI members and partner contributors provided their expertise through interviews and by sharing resources, images, and other materials incorporated into this report.

The potential for unconscious bias may affect this research. The authors and the project team hope that the collaborative contributions of many others to this report provide a robust and well-rounded perspective and reduce the potential for bias.

Thank you to the individuals listed on the following pages for their guidance and support in the creation of this report.

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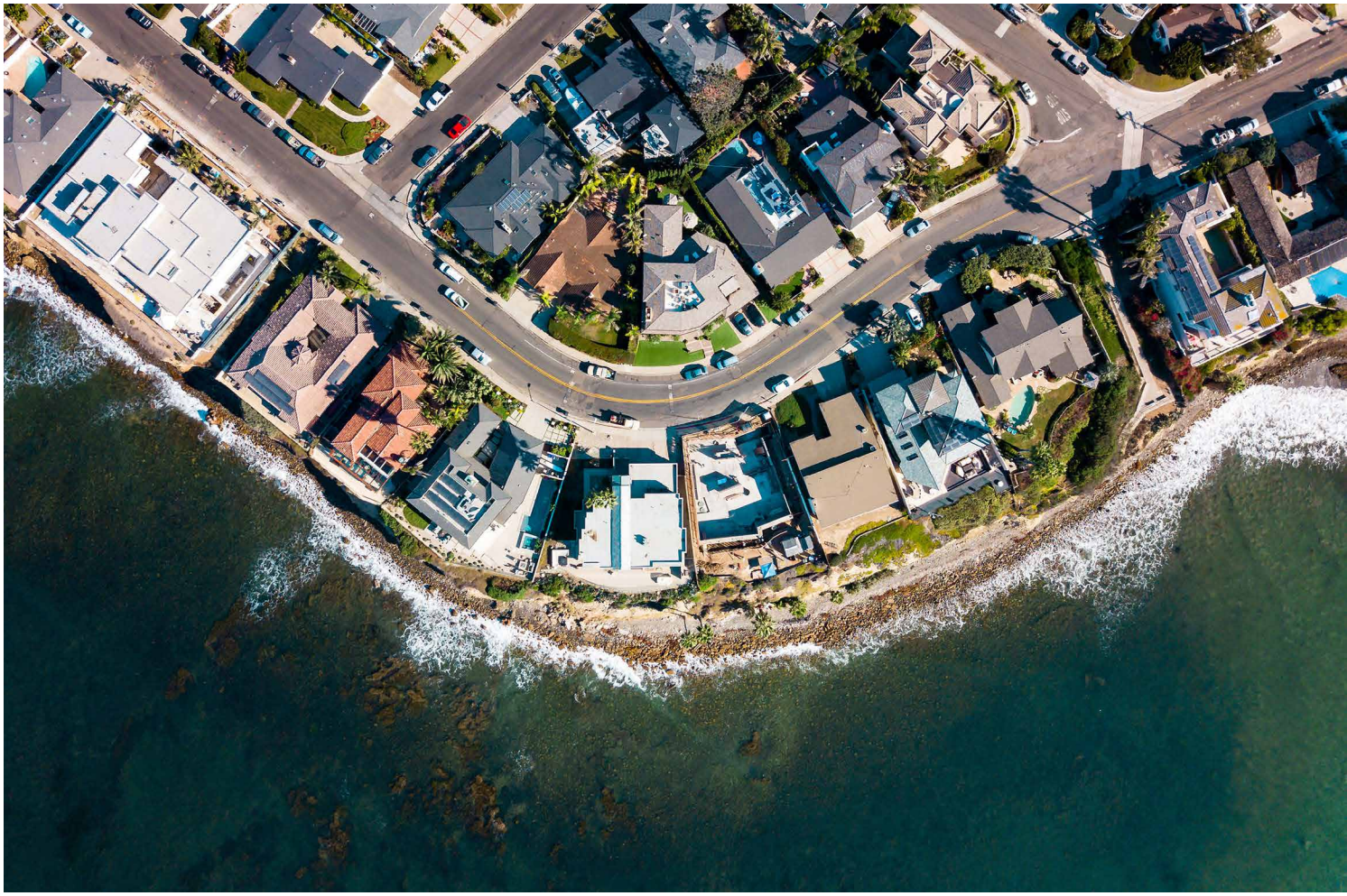


Within the next 30 years, $8 billion to $10 billion of California's existing coastal property is predicted to be under water and an additional $6 billion to $10 billion will be at risk of flooding during high tide, according to a paper by the California Legislative Analyst's Office.[1] The state's legislature is considering instituting a revolving loan program that allows counties to purchase vulnerable coastal properties and rent them out as a means to pay off the loans until the properties are no longer safe to inhabit. This type of long-term transaction is also known as a leaseback, which capitalizes on the market value of the coastal property before it is expected to decrease.

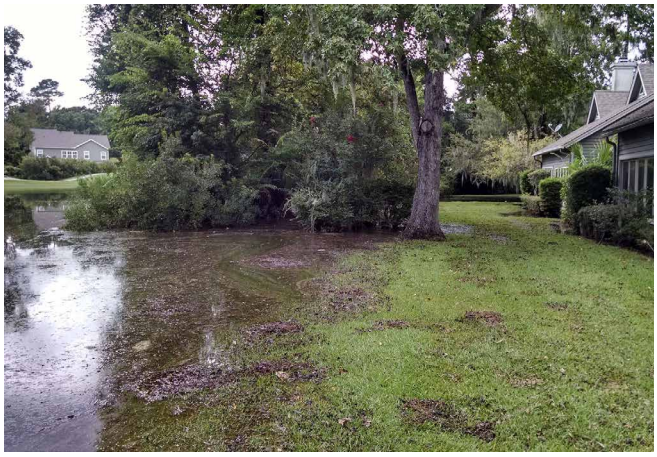
Waterfront communities, large and small, are searching for solutions to manage flood risk as climate change accelerates flooding caused by increasingly frequent and intense storms, sea-level rise, and other climate impacts. Flooding is the most expensive and common natural disaster in the United States, and managing flood risk is critical to protecting homes, local and regional economies, and community well-being.

However, funding and delivering much-needed adaptation measures is challenging, even in communities with significant resources. Officials across the country are entering into tough conversations with their residents and stakeholders, referencing the increasingly dire need to fund the needed adaptation infrastructure—and fast.

Typical financing tools, such as loans, tax increases, and utility fees, can carry high price tags for cities and property owners, and questions arise on how to foot the bill. Others question how and whether properties will continue to be safe for the long term, encouraging officials to consider new strategies to get people out of harm's way.

Local governments are increasingly turning to floodplain buyouts as one strategy to more efficiently reduce flood risk, enhance climate and community resilience, and potentially improve access to open space. The buyout strategy is unique in comparison to other approaches to mitigate flood risk, in that it fully removes a property from future damages. For sites experiencing repetitive flood losses, buyouts can be more cost-effective for the public sector than investing in flood mitigation infrastructure, even though buyouts remove properties from the tax base.[2] Although buyouts are currently almost entirely used for residential properties in the United States, the increased use of the approach has important implications for all real estate product types and for future land use regulation and climate resilience strategy.

The real estate and land use sectors also have important roles to play in preparing for increasingly destructive and frequent flooding events, and the private sector may become more involved in funding or partnership structures to facilitate buyouts in the future.



CITY OF CHARLESTON

Floodwaters rise close to homes in Charleston, South Carolina, posing increased risk to real estate and communities.

A **floodplain buyout** is a property acquisition in which a government agency purchases private property, demolishes any structures on it, and preserves the land as open space, as an area that absorbs excess water, or for both purposes. Although buyouts are led by the public sector, practitioners have shown increased interest in identifying strategies for better collaboration or partnership with the private sector.

Buyouts offer an effective strategy to reduce flood risk and offer relief to property owners and homeowners but are not always leveraged by local governments to provide other much-needed community benefits, such as open space and protective green infrastructure. This lack of coordination can be because of lack of financial or long-term planning capacity, complications related to navigating different funding sources, or lack of land appropriate for scaled-up approaches to flood mitigation.

Buyouts offer an approach to support households disadvantaged by flooding and address discriminatory land use policies. Historically marginalized communities are most at risk from the effects of climate change, and many low-income communities and communities of color have been pushed to live in flood-prone areas by discriminatory policies and infrastructure investments.

While buyouts offer an important opportunity to help households in harm's way, use of the tool suffers from many constraints. Notably, buyouts are voluntary, so they can be difficult to coordinate, costly, and challenging to deliver in urban or high-density development contexts. Often these communities have a high renter population that poses greater challenges for implementing buyout projects. Buyout programs do not necessarily provide relocation services to support households in staying within communities or regions that they have come to call home. And without strategic consideration, buyouts can contribute to inequitable development patterns.

Riverfront Park in Nashville, Tennessee, is located on formerly industrial land that was bought out after a 1,000-year flood event in 2010. The park offers an example of how buyouts can be leveraged as part of a larger vision to remove at-risk structures from the floodplain and create an amenity that also mitigates flooding.

Relevance to Real Estate Sector

As the impacts of climate change continue to intensify, more property owners may actively seek to relocate and look for support in doing so. And as risk grows, the value of flood-impacted real estate may decrease, thereby lowering the justification for infrastructure investment and reducing households' interest in staying in flood-prone areas. Floodplain buyouts can end this downward spiral and offer residents an opportunity to sell their property for preflood market value.

As more property owners may seek opportunities to receive buyouts, more cities and states may pursue establishing or expanding buyout programs. With increased demand will come the need for more funding and partners, including partners from the real estate sector. Furthermore, when administered at larger scales, buyouts may have implications related to community migration, shifting tax bases, changing property values, housing affordability, and associated ripple effects. The industry may also seek opportunities to support development in receiving communities and the implementation of flood mitigation infrastructure.

Alternative Funding Sources for Buyouts: Key Questions

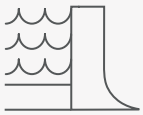
Local governments are increasingly looking to buyouts as a strategy to help relocate households out of harm's way, providing fair market compensation for their property. However, many questions remain about how to most effectively and equitably use this tool and how to scale buyouts as flooding becomes increasingly frequent and severe due to the impacts of climate change. Notably, leaders in the field are currently exploring how to leverage funding sources beyond federal dollars for buyouts, considering the following questions about municipal finance and long-term funding strategy:

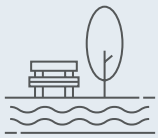
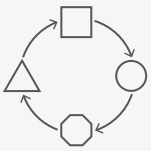
- What is the business case for buyouts for a local municipality?
- What level of damages would meet or exceed the lost property tax revenue when a site is no longer in use for development?
- What strategies can municipalities use to replace this lost tax revenue?
- If a buyout has a long-term return on investment, is there an opportunity for private capital to help finance a buyout program?
- Over the longer term, how can local governments fund both buyouts and the much-needed support for relocation services or future housing for households moving on?

