CLIMAtlantic

[MANAGED] RETREAT: THE ELEPHANT IN THE ADAPTATION FRAMEWORK

Prepared for CLIMAtlantic by DV8 Consulting

March 2023

Acknowledgements

I would like to thank the following people for contributing ideas, information, and support for this paper:

CLIMAtlantic: Sabine Dietz, Stephanie Arnold and Sepehr Khosravi

Government of New Brunswick: Robert Capozi

Government of Prince Edward Island: Peter Nishimura and Eleanor Mohammed

Government of Nova Scotia: Kyla Milne, John Somers, Satya Ramen, Aleen Stanton, Jennifer Organ, Gavin Kennedy, and Gordon Smith

Government of Newfoundland and Labrador: Gerald Crane,

Municipalities Newfoundland and Labrador: Kathleen Parewick,

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Disclaimer

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This report is a discussion paper based on information compiled through research, a literature review, and interviews with invited practitioners from each of the Atlantic Provinces.

The report is non-conclusive and does not provide specific recommendations for the implementation of policy, plans or programs by municipal or provincial governments.

Recommended Citation: Parnham, H. (2023) [managed] retreat: the elephant in the adaptation framework. Prepared for CLIMAtlantic by DV8 Consulting.

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PREFACE

When managed retreat is included in the list of adaptation options presented to decision-makers, it rarely gets serious consideration from a proactive approach and most people would prefer not to consider it at all. It is the elephant in the room. While retreat offers a cost-effective, long-term solution to coastal and flood hazards, there is no denying that it is complex, controversial, and politically unappealing.

The purpose of this discussion paper is to explore the concept and realities of retreat strategies—managed or otherwise—in response to sea level rise, coastal hazards, and other inland flood hazards in Atlantic Canada. The paper is intended for a broad audience of adaptation practitioners, planners, policy advisers, decision-makers in both municipal and provincial governments, and for anyone working in the field of emergency disaster response policy development and program delivery. The paper is not intended to provide direct guidance to communities or property owners on how they should adapt to coastal and flood hazards, or to provide detailed descriptions of all retreat tools and case studies.

The intent is to address the elephant in the room and to raise the following questions:

- What is retreat, managed or otherwise?
- Why is it unfavourable?
- Who benefits from implementation?
- Who is most impacted by our failure to retreat?

This paper will shed light on what is missing from current adaptation action planning and will outline some of the groundwork needed before managed retreat can be considered as an economically viable, socially acceptable, equitable, and sustainable strategy for enhancing resilience in Atlantic Canada.

The adaptation framework, strategies and tools discussed in this paper share a common definition of adaptation which is based on reducing harm and/or increasing benefits to humans (IPCC, 2022: Annex II: Glossary). It is recognized that this definition centers human systems by framing the value of nature, ecosystems, and natural processes with respect to how they benefit us. In contrast, Arnold and Ali-Faisal (2023) recommend that climate action requires centering Indigenous knowledge and leadership by acting and thinking as stewards rather than owners of the land. To explore this approach further would require a re-examination of the definition of adaptation and the frameworks in which adaptation strategies currently are understood—which was beyond the scope of this project. In consideration of this knowledge gap however, readers are encouraged to recognize that the western science and western values presented in this paper are not the only way to respond to climate change and that we have a responsibility to improve land relations as we establish long-term objectives and priorities to guide climate action in ways that uphold Treaty Rights and advance reconciliation.

This discussion paper is organized into three sections:

Why Retreat? The term retreat is defined broadly as one of three strategies within an adaptation framework (i.e., to retreat, accommodate, and protect) and after years of weighing our options for adaptation, retreat is finally getting serious consideration. This section of the paper will provide an overview of the adaptation framework and highlight the importance for establishing long-term objectives and identifying priorities to inform which adaptation strategy or combination of strategies should be used under what circumstances.

The Retreat Toolbox. This section describes examples of different options that can be used to achieve retreat-oriented objectives. The options complement one another and are presented in a preferred order for implementation: prevention, proactive risk reduction, and disaster response.

A Pathway to Adaptation. With such a wide range of options available, where does a community start to achieve the objectives of a retreat strategy? In Atlantic Canada, there is still foundational groundwork to be done, including identifying who will lead and enable the process. New policies, programs, and amendments to existing legislation all may be necessary before managed retreat tools can be implemented successfully and equitably.

WHY RETREAT?

Key Messages

- To date our collective response to coastal and flood hazards has not only been inadequate but it has contributed to making the problem worse.
- Adaptation strategies for coastal and flood hazards are categorized as retreat, accommodate, and protect. These strategies are not mutually exclusive, and we cannot examine retreat without understanding how it can be applied concurrently with the other options to achieve both short- and long-term resilience.
- It is essential to identify priorities and establish long-term objectives to guide decisions about which strategy(s) is most appropriate for a given situation.
- Retreat strategies are more sustainable and offer long-term effectiveness for risk reduction by removing that which is at risk from the hazard.
- Whether or not we are prepared to manage a retreat, unmanaged retreat will continue to occur.

Beyond the Status Quo

Extreme weather events are occurring more frequently and with more intensity in Atlantic Canada due to climate change (Dietz & Arnold, 2021). Coastal hazards, including accelerated coastal erosion, storm surge, and sea level rise, and inland flood hazards caused by extreme precipitation events and seasonal riverine floods, have had significant impact on our communities. As sea level continues to rise, storm surge events and overland flooding will continue to have further reach inland where flood waters have previously not been experienced. We are past the time for explaining what climate change is and what the impacts of climate change will be. Across the region, communities have already been flooded, infrastructure has been damaged, homes have been carried off their foundations, and lives have been lost. Research identified the communities that would be vulnerable (Webster, et al., 2004; Webster, et al., 2006; and Forbes, et al., 2009) and they have since been impacted, confirming that our data and projections on coastal and flood hazard areas in Atlantic Canada are accurate.

