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ORIGINAL ARTICLE

Strategic retreat for resilient and equitable climate adaptation: the roles for conservation organizations

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Abstract

As climate change accelerates the frequency and intensity of natural disasters, damage to public and private property is also increasing, putting exorbitant strain on governments and communities. Societies across the world are working to adapt to climate change, but climate adaptation is currently inadequate to meet the needs of the people left increasingly vulnerable and the places that risk being irreversibly changed or destroyed. One tactic of climate adaptation is strategic retreat, sometimes referred to as managed retreat. Strategic retreat is the process by which the government or another entity purchases (buys out) developed properties that are at risk of destruction or have been destroyed by natural disasters. The structure is most often demolished, and the land is placed under a permanent easement to prevent future development. What happens next is dependent on the entities involved in the buyouts, and can range from derelict, vacant lots to full restoration of ecosystems and their abilities to mitigate flood damage. Sometimes recreational amenities, such as trails or park infrastructure, are prioritized and funded as well. Conservation organizations can leverage their expertise in conservation planning, land acquisition and restoration, policy advocacy, and partnership development to improve the implementation of strategic retreat so that nature and people can thrive in the long term. In this policy paper, we review ways that conservation organizations have and can continue to engage in buyout processes to ensure positive outcomes for communities and nature. Conservation organizations must also evolve their approaches to climate adaptation to integrate equity and redress historical injustices in land use, and contribute towards improving strategic retreat for a more just and resilient future across disaster-prone communities. This work focuses on the context of disasters and climate adaptation in the USA, though many of the principles presented are applicable around the world.

Keywords Managed retreat · Environmental justice · Climate adaptation · Buyouts · Restoration · Conservation

Introduction

Climate change increases the risks associated with extreme weather in coastal and inland geographies due to flooding from storm surge, sea level rise, and precipitation, and from wildfires. As of October 7, 2020, the USA has experienced 16 weather/climate disaster events with losses exceeding $1 billion each. From 1980 to 2019, the annual average number of events is 6.6, but the annual average for the most recent 5 years (2015–2019) is 13.8 events (NOAA 2020). In addition to the rampant destruction of private property caused by storms, wildfires, and weather events brought on by climate change, municipalities across the world are at risk of losing infrastructure such as roads, bridges, and power plants in coastal environments, floodplains, and areas with high vulnerability to wildfires (Neumann et al. 2015). Further, these impacts often reinforce and amplify socioeconomic disparities experienced by low-income, minority, and politically marginalized groups (Shonkoff et al. 2011). Adaptation strategies must address the risks and damages of climate change as well as the social implications of these disproportionate impacts.

Protecting and restoring healthy flood- and fire-prone landscapes are promising climate adaptation strategies. Functioning coastal and river floodplains receive and hold water during periods of inundation brought by events such as intense precipitation, storm surge, or sea level rise. If kept undeveloped or restored effectively, healthy floodplains can act as a buffer between the water and the built environment.

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For example, coastal wetlands prevented over $625 million in damage during Hurricane Sandy (Narayan et al. 2017). While the use of managed open space as part of a wildfire mitigation strategy to increase the resilience of fire-prone communities is a relatively novel approach, it is gaining traction and support from both fire management professionals and fire scientists (Syphard and Keeley 2020).

Land trusts and other conservation organizations carry out the important work of preserving, restoring, and sometimes managing coastal, riparian, and fire-prone landscapes. Conservation has evolved from protecting rare and endangered species and habitats to broader ecosystem functions and processes, to resilient networks in the face of climate change (Anderson and Ferree 2010); the field should further evolve to include conserving nature for the purpose of providing flood and wildfire mitigation, especially in the face of climate change. Simultaneously, many urban landscapes face dire impacts of climate change but lack natural buffers. In these landscapes, strategic (sometimes called managed) retreat is one strategy to remove people and property from risk and re-establish these natural buffers. Strategic retreat is the relocation of structures or abandonment of developed land to manage natural hazard risk (Hino et al. 2017). One way that strategic retreat is implemented is through buyouts, wherein the government or another entity purchases developed properties, demolishes the structures, and enacts an easement or other legal means to restrict future development. This policy paper explores ways in which buyouts can be an option within climate adaptation that, if conducted through inclusive processes and followed by restoration, may promote the hazard-mitigating effects of healthy ecosystems to help buffer nearby intact developed areas from disasters' impacts while advancing community resilience.