Buyout Program Innovation: National Examples

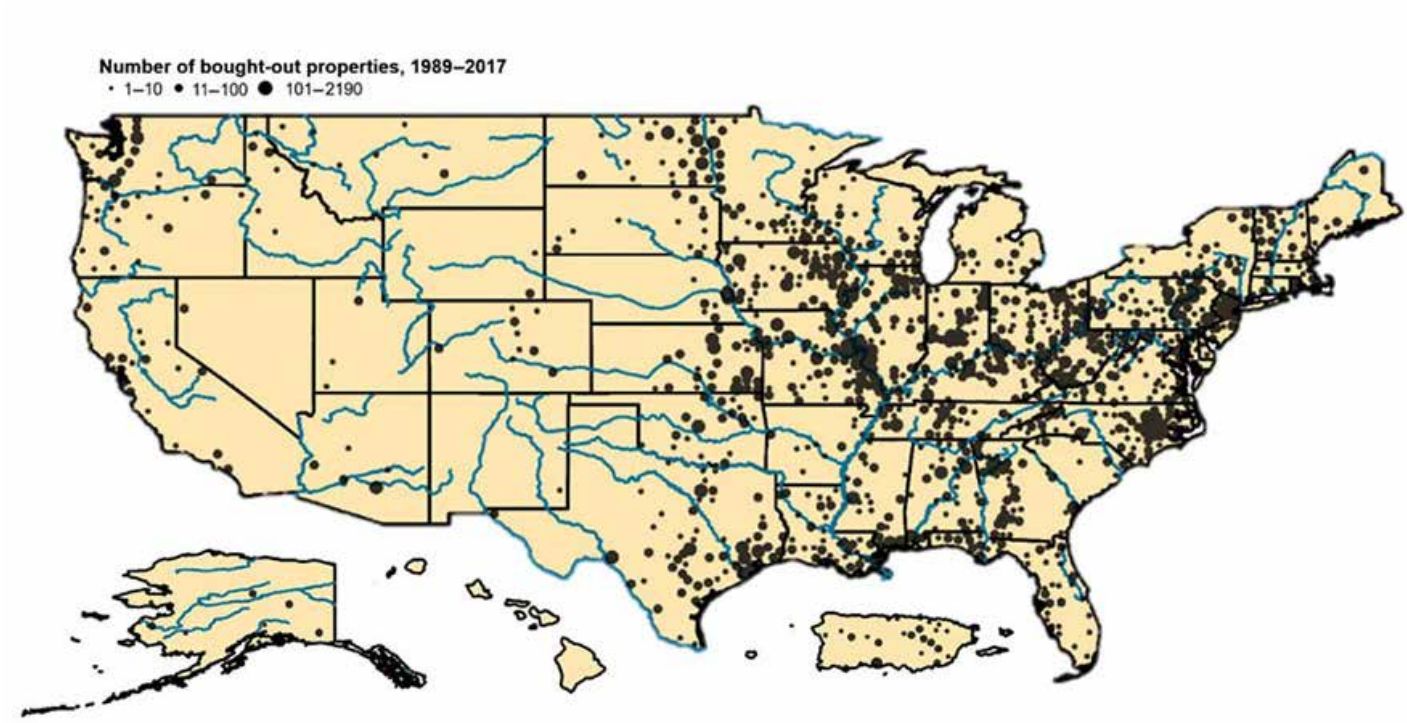
Location		Project	Innovation topic	Description	More information
Cities and counties	Cedar Rapids, Iowa	Cedar Rapids Greenway and Downtown Redevelopment Plan	Partnerships; predicable funding streams (sales tax); coordinated green space	After a 1,000-year storm, the city established partnerships with multiple levels of government, community groups, and businesses to design and develop a 220-acre greenway along the riverfront with flood protection, while creating an amenity for the community.	Page 35
	Charleston, South Carolina	Church Creek Flood Storage and Resilience Project	Coordinated green space	A voluntary buyout program will lead to the creation of a 20-acre greenway and park system, offering water storage for flooding as well as a neighborhood amenity.	Page 37 Read full case study here.
	City of Charlotte and Mecklenburg County, North Carolina	Floodplain Buyout Program	Predictable funding streams (stormwater fee); coordinated green space	The joint city and county utility uses stormwater fees to fund perennial and coordinated buyouts for accessible parks and greenways. Property owners do not have to wait for the availability of federal disaster funds to move out of harm's way.	Page 31 Read full case study here.
	Harris County, Texas	Voluntary Acquisition Program and Community Flood Resilience Task Force	Coordinated green space; equity-driven planning	A community-led task force that will advise county officials in making Harris County more flood resilient, including ways to equitably distribute a $2.5 billion bond for future flood damage reduction projects in the county.	Page 27 Read full case study here.
	Nashville, Tennessee	Riverfront Park	Coordinated green space	The formerly industrial land was transformed into a flood mitigation and recreational park along the Cumberland riverfront.	Page 31
	Pittsburgh, Pennsylvania	Negley Run Green Infrastructure Project	Transfer of development rights (TDR); coordinated green space	The city's redevelopment authority is using TDR to aggregate parcels and encourage density away from flood-prone areas surrounding Negley Run.	Page 39
States	California	Revolving Loan Program for Leasebacks	Partnerships	The state legislature may develop a revolving loan program that allows counties to rent out vulnerable properties to pay off loans until they are uninhabitable, otherwise called "leasebacks."	Page 2
	Louisiana	Louisiana Land Trust	Community land trust; partnerships	The Louisiana Land Trust uses recovery funds to purchase properties in flood-prone areas, initiate restoration projects, and redevelop housing on higher ground.	Page 40
	New Jersey	Blue Acres Program	Coordinated green spaces; relocation and social services; predictable funding streams (sales tax); renter support	This statewide buyout program provides support to local municipalities and social and relocation assistance to property owners and tenants in flood-prone areas.	Page 24 Read full case study here.

Flood Mitigation Strategies and Market Impacts

Strategy		Actions	Examples	Potential market impacts
Building or site scale	 **Adapt structures**	Design new structures or rebuild/retrofit existing structures to be more prepared for future flooding at the asset level, considering elevation, flood proofing, and other resilient design methods.	The cities of Miami Beach and Miami adopted regulation requiring new construction to be no lower than the FEMA base flood elevation plus minimum freeboard (1 to 5 feet). The regulation also provides flexibility on maximum height requirements.	• Reduced flood exposure for new development/individual properties in compliance • Potential for reduced damages and recovery costs for properties in compliance • Potential for reduced insurance premiums for properties in compliance • Potential for increased cost of construction and new development • Potential impacts to housing affordability for new construction
	 **Invest in tactical nature-based infrastructure**	Retain or control flows with small-scale solutions, such as bioswales, rain gardens, green roofs, and permeable surfaces.	New York; Philadelphia; Los Angeles; Detroit; Portland, Oregon; Kansas City, Missouri; and others are setting substantial investment goals in green infrastructure solutions for stormwater management. Along with these public investments, government policies often encourage or require private real estate–sector participation.	• Reduced asset-level and community flood exposure achieved as solutions are implemented, given incremental nature of green infrastructure investment • Potential for reduced community-wide damages and recovery costs • Potential for increased taxes or borrowing costs given costs to local governments, which can contribute to cost of housing • Potential for community co-benefits, such as improved public health, quality of life, and recreation
City or regional scale	 **Implement large-scale protective gray infrastructure**	Resist flood impacts with large-scale engineered infrastructure and physical barriers, such as seawalls, levees, and pipe systems.	New York City's Lower Manhattan Coastal Resiliency project includes seawalls, deployable protection barriers, and other gray interventions to protect vulnerable neighborhoods from sea-level rise and storm surge.	• Reduced community flood exposure upon completion of the infrastructure project • Potential for reduced community-wide damages and recovery costs • Potential for increased taxes or borrowing costs; given costs to local governments • Potential for changes to property values, location desirability, and housing affordability depending on infrastructure characteristics

Strategy		Actions	Examples	Potential market impacts
City or regional scale	 **Implement community-wide green infrastructure**	Invest in large-scale, nature-based restoration as a solution, such as beach nourishment or wetland rehabilitation, or in enhanced recreational open space.	Corktown Common is a vibrant 18-acre urban park in the West Don Lands of Toronto, Canada, that provides dual uses to residents: recreation space and floodwater absorption. The park includes a 4-by-750-meter flood protection landform, made of clay, soil, and plantings, that creates a barrier during extreme weather events and removed over 500 acres of land from the floodplain.	• Reduced community flood exposure upon completion of the infrastructure project • Potential for reduced community-wide damages and recovery costs • Potential for increased taxes or borrowing costs given costs to local governments • Potential for community co-benefits, such as improved public health, quality of life, and recreation • Potential for changes to property values, location desirability, and housing affordability depending on infrastructure characteristics
	 **Redirect future density and land uses**	Encourage future development at locations that are less susceptible to current and future flood impacts.	Norfolk's Vision2100 seeks to encourage development in parts of the city less susceptible to flooding by categorizing land into four categories that consider topography and sea-level rise projections.	• Reduced flood exposure for future development • Potential for reduced community-wide damages and recovery costs • Increased development momentum or market interest in areas that are less vulnerable to the impacts of climate change • Potential for climate gentrification in safer areas without anti-displacement policies in place • Potential for disinvestment and loss in property values/stranded assets in risk-prone areas without sufficient planning and support during transitional period
	 **Relocate**	Migrate or retreat, meaning that occupants are relocated out of harm's way. Buyouts are one way to fund and deliver retreat. However, not all buyouts offer support services for relocation.	After Hurricane Sandy caused major damage in the city of Linden, New Jersey, the Blue Acres Buyout Program purchased 22 repetitive-loss properties in the waterfront Tremley Point neighborhood and coordinated with other government agencies and partners to preserve the area as open space for recreation and floodplain restoration.	• Eliminated risk for purchased or relocated properties • Potential for reduced community-wide damages and recovery costs • Potential for increased development momentum or market interest in other areas, or other markets, less vulnerable to the impacts of climate change • Potential for disinvestment and loss in property values/stranded assets in buyout areas without sufficient planning and support during transitional period • Potential for community co-benefits, such as improved public health, quality of life, and recreation (assuming that new flood mitigation or civic facilities are created on purchased sites) • Potential for significant short-term costs to government, met through increased taxes or borrowing costs • Potential for long-term cost benefits to community to outweigh short-term costs

The Case for Floodplain Buyouts



This map displays the cumulative number of properties bought out from 1989 to 2017.

Source: Katharine J. Mach et al., "Managed Retreat through Voluntary Buyouts of Flood-Prone Properties," *Science Advances* 5, no. 10 (Oct. 9, 2019).

Forward-thinking municipalities across the United States are revising, or planning to revise, their flood management regulations in response to flood frequency and climate projections, and aging or insufficient infrastructure, among other challenges.

Buyouts are one approach to managing flood risks that is increasingly used by public-sector entities. Floodplain buyouts can be a cost-effective flood mitigation investment for the public-sector entity when compared to alternate protective infrastructure, such as expanding stormwater systems and other conventional structures or continuing to support (either directly or indirectly) building in repetitive-loss areas. A recent study found that removing 1 million flood-prone properties would cost $180 million, but the investment would generate $1.6 trillion in savings over a 100-year period.[3]

> **"Buyouts break the cycle of flood damage and recovery."**
>
> —FAWN McGEE, DIRECTOR, NEW JERSEY BLUE ACRES BUYOUT PROGRAM

Consultants specialized in flood mitigation are seeing increased interest in strategies to leverage buyouts. "Some of my clients are starting to see buyouts and retreat as an option," shared Alec Bogdanoff, principal and cofounder of engineering consulting firm Brizaga, which specializes in coastal resilience. "The bought-out properties are removed from the floodplain entirely and cannot suffer any future loss," Bogdanoff continued. "When we mitigate flooding, it is about risk tolerance. One way to ensure

> **"Buyouts are the only approach that achieves a zero-risk level."**
>
> —MICHAEL BLOOM, SUSTAINABILITY PRACTICE MANAGER, R.G. MILLER ENGINEERS INC.

there is no chance of flooding is to remove the risk entirely by removing the infrastructure and people from it."

A majority of floodplain buyout programs in the United States are voluntary, meaning that properties are purchased only from willing sellers, as opposed to the process associated with eminent domain. Many buyout programs depend on the availability of federal funding sources—mostly the Federal Emergency Management Agency (FEMA) and U.S. Department of Housing and Urban Development (HUD)—and in most cases, local matching funds, and therefore can be challenging to execute because of requirements tied to funding. Years

MASTER SERGEANT MARK OLSEN, U.S. AIR FORCE, FLICKR

Over 72,000 homes and businesses were demolished or damaged as a result of Hurricane Sandy.

The communities surrounding the Lower Meramec River, like Fenton, Missouri, have been impacted by three record floods since August 2015. Local governments are implementing wetland restoration and property buyouts to avoid future flood damage in the town.

can elapse between a flood event and the completion of an individual FEMA-funded buyout project, affecting both the families and administering municipalities involved.[4] Depending on the unique needs of the community, effective programs may also need to be coupled with support, such as relocation assistance, rent coverage, technical skills and training, and school enrollment help. For example, to support renters and landlords more quickly, the Blue Acres program added a tenant relocation program with a dedicated team to its purview in 2017. Since then, over $1.2 million in relocation assistance has been distributed to tenants, assisting 51 households, two of which became homeowners.

NOAA

Pictured here as it approaches Louisiana, Hurricane Laura was the most dangerous storm to make landfall in 2020 and one of the strongest storms to make landfall on record.

What Is the National Flood Insurance Program?

The National Flood Insurance Program (NFIP) was chartered in 1968 to offer affordable insurance against flood risk and underwrote most of the residential flood policies in the United States.[5]

The NFIP is managed by FEMA, which also administers the Flood Insurance Rate Maps (FIRMs). FIRMs depict flood zones based on the level of flood risk in a geographic area. They are used by communities to determine flood mitigation plans and how to regulate development in the floodplain. These flood maps also guide property owners on whether to buy flood insurance and mortgage lenders on their level of risk.

The NFIP's current funding model has proven to be inadequate to support the program's demands. As of November 2020, the program is over $20 billion in debt. "The program was never designed to necessarily bring in all the money needed to pay for all the programs, whether that's insurance claims, the grant program, the mapping program, or the floodplain management program," explained David Maurstad, senior executive of NFIP, to CNBC.[6] "And so, the program is actually functioning and operating as it was designed, it is just that the design needs to be updated."[7] Congress has approved 16 short-term reauthorizations of the NFIP program since the end of fiscal year 2017.[8] As weather events increase in their severity, insurance claims will likely incur more debt on the program if it is not redesigned.

A redesign of the NFIP can have equity implications due to discriminatory practices in land use and lending, such as redlining (see page 14). An analysis of $31 billion in flood claims from NFIP between 2010 and 2019 found that damages were occurring disproportionately in zip codes with more than 25 percent Black residents.[9]

Flood insurance rates are based on risk illustrated in the FIRM. As flood risk increases, insurance premiums also increase. Although risk-based premiums can encourage flood-resilient development, they also undermine the affordability of federally backed coverage for properties already located in the flood zone. and disproportionally affect low-income populations and communities of color.

Thousands of property owners have been flooded multiple times, and the numbers of "repetitive-loss properties" (two or three claims) and "severe repetitive-loss properties" (four or more claims) are increasing.