Over 30 years have passed since the IPCC Coastal Zone Management Subgroup first described the three strategies for adaption to sea level rise as retreat, accommodate, and protect (Dronkers et al., 1990). In their analysis of the environmental, economic, social, and legal and institutional implications of each strategy they found that no single option fully addresses the complexity of the required response. As such, they made a single overarching recommendation: the implementation of comprehensive and systematic coastal management programs based upon three principles:

1. Avoid development in areas that are vulnerable to inundation.
2. Ensure that critical natural systems continue to function.
3. Protect human lives, essential properties, and economic activities against the ravages of the seas. (Dronkers, et al., 1990)

We've learned a lot over the past 30 years about projected climate change-related hazards. The list of innovative and creative tools that can be used to adapt to these hazards continues to grow. But a reminder of the importance of these guiding principles to support decision-making in adaptation implementation is needed now more than ever.

Currently, when decision-makers weigh their options between retreat, accommodate, and protect strategies, the options are presented as either/or alternatives, and they lack the long-term objectives and priorities needed to inform which strategy(s) should be used under what circumstances. As a result, our collective response to coastal and inland flood hazards has not only been inadequate, but it has also contributed to making the problem worse (Peck et al., 2022).

The status quo is unsustainable. Whether or not we are prepared to manage a retreat, unmanaged retreat will continue to occur at higher costs and lost opportunities (Siders, 2019). It is time to establish priorities and to make difficult decisions.

The PARA (Protect - Accommodate - Retreat - Avoid) Adaptation Framework

Within human systems, adaptation is the process of adjustment to actual or expected climate and its effects, to reduce or avoid harm or to exploit beneficial opportunities (IPCC, 2018). The adaptation process is continuous, following implementation of an action, adaptation requires monitoring, evaluation and then planning for the implementation of the next action. Within this process, retreat does not exist as a singular adaptation strategy but instead is just one component in a broader adaptation framework.

In Canada, the PARA (Protect – Accommodate – Retreat – Avoid) framework is the most common method used to categorize adaptation and disaster risk reduction approaches to coastal hazards and inland flood risks (Doberstein, et al., 2018; Tyler, 2015; British Columbia Ministry of Environment, 2013). The framework is based on the three approaches to adapt to sea level rise first described by the IPCC's Coastal Zone Management Subgroup (Dronkers et al., 1990), but also includes "avoid" as a separate and distinct category. In this paper, avoid will be considered a subcategory of retreat as originally described by Dronkers et al. (1990) because of its significance to achieving retreat objectives. If we do not prevent future development in known hazardous areas, all efforts to retreat will be cancelled out.

The strategies of the adaptation framework are not mutually exclusive. No one strategy for risk reduction can deliver resilience when used alone (Doberstein et al., 2018). When used together, the long-term strategies provide a fail-safe for the temporary short-term strategies. Practitioners should use the full range of the framework concurrently to address both short- and long-term objectives, as originally proposed by Dronkers et al. (1990). For example, we can prohibit further development in the most hazardous areas, and for critical infrastructure we can implement short-term protection strategies to reduce disruption to the service provided by the infrastructure. And in anticipation that the disruptions will eventually become too frequent to justify continued protection, a long-term plan for relocation (retreat) can be implemented based on the life cycle of the infrastructure rather than waiting for its failure.

The three adaptation strategies within the framework share a common intent, to reduce harm and/or increase benefits to humans. The strategies vary according to which human benefit is being favoured (Cooper and Pile, 2014). At one end of the spectrum, human activities are changed or adjusted to suit the changing environment (retreat/avoid). And at the other end of the spectrum, the strategies involve modifying the environment and resisting change to existing human activities and infrastructure (protect). Cooper and Pile (2014) have described this Adaptation-Resistance Spectrum from the perspective of increasing sustainability and found that the strategies that promote modification to human activities are also the strategies that are most sustainable, provide the most long-term effectiveness and have the least impact on natural processes (*See,* Figure 1).

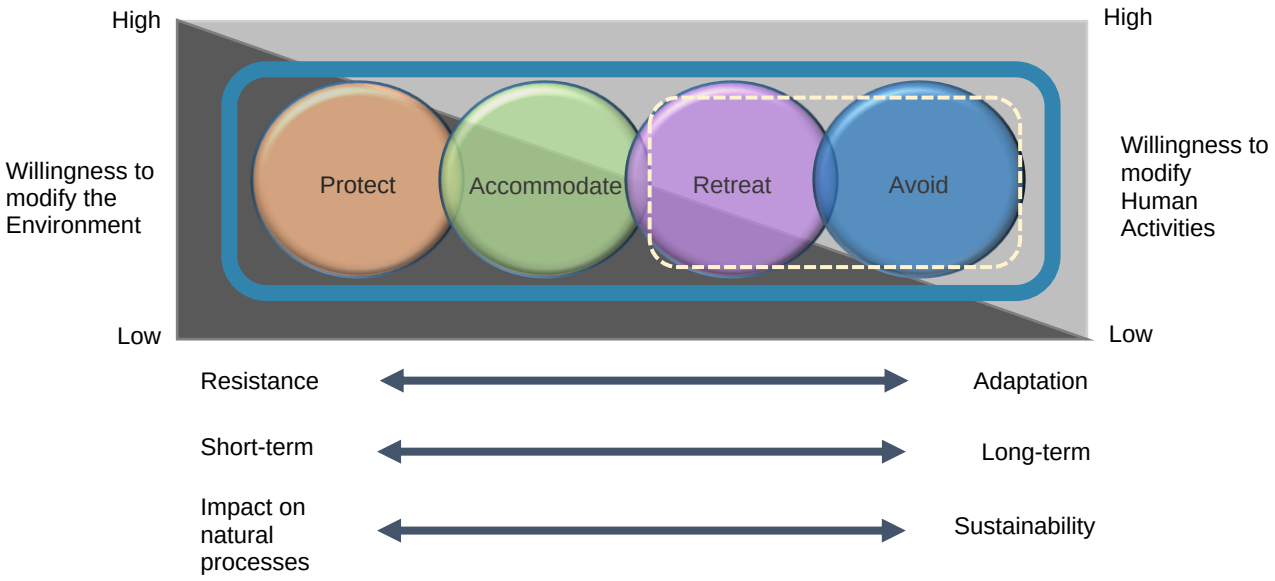

FIGURE 1. ADAPTATION STRATEGIES OF THE PARA FRAMEWORK, ADAPTED FROM THE BRITISH COLUMBIA MINISTRY OF ENVIRONMENT (2013) WITHIN THE ADAPTATION-RESISTANCE SPECTRUM, AS PRESENTED IN COOPER AND PILE (2014). IN THIS PAPER, AVOID IS TREATED AS A SUBCATEGORY OF RETREAT AS DESCRIBED BY DRONKERS, ET AL. (1990).

