

CLIMATE CHANGE ADAPTATION

The case for strategic and managed climate retreat

Why, where, when, and how should communities relocate?

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Faced with global warming, rising sea levels, and the climate-related extremes they intensify, the question is no longer whether some communities will retreat—moving people and assets out of harm's way—but why, where, when, and how they will retreat. To the extent that retreat is already happening, it is typically ad hoc and focused on risk reduction in isolation from broader societal goals. It is also frequently inequitable and often ignores the communities left behind or those receiving people who retreat. Retreat has been seen largely as a last resort, a failure to adapt, or a one-time emergency action; thus, little research has focused on retreat, leaving practitioners with little guidance. Such a narrow conception of retreat has limited decision-makers' perception of the tools available and stilted innovation. We propose a reconceptualization of retreat as a suite of adaptation options that are both strategic and managed. Strategy integrates retreat into long-term development goals and identifies why retreat should occur and, in doing so, influences where and when. Management addresses how retreat is executed. By reconceptualizing retreat as a set of tools used to achieve societal goals, communities and nations gain additional adaptation options and a better chance of choosing the actions most likely to help their communities thrive.

We argue for strategy that incorporates socioeconomic development and for management that is innovative, evidence-based, and context-specific. These are not radical alterations to adaptation practice—adaptation planning often starts with identifying the goals people have, and context-specific

implementation has long been a central tenet of adaptation—but they have been under-applied to retreat. Retreat is hard to do and even harder to do well, for many reasons: short-term economic gains of coastal development; subsidized insurance rates and disaster recovery costs; misaligned incentives between residents, local officials, and national governments; imperfect risk perceptions; place attachment; and preference for the status quo (1–6). A reconceptualization could make strategic, managed retreat an efficient and equitable adaptation option.

AD HOC STATUS QUO

Retreat in response to natural hazards already occurs. It can be driven by major disasters, when people abandon their homes and relocate permanently. Economic pressures such as decreasing agricultural yields or rising insurance prices sometimes push people away from hazardous areas. Government programs have relocated populations out of at-risk areas, moved roads and other infrastructure, imposed setback requirements, banned return to disaster-prone areas, or condemned and demolished buildings considered too risky (2–8). Even in areas experiencing overall growth, some people are retreating (such as in Manila, Nairobi, and New York City) (2–4, 7–10). Whether driven by disasters, market forces, or government intervention, people will continue to move from hazardous places as climate risks escalate.

Without guiding policy, such unmanaged, unstrategic, ad hoc retreat misses opportunities to contribute to societal goals. First, ad hoc retreat can be inequitable. Residents with fewer resources have fewer options to address risk. They may be unable to return and rebuild more resiliently after disaster or to afford increasing insurance rates and may feel forced into retreat. Conversely, they may be unable to afford to move and may end up financially trapped in hazardous places. Climate-related risks are expected to reduce the value of exposed properties, leading to a downward spiral of sale prices until someone is stuck, unable to sell because no buyers are willing or be-

cause the loss at which the owner could sell is financially devastating. Those living in informal settlements or contexts of insecure land tenure can be particularly affected.

Second, retreat to date has focused overwhelmingly on physical removal of people and buildings, with limited discussion of the social, cultural, psychological, or long-term economic consequences (such as gentrification, loss of heritage, or changes in housing and transport demand) (10, 11). Also, by largely overlooking remaining and receiving communities, ad hoc retreat can lead to inefficient investments, such as allowing development in or near areas soon to be abandoned (5, 6) or failing to build social and physical infrastructure needed to accommodate growing populations. In the United States, for example, retreat is often funded and implemented in isolation from decisions about coastal armoring, leading to instances in which new sea walls are being proposed to protect areas already vacated through retreat (for example, Oakwood Beach in Staten Island, New York). Land left behind by ad hoc retreat is rarely repurposed for communal benefit and may instead leave a patchwork of derelict land that can disrupt sense of community and lower neighboring property values.

STRATEGIC, MANAGED RETREAT

A preferred alternative is for retreat to be integrated into the pursuit of broader societal goals (the strategy) and its implementation tailored to context-specific goals (the management). This reorientation is needed to innovate, deploy, and refine socially viable and equitable approaches to retreat.

Strategic retreat

Retreat is not a goal in and of itself but a means of contributing to societal goals. Ideally, retreat is one of many tools to be used in pursuit of a strategy, with goals ranging from economic development to environmental conservation. Because retreat to date has been largely unstrategic across numerous scales and factors, we identify several key dimensions for designing more strategic retreat. Decision-making and planning should take place at larger geographic and temporal scales; involve multiple agencies and jurisdictions; address multiple hazards; and be integrated into planning for economic, social, and environmental goals.