Accelerating Climate Impacts

Climate change is transforming the frequency, intensity, and duration of rainstorms. As the atmosphere warms, more precipitation is expected to fall in shorter amounts of time, increasing the risks associated with riverine flooding, overwhelmed stormwater systems, and flash floods.[10,11] In fact, 2020 was a record-breaking year for flood event disasters in the form of severe storms and hurricanes.[12] It was also the fifth consecutive year with an above-normal hurricane season and the most storms on record, adding to the trend of 18 above-normal seasons in the past 26 years, according to the National Oceanic and Atmospheric Administration (NOAA).[13]

Changing rainfall patterns, stronger storms, and sea-level rise are increasing the flood risk and costly damage to property and infrastructure. Sea-level rise

U.S. ARMY PHOTO/PATRICK BLOODGOOD, FLICKR

The Chesapeake Bay island fishing community of Tangier, Virginia, experiences frequent tidal flooding. Scientists estimate the island may be uninhabitable in the next 25 to 50 years because of sea-level rise, erosion, and land subsidence.

Bearing Billions: 2020, a Historic Year for Weather Catastrophes

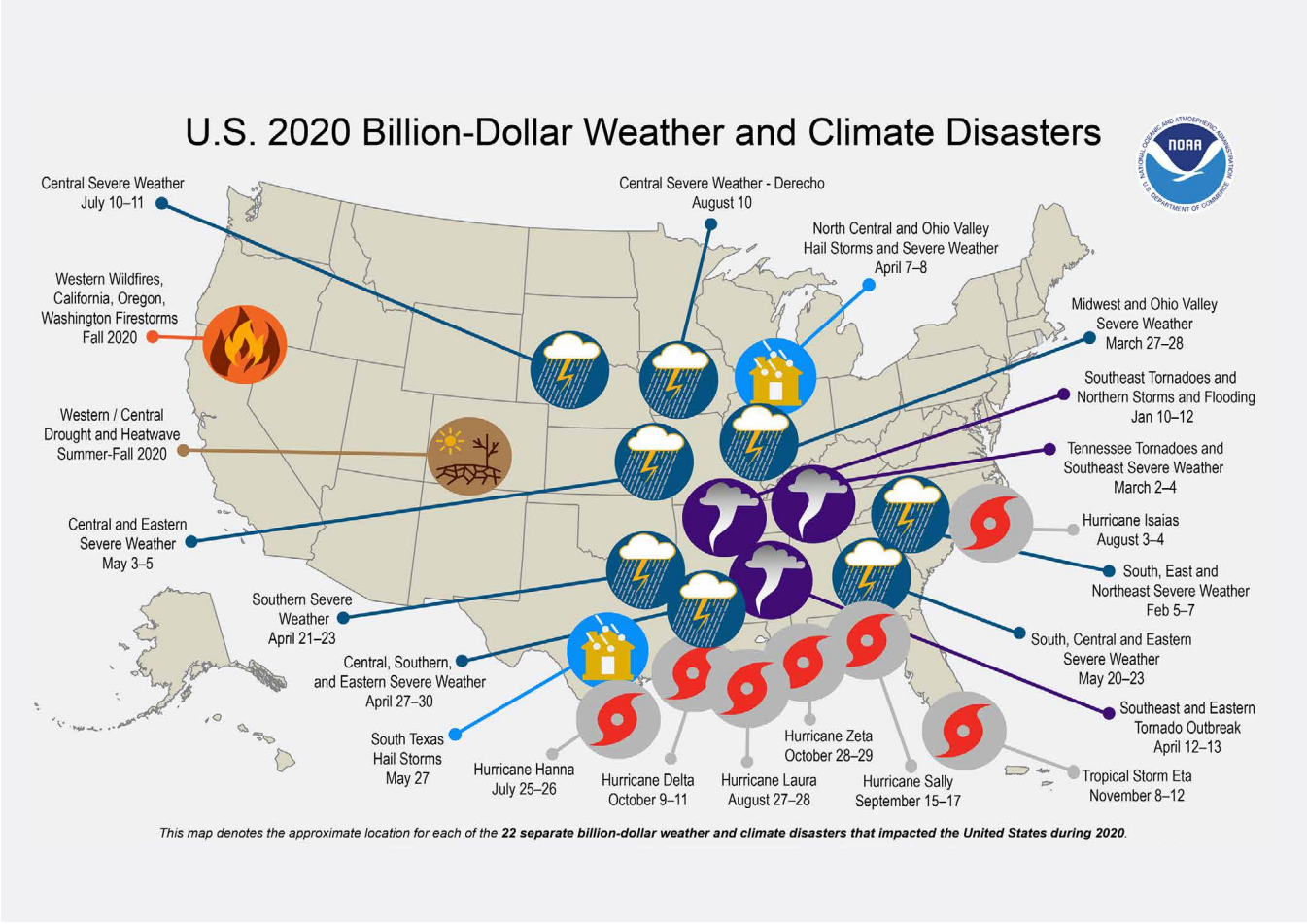
A record-breaking year by number and cost of weather events in the United States, 2020 saw 22 billion-dollar events and over $95 billion in damage. Hurricanes, severe storms, and floods were responsible for roughly 80 percent of weather disaster costs in 2020.

Among the costliest weather disasters were Hurricane Laura, which slammed the inner Gulf Coast and caused over $19 billion in damages, and the Midwest derecho —a widespread wind event capable of producing weak tornadoes, torrential rain, and hail—which swept across Nebraska, Iowa, Illinois, Wisconsin, and Indiana and resulted in over $11 billion in damages.

The following 2020 weather events caused substantial damage from flooding:

Date *(in 2020)*	Event	Estimated cost of damage	States affected
Jan 10–12	Southeast tornadoes and northern storms and flooding	$1.2 billion	Alabama, Arkansas, Georgia, Illinois, Indiana, Louisiana, Michigan, Mississippi, Missouri, New York, North Carolina, Ohio, South Carolina, Tennessee, Texas, Virginia, Wisconsin
July 25–26	Hurricane Hanna	$1.1 billion	Alabama, Florida, Louisiana, Mississippi, Texas
Aug 2–4	Hurricane Isaias	$4.8 billion	Connecticut, Delaware, Florida, Maryland, New Jersey, New Hampshire, New York, North Carolina, South Carolina, Pennsylvania, Puerto Rico, Virginia
Aug 10	Central severe weather/derecho	$11 billion	Illinois, Indiana, Iowa, Nebraska, Wisconsin
Aug 27–28	Hurricane Laura	$19 billion	Arkansas, Louisiana, Mississippi, Texas
Sept 15–17	Hurricane Sally	$7.3 billion	Alabama, Florida, Georgia
Oct 9–11	Hurricane Delta	$2.9 billion	Georgia, Louisiana, Mississippi, Texas
Oct 28–29	Hurricane Zeta	$3.5 billion	Alabama, Georgia, Louisiana, Mississippi, South Carolina
Nov 8–12	Tropical Storm Eta	$1.5 billion	Florida, North Carolina, South Carolina, Virginia

Source: U.S. Billion-Dollar Weather and Climate Disasters: Events, https://www.ncdc.noaa.gov/billions/events.



NOAA

also compounds coastal hazards, leading extreme weather events to become more frequent and intense. For most insured Americans, the National Flood Insurance Program covers flood damage for homes and businesses.

Both the losses from flooding, many of which are not insurable, and flood mitigation investments are costly to owners, if not incentivized by public policy. Unaddressed flood risk can also cause direct harm to residents' health (through issues such as mold exposure), safety, and mental health given stress and uncertainty. Unaddressed flood risk also has the potential to drain municipal resources and cause reputational risk, which could negatively influence acquiring bond ratings and market investment.

The risk of community and ecological harm from increasing precipitation rates, rising sea levels, and other related coastal and inland flood hazards highlights the need for flood protection, insurance, or both in flood-prone areas.

Flooding's Inequitable Impacts

Flood risk is not equally distributed. Systemic racism in land use and development decision-making has put many historically marginalized communities in harm's way, including low-income communities and communities of color. Disasters and flood events also exacerbate vulnerabilities for low-income households, which have fewer resources to both prepare for and rebuild after a flood event, in addition to having fewer options in the event

U.S. NATIONAL GUARD, FLICKR

The Port Arthur neighborhood in Texas flooded during Hurricane Harvey in August 2017 and has since been identified for floodplain buyouts. The aftermath of Hurricane Harvey has had large financial implications for historically low-income and marginalized communities in Houston.

they must relocate. Although many high-value coastal properties face significant flooding risk, those property owners have sufficient resources to be able to pursue other options. Moving may not be an attractive proposition for all property owners, given emotional attachment or lifestyle preferences, but high-value property owners typically have the means to do so.

Geography of Inequity

Because of longstanding discriminatory land use, lending, and housing policies and practices, non-White people are more likely to live in flood-prone areas and are disproportionately exposed during flood events. An analysis of $31 billion in flood claims paid by NFIP between 2010 and 2019 found that damages were occurring disproportionately (nearly 20 percent of the claims) in zip codes with more than 25 percent Black residents.[14] Examples of racial inequities and flood vulnerability abound from many of the country's most recent destructive storms. For example, the Houston neighborhood that suffered the worst flood damage from Hurricane Harvey was 49 percent Black. Four of the seven zip codes that experienced the worst flood damage after Katrina were at least 75 percent Black.[15]

A 2021 analysis led by Redfin found that Americans whose homes are in formerly redlined neighborhoods are more likely to have experienced flooding that threatened their homes than those living in non-redlined neighborhoods.[16]

"Decades of segregation and economic inequality shoehorned many people of color—especially Black Americans—into living in neighborhoods that are more vulnerable to climate change," said Redfin senior economist Sheharyar Bokhari in a press release

Flood Survivor Perspective: "Divided We Fall, Together We Rise"

Melissa Krupa, a leader for Rosewood Strong, a grassroots organization of Rosewood Estates flood survivors in Myrtle Beach, South Carolina, shared that despite having no history of flooding before 2015, she and her about 60 neighbors have been repeatedly flooded, suffering major damage and health concerns. Rosewood Strong has been trying to make their case for buyouts since experiencing the impact of Hurricane Florence in 2018. Melissa stated that after the hurricane, "There was a little over five feet of water in my house, and I knew I couldn't live there anymore because I couldn't go through the mental stress and I physically wouldn't be able to fix my home . . . not to mention the land is now contaminated by dirty water." Since Hurricane Florence, the neighborhood has flooded an additional four times because of high precipitation rates and rising river levels. Krupa also expressed concern about current sales of properties, bringing more people into harm's way who may not have been aware of the flood risk.

Krupa continued, "As we [Rosewood Strong] continue to fight this fight, the flooding continues to occur. . . . People cannot live this way." County officials submitted a proposal for buyouts in July 2020. As of March 2021, the South Carolina Disaster Recovery Office announced the approval of $13 million Community Development Block Grant Mitigation funding that will support buying out about 60 homes.

Community-based organizations can be powerful partners in supporting their local municipalities and raising resident awareness. In De Soto, Missouri, the Citizens' Committee for Flood Relief advocates for buyouts and solutions that address flash flooding. Susan Liley, cofounder, described how their risk of flooding has heightened in recent years. "It usually takes four inches of rain, and this past time it only took two inches of rain to cause an evacuation." The organization has been successful in hosting meetings to raise awareness among residents and stakeholders, developing partnerships to apply for and collect grant funds for a U.S. Army Corps of Engineers flood study and a community flash flood warning system that is "lifesaving."

"With the flooding and soon-to-be unaffordable insurance costs, people want to get out, so they fix up the house and sell it. It's a vicious cycle."