Often, in the American context, strategic retreat brings to mind images of empty, deserted lots (Zavar and Hagelman III 2016). Conservation organizations have a critical role to play in the evolution of this concept so that strategic retreat becomes a means of not only risk reduction but also restoration of healthy ecosystems and/or development of community assets such as parks.

Challenges

As development increases, it encroaches on undeveloped areas that could include healthy floodplains and the wildland-urban interface (Radeloff et al. 2018). The wildland-urban interface is the area where structures and other human development meet undeveloped wildland or vegetation that can fuel a wildfire (National Wildfire Coordinating Group 2019). It is this area where the risk of property destruction from wildfires is highest. For centuries, human patterns of development have put lives, private property, and public infrastructure at risk, and this risk is being compounded by climate change. Further, policies at the municipal, state, and federal level often do little to disincentivize development in the floodplain or other areas at risk of sea level rise and natural disasters. For example, the maladaptive cycle of flood risk mitigation highlights a significant disconnect between who pays and who benefits: the National Flood Insurance Program (NFIP) can artificially increase the value of land in the floodplain by paying for repeatedly repairing infrastructure after floods, thus reallocating risk of flood damages from floodplain property owners to taxpayers (Christin and Kline 2017).

Buyout programs are one way to move people out of harm's way. However, most buyout programs are inadequate to meet demand, slow to be administered, a missed opportunity for resilient climate adaptation, and a source of discontent for community members and those in surrounding communities, and can perpetuate risk (McGhee 2017; Siders 2019; Binder et al. 2020). The Federal Emergency Management Agency (FEMA) Hazard Mitigation Grant Program (HMGP) is one of the largest funding sources for hazard mitigation projects in the USA, and one element of HMGP funding is buyouts. The HMGP is singularly designed to meet risk reduction on a property-by-property basis (rather than whole neighborhoods) in areas with high levels of risk. In addition, eligibility and administrative constraints often favor gray infrastructure solutions such as seawalls or levees, which are relatively quick to construct but can fail catastrophically and often adversely impact ecosystems, at the expense of solutions that center the disaster-mitigating effects of healthy functioning ecosystems (Suckall et al. 2018).

Environmental benefits can be difficult to quantify in the cost–benefit ratio that is a required calculus in justifying buyouts. Between 1990 and 2000, only 7.5% of HMGP-funded buyout sites surveyed had undergone wetland or native plant restoration (Zavar and Hagelman III 2016). Factors preventing restoration include lack of funding, lack of leadership and/or capacity, lack of long-term caretakers of the land, and the checkerboard or piecemeal nature of parcels over the short term that results from a property-by-property approach to buyouts. The images of deserted parcels that come to mind with strategic retreat are real. After buyouts, land is often left as vacant lots that are poorly maintained, leading to upset neighbors and decreased property values (Zavar and Hagelman III 2016; Binder et al. 2020; G. Jacob pers. comm.). Gregory Jacob is a Policy Advisor for The Nature Conservancy's New York Chapter. He has closely managed multiple properties that were bought out in partnership with the Natural Resources Conservation Service on Staten Island after devastating damage from Hurricane Sandy and interacted closely with multiple community members as a result of this work. Though the utility of the open spaces resulting from buyouts might be increased if the land is restored or developed into

gardens or parks consistent with a long-term community vision, most municipalities require funding unavailable in their budgets to make such options a reality. And, most government buyout programs allocate funds for acquisition and demolition, not for restoration.

