Centre for International
Governance Innovation

Policy Brief No. 158 — April 2020

Managed Retreat from High-risk Flood Areas: Design Considerations for Effective Property Buyout Programs

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Key Points

- Managed retreat through property buyouts is widely regarded as an effective disaster risk reduction strategy.
- Designing property buyout programs involves several key policy considerations, which ideally balance efficiency, social acceptability and political feasibility.
- The effectiveness of managed retreat could be strengthened in Canada by identifying priority areas to target, drawing lessons from past property buyout programs and building supportive partnerships between governments, private sector firms and non-governmental organizations.

Introduction

Flooding is Canada's most significant climate change risk. Damage from flooding consumes more than 75 percent of federal disaster assistance, which exceeds $600 million annually, and this amount is expected to increase sharply in future years (Office of the Parliamentary Budget Officer 2016). Flood damage is also the most frequent and costly source of insurance claims, contributing to record losses in recent years. The Insurance Bureau of Canada (IBC) estimates that 20 percent of Canadians face a high risk of flooding (Meckbach 2016) and individual property owners pay $3 out-of-pocket for every $1 covered by insurance (IBC 2019).

Flood risk is increasing with climate change. The frequency of extreme precipitation events has already increased globally and it is projected to double if the earth's atmosphere warms by three degrees or more (Papalexiou and Montanari 2019; Fischer and Knutti 2016). Canada faces similar trends: extreme rainfall that was once expected every 50 years will occur every 20 years if the current rate of greenhouse gas emissions continues (Zhang et al. 2019). In addition to these precipitation trends, which threaten to increase riverine and urban flood risk, sea-level rise of between 25 cm and 1 m is projected to increase flood risk in Canada's coastal communities (Lemmen et al. 2016).

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This increasing risk is prompting governments to rethink the traditional approach to flood management that relied on structural controls such as seawalls, shoreline armouring, berms, dikes, dams and reservoirs to hold back flood waters (Wilby and Keenan 2012). Whereas these structural defences were effective against historical storm events (for example, the 100-year flood), they are not designed for the more extreme floods anticipated with climate change (Sörensen et al. 2016). Moreover, governments have recognized that structural defences create a false sense of security that encourages further development in high-risk areas (Gordon and Little 2009; Thistlethwaite and Henstra 2017).

Canada's new Emergency Management Strategy outlines an alternative approach that involves reducing the exposure and vulnerability of people and property to hazards (Public Safety Canada 2019). Flood risk maps, for example, can be used to encourage households to invest in property-level flood protection measures that reduce their exposure to flood hazards, or to purchase flood insurance to reduce their economic vulnerability to flood impacts. This approach is rooted in the paradigm of disaster risk reduction, which aims to substantially reduce social and economic impacts of disasters by better understanding disaster risk, strengthening governance arrangements to manage disaster risk, investing in measures that enhance resilience to disaster risk and increasing preparedness for effective disaster response (United Nations Office for Disaster Risk Reduction 2015).

As illustrated in Figure 1, one policy option for disaster risk reduction that is underdeveloped in Canada is managed retreat — the purposeful relocation of people and property out of areas vulnerable to flooding — which is achieved primarily through public acquisition of exposed structures (Agyeman, Devine-Wright and Prange 2009; Hino, Field and Mach 2017). Buying out properties in high-risk areas is regarded as an effective tool to adapt to climate change risk, and governments around the world are increasingly embracing this strategy (Dannenberg et al. 2019; Greiving, Du and Puntub 2018).

The design and implementation of property buyout programs is crucial, however. Well-designed buyout programs can effectively eliminate flood risk to people and property, restore natural flood protection along shorelines and free up land for public recreation (Calil and Newkirk 2017). By contrast, poorly formulated buyout programs lack transparency, exacerbate social inequities, engender resistance from property owners and erode trust in the process (Rey-Valette, Robert and Rulleau 2019; Robinson et al. 2018).

This policy brief aims to inform policy development on property buyouts in Canada. It begins by briefly examining some experiences with property buyout programs in the United States and Canada to illustrate the complexities of managed retreat. It then outlines several policy design considerations for governments seeking to leverage this powerful tool for disaster risk reduction. The final section offers some recommendations about how property buyouts could be incorporated into Canada's efforts to manage flooding in a changing climate.