—MELISSA KRUPA, ROSEWOOD STRONG

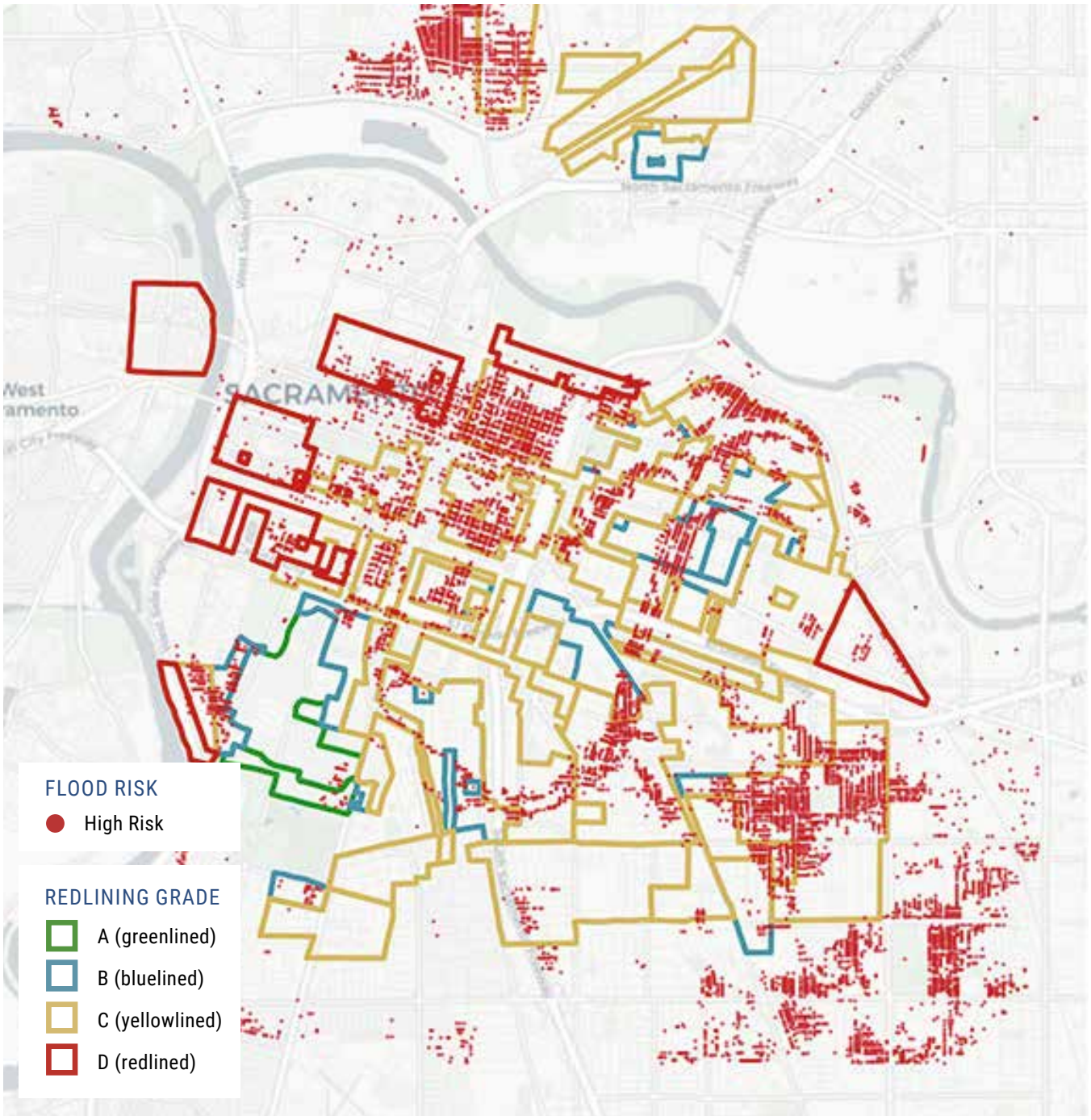
MELISSA KRUPA

In 2015, Rosewood neighborhood properties were inundated with up to eight feet of floodwater in some places.

"We have an opportunity to be forward thinking [about land use patterns]. We don't have to keep building the way we were building."

—SUSAN LILEY, COFOUNDER, CITIZENS' COMMITTEE FOR FLOOD RELIEF, DE SOTO, MISSOURI

SACRAMENTO'S FORMERLY REDLINED AND YELLOWLINED NEIGHBORHOODS FACE HIGH FLOOD RISK



Formerly redlined and yellowlined areas in Sacramento, California, contain large shares of properties with high flood risk, according to the 2021 Redfin study. (See note 16.)

announcing the report. "Redlining kept home values in Black neighborhoods depressed, which in turn meant there was less money invested and reinvested in those neighborhoods for decades to come. . . . The cycle continues today," Bokhari said. "As climate change fuels rising sea levels and powerful storms, many of these neighborhoods lack the funding for the infrastructure upgrades necessary to combat flooding."[17]

Lessons from Isle de Jean Charles: A Community-Scale Relocation

Louisiana's coastlines are changing drastically–the state's coastal parishes have lost over 2,000 square miles of land since 1932, an area roughly the size of the state of Delaware.[18]

For some communities, some of whom were forced or pressured to live in vulnerable coastal sites generations ago, the land loss means more than being met with the already challenging decision to relocate, it also means uprooting generations of culture and tradition. The community of Isle de Jean Charles offers one such example. This community, many of whom belong to the Biloxi-Chitimacha-Choctaw tribe, first settled in the area after being forced to relocate from mainland Louisiana on account of the 1830 Indian Removal Act.[19] Because of rising sea levels and subsidence, the community embarked on a relocation effort in 2012 that aimed to keep the entire community together, to safeguard traditions and culture that have deep ties to the land.

After years advocating to the state for assistance reuniting the tribe on higher ground, the community received funding via a $48.3 million Community Development Block Grant from the U.S. Department of Housing and Urban Development in 2016. This funding was intended to relocate the community together, the first federal allocation of its kind.[20]

Since the award, the resettlement process has proven to be incredibly complex. For some community members, the nearly 20-year process of preparing for and receiving the grant funding has worn down their patience and contributed to misunderstandings about what the relocation would entail.[21] Some also saw the state's approach as not sufficiently honoring community members' connection to the land. The top-down approach to community migration has exposed "logistical and moral dilemmas" and points to challenges that may lie ahead for other communities facing displacement due to climate change.[22]

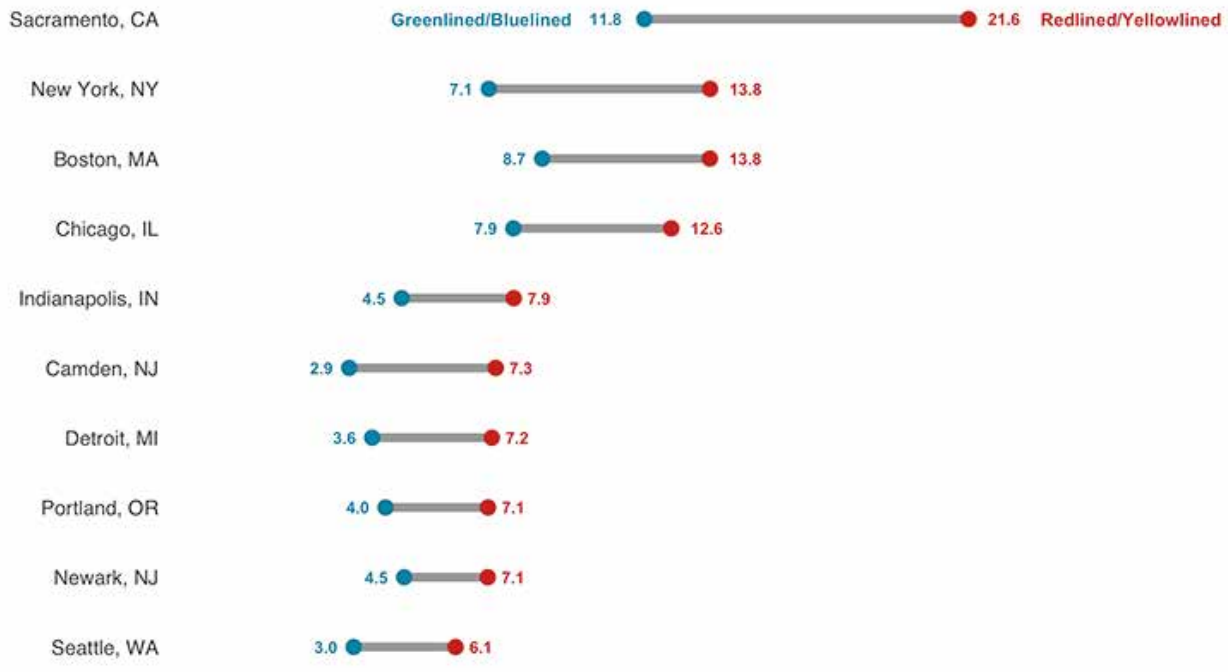
Policymakers also anticipate this community's story could be the first of many federally supported relocations; in 2020, the U.S. Office of Government Accountability studied the relocation from Isle de Jean Charles, among other communities, to determine how the government can seek to identify and provide assistance to communities interested in relocation as a climate resilience strategy.[23]

KAREN APRICOT, FLICKR

A vacant home on Isle de Jean Charles.

TOP 10 METROS WITH GREATER SHARE OF HOMES AT RISK IN REDLINED AND YELLOWLINED AREAS

Percentage of homes, by redlining grade, that face high flood risk



REDFIN

The 2021 Redfin analysis found that these metropolitan areas have the greatest share of homes at risk in formerly redlined and yellowlined areas, unlike green and bluelined areas. (See note 16.)

Many formerly redlined neighborhoods also face a host of other environmental justice challenges that can compound flood risk. For example, neighborhoods adjacent to formerly industrial land or combined sewer overflows face greater health risks from exposure to contaminated water.[24]

Historically marginalized communities are not only more likely to live in flood-vulnerable locations, they also may experience more prolonged disruptions from flood events caused by lack of resources for flood preparedness, home repairs, or relocation. In 2017, four of 10 U.S. households were not prepared for an emergency $400 expense, let alone the significant potential costs of a flooded home.[25] Low-income households are less likely to have funding for temporary lodging or rebuilding and are less likely to have the flexibility and means to evacuate in times of a flood emergency. Evacuation can also be more challenging for households without cars; thus low-income households may be less likely to evacuate in advance of a storm than wealthier households.[26]

Rising Real Estate Values Inland

However, for many cities, such as Miami, the most desirable real estate locations are coastal; yet they also face severe risk of flooding from sea-level rise and extreme weather events. According to the Redfin study, a majority of households in Miami's "historically greenlined beach areas," or neighborhoods that have received significant investment, are at a high risk of flooding. These areas, which are estimated to comprise about 54 percent of the city's housing stock, represent more than

$22 billion in home values. This share soars over the home values in formerly redlined areas, which comprise about 34 percent of the city's housing stock and amount to $7 billion.[27]

Flooding in areas with higher real estate values may spur the relocation of wealthier, often whiter, populations inland, pushing out communities of color in the process. This phenomenon is known as "climate gentrification." Although Miami has become the textbook example for this market trend, similar circumstances also exist in Florida's Jacksonville and Tampa, and Virginia Beach, Virginia.[28]

Discriminatory Practices in Buyout Program

Although buyout programs can offer relief to households most at risk from flooding, the programs can also perpetuate discriminatory practices. Several recent studies point to inequity in federally funded buyout implementation and outcomes. For example, a study published in 2019 analyzed FEMA-funded voluntary buyouts and found that "Local governments in counties with higher population and income are more likely to administer buyouts. The bought-out properties themselves, however, are concentrated in areas of greater social vulnerability within these counties, pointing to the importance of assessing the equity of buyout implementation and outcomes."[29] These patterns indicate the risk of operating buyout programs without complementary programs providing relocation assistance, combatting displacement, and providing affordable housing. Without relocation support, the programs can perpetuate segregation by facilitating lower-income homeowners' moves out of their home communities, through lack of capacity to buy a new home if home values have increased or are otherwise unaffordable.

A second national study, published in 2020, reviewed the FEMA-funded buyouts and their impacts related to racial inequities and discovered that "statistical analyses indicate that net of local flood damage, population, and incomes, the program disproportionately targets whiter counties and neighborhoods, especially in more urbanized areas where the program now concentrates" (post-Sandy buyouts are an exception to this trend). The report continued, "[buyouts] are inherently a racialized process because residential properties, the ultimate target of the program, are socialized assets, embedded in neighborhoods that have long been segregated and unequally served by government programs, especially in urban areas."[30]

Climate gentrification refers to the redevelopment of neighborhoods that are less susceptible to climate hazards such as flooding and the corresponding displacement of longtime, often low-income residents on account of rising property values.

Distrust of programs like buyouts is related to long-term trauma from housing segregation and discrimination in land use policy. Harriet Festing, cofounder and executive director of Anthropocene Alliance, said: "There's also a lot of concern and mistrust regarding the intentions of city governments [during a buyout process]. Research shows that federal funding for buyouts is more likely to go to wealthier communities and is used to buy out poorer residents. To build trust, these sectors would need to partner with community leaders."

Buyouts Are Not a "Silver Bullet" for Everyone

Floodplain buyouts can offer financial relief to property owners, but many households may not choose to participate for other reasons, such as personal tie to location, high cost of relocating or living elsewhere, delay in offer, or other factors. Low-income households often have less flexibility around these parameters.

"It is how privilege works in the age of climate change. It brings more options and public resources to those living in more socially advantaged spaces, especially if they own property, while leaving those in socially marginalized spaces more reliant on government assistance that is not only less likely to come but less trusted when it does."[31]

—JIM ELLIOTT, PROFESSOR AND CHAIR OF SOCIOLOGY AT RICE UNIVERSITY AND A FELLOW AT RICE'S KINDER INSTITUTE FOR URBAN RESEARCH

In addition to the effect of flooding, buyout opportunities can cause social and psychological impacts. For many homeowners, the prospect of relocating away from established social and community networks is unthinkable, especially if costs of living have increased in their market since the purchase of their home. "We have learned that people don't want to move a long way away. Stay[ing] within the metro, trying to stay with their neighbors. It's not just a house. Leaving the physical building is one thing, but leaving all the other stuff in the community is much harder," shared Nathan Woiwode, North America climate adaptation project manager at the Nature Conservancy.

CITY OF CEDAR RAPIDS

After the 2008 flood event in Cedar Rapids, Iowa, the city trained its employees to facilitate effective conversations with residents to synthesize community input, obtain feedback on draft proposals, and finalize a plan to move forward with implementing the city's plan.

Navigating the bureaucracy of buyout programs can be daunting and would be inaccessible to homeowners with language, access, or technology barriers, among others. Fawn McGee, director of the New Jersey Blue Acres Buyout program, noted, "You have to understand the predicament that those families are in before you can go in and offer them hope. . . . Outreach is key."

She attributes success of the New Jersey program to compassionate staff and "being good listeners."