Often, adaptation strategies result in environmental injustices and undermine access for at-risk communities (Moore 2007; Marino 2018; Weber and Moore 2019; McConnaughey 2019). The consequences of floods and fires are not experienced homogeneously, and the current decision-making paradigm reinforces systemic inequities (Ahern et al. 2005; Alderman et al. 2012). The richest and poorest live at the coast, yet the poorest are more likely to be exposed to environmental and health burdens and have a reduced ability to recover from flooding events (Cutter et al. 2003; Zahran et al. 2008; Islam and Winkel 2017). In the case of retreat, many buyout programs (as currently administered) exacerbate pre-existing vulnerability and consequently disproportionately impact disadvantaged groups (Binder and Greer 2016; Siders 2019). For example, some homeowners relocate to areas within the same floodplain while others who leave the area might lose their social ties to the neighborhood, which can perpetuate vulnerability for those individuals (Binder and Greer 2016; Marino 2018). The process and management of buyouts lacks transparency and consistency (Siders 2019). Subjective decision-making can reinforce bias and inequity because of who is and is not in the room making decisions. It is imperative that a reimagining of strategic retreat address these shortcomings and that they evolve to be a means of utilizing the power of nature to mitigate the impacts of destructive disasters.

Approaches to adaptation

Historically, most conservation organizations have prioritized actions based largely on ecological criteria and opportunity, primarily through protection of intact habitat. As climate change intensifies extreme events such as wildfires and flooding, some conservation organizations are broadening their prioritization strategies to include mitigation of risk to people through conservation and restoration of natural protective services (Fraser et al. 2003; McCann 2006; Freudenberg et al. 2016; UNC Institute for the Environment 2017). Some organizations have demonstrated that buyouts, followed by structure demolition and/or relocation and the restoration of floodplain habitats, can support social, environmental, and economic objectives — though there are almost always inevitable tradeoffs (Fraser et al. 2003; Calil and Newkirk 2017; Bridges et al. 2018; Reguero et al. 2018; Binder et al. 2020). There is a need for these tactics, including buyouts, to be more informed by science and issues of equity if they are to maximize community risk reduction and conserve important undeveloped habitats and their disaster-mitigating and other ecosystem services.

Prioritizing strategic retreat as a way to adapt to climate change can be based on a number of criteria. Anderson et al. (2018) developed a composite map of terrestrial resilience in the contiguous USA to highlight geographies with higher densities of microclimates and connectedness that support shifts in species and habitats in response to a changing climate. This map is used to inform conservation strategies of The Nature Conservancy (TNC), one of the largest land-holding conservation organizations in the world, and is similar to other prioritization schema in conservation idiom (Shepard et al. 2011; Spalding et al. 2014; Calil et al. 2015). Like the work of Anderson et al., the guidance that many conservation organizations use to prioritize land for protection or other conservation actions is based on biodiversity and ecosystem service targets. Importantly, some research has shown that prioritizing parcels that are the most ecologically valuable and vulnerable to floods does not significantly reduce the cost-effectiveness of buyouts; in buyouts, flood risk reduction can be combined with protecting ecological values in a way that helps communities to become more resilient over the long term (Atoba et al. 2020). In an encouraging recent development in September 2020, FEMA issued a policy revision to the previous stipulation (FP-108-024-01, issued June 18, 2013) that ecosystem service benefits could only be included in a project's benefit–cost ratio (BCR) when the project's BCR was calculated to have a BCR of 0.75 or greater using traditional risk reduction benefits. The new policy, FP-108-024-02, "rescinds FP-108-024-01 and eliminates the BCR 0.75 requirement, allowing consideration of ecosystem service benefits for a project regardless of BCR value. FEMA rescinds that policy in recognition that the natural environment is an important component of a community's resilience strategy" (FEMA 2020a). This policy revision is the result of many years of advocacy by nonprofit organizations, disaster mitigation practitioners, and academic scholars. It represents a huge step forward in making federal funding available for disaster mitigation projects that prioritize ecological benefits as part of resilient climate adaptation efforts.