Figure 1: Managed Retreat through Buyouts of Flood-prone Properties

Source: Adapted with permission from Mach et al. (2019).

Managed Retreat in Practice

The United States has a long history of property buyouts. Between 1989 and 2017, the US Federal Emergency Management Agency (FEMA) administered more than 40,000 buyouts across 49 states, chiefly through grants funded under its Hazard Mitigation and Grant Program and the Department of Housing and Urban Development's Community Development Block Grants (Freudenberg et al. 2016). Federal funding has typically been awarded to states that can demonstrate buyouts will reduce future flood risk and will achieve a positive cost-benefit ratio (FEMA 2007). The typical approach involves a state or local government applying for a grant, which is used to purchase properties from owners willing to sell (Mach et al. 2019).

Analysts have noted, however, that most US buyout programs have been ad hoc, rather than initiated as part of a coordinated national strategy, and there is little evidence that policy makers draw lessons from past programs (Greer and Binder 2017). This failure to aggregate knowledge about effective property buyouts has undermined program evaluation and improvement (Binder and Greer 2016).

In Canada, property buyout programs have been rare, limited in scope and implemented reflexively in the aftermath of flooding, rather than grounded in thoughtful policy design. For various reasons, recent efforts to acquire flood-exposed properties have been largely ineffective in removing people and property from high-risk flood zones. For instance, the Government of Alberta's 2013 attempt to coax property owners in Calgary's river flood zone to voluntarily leave their homes ultimately failed when two-thirds turned down the province's compensation offer (Markusoff 2018). In the spring of 2019, the Government of Quebec's offer to buy out flood-damaged homes, but limit compensation to $200,000, was met with political backlash from property owners who argued their properties were worth more (Bruemmer 2019). After long delays and an announcement that properties would be bought out only at post-flood market value, residents in Grand Forks, British Columbia, mobilized in November 2019 to demand a "fair deal" that would compensate them more generously (Edwards 2019).

Support for government-initiated buyout programs appears to be gaining political momentum in Canada, however. In May 2019, for instance, the federal minister of public safety commented publicly that the Government of Canada was considering buyouts (Porter 2019). Around the same time, several provincial leaders approached Ottawa for more than $100 million to assist with acquisition of flood-prone properties (Press 2019). Most recently, the Liberal Party of Canada pledged in the 2019 election campaign that it would undertake a national plan to help homeowners relocate if they are at risk of repeated flooding (Lowrie and Rabson 2019).

Policy Design Considerations

There is an urgent need for evidence-based policy guidance on the design and implementation of effective property buyout programs. Optimally, these programs will achieve multiple public policy objectives, including:

- efficiency, by ensuring prudent use of scarce resources and minimizing overlap and duplication in governance;
- social acceptability, by setting out clear lines of accountability, outlining transparent parameters and embracing citizen participation; and
- political feasibility, by securing the support of elected officials and influential stakeholders.

Although there are myriad factors to examine in the design of property buyout programs, analysts have focused significant attention on five key considerations: timing, coerciveness, compensation, eligibility and governance. Each of these factors is discussed below.

Timing

Most buyout programs in the United States and Canada have been initiated after a flood has occurred, and this approach can be effective if the buyout program is implemented rapidly. However, it also has several weaknesses. First, compensation is often slow in reaching property owners, meaning they must continue

making mortgage payments on their damaged property, while also seeking a new property (Baker et al. 2018). Indeed, nearly half of buyouts administered by FEMA over the past 30 years took five years or more to complete (Poon 2019).

Second, the emotionally charged atmosphere of the post-flood period is not conducive to respectful and rational dialogue about property buyouts to move people out of harm's way. The instinct to rapidly restore communities to their normal functioning (Becker and Reusser 2016), combined with a tendency of flood-affected residents to downplay future risk (Cologna, Bark and Paavola 2017; Tanner and Árvai 2018), can weaken the social acceptability of government compensation offers.

Programs designed to buy out properties before flood damage occurs provide a better opportunity to engage meaningfully with stakeholders and undertake the administration required to avoid delays and potential opposition from property owners (Baker et al. 2018). Buyout programs with robust stakeholder engagement in the initial design stages have stronger social acceptability and greater uptake among communities targeted for relocation (Binder and Greer 2016). Anticipatory buyout programs can also be more politically feasible if, for example, they are embedded in local climate change adaptation strategies and can therefore be shown to align with other long-term community goals (Freudenberg et al. 2016).