It is important that team members understand that this is emotional and traumatic—the flood events, the history in their homes, putting their faith in a government program, and moving: "Nobody wants to leave their home, and folks don't necessarily trust the government." In addition to the one-on-one attention provided to each family, McGee continued, GIS mapping of flooded areas can often help the homeowners see the storm's effect on the home and neighborhood. A picture is worth a thousand words.

Buyouts and Migration

Most buyout programs do not track the new locations of households—meaning there is no way to know whether households have moved to a less flood-prone location. However, buyouts are likely part, or will become part, of larger demographic trends related to climate impacts and migration, underscoring the need for affordable housing on higher ground.

Sea-level rise is projected to displace 13 million Americans from coastal communities in the next 80 years.[32] Direct and indirect impacts may have longer-term repercussions, such as market shifts and migration, as former coastal residents settle in new communities. Currently about 14.6 million properties are at risk from a 100-year flood (one with a 1 percent chance of striking in any given year) due to sea-level rise, rainfall, and flooding along smaller creeks.[33]

Governments and property owners are investing in adaptation infrastructure to address this rising flood risk. However, access to the resources needed to assess the feasibility and fund infrastructure at the necessary scale is difficult to come by. To mitigate the impacts of sea-level rise alone, the cost of providing safeguarding infrastructure could reach $421 billion per year and could cost upward of $1.1 trillion in the United States.[34] Not only are major infrastructure projects prohibitively expensive in many cases, but they also are becoming insufficient when it comes to protecting communities and cannot be continually redesigned and improved as climate change outpaces past projections.[35] City preparedness for climate effects is likely to become an even more urgent issue in upcoming years and has the potential to be a key factor in the migration and location of households, businesses, and overall economic development opportunities.

Floodplain Buyouts 101

Buyouts Process Overview

Floodplain buyouts can be a valuable tool to remove existing structures from flood-prone or impacted areas and offer benefits in the form of enhanced community resilience; however, implementing buyouts in certain land use contexts can be challenging. Floodplain buyouts are usually funded and delivered by a partnership between federal and state or local government entities. Typically, flood-prone properties are acquired through federal grant programs, like FEMA's Hazard Mitigation Grant Program (HMGP), Building Resilient Infrastructure and Communities (BRIC) (previously known as the Pre-Disaster Mitigation Grant Program), Flood Mitigation Assistance Program, and HUD's Community Development Block Grants (CDBG). Each federal program prioritizes different aspects and includes different stipulations for applicants and standards for future land uses.

Although design and funding of buyout programs typically start at the federal level, local governments administer most property acquisition programs.[36] State and local governments must be able to secure and meet the criteria of the federal programs, through grant writing processes. After a successful application process, federal grant programs contribute 75 percent of the funds needed, but require a 25 percent match from the local government.[37] However, grants tied to a designated disaster could amount to 100 percent federal funding.[38]

Because of the voluntary nature of most floodplain buyout programs, offers are based on preflood market values, and property owners have final decision-making ability to participate. Local governments with floodplain buyout programs typically have a checklist or specifications to prioritize buyouts from willing sellers, including the level of damage experienced, costs and losses, value of the home before an event,

KEY STEPS IN FEDERALLY SUPPORTED FLOODPLAIN BUYOUTS

Flood Disaster

- Flood event occurs and President declares disaster.

Initiation

- Local government or state government scopes interest in buyouts with impacted households.

Application

- Local government entity (aka potential federal grant recipient) prepares and submits application.
- Local government also conducts a benefit/cost analysis (BCA).

Evaluation

- Federal agencies evaluate and ultimately approve or deny grant application.

Distribution

- If approved, grant funds are distributed to the grantee.
- Up to 75% of the project costs are funneled to the grantee. 25% of the project costs come from a non-federal source, typically the local government entity.*

Implementation

- Grantee engages again with property owners and offers buyout opportunity for preflood market value. If interested, property owners either voluntarily choose to accept or deny the offer.
- If the buyout offer is accepted, the property deed is transferred to the local government entity and the household relocates.
- All structures are demolished and the remaining land is preserved as open space.
- Best practice for implementation includes offering wraparound services for relocating households and maximizing opportunities for enhanced open space for flood preparedness and improved community quality of life. (See page 26.)

*Community Development Block Grants can be used to meet the local match requirement.

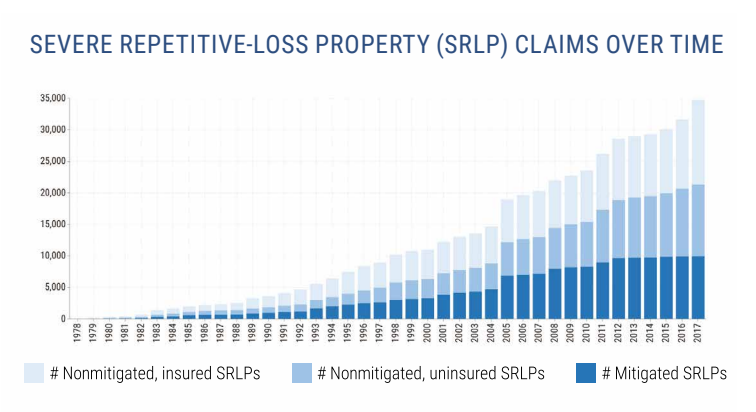
Source: ULI, adapted from sources cited in notes 29 and 54.

Buyouts in the United States: Increasing Need and Use

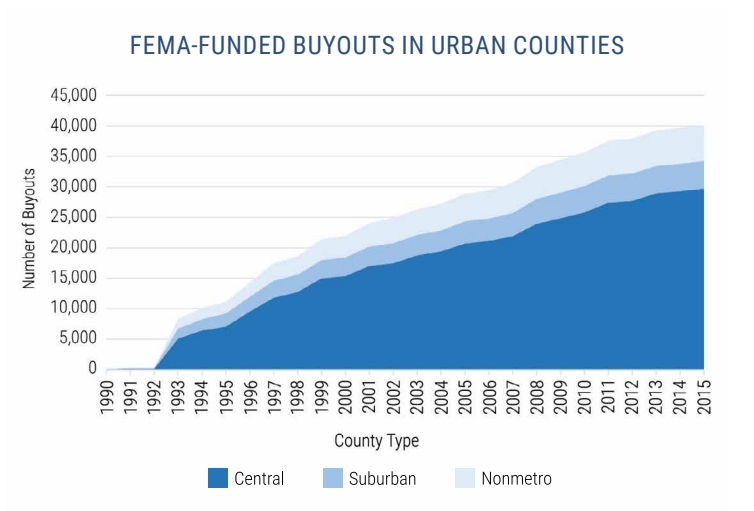
Since the early 1990s, about 43,000 federally funded buyouts have taken place in the United States.[39] Most of the executed buyouts are of single-family residential properties; however, multifamily, commercial, and industrial properties have also been voluntarily acquired.

In 2017, more than 36,000 severe repetitive-loss properties existed, more than 26,000 of which properties either remained uninsured or have not undergone flood mitigation efforts, and the number continues to grow (see upper chart).[40] Despite repetitive losses, not all these properties received buyouts.

Buyout programs have been executed to address flood risk in every state except Hawaii.[41] The number of flood buyouts has been steadily increasing in urban counties (see lower chart). As of 2015, about 75 percent of FEMA buyouts have taken place in central counties of metropolitan areas, as opposed to suburban or nonmetropolitan counties of the United States, "where land costs and racial diversity tend not only to be higher than in surrounding suburban and nonmetropolitan counties, but also more entwined," according to a recent study.[42]



This chart shows that severe repetitive-loss property claims have been increasing over time. The dark blue bar segments show severe repetitive-loss properties that have mitigated flood risk in some way; however, the two lighter blue bars show the growing number of repetitive-loss properties that have not implemented flood mitigation. Therefore, flood mitigation options and approaches are not keeping up with risk. (ULI with data from NRDC, "Losing Ground: Flood Data Visualization Tool," September 15, 2020.)



FEMA-funded buyouts have occurred mostly in central counties of metropolitan areas and have continued to increase to more than 40,000 in 2015. (Elliott et al., "Racial Inequities in the Federal Buyout of Flood-Prone Homes.")

and floodplain characteristics. Communities vary on the prioritization of such characteristics and the time frame in which buyouts are executed.

After a buyout is complete, there is an opportunity to restore the lot as open space for flood mitigation, with green infrastructure or other design strategies.

Buyouts and Land Use Implications

Increasing damages from flooding and recognition of the future impacts of climate change may lead to increased interest in buyouts from both homeowners and local governments. However, even with increased

interest, buyouts are challenging to deliver in many contexts. Notably, coordinated buyouts and buyouts in urban or high-land-value locations are extremely difficult to orchestrate with current funding and governance limitations.

A key concern for many practitioners is the difficulty leveraging buyouts for outcomes to enhance communities as a whole, as opposed to outcomes for individual households only. Buy-In Community Planning Inc., a nonprofit organization established in 2020 to improve the process for buyouts, notes as follows: "A better buyout is transparent, efficient, equitable, and results in improved quality of life and environment for everyone in the community, not just individuals. The challenges are not insurmountable. Thoughtful engagement, pre-emptive planning, and innovative data sources can help cities and their residents envision a future without the threat of recurrent disasters."[43]

Coordinating Buyouts for Hazard Mitigation

Local governments and hazard mitigation planners are increasingly interested in coordinating or strategically clustering floodplain buyouts, to stop repetitive losses in particular areas and solve the challenge of providing services to an area with reduced population. Strategically clustering floodplain buyouts would also return larger portions of land to a retention area that can support flood mitigation for storm and flood events by absorbing excess water. Katie Spidalieri, a senior associate at the Georgetown Climate Center who provides legal and policy analysis on climate adaptation initiatives such as buyouts and managedretreat, shared, "It is really important to look at buyout programs comprehensively as opposed to one-off projects that have been funded through federal grants."

When homeowners in a community make different decisions about buyout offers, the result is a "checkerboard effect," with a mix of occupied homes and bought-out lots that have reverted to open space. Sustainability practice manager Michael Bloom of R.G.

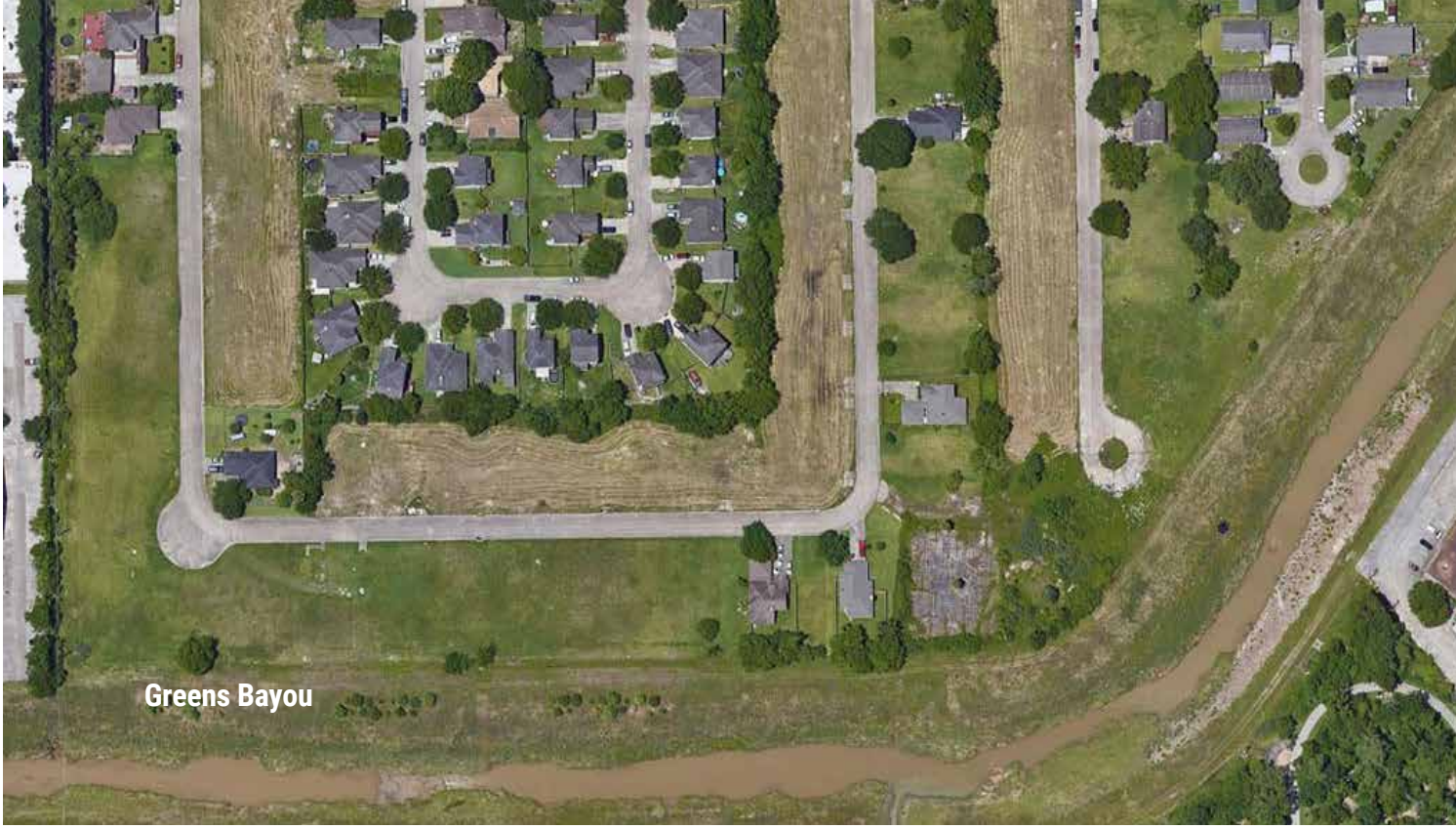
New Jersey Blue Acres Buyout Program

In New Jersey's tapestry of small towns and close-knit communities, a state program called Blue Acres weaves together social services with flood protections. The program, conceived in 1995, amped up after Superstorm Sandy destroyed hundreds of coastal homes. Now its staff works around the clock to counsel, advocate for, inform, and listen to homeowners considering a buyout. Staff does this work on homeowners' terms, allowing life events to occur before scheduling a closing.