Protect

Protection strategies include actions that alter the environment to protect existing activities, property, and infrastructure from a hazard, while that which is being protected remains largely unchanged.

Protection can be achieved by holding back or diverting flood water or preventing erosion by hardening or fortifying exposed areas. Common examples include hard infrastructure, such as shoreline armouring or rip rap, seawalls, dikes, and levees. These examples are technocratic solutions and the continued practice to invest resources into their construction has been ongoing for thousands of years despite the overwhelming evidence of their limitations under a changing climate (Gannon, 2019; Doberstein et al. 2018; Peck et al., 2022; Pilkey et al. 2016).

FIGURE 2. SHORE PARALLEL ENGINEERED STRUCTURES (REVETMENTS, SEAWALLS, NEARSHORE BREAKWATER). IMAGE SOURCE CLIMATLANTIC COASTAL ADAPTATION TOOL (2023)

While protection is often the first strategy used, it can be very costly and has limited long-term effectiveness. Protection is a reactive strategy that is best used to address immediate risks to critical infrastructure. It can provide a short-term, temporary solution to an immediate threat while other strategies (i.e., replacement and/or relocation) that are expected to take longer can be implemented. Because protection prioritizes existing activities, property, and infrastructure over natural processes, it can cause extensive environmental damage and ecosystem disruption. Protection efforts have also been known to create a false sense of security by driving development towards a hazardous area, increasing long-term risk and vulnerability (Thistlewaite et al., 2020). Investment into protection strategies is usually justified by the value of the property(s) being protected which perpetuates social and economic inequities, leaving those who are most vulnerable at highest risk (Peck et at., 2022).

Another form of protection is when an area is altered in a manner that provides or enhances natural adaptive capacity by using the power of functioning ecosystems as infrastructure. These methods are referred to as green infrastructure (BC, 2013) or nature-based solutions (NbS) (IUCN, 2020). Examples include coastal wetland restoration, beach nourishment, living shorelines, or planting vegetation to promote soil stability. These strategies offer many co-benefits within the built environment. However, they should not be considered as an alternative to protecting existing natural systems and restoring degraded systems.

Accommodate

Accommodation strategies involve actions that alter the property, infrastructure or activity that is at risk.

When people change how they build, or what activities they undertake within a hazardous area, they can reduce their risks by accommodating periodic disruptions caused by nuisance or extreme weather-related flooding. Accommodate strategies require creative solutions and compromise. For example, a new development may be permitted within a flood hazard zone but only if its foundation is raised above the projected flood elevation. More generally, the permitted land uses in a known hazardous area may be changed from residential to a less vulnerable land use, such as recreation (i.e., soccer fields), because we can assume that people will not be using these types of spaces during extreme weather events, and they can also return to regular use more easily following a flood.

Accommodation works best as a proactive strategy but can also be useful when applied to policies that address how and where rebuilding can occur in an area damaged by an extreme event. As with protection strategies, accommodation has limited long-term effectiveness. As sea level continues to rise and extreme weather events occur more frequently, occasional, or periodic disruptions will likely become a more regular occurrence in the future.

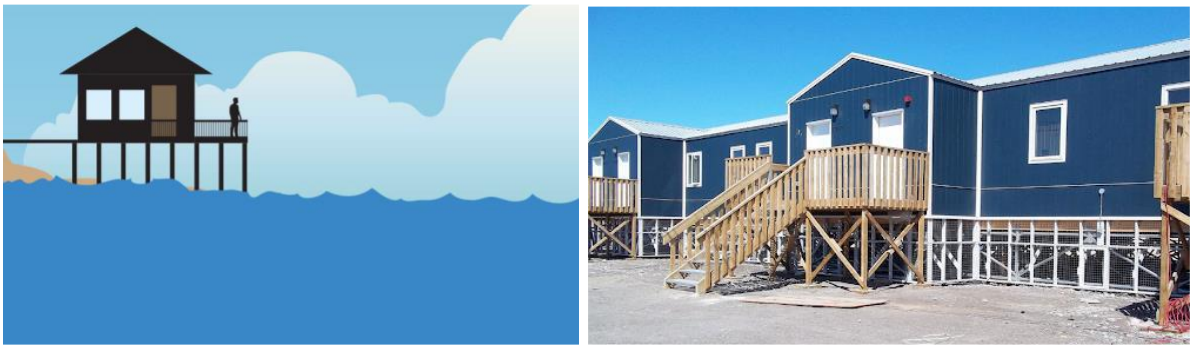

FIGURE 3. SCHEMATIC SHOWING WET FLOOD PROOFING AND AN EXAMPLE OF A MULTIPOINT FOUNDATION (TRIODETIC MULTIPOINT FOUNDATIONS). IMAGE SOURCE CLIMATLANTIC COASTAL ADAPTATION TOOL (2023)

Retreat

Retreat strategies reduce risk by removing the people, property, and infrastructure away from a hazardous area. Retreat strategies can be preventative, proactive, or implemented as part of a disaster response.

Preventative retreat (avoidance) policies serve two specific purposes. To prevent development from occurring in hazardous areas and areas expected to become hazardous in the future. And, to prevent development in vulnerable areas which provide natural adaptive capacity and a buffer between a dynamic natural system and a developed area further inland. Avoidance is the most proactive strategy a community can adopt. It can be implemented at little to no cost, and it is effective for the long term.

Proactive Risk Reduction (managed retreat) is a proactive approach to address the existing properties and assets that exist within a hazardous area or an area that is expected to become hazardous in the future. It involves the purposeful, coordinated movement of people and assets out of harm's way (Siders, 2019). Examples include policy actions that prevent further development in these areas or the physical relocation of existing buildings and infrastructure from one area to another.

Disaster Response (reactive retreat) are those actions taken following an event that has caused damage to properties and infrastructure. An example would be programming that is established to provide financial support to people who have experienced property loss or damage. Disaster response can also include regulations to address how and where properties can be rebuilt.