Coerciveness

Most property buyout programs in the United States and Canada have been voluntary, whereby property owners have the flexibility to choose whether to relocate in exchange for compensation (Mach et al. 2019). However, these programs can also be mandatory, whereby the state takes over private property through its legal powers of expropriation or eminent domain, while compensating owners at fair value (Siders 2013). In 1954, for instance, the Government of Ontario purchased more than 200 properties in the aftermath of Hurricane Hazel, one of the costliest flood events in the province's history. This program is considered "one of the most effective buyout programs in Canadian history" because it substantially reduced the exposure of people and property in a high-risk area that continues to experience flooding (McGillivray 2017).[1]

Decisions about the coerciveness of property buyout programs clearly involve trade-offs. Voluntary buyouts are more politically feasible, since some property owners resist mandatory buyouts (Rey-Valette, Robert and Rulleau 2019), and more socially acceptable, because the decision whether to leave is ultimately left to the homeowner. On the other hand, voluntary buyout programs are less effective in reducing flood risk, because a significant proportion of targeted property owners decline. For instance, less than 40 percent of eligible property owners agreed to buyouts from the Alberta government after flooding in 2013 (McGillivray 2017), resulting in isolated homes separated by vacant lots that cost approximately $80,000 annually to maintain (Rieger 2018). Voluntary buyout programs are also less efficient, because governments must continue to fund defences for property owners who remain in the risky areas.

Compensation

Policy choices about the level of compensation offered to property owners can have a significant influence on the outcomes of a buyout program. In some cases, the maximum value of buyouts is absolute, as illustrated through the Government of Quebec's 2019 decision to cap compensation at $200,000 for a single family home and limit the offer to properties with damage that exceeded $100,000 or 50 percent of their value (Adriano 2019). In other cases, buyout programs offer compensation based on property value either before or after flood damage. Pre-flood market values are typically higher, so programs designed in this way are more expensive, but they are also more socially acceptable. Offering post-flood market value lowers the costs of the program, making it more politically feasible and economically efficient, but reduces social acceptability and therefore threatens participation rates (Siders 2019).

Research suggests compensation must be adequate for property owners to replicate their current quality of life in another area. Decisions about pre- or post-flood valuations often fail to consider that the value of properties in areas

1 See www.ec.gc.ca/ouragans-hurricanes/default.asp?lang=En&n=CA3BC939-1.

suitable for relocation can exceed those in areas targeted for acquisition (Binder and Greer 2016). For this reason, choices about the generosity of compensation are a crucial element of securing uptake among targeted populations. For example, New York State's program to buy out properties affected by coastal flooding from Hurricane Sandy included incentives ranging from five to 15 percent above pre-flood market appraisal, with the most generous incentives given to property owners who relocated to low-risk areas protected from future flooding (Contant 2019).

Eligibility

Determining eligibility is a critical element of buyout program design. In the United States, although FEMA has relatively loose eligibility criteria for buyouts, economic and political considerations play a significant role. Cost-benefit analysis — a method for assessing the economic efficiency of public policies — is often used to project whether the benefits of reducing future disaster losses exceed the costs of acquiring a property. Other criteria used to assess eligibility include damage thresholds (for example, estimated repair costs exceeding 50 percent of a property's value) and geography (for example, properties located in the 1-in-50 flood zone). The former criterion was used to assess eligibility for buyouts in Quebec in 2017 and New Brunswick in 2019 (Adriano 2019; CBC News 2019), whereas the latter is currently being considered for the buyout program in Grand Forks, British Columbia (Grand Forks 2019).

These eligibility criteria are highly subjective and often lack transparency (Siders 2019). For example, cost-benefit analysis often disproportionately targets lower-income households for relocation because they are more likely to be in high-risk flood areas and are likely to suffer more damage relative to higher income properties. Lack of transparency around eligibility criteria, which often translates into ambiguity about the geographical boundaries of the buyout zone, can cause considerable confusion among residents, and confidence in the program can be undermined if decisions are regarded as arbitrary (Binder and Greer 2016).