Learn more on ULI's Developing Urban Resilience website at www.developingresilience.uli.org/case/new-jersey-blue-acres-buyout-program/.

DVIDSHUB, FLICKR

A New Jersey beachfront community that flooded during Hurricane Sandy.



GOOGLE EARTH

Aerial view of a Houston neighborhood along Greens Bayou where executed buyouts resulted in a "checkerboard" land use pattern, which occurs when some homeowners take buyouts while others do not. This land use pattern is detrimental to the city and community members who still reside in the area because the city cannot scale back infrastructure costs, but residents still remain in harm's way.

Miller Engineers notes: "The checkboard result limits how the buyout area can be redeveloped to serve as a stormwater management area or park or similar amenitized open space. Checkerboard outcomes also have an adverse impact on the operation of both water and sewer systems because of reduced usage. The outcome also reduces the safety and security of the neighborhood because of reduced pedestrian and vehicle traffic."

Buyouts and Land Density

Delivering buyouts in a high-value or urban context is also extremely challenging given land value, population density, and coordination among different property owners. Fundamentally, buyouts may not always be economically feasible for denser areas with higher market values. Matt Fountain, the city of Charleston's director of stormwater management, describes the city's approach to enhancing resilience in Charleston's downtown peninsula compared with the surrounding areas: "Buyouts in downtown areas are just not cost practical—you're not going find that kind of [water] storage, you'll be restricted to more civil infrastructure, and you don't want to lose the ability for that area to fund and generate revenue, bring in tourism, etc. As you move out into the outlying communities [of the city], what makes those communities special is their proximity to [the] natural environment."

Katie Hagemann, who leads climate adaptation efforts for Miami-Dade County, agreed, stating that the county is prioritizing protecting existing development for many reasons, including that "the cost of retreat . . . if you were to buy [properties] out at market value, would be really high."[44] As a result, the county is focused on strategies to protect existing development, as outlined in its 2021 Sea Level Rise Strategy.

Rural properties may also be eligible for more federal funding opportunities. JaLeesa Tate, Maryland's state hazard mitigation officer, shared that "in an urban setting, [some] programs are not available. The land is also so valuable in urban [areas] with the population density." One funding source for rural projects that Tate focused on is conservation easements, voluntary legal agreements between a landowner and a land trust or government entity that permanently limits the use of the land to protect its conservation values.

Best Practices for Buyouts

TYLER NEU, FLICKR

Riverfront Park in downtown Nashville, Tennessee, is a popular destination for waterfront concerts and events.

Best practice in buyouts creates opportunities to expand on flood mitigation benefits and implement amenities that further enhance the well-being of the community, improve connectivity, and restore ecology and the natural system.

Engaging with Communities Equitably

Effective communication and engagement with community residents and stakeholders are vital at all stages of a voluntary buyout program and visioning toward implementation of future plot uses.

Current best practices for community engagement include the following:

- **Prioritize at-risk communities equitably.** Given the limited financial resources available for adaptation and buyouts, public-sector decision-makers are met with difficult choices regarding when and where investments should be made and what types of flood mitigation projects should be pursued. In Harris County, Texas, a new Community Flood Resilience Task Force will support investment for buyouts and flood mitigation projects while

maintaining equity as a central component and use transparent evaluation frameworks, like the Social Vulnerability Index.

- **Ensure that all aspects of the buyout program remain voluntary.** Governments should plan for homeowners who do not immediately decide to participate and let homeowners opt in when they are ready. Understanding how residents make relocation decisions can help buyout program administrators enhance the process for buyout and relocation services. Although the voluntary nature of buyout programs can create a hurdle for long-term strategic planning, it is critical that programs remain voluntary, given the pressures and stress on homeowners.
- **Maintain transparent communication and outreach.** Communication with community residents and stakeholders should be grounded in science and real estate market indicators. The information should be delivered in a fashion that allows for absorption by all audiences. For example, the Harris County Community Flood Resilience Task Force included a local scientist and a communications expert as part of its inaugural members.
- **Offer full-cycle support and "wraparound services."** Wraparound services refer to the assistance offered to property owners through all aspects of the buyout and resettlement process to ensure that programs are successful beyond just decreasing exposure to climate risks. Services can include support identifying temporary or permanent residences, moving, identifying schools and transportation methods, and meeting other needs. Entering into an agreement for a buyout may cause hesitation among homeowners because of challenges related to displacement and relocation. Offering these wraparound services can put homeowners in a better position to consider a buyout. For example, the New Jersey Blue Acres program provides social and relocation assistance to property owners and tenants in flood-prone areas.

Harris County Voluntary Acquisition Program and Community Flood Resilience Task Force

Houston, with its increasing population and diversity, has faced the constraint of catastrophic floods for decades. In response, the Harris County Flood Control District mounted the Voluntary Acquisition Program to identify property in likely inundation paths and work with residents. It finds success on two tracks: delivering public spaces that control flooding impact and executing buyouts that rescue homeowners. The Community Flood Resilience Task Force will advise county officials in making Harris County more flood resilient, including ways to equitably distribute future flood damage reduction projects in the county.

Read the full case study on ULI's Developing Urban Resilience website at www.developingresilience.uli.org/case/harris-county-voluntary-acquisition-program-and-community-flood-resilience-task-force/.

HARRIS COUNTY FLOOD CONTROL DISTRICT

Pre- and post-buyout in the Cypress Creek watershed. Harris County Flood Control District estimates that more than 300 homes were spared from flooding on Cypress Creek due to voluntary buyouts in the area.

Flood Recovery and Relocation for Renters

Disaster recovery support tends to disproportionately support homeowners rather than renters.[45] According to the American Flood Coalition, "Renters are twice as likely to be minorities and are less likely than homeowners to be financially secure (46 percent of renters report having trouble paying for basic needs compared to 36 percent of owners)." This disadvantage is exacerbated in a disaster recovery context. "While individuals wait for home repair funds, buyout approval, or permanent relocation, they need ample monetary and social resources to find adequate interim housing. As rents rise and replacement housing is slow to be built, disasters can lead to shortages in affordable rental housing."

Support for renters varies based on the buyout program and funding sources used. Buyout programs can support renters under the Uniform Relocation Assistance and Real Property Acquisition Act (URA), which provides relocation services to displaced tenants, reimbursement for moving expenses, and payments for the added cost of renting comparable housing.[46] However, not all tenants might meet minimum requirements to receive benefits. In that case, it falls to the local government entity to develop programs that provide assistance when URA does not apply. Kelly Leilani Main of Buy-In Community Planning Inc. stated that "although the URA requires financial support for renters, they are generally sidelined by the buyout process, especially low-income households in areas with a shortage of affordable housing."

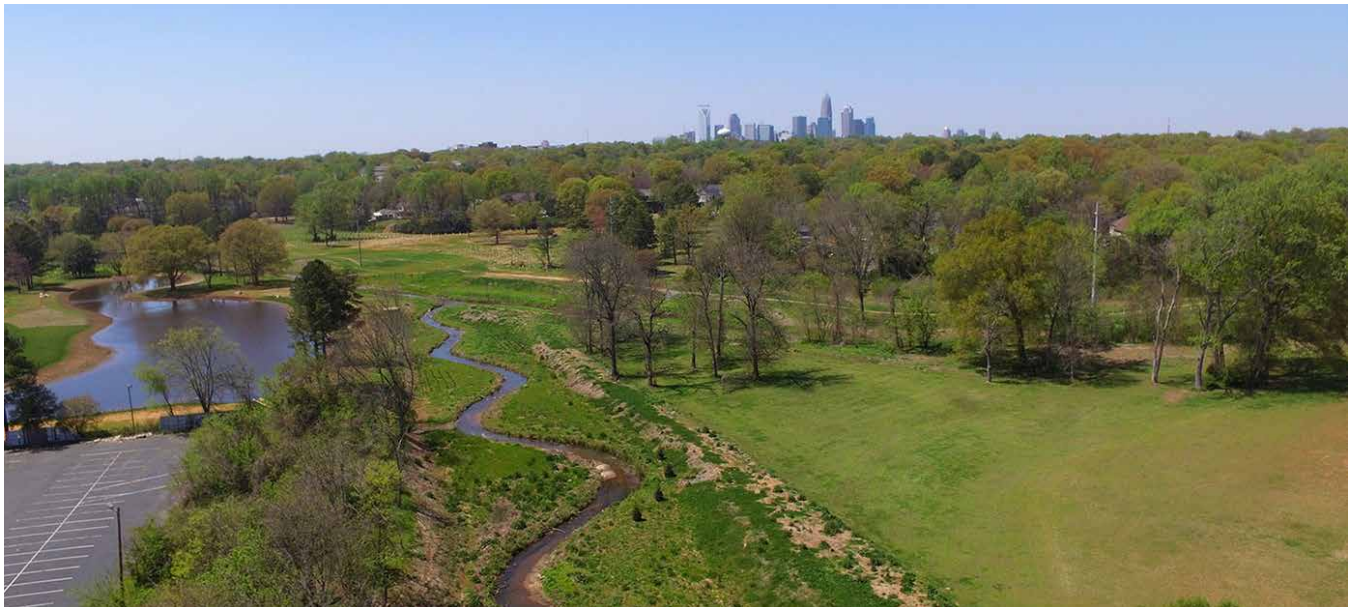
For example, when a tenant-occupied property is purchased through the buyout program in Harris County, the tenant becomes eligible for relocation assistance and benefits under URA. The tenant will be assigned a case manager to assist them through the eligibility process, followed by a relocation adviser to ensure that they have information they need for long-term recovery efforts.[47]

- **Bring in independent third parties throughout the process,** such as appraisers and community-based organizations. This approach can enhance both community trust and accountability. Tim Trautman, the flood mitigation program manager for Charlotte-Mecklenburg Storm Water Services, considers this to be one of the most important aspects of their buyout program. "We hire an outside consultant who we expect to develop a personal relationship with each property owner. It allows us to insulate ourselves and put out expectations of a certain level of service so that they can meet with folks 24/7. We put a lot of emphasis in building that relationship and trust, and I think that has [contributed to] a lot of our success."
- **Take a "human-centered" visioning approach.** Participating in a buyout can be a deeply emotional undertaking. Community members should be part of that reimagining process of what the affected land and space could be afterward, preserving legacy and cultural assets. Says Julie Ulrich, director of urban conservation at the Nature Conservancy, "Transparency and involving people who would be impacted in some sort of decision-making process and co-creating around a shared vision of what comes after would be a key principle. . . . It is reciprocity vs. transaction."

Leveraging Buyouts for Enhanced Open Space

Community engagement is a critical component of the buyout process. However, after homeowners have made the decision to relocate, local governments have a different challenge to face: determining a long-term use and maintenance strategy for purchased sites. Leveraging buyouts for enhanced open space is an important best practice for both flood preparedness and enhanced community quality of life.

Parks and green spaces are critical to enhance communities' sustainability, health, connectivity, and resilience to storm and flood events and have become even more critical assets during the COVID-19 pandemic.



CHARLOTTE-MECKLENBURG STORM WATER SERVICES

After Tropical Storm Fay, the city of Charlotte, North Carolina, bought out commercial and multifamily properties and single-family homes to coordinate a large green space, now known as the Chantilly Ecological Sanctuary (above). One of the bought-out properties is shown here during a 2020 rain event, effectively capturing flood water (below).

CHARLOTTE-MECKLENBURG STORM WATER SERVICES

"We considered various structural approaches to reduce flood damage, but we came to the realization that because of where our floodplains are, it was time to start un-developing."

—TIM TRAUTMAN, FLOOD MITIGATION PROGRAM MANAGER, CHARLOTTE-MECKLENBURG STORM WATER SERVICES

Property left behind from buyout programs can offer ecological functions that mitigate flood risk and can enhance climate and community resilience.

Plots restored to floodplain, forest, coastal wetlands, and natural habitat can be valuable to the surrounding community in many ways, including meeting the following needs:

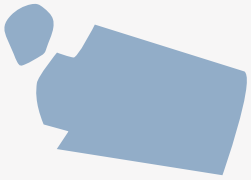
- Beautifying a neighborhood or site, and offering aesthetic value;
- Restoring ecological function to reduce future flooding;
- Creating a natural flood buffer zone;
- Enhancing water quality; and
- Offering recreation and educational opportunities, which can enhance community health and quality of life.