Retreat strategies can also include programs that provide support for receiving communities or for the low-risk area within the community to accommodate people who are temporarily or permanently displaced due to an extreme event (Ajibade et al., 2020; National Academies of Sciences, Engineering, and Medicine, 2023). This final step in the retreat process is particularly important where housing availability is already limited. When only a portion of a community has been impacted by the event, the community at large will benefit if the displaced residents can find alternate housing in the low-hazard areas within the same community.

While retreat can initially be disruptive, there are many co-benefits that should be considered with these options. The conversion of waterfront residential properties into a public open space can be used to accommodate periodic disruptions and act as a buffer between the hazard source and the remaining low-risk properties in the community. The public space amenity improves public access to the shore which has social and health benefits for all residents and can lead to increased property values for the other areas (Koslov, 2016). Retreat strategies eliminate the ongoing costs for maintenance and repairs of at-risk infrastructure and the built infrastructure intended to protect it. Additionally, avoidance and proactive retreat contribute to risk reduction and cost savings associated with disaster response including the costs to deploy first responders and the costs of cleanup and recovery (Saunders-Hastings et al., 2020).

The Main Issues with Retreat Today

An in-depth literature review on research relating to adaptation strategies, policies and tools, managed retreat case studies, and other related works has shed light on the primary issues that influence the implementation of retreat strategies today. One of the most prominent issues is that there is still debate on terminology and there are inconsistent definitions and interpretations on what retreat is in practice. When the word is used, practitioners, politicians, and the public often don't know what it refers to.

The most common retreat tool used is a property buyout that occurs after an event has resulted in extensive damage, and when similar events are likely to reoccur. In Canada, buyout programs are implemented as part of a larger disaster/emergency response and publicly funded through a provincial and/or federal program, referred to as Disaster Financial Assistance Arrangements (DFAA). Disaster response buyouts are neither planned nor managed. Consequently, retreat strategies in general are rarely implemented through locally supported, strategic planning processes. Communities that are in support of a proactive strategy, such as the relocation of buildings in a high-risk area, have struggled to find the necessary funds to support implementation (Bronen, 2015; Richardson, 2010).

The financial challenge for implementing retreat is further complicated because the people deciding how much risk to take on (property owners) are not the same people who will bear the costs of that risk (government and taxpayers) (Young, 2018). Distorted market values of properties located within hazardous areas (i.e., exclusive waterfront properties) and the assumption that public funds will be made available post-disaster, have often prevented individuals from managing their own risk tolerance.

Finally, the necessary response to coastal and inland flood hazards conflicts with short-term objectives and political agendas. Practitioners advise that successful and equitable retreat requires community buy-in and local support, led by community champions rather than through a top-down approach (Saunders-Hastings, et al., 2020). However, it is unfavourable for local representatives to disrupt the status quo or to invest in a problem that has not yet occurred because there are no incentives or direct support from higher levels of government to do so. Furthermore, proactive actions which appear to have been taken too soon could result in displacing the local population, reducing property values and a municipality's tax base. For small vulnerable communities that already lack the resources to provide day-to-day service delivery, support and guidance will be necessary.

The issues described above highlight the financial challenges to retreat. However, when culturally significant (i.e., ceremonial grounds, cemeteries, etc.) and historic sites (i.e., Fortress of Louisbourg), are located within a hazard area, communities are faced with even more complex decisions. These issues and others have led to our current predicament, where communities prioritizing a do-nothing or wait-and-see approach because funding is only made available after damage is done.

Establishing Priorities within the Framework

Decision-makers must consider a wide range of factors when deciding which adaptation strategy or combination of strategies to implement for a given situation. Some key factors include:

- who is at risk;
- what is at risk (i.e., the type, age, density, function, and value of the infrastructure or development);
- who owns or is responsible for what is at risk;
- what resources are available to address the risk; and,
- over what time frame is the response required.

Secondary factors are often overlooked in adaptation decision-making, including whether the individuals at risk are marginalized or if they have additional resources to support themselves (Dundon, 2021); whether there could be unintended consequences on the environment, natural process, or natural resources on which the community depends (Pilkey, et al. 2016); whether the community has the necessary capital required for ongoing maintenance and repairs (Siders, 2013); or, whether the implementation of the strategy could unintentionally increase vulnerability (Thistlewaite, et al, 2020).

In 2016, the Atlantic Climate Adaptation Solutions Association published a cost-benefit analysis on a series of adaptation options for select coastal infrastructure sites throughout the region. The methodology was based on an economic analysis that compared the monetary value of the existing infrastructure with the cost to protect, relocate or abandon it over time. The study succeeded in demonstrating the complexity of cumulative impacts and adaptation trade-offs, however it failed to incorporate factors such as the disruptions to community and individual socio-cultural values, or the value of the natural assets of each site (Parnham, et al. 2016).

In the absence of resources to support long-term planning and priorities to guide decision-makers on which strategy is most appropriate for a given context, it is likely decisions will continue to weigh heavily on a straight-forward cost-benefit analysis and the quick-fix that is often achieved with built infrastructure. Unfortunately, while protection is intended to avoid disruption to the status quo, these strategies are often socially, economically, and environmentally unsustainable (Peck et al., 2022) and in the long-term they can cause the most significant disruption due to catastrophic failure (Doberstein, et al. 2018; Cooper and Pile, 2014; Pilkey, et al. 2016)