Governance

A final policy design consideration around property buyout programs is governance, specifically their financing and administration. Buyouts are typically initiated and administered by local governments, which are responsible for land-use decisions and have delegated authority to regulate development in high-risk flood areas. Local control increases political feasibility and social acceptability. However, responsibility for land-use regulation also creates a potential conflict of interest for local governments, which rely heavily on revenues generated through property taxes, especially those levied on high-value properties along rivers and coastlines (Thistlethwaite and Henstra 2017). Moreover, many local governments lack the financial resources and administrative capacity to design and implement an effective buyout program.

With their superior fiscal capacity, more robust bureaucracy and legal authority over land use within their boundaries, provincial governments seem well positioned to undertake property buyout programs. The Government of Canada is also an important potential partner, given its nationwide mandate, policy commitment to disaster risk reduction and escalating disaster financial assistance liabilities.

Unlike FEMA's established programs in the United States, Canada's approach to buyouts is ad hoc and largely opaque, involving repeated negotiation and contestation between provinces, municipalities and residents. This ambiguity often leads to delays in confirming eligibility and making funding available, which is frustrating for property owners (Bergeron and Carlucci 2017; Marandola 2017). There is reason to be optimistic that this governance gap might be remedied, as the mandate letter issued to the federal minister of public safety in December 2019 directed the department to "develop a national action plan to assist homeowners with potential relocation for those at the highest risk of repeat flooding" (Canada 2019). However, this could also exacerbate confusion if it adds another layer of rules onto existing provincial programs.

Recommendations

As climate change and social drivers increase the risk of flooding, Canada must adopt a diverse range of strategies to achieve its disaster risk reduction goals. Managed retreat from areas that face a high risk of flooding — achieved through the public acquisition of exposed properties — is widely regarded as an effective disaster risk reduction strategy. As this brief has demonstrated, however, designing property buyout programs involves several policy considerations. Implementing the following recommendations could assist in

incorporating managed retreat into Canada's broader efforts to manage climate change risk.

Identify priority areas for managed retreat. A first step toward employing property buyouts for disaster risk reduction more systematically is to pinpoint areas at greatest risk of flooding. Flood risk is the product of hazard exposure, meaning the number of people and tangible assets located in flood-prone areas, as well as of vulnerability, meaning sociodemographic characteristics that reduce people's capacity to cope with and recover from hazard impacts (Cutter et al. 2013; Sayers, Penning-Rowsell and Horritt 2018). Hazard exposure can be assessed using a combination of historical flood records, predictive analysis through modelling and simulation, and solicitation of expert opinion to complement and validate hazard information. Vulnerable populations can be identified using social, economic and demographic indicators — age, income, housing type and so on — that can be drawn from census records and other administrative data (Chakraborty et al. 2020).

Areas that have experienced repeated flood losses are perhaps the most obvious places to consider buyout programs (Siders 2013). More broadly, however, analysts suggest that managed retreat is most likely to be successful in locations where residents feel flood risk is intolerable, there is evidence that a buyout program would generate benefits for broader society, the social benefits of relocation outweigh costs and the political will to implement retreat is high (Hino, Field and Mach 2017).

Document experiences with property buyout programs to aggregate knowledge on best management practices. In the United States, FEMA maintains records of past buyout programs and researchers have conducted longitudinal evaluations of the strengths and weaknesses of property buyouts (for example, Greer and Binder 2017; Weber and Moore 2019). There has been no comparable research in Canada and there is no central repository of information about buyout programs that have occurred around the country. Governments would benefit greatly from a more systematic effort to aggregate knowledge about what works and why. This could also include learning from cases in which neighbourhoods or whole communities have been relocated for reasons other than flood risk but that nevertheless offer lessons about effective implementation.

Build partnerships to support managed retreat. Recent property buyout programs in Canada have suffered from various weaknesses that have blunted their effectiveness. One of the ways to improve future buyout efforts is to build a coalition of parties that have an interest in managed retreat from high-risk flood areas and have knowledge or resources to contribute. As noted, all levels of government have potential roles to play in relocating people out of harm's way. A better negotiating of these roles would increase the legitimacy of property buyouts and potentially reduce the time it takes to implement them. Private sector partners such as insurers and risk modellers should be engaged to share information and resources, and non-governmental organizations that work with flood-prone communities could offer valuable advice and capacity to assist with the administration of buyout programs.

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Waterloo, ON, Canada N2L 6C2
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