Describing goals to implement riparian buffers, wetlands, and other nature-based flooding solutions on purchased properties, Tate, of the Maryland Emergency Management Agency, explained, "I would definitely like for people to be more innovative in what we set up as the reuses of the

Land Use Patterns after Buyouts

Voluntarily acquired properties through a buyout program may materialize in a range of land use patterns, depending on the level of planning and willingness for individual participation.

The Environmental Law Institute and University of North Carolina identified management and land use approaches available for different circumstances:

	Level of connectedness	Description	Examples of uses
	Patchwork	Properties acquired under voluntary buyout programs are dispersed unevenly across the community. This scenario is informally described as the "jack-o'lantern" or checkerboard effect.	Community gardens, pocket parks, or small green infrastructure projects
	Holdouts	Multiple adjacent properties may have been acquired, but a few remaining property owners chose not to participate, and infrastructure remains.	Trails and greenways that connect other amenities
	Comprehensive	A large contiguous area was purchased through a voluntary buyout program.	Large-scale flood mitigation project or habitat restoration

Source: Environmental Law Institute, University of North Carolina Institute for the Environment, Strategic Partnerships and Floodplain Buyouts 2017,www.eli.org/research-report/strategic-partnerships-and-floodplain-buyouts-opportunity-wetland-restoration.

properties . . . [to] create something which is giving back to the community and becomes a community amenity."

However, public-sector partners face challenges such as the following with converting buyout sites into open spaces:

- The voluntary nature of buyout programs makes planning for property acquisition at strategic sites difficult or impossible.
- The patchwork nature of voluntary buyouts can also lead to the acquisition of an assortment of sites, rather than a larger consolidated site more appropriate for a flood installation or regional amenity.
- Buyout programs do not include funding for future design, maintenance, or operations of purchased properties.

Buyout properties, considered either as individual parcels or at larger, multiparcel scales, can offer a range of benefits to both the ecosystem and community residents, with an eye toward flood resilience. The opportunity to provide these amenities is based on location, property size, adjacent land uses, available funding, and capacity of the local governing or partnering land management entities to implement. Keith Bowers, president and founder, Biohabitats, further explained: "You need to have a good understanding of the context: where that property is located spatially within the watershed, how it's connected hydrologically, and what potential ecological benefits it could have."

Active space uses beyond natural restoration may rely on funding source requirements and coordination with community neighbors and stakeholders. Regardless of the "connectedness" of the parcels, communities can envision future land uses based on a range of distribution of bought-out properties.

Riverfront Park in downtown Nashville offers one high-profile example of the transformation of buyout properties into a park offering flood mitigation and recreational amenities. The park is located on previously industrial land next to the Cumberland River that was bought out following a devastating 1,000-year flood event in 2010. This large-scale flood mitigation infrastructure project incorporates bioswales, bioretention areas, rainwater harvesting, and a 375,000-gallon cistern buried below the park's amphitheater that is used for park irrigation. Riverfront Park and related improvements were funded by $7.1 million in federal aid after the flood and Metro Council capital spending plans.[48]

Charlotte-Mecklenburg Storm Water Services Floodplain Buyout Program

In the booming metro of Charlotte, North Carolina, strengthening stormwater infrastructure to reduce impacts to buildings and residents is key. When this demand was not being met, Mecklenburg County, the city of Charlotte, and six surrounding towns created a joint Storm Water Services utility to enhance flood resilience across the region. The utility's fees generate perennial revenue for its Floodplain Buyout Program, which has acquired more than 450 flood-prone homes, apartment buildings, and businessess and has returned over 185 acres of floodplain to natural land and open space. Charlotte-Mecklenburg Storm Water Services (CMSWS) estimates that these buyouts have avoided $25 million in losses and will ultimately avoid over $300 million in future losses. CMSWS leadership has learned to tap its perennial funding stream to work wiith homeowners on sensible, compassionate buyout plans that reduce potential harm from a future flood event. Having funds available to develop locally initiated buyouts, and to match federal grants when feasible, enables the utility to plan buyouts with residents in a geographically more comprehensive way.

Read the full case study on ULI's Developing Urban Resilience website at www.developingresilience.uli.org/case/charlotte-mecklenburg-floodplain-buyout-program/.

CHARLOTTE-MECKLENBURG STORM WATER SERVICES

Charlotte-area residents ride along the Little Sugar Creek Greenway, which was established on bought-out land.

GARY PARENT, BLUE ACRES PROGRAM

This coastal home in New Jersey is being demolished as part of a buyout in the area, and the land will be returned to support flood absorption.

Overcoming Challenges and Finding Solutions for Buyouts

Although policy innovations are continuing to drive buyouts forward, some barriers still exist to using buyouts effectively and equitably. The following limitations restrict local governments' ability to implement buyouts comprehensively and offer them as support to property owners; however, innovations in policy and partnership models can help break barriers for buyouts.

Challenge: Floodplain buyouts are resource and time intensive, potentially deterring local government entities and property owners from participating. It takes a median of more than five years for a FEMA-funded buyout to be completed after a flood event.[49] Longer buyout timelines reduce the opportunity for people with fewer resources to participate in the program, making it less accessible and therefore less effective as a reliable climate adaptation tool.

James Wade of the Harris County Flood Control District said, "The biggest struggle is to get the federal funding. The problem with that is that you have a lot of interest out front, but as time goes on, families can't wait." This situation is particularly stressful for property owners in a post-disaster context. Many homeowners experiencing long wait times are those who can least afford it. As a result, some property owners may have to list their homes to avoid the risk of a denied buyout application or a long period in limbo.

Solution: Emerging tools and partnership models can potentially offer strategies to speed up funding availability and advance buyout projects more quickly and with additional capacity. Disclosure requirements

may also reduce the likelihood that properties are sold on before completing a buyout process.

When property owners cannot wait for a buyout, they may look to sell the property, continuing the potentially problematic current use of the site. Matthew Fountain, city of Charleston, suggests that enhancing disclosure rules can help close the loop. "It's a tough situation, but I think more disclosure is better because it's an accurate reflection of what you have. It hurts people who purchase a home, not knowing that it was going to flood, and you're basically asking them to absorb that cost. . . .That's where we've tried to close the gap of the buyout program."

The New Jersey Blue Acres program is a nationally recognized example of a state-run buyout program that leverages other funding sources for its support. For instance, some residential properties within a buyout area may not meet all federal funding eligibility requirements. In these cases, the state may be able to purchase the property using state funds (rather than relying on the local municipality), which offers a path forward to help the property owner and create a more comprehensive buyout area.

Another example, from the city of Houston's resilience strategy, calls for the creation of a Community Buy-In/Buy-Out Property Swap Program. Citing the limitations of federal buyout programs, the city will coordinate with partner agencies and organizations to create a voluntary program for low- or moderate-income homeowners within the floodplain to buy into and relocate to new, refurbished, or relocated homes with lower flood risk within the same community. If implemented successfully, the program will reduce flood risk to vulnerable community members "while being respectful of social networks and community resources."[50] Acquired lots through the Buy In/Buy Out program will be used for flood reduction and offer public amenities.

At the community or city scale, Michael Bloom suggests a solution that includes banking federal funds for buyouts: "Immediately after a flood, owners

SUSAN LILEY, CITIZENS' COMMUNITY FOR FLOOD RELIEF

A lack of federal funding poses challenges for residents in communities like De Soto, Missouri, waiting for a buyout. The Citizens' Committee for Flood Relief, a community-based group in De Soto, has been advocating for buyouts in response to an increase in flash-flooding events in recent years.

are most interested in selling, but the 75 percent federal share is still three to four years in the future. If local communities could 'bank' buyout money—then use it in the immediate aftermath of a flood—then get the 75 percent federal share reimbursed later, that would drastically enhance the effectiveness of buyout programs and encourage owners to sell."

> **Challenge: Local buyout programs are "unlocked" by the availability of federal funds.** Local governments interested in pursuing buyouts are typically constrained by the availability of federal support and must usually go through a complicated grant application process. In turn, this creates a "hurry up and wait" mentality that can stymie the process if property owners are not willing to participate over the long term.

Solution: Funding models with diversified sources enable local and state governments to move away from their reliance on federal support and potentially offer buyouts in a more streamlined, efficient manner. These new models can give local governments more flexibility to implement buyouts without waiting on the outcomes

of federal funding proposals, while still leveraging federal dollars when they are available.

State and local governments can leverage a range of traditional and innovative financing mechanisms for buyouts,[51] including the following:

- Revolving loans;
- Municipal bonds;
- Green bonds;
- Local option taxes;
- Utility fees; and
- Impact fees.

Tim Trautman, flood mitigation program manager for Charlotte-Mecklenburg Storm Water Services in Charlotte, North Carolina, explained: "The most successful programs are ones that continually invest in [buyout] efforts. What I see very frequently are these flood disasters, like Irene or Sandy, and a bunch of money shows up from the federal government, and all of the programs are established based upon that federal funding. When it goes away, all of those programs go away." Charlotte-Mecklenburg Storm Water Services leverages stormwater utility fees to create a perennial revenue source for flood control infrastructure, including buyouts. Revenue generated by the fees almost entirely funds its Floodplain Buyout program, which has acquired over 400 properties and created 185 acres of protective open space, amounting to an estimated $25 million in damages since 2003.[52]

New Jersey's Blue Acres program is partially funded by bonds to leverage federal funding sources. As of 2019, the bonds have generated $36 million to acquire flood-prone properties.[53]

> **Challenge: Buyouts remove "ratables" (or tax revenue–generating properties) from the municipal tax base.** Initiating the conversation with local municipalities can be a nonstarter because of buyout's inherent goal of removing a property from the tax base, thus negatively affecting local revenue streams. As JaLeesa Tate, state hazard mitigation officer at the Maryland Emergency Management Agency explained: "[Buyout] projects are riddled with challenges. The first hurdle is getting the local government buy-in, because [the buyout] is reducing the tax base . . . and creating a cost because the property has to be maintained in perpetuity."

Solution: Effective communication about leveraging tax dollars to enhancing resilience for the entire community, not just the lot, can support these difficult conversations. Fawn McGee, Blue Acres Buyout Program director, pointed out: "I think that we have to get face to face with the communities and with the federal partners. . . . I've had mayors say, 'This is great, even though we're losing the ratable.' The reality is that the values of these homes will start to decrease, so those homes aren't as beneficial as maybe they started out to be on the books. So when you start to sit down and have that conversation with the communities, they start to realize that in the long term, this is a beneficial change and a healthy change for their community." In addition, better understanding the business case for local government investment in buyouts, even with the property tax losses, may be a promising area of research in the future.

> **Challenge: Federal programs' requirements may counteract one another.** For local governments seeking federal support of a buyout, conflicting requirements cause complexity in the process, ultimately creating delays and hindering the flood-impacted property owner. The requirements may invoke complex processes at the application and implementation stages.

Solution: Ensuring that government staff have the expertise and background to facilitate the complexities of buyout programs will help ensure they are executed and implemented successfully. The Maryland Emergency Management Agency puts the time in to balance federal programs and use them in ways that complement each other. JaLeesa Tate, Maryland's state hazard mitigation officer, shared, "Leveraging different resources takes a lot of planning, and you need people on your teams who know the programs really well."

CITY OF CEDAR RAPIDS

Remembered as the "Year of the River" in Cedar Rapids, Iowa, 2008 saw a massive flood event inundate over 10 square miles of the city and displace more than 300 city facilities, devastate more than 7,000 properties (including more than 5,000 homes), and cause over $6 billion in damage.

Challenge: Post-buyout, local governments take on ownership of the site without guidance. A traditional buyout is reactionary, after a flood event, and potentially executed in an ad hoc manner. Local governments complete buyout transactions with little capacity or funding for restoration and management of the site, let alone planning long-term benefits for the surrounding community. Federal grants for buyouts do not include funding beyond the acquisition and relocation phase of the process, leaving the responsibility to maintain and repurpose the land to the local government.[54] Lack of capacity for developing strategy in line with allowable parcel use post-buyout may leave many of the properties underused.

"In many cases to date, newly acquired land is left as empty, unused lots, because local officials and managers do not have specific post-acquisition use plans in place or lack funding and/or capacity for restoration or other projects," according to a report on strategic buyouts by the University of North Carolina Institute for the Environment.[55]

Solution: Partnerships and tools that facilitate land banking, leasing, and transfer, for example, can be used to design, develop, and maintain plots post-buyout. Coalescing around a common goal with local partners, stakeholder groups, and government agencies can help assemble a vision and potential for the site.

For example, after a historic flood event hit Cedar Rapids, Iowa, the city initiated and managed partnerships with county and state levels of government and private citizens and businesses to design and build various phases of the Cedar Rapids River Corridor Redevelopment Plan. Between 2009 and 2014, the city of Cedar Rapids acquired more than 1,000 inundated properties, most of which were then reverted to a 220-acre greenway along the downtown's riverfront.

JASON HELLENDRUNG

The Cedar Rapids River Corridor Redevelopment Plan balanced recovery with short- and long-term strategies to provide flood protection, while creating civic amenities, like the McGrath Amphitheater. The back wall of the amphitheater serves as a levee and is the first segment of the flood protection system for the west side of the river. It was also built with removable flood panels to protect the street inland.