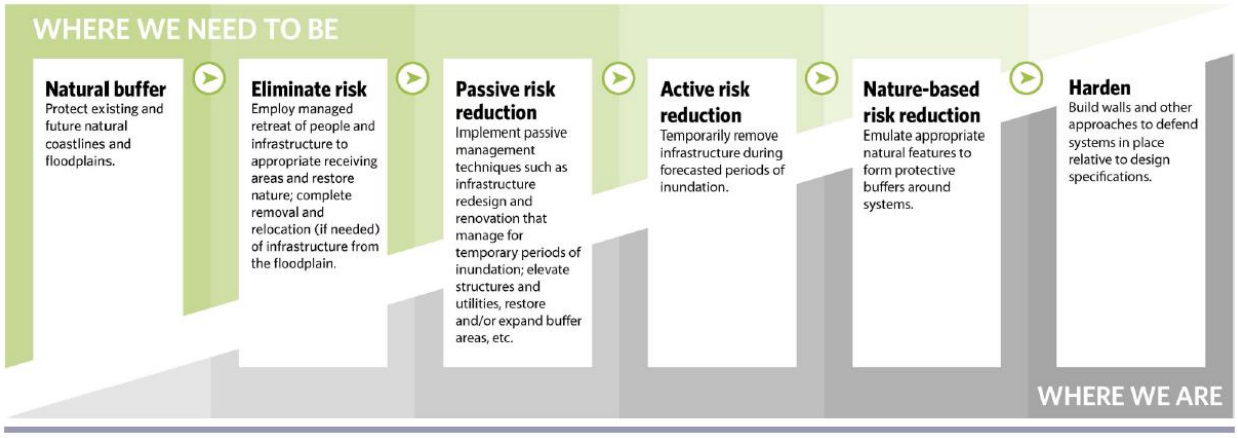

FIGURE 4. THE FLOOD ADAPTATION HIERARCHY (WHERE WE NEED TO BE) IS CONTRASTED WITH CURRENT PRACTICES (WHERE WE ARE), AS PRESENTED BY PECK ET AL., (2022)

A Flood Adaptation Hierarchy (*See* Figure 4) was proposed by Peck et al. (2022) based on long-term objectives, and it establishes priorities for adaptation implementation. The Hierarchy aligns closely with the original coastal management principles identified by Dronkers, et al. (1990) described earlier. The hierarchy prioritizes the protection of intact natural ecosystems and eliminating risk (i.e., avoidance) which ensures that natural systems continue to function (i.e., second coastal management principle). Only after considering these options for adaptation does one move to the next step in the hierarchy to implement passive and active strategies for risk reduction (i.e., retreat) by avoiding development in areas that are vulnerable to inundation (i.e., first coastal management principle). Finally, the hierarchy allows one to consider the use of defence strategies. The use of nature-based solutions or hard infrastructure alternatives as a last resort corresponds to the framing of the third principle which reserves protection for “human lives, essential properties and economic activities” (Dronkers, et al., 1990).

Rather than framing retreat as a goal, or even as the priority action, the Flood Adaptation Hierarchy reconceptualizes retreat as a set of tools to achieve societal goals (Peck et al., 2022). By using a similar approach, communities have a better chance to select the strategy(s) most suitable for long-term sustainability (Siders et al., 2019).

We cannot assume that the objectives of different communities will be the same. What is defined as essential properties and critical economic activities will vary, but communities must identify those for themselves. In the meantime, in the absence of a long-term strategy, the principles presented by the IPCC Coastal Working Group (Dronkers et al., 1990) and the priorities of the Flood Adaptation Hierarchy (Peck et al., 2022) are a good place to start.

What's In a Name?

The word retreat has been used to describe a category of adaptation strategies for over 30 years and for just as long, people have debated the appropriateness of the term. "Retreat is like defeat" they say (Carey, 2020; Saunders-Hastings, 2020; Young, 2018; Koslov, 2016). The argument is that retreat refers to when the military pulls back their troops from the enemy line because the enemy is winning. Since decision-makers don't want to let climate change win, they would prefer to go on the attack by building longer and higher seawalls (Koslov, 2016). Practitioners have tried other names, including relocation, resettlement, realignment, migration, displacement, strategic advance, and aggressive resilience (Kamal, 2021; Carey, 2020). Each has their own modified definition, but the exercise has proven to be counterproductive because the new definitions are too narrow and there are negative connotations associated with other terms as well.

We avoid using the terms relocation and resettlement because they are recognized as being associated with the forced historical movement of Indigenous populations (Saunders-Hastings 2020; Koslov, 2016). The terms are even more problematic when paired with the verbs "planned" or "managed" which implies that the process is happening to rather than by the community.

Practitioners prefer to reserve the terms climate migration or displacement for a bigger issue. Populations from large geographic regions are expected to migrate due to increasingly hostile living environments such as extreme heat and the complete inundation of small island nations by sea level rise. Issues relating to climate migration specifically address the free mobility of people which is regulated by global immigration policies and laws. (Kamal, 2021; Ajibade et al., 2020).

Realignment is used to describe actions that involve altering existing coastal infrastructure to enhance natural adaptive capacity of intertidal environments under a changing climate, such as dike realignment (Esteves, 2014). Realignment strategies are a subcategory of retreat, but they only apply to areas that have been previously altered or 'protected' with infrastructure and which now are being restored to reinstate natural functions.

Ultimately, the debate over the term retreat has been a distraction from the actual issue. Thirty years ago, one could have argued that the theoretical battle had not yet started, and communities first needed an opportunity to assess their risks before considering whether retreat was an appropriate response. But in 2023 the analogy is more relevant than ever. Most practitioners will admit we are in a battle, but it is not with nature, it is with ourselves and the unsustainable patterns of development on which we have become dependant. To retreat is to seek safety in a place of refuge and there is no shame in civilians seeking safety during times of battle. Similarly, residents in our communities who need to seek refuge from climate hazards should be encouraged and supported to do so.

THE RETREAT TOOLBOX

Key Messages

- Retreat strategies reduce risk by removing people, properties, and infrastructure—both gradually and directly—away from a hazard.
- The tools used to prevent people from building in a hazardous area (prevention) are just as important over those tools intended to move people out of the same type of areas (proactive or reactive retreat).
- Goals and objectives which prioritize new development and infrastructure investments in safe areas within a community and restricts or discourages new development in high hazard areas are necessary for long-term community sustainability.
- The rebuilding phase in disaster recovery could be the best opportunity to implement change – either by restricting repetitive repairs, or by encouraging property owners to relocate rather than rebuilding in place.

Using the Whole Toolbox

The managed retreat toolbox includes actions that can be used to achieve long-term sustainable community objectives. Some of the tools are intended to be proactive. They take time to yield specific results, but these tools have long-term effectiveness and may prevent the need for any further adaptation actions. Other tools can be implemented relatively quickly, following an event or when a pre-identified tipping point has been reached. The strength of the toolbox is in how the tools can be used together to collectively reduce risk by removing people, properties, and infrastructure—both gradually and directly—from a hazardous area. In the following sections the tools for retreat are described broadly in three categories: prevention, proactive risk reduction, and disaster response.