Equity and other socioeconomic factors should be incorporated in conservation planning, which may lead to an emphasis on new locations that go beyond preservation to include restoration. Equitable buyouts must ensure that all vulnerable people, regardless of race, class, and other socioeconomic characteristics, have access to a variety of adaptation options, including buyouts. However, in the American context, histories of racist and classist development have resulted in predominantly urban developments for lower-class communities (Rothstein 2017; Hoffman et al. 2020). Thus, if a prioritization framework for where buyouts should occur is informed primarily by natural science criteria, then those buyouts could bias towards communities that live in more suburban or rural areas within proximity to wetlands — negating the principles

of equity by excluding those living in more urban areas (Elliott et al. 2020). Conservation organizations, especially in partnership with governments and community organizations, are uniquely poised and must be held to task to facilitate and implement adaptation options that promote community-scale risk-reduction through habitat restoration — rather than choosing one over the other.

Methods of inquiry

In an effort to promote learning about how conservation organizations might play a role in strategic retreat across geographies, organizations, and governments, we conducted case studies with a focus on projects or programs where buyouts occurred and conservation outcomes were achieved, and an emphasis on cases that have not been extensively covered in published literature. Case studies are a critical tool to investigate the processes and practices that produced (or failed to produce) social, economic, and restoration outcomes. These case studies consisted of conversations with nonprofit and government professionals involved in buyout programs. Because the purpose of this paper is to inform the role for conservation organizations in buyout program design and implementation, these individuals were deemed the most relevant to our main lines of inquiry. A list of questions can be found in Appendix. These conversations followed similar formats in that they consisted of generally the same questions about the program of interest. The purpose of these conversations was to inform this policy paper and gather information that is not readily available through internet research on the practical application of government programs or policies. The conversations were about the nature of buyout programs and their implementation, not about personal reactions to or perspectives on such programs. The following section outlines various roles for conservation organizations and exemplifies those roles with case studies to highlight specific examples of these principles in action. We hope that the combination of thematic overviews and concrete examples demonstrate diverse approaches implemented to reduce risk and restore ecosystem services to previously developed areas. The following recommendations are also based on a facilitated dialogue that occurred in the fall of 2019 among senior practitioners from multiple state chapters of TNC. These practitioners have decades of aggregated experience working in communities on land management, adaptation, and strategic retreat.

The roles for conservation organizations

There are a variety of ways that conservation organizations can and should engage in the evolution of strategic retreat towards a future of truly resilient and equitable climate adaptation. The core objective of this work must be to protect and restore nature in an equitable way, so that people and nature can thrive in the face of climate change, across landscapes, and over the long term. The way that conservation organizations support strategic retreat as an adaptation tactic will vary depending on geography, sociopolitical context, the organization itself, and many other factors. Even in programs lauded for their success, there is always room for improvement to ensure more equitable outcomes for participants. Conservation organizations engaging in strategic retreat should invest thoughtfully in the following critical components of success: partnerships, funding, acquisition and restoration, and political advocacy.

Partnerships

Local-level conservation groups must develop partnerships with established community leaders who are equipped to facilitate and implement equitable processes and programs. These partnerships are key to ensuring that the process of climate adaptation planning is representative and reflective of the needs and voices of the community. Conservation organizations could actively encourage participation from the community by soliciting grants, convening meetings, and adding capacity to the planning process in flood-prone areas. However, adaptation plans should be led by the community, not imposed by external conservation agendas. In developed areas, conservation organizations can bring together climate adaptation thought leaders, community leaders and members, local land trusts, and multiple levels of government to promote planning and consideration of strategic retreat followed by restoration as a possible solution. All partners should commit to inclusive processes and diverse partnerships so that there are ample opportunities to discuss concerns, opportunities, and logistics associated with buyouts for climate adaptation, and to ensure these conversations reflect the diversity of the community.

Thus, through strategic partnerships between the private, public, and nonprofit sectors, conservation organizations may provide needed transparency in documentation, capacity, and resource availability to increase communication and education among governments, nonprofit organizations, and communities. By implementing educational programs and community-led planning processes, pre-disaster planning can help people consider moving to appropriate receiving communities (such as those with economic opportunity and affordable housing) rather than haphazard migration (unplanned retreat) post-disaster.