"Cedar Rapids is a great example of a community broadly coming together after a disaster, crafting a community-driven plan, and doing it quickly. It was a bold vision for the future, with a lot of input and iteration with the community. The mantra after the flood was, 'Make the plan, work the plan,' and it then became easy to make funding requests to implement the plan," shared Jason Hellendrung, vice president, planning and design, Tetra Tech, who was formerly on the consultant team leading the planning phases.

"After such a staggering disaster, it was important to us as a City to commit to a plan that could be implemented quickly and support our residents in the middle of a housing crisis," says city of Cedar Rapids community development and planning director Jennifer Pratt.

"The ability to quickly bring on board a professional consultant allowed us to form a plan that not only served our residents, but helped attract additional funding support from outside agencies."

The McGrath Amphitheater is a portion of the larger vision, funded through partnerships. "The city was able to apply and receive funds from the state's I-JOBS and RECAT grant programs, with a private match from local foundations, businesses, and individuals, some land and money donated by the county, and city funds. The results are a new community space that brings the community together, provides flood protection, and has helped support economic development in the adjacent neighborhoods," said Hellendrung.

Future Partnerships and Innovations in Buyout Programs

As the impacts of climate change continue to intensify, local governments may increasingly look to buyout programs and potentially other types of relocation and assistance programs to help remove households from harm's way. However, with public-sector funding limited, many may also need to look for partners and new funding models to support these initiatives and deliver them in more challenging contexts, such as urban or high-density settings. Future city initiatives may also increasingly seek to support households in their relocations, rather than providing compensation only.

Climate adaptation calls for creativity and collaboration. Charleston, South Carolina, approaches flood mitigation projects strategically to offer the multiple benefits that leverage public, private, and nonprofit partners. Matt Fountain, city of Charleston, explained: "At the city, we are trying to take something we are doing and turn it into one project that does lots and lots of things, instead of one project that does just one thing. And that lets us bring in all these nontraditional partners."

Partnerships can be a key source of funding, capacity, and expertise; local governments may look to the real estate sector for funding and implementation support. Approaches for other types of redevelopment, such as brownfield redevelopment, may also offer potential models to explore how to better leverage buyouts for community green space and green infrastructure. Julie Ulrich, director of urban conservation for the Nature Conservancy, observed that "Brownfields offer good precedent: contaminated sites have been revised and reimagined in collective fashion, so while it's not necessarily a buyout, there's a similar technical structure, design, and planning process that is required."

Church Creek Basin Resilience Project in Charleston, South Carolina

The Church Creek drainage basin has repeatedly flooded, affecting nearly 50 townhouses. In 2015, the city of Charleston bought out residents and embarked on the Church Creek resilience project, which will mitigate flooding for the surrounding community by delivering a greenway that will offer water storage during weather events and a new amenity. Read the full case study on ULI's Developing Urban Resilience website at www.developingresilience.uli.org/case/church-creek-flood-storage-and-resiliency-project/.

CITY OF CHARLESTON

As shown in this rendering, Bridge Point Park will be on land that was part of the Church Creek basin buyout.

JIMMY BAIKOVICIUS, FLICKR

Sunny Isles Beach in Miami studied the economic benefits of using transfer of development rights and established a TDR Bank to operationalize the land use tool.

Some tools that municipalities are beginning to explore using for buyouts include the following:

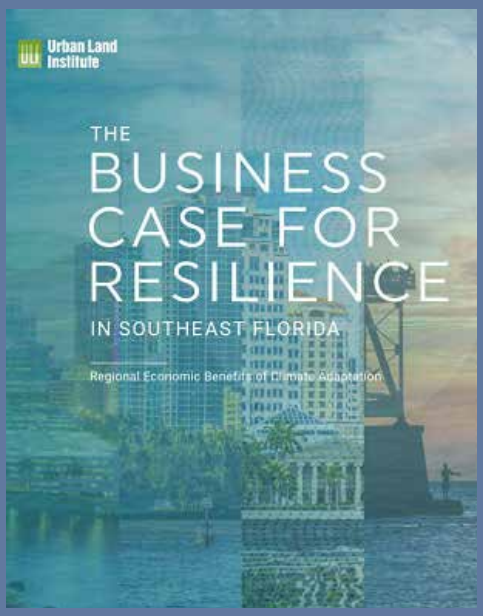
Property transfer/transfer of development rights (TDR) programs, create market incentives to move development away from areas where it is discouraged and to areas where development is preferred, known as receiving areas. Kelly Leilani Main, cofounder and executive director of Buy-In Community Planners Inc., describes TDRs in a buyout context, "Communities can identify high-risk sending areas and establish receiving in areas out of the flood zone, where the city may also like to increase density or improve walkability, sustainability, etc." Main continues, sharing insights into opportunities for property owners and the industry: "The primary idea here is that homeowners could capture additional cash from the sale of their development rights and use that funding to support their relocation assistance needs as part of the buyout process. Developers can purchase development rights and cities can provide incentives like density bonuses to increase participation in this process. Such a program could also help preserve or even increase the local property tax base, which is a major barrier for local jurisdictions."

In 2017, a ULI Southeast Florida focus group advised Miami-Dade County on the use of TDRs as a climate adaptation strategy in the Florida regulatory context and explored whether the mechanism could be viable to divert

Related Reading: *The Business Case for Resilience in Southeast Florida*

The Business Case for Resilience in Southeast Florida: Regional Economic Benefits of Climate Adaptation was commissioned by the Southeast Florida Regional Climate Change Compact and the local business community to systematically assess the economic impact of investment in resilience in the Southeast Florida region. The findings illustrate the shared interest in action by both the public and private sectors to coordinate investment in proactive flood protection and climate adaptation measures. It presents a compelling business case for the Southeast Florida region to make significant investments in resilient infrastructure now, including both community-wide and building-scale adaptation measures.

For more information, read the full report on Knowledge Finder at http://knowledge.uli.org/floridabusinesscase.



ULI

Local governments in California are considering leasebacks as a tool to purchase at-risk coastal properties and lease them to their original owners or others for rental or vacation purposes until the properties are no longer safe to reside in.

development from low-lying, repetitive-loss properties toward higher-ground areas able to provide safer housing. The final report details "this exciting opportunity" and the focus group's insights into implementing a successful program. "In developing TDR programs, care must be taken to structure programs that are responsive to market forces and that generate value on both sides of the equation," stated the report. "A frequent complaint about current [TDR] programs is that there is little or no market for the credits, decreasing their value to the point of making the programs rarely utilized."[56]

In Pittsburgh, about 10,000 vacant and tax-delinquent parcels along the Negley Run watershed are being transformed into green spaces such as urban farms, community gardens, and pocket parks. The Urban Redevelopment Authority is the majority landowner in the area and is working with the city to evaluate the use of TDR to aggregate these parcels and encourage density away from flood-prone areas to implement green infrastructure along the corridor. During heavy rainfall events, Negley Run overflows onto major roads and nearby property in the historically underinvested neighborhoods of Larimer and Homewood and "represents one of the most urgent flood risk challenges in the city."[57]

Land banks are entities, usually facilitated by nonprofit or municipal or other governmental entities, that convert (usually) vacant, abandoned, and foreclosed properties into new uses. Most land banks hold and maintain a designated parcel temporarily until a new owner is identified. In a buyout context, land banks can be a productive vehicle to facilitate the acquisition, management, and disposition of parcels until a new use is identified.

Leasebacks, also called sale-leasebacks, allow local governments to purchase property and rent it to either the original owner or a third party to generate the revenue needed to cover the cost of the purchase. In a buyout context, leasebacks offer local governments a more flexible strategy to acquiring properties at risk of flooding for hazard mitigation or open-space uses.[58]

Leasebacks can minimize negative circumstances of buyouts by offering property owners additional, but not unlimited time in their homes to facilitate an easier transition during relocation. For example, Charlotte-Mecklenburg Storm Water Services has used a leaseback model with elderly homeowners or other property owners who require additional time during the relocation process.

Community land trusts (CLTs) are nonprofits that can gain control of land to address a community need over a long period of time. They have been effectively used to deliver affordable housing and other amenities like parks and open space across the United States and are increasingly used to provide low-cost commercial properties for culturally significant businesses and nonprofits.[59] CLTs can offer a community-centered, flexible model and are being used to support relocation from vulnerable places and deliver needed housing in receiving communities. This approach can also "help communities implement managed retreat in ways that allow whole communities to relocate together, minimizing the social and economic consequences of relocation," according to a new report by the Georgetown Climate Center.[60] An example cited in the report is the Louisiana Land Trust, a state-created land trust that has used federal disaster recovery funds to buy out residents in flood-prone areas, initiate restoration projects, and redevelop housing on higher ground. CLTs are also an effective vehicle to preserve or repurpose acquired properties into community parks and open spaces.

Value capture models may offer an opportunity to develop partnerships that, through the installation of green infrastructure and park or open-space amenities, capture value from surrounding properties benefiting from the new amenity. Innovation in the space is still needed, but the model can be promising, according to James Wade of the Harris County Flood Control District. "Funding is an issue. I don't know how to correlate the benefit, but maybe through a partnership for parks, and trails that could tie into benefit to all." Challenges around the maintenance of lots and long-term designation determined by funding source may arise. For municipalities that lack legal authority to invest in parks or other amenities, partnerships are even more important to develop and implement green infrastructure.

Beyond Flooding: The Applicability of Buyouts for Other Climate Hazards

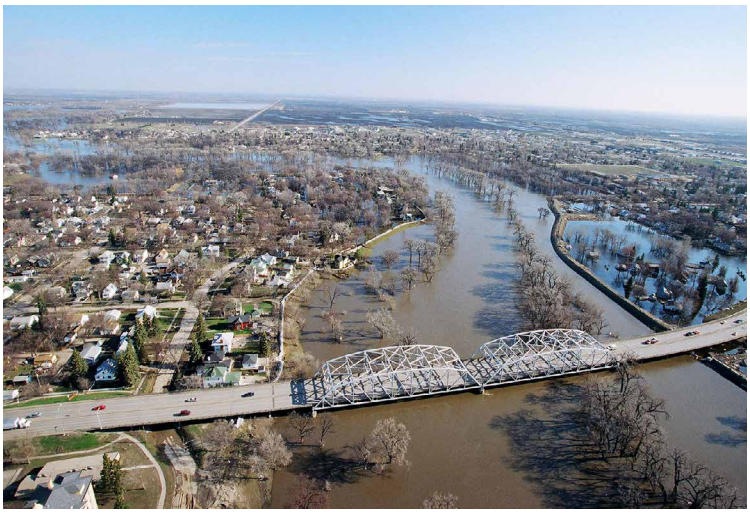
"All climate perils have definable costs to remove the peril or to defend against the peril in advance," John Macomber, senior lecturer in the Finance Unit, Harvard Business School, commented, "and they all have possible very large and hard-to-identify costs to deal with the impact of an event after the fact—and a climate-related event might or might not even happen in the time frame of the analysis. The question is always, 'Who pays, when do they pay, and who will benefit?'"

Climate hazards ranging from flooding to heat, wildfires, and drought, can have short- and long-term impacts on homes, businesses, and other institutions. The potential financial exposure they present must be integrated into adaptation decision-making.

Macomber continued, "Investments in prevention—not just in recovery—are going to happen more and more. [Buyouts] may start to make economic sense in the Southwest with respect to unlivable heat and unavailable water, for example. It may not be as event specific, like a big flood, but the negative impacts on life and property are still real—and they don't go away when the flood recedes. How long will it be before we start thinking about financial protection against slower moving climate risks like extreme heat and drought? Probably not that long."

Conclusion: On Safer Ground

LEFT: MICHAEL RIEGER/FEMA | RIGHT: BRENDA RISKEY/FEMA



The green infrastructure alongside the Red River (right) in Grand Forks, North Dakota, has repeatedly proved its flood mitigation benefits by protecting the community during several major flood events, like the 1997 flood (left).

Flooding threatens public safety, asset values, and affordability. Buyouts are an opportunity to relocate people, structures, and infrastructure out of harm's way; they are one tool to realign land use patterns with current and future climate threats. Floodplain buyout programs can right past wrongs of land use planning and development and acknowledge the increasingly costly and dangerous impacts of climate change. However, the limitations of buyouts also present challenges to municipalities and other public-sector actors and have implications for local real estate markets. Furthermore, offering buyouts without complementary relocation and support services can exacerbate exclusionary practices and lead to displacement, further disadvantaging flood survivors.

As flood risk continues to increase, public-sector partners, practitioners, and communities are eager to develop more long-term strategies that can support strategic installations of flood mitigation approaches and offer community benefits. Buyouts are likely to always be challenging for both public-sector partners and property owners, given the costs, the voluntary nature of the programs, and the fact that programs do not usually support homeowners' relocations. Notably, working in high-density, urban contexts presents significant challenges, but may be increasingly of interest to both property owners and municipalities, especially if new funding strategies can be identified.

Despite limitations, innovation in buyout program administration is enabling opportunities to use this tool more proactively, which could enhance adaptive capacity of communities. Buyouts may be leveraged more in the future, including in structures with active partnership from the real estate sector, as communities and households increasingly recognize the impacts of climate change and consider migration to safer ground. Real estate and land use practitioners have an opportunity to equip themselves with knowledge on best practices and empower their communities and partners to develop equitable and multi-beneficial buyout programs, before the next flood.

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