Additional Resources:

For a more in depth review of specific tools and for a broader range of implementation options, readers should refer to: Coastal Adaptation Toolkit: Adapting to Climate Change in Coastal Communities of Atlantic Canada: Part 2, Land Use Planning Tools Adaptation Options (Manuel et al., 2023); *Sea level rise adaptation primer: a toolkit to adaptive capacity on Canada's South Coasts* (British Columbia Ministry of Environment, 2013); and, *Managed Coastal Retreat: A Legal Handbook on Shifting Development Away from Vulnerable Areas* (Siders, 2013).

Preventative Actions

Applicable for natural areas that have not yet been altered by human activities or development, and that which continues to exhibit natural adaptive capacity under a changing climate.

Examples: Land Use Planning Policy and Development Regulations, Indigenous Land Protection and Management, Environment Protection, Conservation and Protected Lands

Proactive Risk Reduction

Applicable for communities that are aware of a current or projected future risk due to coastal hazards and inland floodplains.

Examples: Land Use Planning Policy and Development Regulations, Conditional Permitting, Managed Realignment, Risk Disclosure, Relocating Built Structures, Restrictions on Shoreline Armouring

Disaster Response

Applicable for communities that have experienced damage due to an extreme event, especially when it is anticipated that such an event will occur again in the future.

Examples: Land Use Planning Policy and Development Regulations (Rebuilding Restrictions), Property Buyout

FIGURE 5. THE RETREAT TOOLBOX INCLUDES STRATEGIES FOR PREVENTION, PROACTIVE AND DISASTER RESPONSE.

Prevention

The first step in retreat is ceasing to advance (Siders, 2019). While it may not seem like a priority to develop policies for locations where people and infrastructure are currently not at risk, prevention of future risk is the most economical adaptation strategy, as well as the most sustainable over an extended time-period. Once established these areas won't need any further adaptation. Furthermore, implementing preventative actions sets the tone for policy priorities in other areas.

Preventative retreat serves two specific purposes. First, to stop making the problem worse by preventing new development from occurring in known hazardous areas and in areas expected to become hazardous in the future. And second, to protect the natural adaptive capacity of intact natural systems. Under changing conditions, such as increased storminess or sea level rise, a beach ecosystem (sand dunes, beaches, etc.) will migrate landward, river floodplains will expand and contract, and rivers will meander. These natural processes need room if there is to be a buffer between the dynamic coast and floodplains and the developed areas further inland. For those communities that still have an intact natural buffer separating them from hazardous areas, preserving nature may be their best form of long-term defence.

There is a full suite of direct and indirect benefits that result from allowing natural processes to evolve without restriction including flood protection, water filtration, sediment transport, and carbon sequestration (Peck et al., 2022); not to mention the added benefits of reducing or eliminating the risks to people and built infrastructure. A study on the United States' coastline found that the number of vulnerable people and the total value of residential properties exposed to hazards could be reduced by half if existing coastal habitats remained fully intact. Where vulnerable communities are currently adjacent to coastal vegetation and intact reefs, the magnitude of potential losses is further reduced (Arkema, 2013).

In Atlantic Canada, coastal and floodplain habitats that enhance resilience include wetlands, saltmarshes, eelgrass beds, reefs, sand dunes, barrier islands, spits, and sandy beaches. By recognizing the importance of coastal and floodplain habitats which provide natural adaptive capacity, the protection of these environments should be prioritized. By protecting these spaces now, we save future generations from visiting shorelines with no beaches, or floodplains that have been permanently altered by the debris of destroyed seawalls, building foundations and other failed infrastructure (Pilkey and Pilkey, 2019).

In other words, the tools used to prevent people from moving into a hazardous area and to prevent infrastructure from being developed in these areas should be prioritized and put in place prior to, or at least concurrently with, the tools intended to move people and assets out of the same type of areas. Examples of tools that can be used to achieve the preventative retreat objectives include land conservation efforts, environmental protection regulations and land use planning.

Land Conservation

The Federal Government has recently announced a goal of conserving 30% of Canada's land and water by 2030 to reverse the decline in biodiversity, better fight climate change and maintain a strong, sustainable economy (Office of the Minister of Environment and Climate Change, 2022). As of December 2021, 7.25% of the land area within Atlantic Canada has been protected by conservation designation (Government of Canada, 2021) and each of the Atlantic Provinces have established goals that will contribute to the new national target.

- Nova Scotia intends to protect at least 20% of the province's land and water by 2030 through a new protected area strategy, which is a substantial increase from the 12.8%* that is currently protected (Province of Nova Scotia, 2022).
- Prince Edward Island plans to acquire and manage lands of strategic importance, specifically those that could reduce the hazards of climate impacts by partnering with the Nature Conservancy of Canada, Island Nature Trust, and Ducks Unlimited Canada; they will also examine increasing the area of protected lands, currently at 4.5%*, through land use designation (Province of Prince Edward Island, 2022). To help achieve these goals, the province announced on February 9, 2023 that it is now offering to buy land near buffer zones, watercourses or wetlands.
- New Brunswick plans to set a new target for protected land and freshwater by 2024, increasing their current amount of 4.9%[1]* to a target beyond 10% (Province of New Brunswick, 2022).
- In 2020 Newfoundland and Labrador presented a strategy to increase their protected land area from 6.9%* to 8.7% by adding 24 new protected areas, expanding 2 existing protected areas, and creating 6 transitional reserves (Wilderness and Ecological Reserves Advisory Council, 2020).

* Current values for provincial protected lands are based on the Government of Canada, December 2021 Canadian Protected and Conserved Areas Database.

Hog Island Sandhills

The Hog Island Sandhills are a chain of barrier islands that stretch 50 km in length along the northwest coast of PEI. Barrier islands are among the most dynamic natural environments and are capable of migrating landward in response to sea level rise (Pilkey and Pilkey, 2019). The Hog Island Sandhills are described as PEI's last coastal wilderness. In 2019, Parks Canada began a feasibility assessment on the establishment of a new national park reserve for these islands, which will be called the Pitaweikek National Park Reserve (CBC, 2020). The initial proposal for this national reserve was led by the Mi'kmaq of PEI and was based on the significance of the cultural and historic heritage of the islands and for the protection of the vulnerable coastal dune ecosystem and rare species that are found here.