Another critical element of strategic retreat followed by restoration is the long-term maintenance and management of land. Conservation organizations are adept at facilitating management plans for restoration, stewardship, monitoring for ecological outcomes, and preventing unsanctioned activities. Partnerships with multiple levels of government as well as others in the nonprofit sector are critical to the successful long-term management of parcels where buyouts have

occurred. An innovative example of this type of partnership is in Paradise, CA. TNC is partnering with the Paradise Recreation and Park District (the District) to develop and promote nature-based solutions that will mitigate future fire risk — including creating a greenbelt around the town to serve as a protective buffer between people and the wildlands. As a landowner across a large swath of Butte County that was affected by the Camp Fire, the District is well-positioned to play a leading role in implementing new approaches to land restoration, stewardship, and management that will reduce the risk of fire while providing exciting conservation and recreation opportunities. TNC is providing science research, prioritization, real estate expertise, and fundraising support.

> The City of Austin's Watershed Protection Department (WPD) has successfully implemented science-informed buyouts that create ecological and social value while mitigating risk to the community from natural disasters. The buyouts conducted by Austin's WPD are some of the most successful in the country by the metric of acquiring contiguous parcels that can be (and have been) restored or converted to community amenities. This is achieved by exceeding state and federal requirements for relocation assistance and the City's hands-on role in helping ensure that residents find a comparable property on the market and understand engineering studies and flood risks. These incentives are a critical component of the city's commitment to trying to make buyout participants "whole." By working to ensure that residents have a financial buffer to purchase a comparable home that fits their needs (i.e. number of bedrooms, school district, public transit lines for access to jobs), Austin hopes to help ease the burden of legacy impacts such as gentrification and housing shortages that plague Austin. In addition, these incentives encourage high rates of participation, which in turn leads to opportunities for climate adaptive conservation efforts. In 14 years, the WPD has purchased close to 1,000 properties. Many of the areas where buyouts have occurred have been transformed into pollinator habitat, parks, or other community amenities. In Williamson Creek, one area of the city where buyouts have occurred, a community visioning and master planning process has begun with residents through partnerships with local nonprofits including The Nature Conservancy, Community Powered Workshop, Public Green and Wild, the National Parks Service, and Asakura Robinson (a landscape architecture/planning firm). The partners' roles include convening community meetings, managing the master planning process, assisting with obtaining permits, and applying for grants to fund these efforts. Elsewhere in the city, a partnership between the City of Austin and the Army Corps of Engineers has helped to build out a portion of the Onion Creek Metropolitan Park at Yarrabee Bend where flooded residences once stood. (P. Kearfott, pers. comm.).

Pam Kearfott is the Supervising Engineer for the Watershed Engineering Division in the Watershed Protection Department for the City of Austin. The WPD's approach to buyouts in Austin is an excellent example of how buyout programs can better integrate equity through community engagement, strong incentives, and strong partnerships with locally based organizations representing a community's diverse constituency. Conservation organizations can contribute scientific and organizational capacity and funding towards buyouts and restoration (or amenity development such as community parks) of acquired land, or facilitate funding acquisition from government sources. In addition, conservation organizations can improve strategic retreat through policy advocacy, community engagement, and partnership development for buyouts that successfully reduce risk and improve social and ecological resilience. Even in program lauded for their success, there is always room for improvement to ensure more equitable outcomes across stakeholder groups. The pursuit of equity in buyout programs should always be iterative processes, and conservation organizations must take responsibility to participate actively in and vocally, financially, and strategically support these processes.