Shared strategic vision for a community, organization, or region could be articulated by government, a nongovernment entity, or a partnership but involves societal rather than purely individual goals. This sets strategic retreat apart from individual households who relocate for their own benefit. Strategies articulated at larger scales may

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have a greater potential to achieve multiple benefits. Coordinating across jurisdictions—such as planning for changes in demand for housing, schools, and health services—is complicated but critical when people are moving across boundaries and multiple communities will be affected. Planning at national or regional scales, such as in Fiji and the United Kingdom, identifies candidate areas for retreat, enabling prioritization of resources and ensuring that neighboring communities pursue complementary responses. When countries relocate populations across international borders, mechanisms for preservation of sovereignty and culture will need to be negotiated between origin and destination countries (for example, Kiribati purchasing land in Fiji, or Marshall Islanders moving to the United States). International institutions such as the Sendai Framework for Disaster Risk Reduction are beginning to address retreat as a risk reduction option and could be influential in facilitating large-scale planning.

Cultural and social considerations are also important within countries. For example, locals in Belen, Peru, returned to flood-prone homes because resettlement buildings did not account for local culture and lifestyle (2). Other communities may wish to remain near ancestral lands or burial grounds. More strategic retreat could align residents' holistic needs with relocation destinations. In some cases, retreat may need to include reparations or payments for loss and damage to address historic practices that placed communities at risk or to enable communities to retreat in a way that does not exacerbate past wrongs (for example, forcibly relocated indigenous, minority, or impoverished populations, or greenhouse gas emissions from major economies that contribute to rising seas, imperiling island nations) (12).

Strategy that integrates multiple hazards and addresses risk at both origin and destination sites will be more likely to reduce risk for people who move and who remain. Strategy that connects land use and budgets, requiring coordination across administrative silos, could specify how open spaces created through retreat will be used and maintained for local benefit. Strategies that identify destination sites that are safe from multiple hazards could help people relocate to less risk-prone areas rather than

allow them to substitute one type of risk for another (9). In the absence of such a relocation strategy in the United States, some retreat programs have resulted in people moving from one floodplain to another (for example, residents of Staten Island, New York, after the state purchased flood-prone homes after Hurricane Sandy). While guiding residents to low-risk areas, strategic retreat could promote socioeconomic goals such as densification near public transit.

Strategy should be forward-looking and responsive to economic opportunities, market forces, and demographic changes; for example, a strategy may consider locations where out-migration is rising (perhaps because of rising housing costs as insurers incorporate risk) and respond by allocating

identified locations (such as in Colombia, India, and Mozambique), property acquisition (such as in Colombia, Japan, Netherlands, New Zealand, and the United States), and a few examples of whole-community relocation (such as in Australia, China, Fiji, India, Vietnam, and the United States). Management approaches should be chosen that fit the local context and address the full set of stakeholders. Rebuilding bans have been generally limited in scope and laxly enforced and may be unfair to renters or low-income homeowners; community relocations and required resettlements have often raised inequity and human rights abuse claims; and property acquisitions are likely too expensive to deploy at the massive scales that may be required in the future. Experimentation



Apartment buildings (now abandoned) in Chalmette, Louisiana, a suburb just east of New Orleans, were flooded by Hurricane Katrina in September 2005.

resources to support displaced households or by building a new levee. A proactive strategy may recommend retreat be pursued in at-risk areas the next time those homes are flooded. Or it might identify path dependencies: steps taken today that promote or limit future options. For example, limits on shoreline armoring could enable future retreat, whereas heavy armoring today is likely to encourage dense development and make future retreat more difficult.

Managed retreat

There are numerous ways in which retreat may be managed, only some of which have been explored. Retreat to date has involved bans on rebuilding (such as in Australia, Germany, Japan, New Zealand, the Philippines, and Sri Lanka), required resettlement to pre-

and research are needed to improve on these tools. This is especially true for the issue of scale: New approaches will likely be necessary for the large-scale retreats that future climate change may entail.

Unlike strategy, more management is not necessarily better. Intangible community preferences will be important in choosing the appropriate level of management. In some communities, residents may prefer low levels of management and the freedom to move independently without bureaucracy. Many island nations and indigenous communities where social cohesion is of utmost importance have been pursuing communal relocation, which may be critical to cultural preservation and sovereignty. Such coordination requires a level of investment of resources that may not be an option for many

communities. The legal context (for example, property rights) and cultural preferences may also constrain management choices. Some approaches are very expensive, so countries with fewer resources will either need international support or be pressed to retreat through less resource-intensive approaches.