The barrier islands also serve a very important role in achieving the objectives of a preventative retreat strategy. The islands provide a natural barrier between the Malpeque Bay and the Gulf of Saint Lawrence. Climate change risk assessments have noted that a future breach in Hog Island could allow more extreme wave and water level conditions to directly impact the shores of Lennox Island (Davies and MacDonald, 2016). The national park reserve designation will help contribute to the long-term protection of the natural adaptive capacity of the Hog Island Sandhills, and in turn will likely increase the resilience of Lennox Island First Nation and other Malpeque Bay communities.

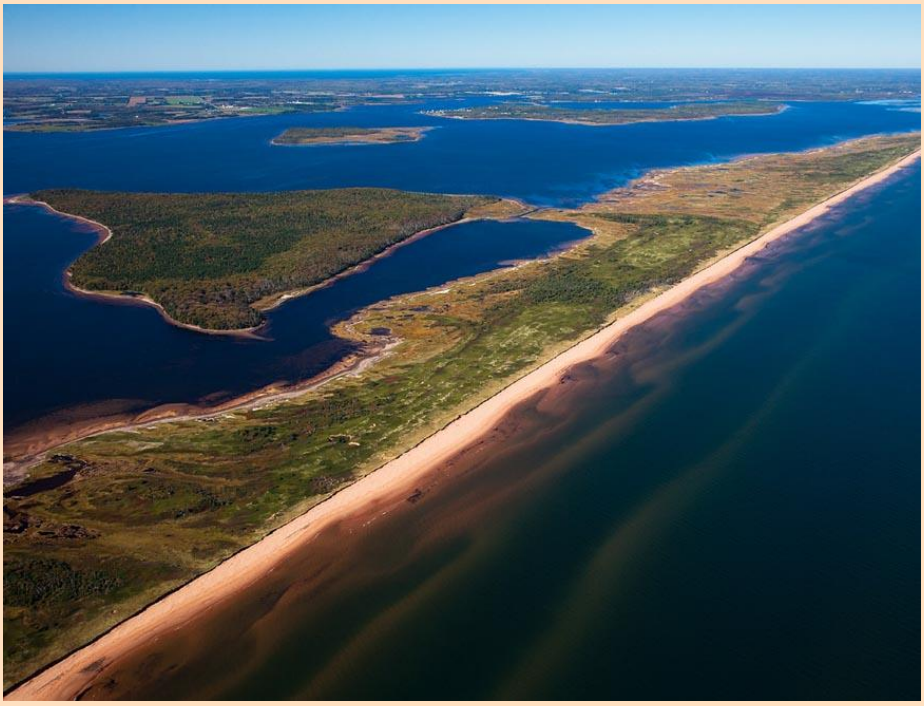

FIGURE 6. A VIEW OF THE WEST SIDE ACROSS THE SANDHILLS. © EPEKWITK ASSEMBLY OF COUNCILS. IMAGE FROM: HTTPS://PARKS.CANADA.CA/PN-NP/CNPN-CNNP/PITUAMKEK

Environmental Protection

In addition to land conservation, retreat objectives can also be achieved through environmental protection policies and legislation which address environmental land management issues at the provincial level including natural resources, wildlife and habitat, protected lands, wetlands, watercourses, and shorelines. Nova Scotia's new *Coastal Protection Act* is intended to achieve environmental protection goals, by protecting natural ecosystems as well as ensuring that new construction is built in safer locations (Manuel, et al., 2023).

Land Use Planning

Land use planning can contribute to risk reduction and the protection of environmentally sensitive areas, and direct development to low-risk areas. Municipalities can use their Community Statutory Plans (i.e., Official Plans), Secondary Plans, Land Use Bylaws, and zoning tools to achieve these goals. However, provincial legislation needs to be in place to support and enable local governments to adopt plans and regulations, and for them to include environmental protection and the avoidance of hazards as a requirement.

In Atlantic Canada, the distribution of authority and control over land use varies between provinces. In Nova Scotia and New Brunswick almost the entire province (except for First Nations communities) is incorporated into municipalities which allows the province to adopt legislation with regulations that could be implemented province-wide through municipal planning and development control processes.

In contrast, a large percentage of both Prince Edward Island and Newfoundland and Labrador remain unincorporated. The unincorporated land areas, as well as small municipalities that do not have capacity to provide land use planning services, fall under provincial planning authority. In these areas, there is no local representation for decision-making and the absence of land use planning will likely make implementing preventative retreat strategies much more challenging.

Proactive Risk Reduction

Proactive risk reduction first requires the identification of the at-risk areas, followed by the consideration of adaptation options within the context of established priorities and long-term objectives of the community. The questions that need to be asked is what can/should be moved now before the structure or infrastructure is damaged; what is critical and required for public good and economic development; and what temporary disruptions or damages can be tolerated?

While there are several examples of retreat case studies that involve entire communities that have been moved or rebuilt in a new safer location, these examples are the exception. There are few (if any) examples in Atlantic Canada where an entire community is currently at risk and would warrant a full retreat based solely on coastal and/or flood hazards. It is more likely that a portion of a community and/or key pieces of critical infrastructure that the community depends upon are what is at risk. The key to sustainability for communities is in establishing long-term objectives which support and encourage new development and infrastructure investments in the safe (low-hazard) areas within the community – and use regulations and/or disincentives to discourage or restrict further development in the high-risk areas.

Prohibited and Restricted Development

Land use planning, zoning and development control regulations can be used to ensure that new development is prohibited in the areas at highest or immediate risk. Planning tools are best implemented by local governments through the municipal planning process which involves community engagement as a fundamental principle. However, municipalities in Atlantic Canada currently do not have legislated responsibilities to consider, manage, and disclose climate change flood risks (Northrup, 2022), and many lack the resources and capacity to do land use planning beyond development control.

Some of the challenges with implementing restrictions on development will be in achieving consensus from the community on what level of risk is deemed acceptable. Risk tolerance will vary between people and will likely to be different for different land uses. While public safety and critical public infrastructure should be prioritized with a low risk tolerance, new development of some uses could still be permitted on the condition that they will be relocated and/or abandoned when the community phases out service and maintenance to the supporting infrastructure in the area. Communities should be cautious to avoid policies that base decisions on whether a property owner is willing to take on a personal financial risk as these decisions can intensify inequities. As approving authorities, municipalities will always be legally liable for permitted development regardless of location.