Funding

Funding for buyouts and restoration is a critical component to successful implementation. Most buyouts in the USA are funded by the federal government, yet many of the programs that are able to achieve impactful ecological and social outcomes (as opposed to single-property risk reduction) typically utilize state and municipal funding entirely or with rare supplementary funding from federal sources (e.g., Blue Acres-NJ, Floodplains by Design-WA, Austin Watershed Protection Department Buyout Program-TX, Charlotte-Mecklenburg Buyout Program-NC). Federal funding requires a local match (75% federal funding, 25% local match), which can disadvantage or present an extra challenge to less wealthy communities with a weaker tax base or a smaller municipal budget. State funding, as well as funding support from other sources (which could be acquired through the work of conservation organizations and partners), is thus critical to the equitable implementation of buyouts as a climate adaptation strategy.

Funding for buyouts that is administered through FEMA or the Department of Housing and Urban Development (HUD) is subject to slow bureaucratic processes that can leave vulnerable homeowners waiting for over 11 years from disaster to acquisition, and fewer than half of buyout projects reached closure in less than 5 years (Weber and Moore 2019). While

federal policy reform is one avenue to reduce the above issues, there are other innovative strategies that could improve this issue, such as public–private partnerships that rely on private capital for faster acquisitions from willing sellers in pre-approved flood-prone areas. A public–private partnership fund could also support other expenses associated with buyouts (i.e., demolition and removal, price-match to compete with private real estate, restoration). Private expenditures would be reimbursed by public capital (e.g., federal grants, state bond measures, a local sales tax, or real estate transfer tax fund). Agreements would be required to determine payment and ultimate disposition of the properties (i.e., whether lands were retained by a land trust or transferred to a state or local government). This model is similar to current practices between land trusts and governments for the protection of ecologically valuable land.

One funding mechanism that has been proven successful in both Charlotte-Mecklenburg, NC, and Austin, TX, is a utility fee. In Charlotte-Mecklenburg, some buyouts (local risk-based buyouts) are funded entirely by Storm Water Services through local stormwater fees or funding through local partners, and other buyouts (Quick Buys) are funded through a "rainy day fund" established in 2003 to purchase damaged properties before substantial repairs are made (Love 2020). In Austin, TX, a "Drainage Utility Fee" is calculated individually for each property based on the amount and percent of impervious cover (higher fees for more impervious cover) (P. Kearfott, pers. comm.). Once the property is acquired, the city removes connections to utilities, conducts environmental inspections (asbestos, etc.), and demolishes the structure including slab removal. The land is graded and seeded with a native seed mix for the short term. If restoration beyond this occurs, such as tree planting or specific efforts to develop habitat, it is carried out by partners through their own funding.

Innovation in acquisition, restoration, and management

Conservation organizations have a long history of innovating beyond fee simple acquisition in real estate, such as through conservation easements and floodplain easements. These organizations have also utilized creative mechanisms to financially incentivize conservation, such as tax deductions for those easements. Conservation organizations, especially land trusts, can continue this legacy of innovation to implement and incentivize floodplain easements, buyouts and restoration, and other land use planning and regulation for the express purpose of mitigating risk and adapting to climate change. For example, rolling easements are easements that are triggered by certain criteria (e.g., levels of inundation, death of property owner). These rolling easements can also restrict future development in flood-prone areas where little development already exists, such as agricultural areas. Mary-Carson Stiff, cited below, is the Policy Director at Wetlands Watch.

> Wetlands Watch (WW) is partnering with the Living River Trust (LRT), a local land trust, to develop two pilot projects in the Cities of Norfolk and Chesapeake, Virginia to examine how land conservation organizations can assist local governments in forming and executing sea level rise retreat policies and adaptation strategies. One pilot is focused on transferring ownership of five contiguous vacant shoreline properties acquired by the City of Chesapeake through FEMA's Hazard Mitigation Grant Program to LRT. This pilot requires modifying the FEMA Model Deed Restriction to meet the standards and practices of a land conservation organization. The goals of the Chesapeake pilot facilitate partnerships for timely and effective restoration, offering natural shoreline features the opportunity to migrate landward with sea level rise. The second pilot is evaluating and revising a resilience mitigation zoning program developed by the City of Norfolk that includes an option for developers to fund the purchase of rolling easements on coastal and floodplain properties. This option will hopefully be favorable for developers because the maintenance of other mitigation options (such as a solar farm or green roof) could be a burden for developers. Through this option to fund the purchase of rolling easements, the City, in partnership with WW and LRT, can direct private capital towards removing development rights and property from areas of risk (M.C. Stiff, pers. comm.).