Managed retreat does not eliminate the backdrop of existing inequities in capacities to adapt, but more management for retreat does not simply mean more money. Assistance could involve time to help residents find housing near current neighbors, workplaces, health care providers, or other social services. Relocation assistance could be designed to foster social mobility. When families move to areas of higher socioeconomic status, their children have higher projected lifetime incomes (13). One proposal for Bangladesh suggests investing in a dozen cities to provide infrastructure along with educational and employment opportunities to draw successive generations of people away from low-lying coasts. Participatory planning will be vital to ensure that such programs benefit participants and are not overly paternalistic.

EQUITABLE AND EFFICIENT

To achieve effective and equitable retreat at increasing scales, we highlight key research gaps to be addressed and deployments in practice that must be tested and refined.

Interacting barriers—ranging from institutional silos and financial constraints to misaligned incentives between individuals, communities, and government agencies—have resulted in largely unstrategic retreat to date. Improving our understanding of and addressing these barriers will be necessary to enable more strategic retreat. For example, researcher-practitioner partnerships could develop tools to identify residents who want to retreat and need assistance and could test communication strategies to engage reluctant residents.

Financial and legal systems often complicate retreat or incentivize living in risky locales. Legal scholars and practitioners could assess what liabilities exist for governments, developers, or mortgage lenders who enable at-risk living. Lack of access to high-quality climate hazard maps makes it difficult for consumers to make informed choices or for market pricing to accurately capture risk. Such maps must be improved and updated regularly. Real-estate disclosure laws can be strengthened so that consumers receive information about the risks they face.

Emergency response officials and land-use planners are often in different departments. To what extent do these bureaucratic divisions inhibit retreat or enable development in hazardous places? Decisions about whether

to armor are often made without recognizing that a decision not to armor may be a de facto decision to retreat. Improved decision support could highlight these trade-offs.

Evaluations of retreat outcomes are limited. Recommendations for policies and practices that are suitable for different contexts are scarce. Evaluations have been severely constrained by a lack of data. For example, there are few records of where people relocate after a retreat program. There are even fewer records of how they or others have fared: economically, socially, or psychologically. Data to assess public perceptions of fairness and legitimacy are also notably missing. Gathering data across multiple metrics and making them available to enable comparisons across contexts and management approaches will be key. Conducting such comprehensive evaluations will require collaboration across disciplines. Longitudinal studies will be necessary. Future retreat will need to be engaged with a spirit of experimentation: a willingness to try new things paired with rigorous research and evaluation of process and outcomes for all affected.

Partnerships between research and practice are needed to articulate scenarios with and without strategic, managed retreat and to evaluate the outcomes of policies and programs. Such collaborations can explore feasible and desired futures: If strategic, managed retreat does not occur, what happens? Do people remain in place, defended by alternate adaptation strategies, or might they leave on their own after a catastrophic event? How do future scenarios compare on public and private costs and economic, environmental, and social outcomes? To understand the global scope of strategic and managed retreat that may be needed, decision-makers and researchers require a better understanding of how disasters, land tenure, and market forces will interact across multiple scales in the near and long term. Projections of migration rates and destinations due to climate change are a start but will need to be paired with risk assessments, economic analyses, and ongoing validation against evolving migration trends in order to fully support policy-making.

There is a disconnect between retreat and the research and practices around migration, displacement (due to disaster or development), and environmental justice (14). Far too little of the existing literature on migration or displacement is referenced in research or policy for managed retreat, despite its relevance. For example, migration research has developed tools to identify settlement communities that maximize the employment prospects of immigrants (15). Such techniques could be applied in the context of

climate-driven retreat. Research on retreat could learn from the discussions of equity surrounding migration and displacement. Retreat may exacerbate historic wrongs if it relocates or destroys historically marginalized communities. Conversations around who should pay for retreat will almost certainly need to address reasons why certain communities find themselves at risk.

Last, retreat may be the long-term answer in some areas but not be necessary this year or decade. The challenge is to prepare for long-term retreat by limiting development in at-risk areas, identifying timelines and tipping points for retreat, and analyzing path dependencies—things that need to happen now to enable retreat in the future. This will require long-term plans with thresholds that trigger specific responses, accompanied by a monitoring program to evaluate conditions and modify plans over time.

Retreat is difficult for many reasons, such as individual psychology, market failures, and the challenges of coordinating governance across scales. A substantial amount of innovation and work—in both research and practice—will need to be done to make strategic, managed retreat an efficient and equitable adaptation option at scale. The opportunities presented by succeeding in this work are immense, and the climate risks are urgent and growing. ■

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