Further, it is critical that the policies of both conservation organizations and all levels of government ensure that post-buyout open-space amenities benefit the whole community and do not inadvertently create gentrification or displacement pressure. One way that this could be achieved is by ensuring that those who are displaced are given adequate financial and social support to find more-than-adequate replacement housing, especially housing that is as close to new amenities as possible while still being safe from disasters. Two recent reports from the Strong, Prosperous, and Resilient Communities Challenge (SPARCC) discuss this concern and how vulnerable communities can be protected in the context of climate-related shocks and stressors (Cash et al. 2020; Gregg and Braddock 2020).

Political advocacy

Conservation organizations can advocate at multiple levels of government for strategically informed buyout policy that achieves multiple benefits such as risk reduction, resilience to future impacts, habitat conservation, creation of community assets for outdoor access and the ensuing public health benefits, and ecosystem restoration to benefit diverse stakeholders.

At the state and municipal level, conservation organizations and their partners should advocate for the establishment and long-term funding of local and state programs that employ buyouts as a strategy to reduce community risk. Funding for the programs could come through a designated tax or long-term bond allocation (see, e.g., Charlotte-Mecklenburg and Austin examples, above). Whatever the source, funding must not be tied to the boom-and-bust cycles of disaster funding. Reactive programs that spring up post-disaster and then disintegrate (such as New York's "New York Rising" after Hurricane Sandy) do not allow for iterative learning and can lead to ill feelings within communities because of a lack of continuity in staffing and approach. As importantly, appropriate resources for adequate staffing capacity are critical to the success of a long-term program. Programs need compassionate, dedicated staff who are able to ensure that families are made whole and the buyout does not perpetuate risk, according to Fawn McGee, long-time director of New Jersey's Blue Acres program (F. McGee, pers. comm.).

Conservation organizations must also focus on efforts to make administrative and funding capacity available for restoration and pre-disaster mitigation planning. The Building Resilient Infrastructure and Communities (BRIC) program is a new federal program that aims to categorically shift the federal focus away from reactive disaster spending and towards research-supported, proactive investment in community resilience (FEMA 2020b). This program is a critical step towards government investment in scaled climate adaptation that utilizes nature to build resilience. As the BRIC program becomes established, conservation organizations should advocate for FEMA to place a higher priority on nature-based projects, and should revise the Hazard Mitigation Assistance guidance to incorporate some of the changes recommended here.

Reform of the NFIP should ensure that flood maps reflect the latest and most rigorous climate science so that homeowners and property buyers are well-informed of the risks of flooding, now and in the future. Re-development in risky areas must be sharply disincentivized, though balanced with the needs of the community and tax base.

Conclusion

Strategic partnerships among public, private, and nonprofit entities could produce outcomes for risk mitigation, habitat conservation, and restoration in at-risk areas so that people and nature can thrive in the face of climate change across landscapes and over the long term. Climate adaptation strategies should deliver multiple benefits and must consider both equity and the ability of healthy ecosystems to mitigate the impacts of natural disasters. Conservation organizations are uniquely situated to play a critical role in this re-imagining, specifically through improving the implementation and outcomes of buyouts and strategic retreat. The combination of strategies outlined above presents a road map for conservation organizations and their partners to contribute to the implementation of more equitable buyouts as a climate adaptation strategy.

There is much work to be done if buyouts, as a component of strategic retreat, are to be implemented at an impactful scale to achieve resilient and equitable climate adaptation. The case studies presented above represent some of the most high-regarded buyout programs in the country. However, there are many states and municipalities for which there are active efforts to develop new and improve existing buyout programs and subsequently implement climate adaptive conservation measures. In these places, conservation organizations in partnership with many other stakeholder groups must continue to rise to the occasion to hold governments at multiple levels accountable. This is especially important to ensure that the many means outlined above that could contribute to more equitable outcomes are at least discussed, and ideally implemented. Further, conservation organizations must ensure that equity is considered strongly in how and where climate resilience efforts are put in place (post-buyout) to help protect remaining communities from disaster hazards.

Successful strategic retreat requires extensive further research and strategy development. For example, cultural attachment to place, particularly for indigenous people, cannot be revived once that place has been overwhelmed by sea level rise, and the community has been displaced. There is a paucity of information on receiving communities, and of the social and environmental impacts of climate migration. Further, the current capitalist system (manifested in minutiae such as the 7% discount rate of FEMA's benefit–cost analysis) incentivizes increasing development and economic activity, particularly in large, at-risk coastal cities. This paper does not purport to solve any of these incredibly complex issues. Rather, we offer specific ways that conservation organizations can leverage their expertise and rise to the challenge that we collectively face as a society to adapt to climate change. We must build coalitions of partnerships across geographies and scales that tackle these tough issues as well as those inherent in carbon mitigation. Conservation organizations are critical to ensure that both nature and people are protected from climate risks as the future unfolds

Appendix

Guiding questions for conversations with buyout program managers, facilitators, and partners

Questions (varied by site):

- What were the goals of this project?
- What were the factors that pushed this program to be set in motion?
- Who led the strategy for this work? What partnerships were required? What partnerships might have been included but were not? Were any extraneous?

- Who were the partners, and in what way were those partners tied to scale?
- To the extent that FEMA was involved, how was it to work with their personnel and tools?
- Was the pace of response satisfactory?

- How was this work funded?

- Is there a budget for management? For how long?

- If restoration was a major priority, how did those priorities get set up and funded?

- How did you avoid patchwork patterns?

- How did community engagement happen?

- At what timescale? How were leaders selected and engaged?

- What was the community's initial response? Did that change over time? Were efforts made to avoid negative perception from the community?
- Where do people go?
- What kinds of information did you make sure that you had when developing this strategy (Floodplains by Design) or before going through with a series of buyout offers?

- What information did you wish that you had but couldn't get?
- Metrics to choose buyout site? Prioritization schema? Metrics of success?

An example of how I adapted the above for each case study –

Questions for Blue Acres:

- Partnerships

- Who is the Blue Acres team, and how are the responsibilities divided?
- If you had adequate funding to hire 2-3 more staff, what might their roles be?
- Who were the partners, or what was the process that helped to make Blue Acres a reality?
- What partnerships that don't yet fully exist might promote your goals and work?

- Goals

- Was this program modeled off of other programs?
- How are buyouts prioritized?
- What happens to the properties after they are acquired and development is demolished?

- Restoration

- When restoration does happen, what does it look like? (best-case example? Where did funding come from? – or an example where restoration should have happened for great benefits, but didn't for some reason)
- Is restoration a priority? Why or why not? Is there funding set aside for restoration? How is this different or similar to Green Acres?

- I understand that restoration doesn't happen for all buyouts – why? What factors contribute to whether and how a property is ecologically restored?
- Do you see avenues for acquiring permanent restoration? What information would be needed to make that case?
- In your experience, are municipalities generally in favor of restoration? Why or why not?
- How are outcomes or progress measured?

- How are patchwork patterns avoided (how do you select for mostly only clustered projects?
- How is the community engaged?

- At what timescale? How were leaders selected and engaged?
- Property tax – perception versus calculus

- How did the community think about loss of revenue, and what were the calculations therein?

- Where do people go? How far away? Was risk reduced or assessed after the fact for those who left?
- What kinds of information are critical to have when doing your work, developing strategies or going through with buyout offers?

- What information do you wish you had but can't get?

What were the intended/unintended outcomes of the project? Were they measurable?

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Author contribution Mali'o Kodis performed all research and wrote the article. Sarah Newkirk served as primary advisor throughout the research, and Marci Bortman as secondary advisor. Both Sarah Newkirk and Marci Bortman provided significant revisions to the article throughout authorship.

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Declarations

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