In the areas where new development will be prohibited or restricted, the existing at-risk development will take on a non-conforming status. Non-conforming properties are those that are legally existing today but do not meet current regulations. Non-conforming properties are permitted to remain and continue to be used under certain conditions.

Risk Reduction in Future Hazard Zones

If new development is prohibited or restricted in high hazard areas, policies and regulations should also be adopted for the properties that fall on the periphery of the high-hazard zones. These areas are likely to become more hazardous in the future and future risks should be accounted for in present-day design standards. For these properties, a more favorable adaptation option is likely to be some form of accommodation, where design and land use

considerations made now will ensure that the development can better withstand the hazards anticipated in the future. However, the boundary between high hazard and future hazard should not be considered a sure thing. For example, in Prince Edward Island the province currently uses the 1% annual exceedance probability (1-in-100 year) coastal floodplain to describe the high hazard zone however Hurricane Fiona's storm surge exceeded this water elevation. As hazards increase over time (i.e., as sea level continues to rise) the boundary between the high-hazard and peripheral areas will change to reflect changing conditions, what was once acceptable may no longer meet those criteria and the previously conforming properties will become non-conforming over time.

Risk Disclosure

Risk disclosure policies implemented at the time of sale of properties in high or moderately high hazard areas would contribute to correcting market values which often do not reflect a risk assessment. Disclosure policies or regulations would ensure that the developer, mortgage lender, property owner, insurer and any future property owners are all made aware of the known or anticipated hazard, or of any conditions that were agreed upon when the property was approved for development.

For example, where a community is still permitting development in hazardous areas, property owners should be notified that they may not be eligible for financial support if damage is sustained in a manner which could have been prevented through proactive design strategies. While each province has their own emergency response policies, if financial assistance is dependent on the federal Disaster Financial Assistance Arrangements (DFAA) program, the guidelines specify that "the costs of repairing or replacing structures are not eligible if they are in a location that, prior to its construction was designated, recognized or zoned as a flood risk area by provincial or municipal authorities" (Public Safety Canada, 2007, p. 16).

Risk disclosure policies are necessary to ensure that potential buyers are made aware of these types of conditions that transfer with property ownership. In support of risk disclosure, New Brunswick has recently announced that a notice will be placed on the provincial government's land registry, when a property is no longer eligible for the government's disaster financial assistance funding for inland or coastal flooding (Government of New Brunswick, 2023).

Relocating Built Structures

Not all structures and infrastructure currently within high hazard zones should be considered a lost cause. Property owners should be encouraged or supported in their efforts to move these buildings to a safer location prior to sustaining damage, saving both the property owner and community from a disaster response.

In contrast to the cost of disaster recovery or a property buyout, physically moving buildings and infrastructure presents an opportunity for both cost savings and proactive risk reduction. Unfortunately, communities that have voted in favour of relocation of high-risk buildings have struggled to find financial support for implementing a proactive response (Koslov, 2016). The cost associated with the relocation of homes, includes not just moving the structure but also the new property and infrastructure required to place the building in its new location and connect it to services.

In a first for the United States, the Biden administration announced in November 2022 that the federal Interior Department would be funding the relocation of Native American Indigenous communities away from rivers and coastlines. The initial funding will support 3 communities in

Alaska and 2 in Washington State (The New York Times, 2022). It appears to be the first federally funded 'proactive/managed retreat' initiative and it is anticipated that this program will create a new model for response in other communities in the country.

Texas *Open Beaches Act*

In Texas, a rolling easement for public access is recognized by the *Texas Open Beaches Act* (OBA) and where the shoreline is critically eroding, waterfront homes end up in the public beach easement over time. In 2006, a structure removal initiative was created to financially support property owners with the costs to move their homes from the beach to a more suitable location. At a cost of up to $50,000 (US) per property, at least 18 homes have already been relocated, improving public access to the beach, and reducing risk to people and property during storms (Esteves, 2014).

Managed Realignment

Managed realignment involves activities that enhance the natural adaptative capacity of the intertidal habitat through the deliberate alteration or removal of existing coastal or floodplain defences. Managed realignment can include both seaward advances and landward retreat (Esteves, 2014). Examples of managed realignment which contribute to achieving retreat objectives include the removal or shortening of defence structures, and habitat restoration efforts.

The Town of Truro, NS experienced multiple flood events with floodwater overtopping existing dikes. After stakeholder consultation and a public engagement process, the community unanimously opted for a retreat adaptation strategy involving the managed realignment of the North Onslow Dike. This project will reduce dike maintenance costs, enhance protection of public and private infrastructure, and enhance resilience through the restoration of the coastal flood plain (Sherren et al., 2019).

Restrictions on Shoreline Armouring

Shoreline armouring, which was once considered the default solution for addressing actual and perceived risks to coastal hazards, has become increasingly understood as part of the problem. By 'holding the line' with hard infrastructure, coastal armouring has destroyed beaches, and the loss of dynamic systems have made both natural and developed coastlines more vulnerable to further impacts (Pilkey and Pilkey, 2020). The increasing presence of armouring on our shorelines also reduces public access to the shore, damages coastal habitat and presents a public safety hazard.

In the United States, at least seven states have banned or significantly restricted the use of armouring for private property in select areas of, or for the entire state's coastline, including Maine, Massachusetts, North Carolina, Oregon, Rhode Island, South Carolina, and Texas (Siders, 2013). In these States, armouring is only permitted in exceptional circumstances, there are rigorous permitting requirements. In some cases, the legislation also includes removal and repair orders to address responsibility for structures that fail or cause damage to other properties or to the public beach. Legislation may also limit repair, rebuilding and expansion of grandfathered armouring.

Nova Scotia is the first province to propose similar legislation with the *Coastal Protection Act.* While the regulations have not yet been adopted, as currently drafted, there will be restrictions

on works and construction that may interfere with the dynamic nature of the coast or disrupt sensitive coastal ecosystems, and on new in-filling and stabilization work below the high-water mark, including shoreline armouring (Province of Nova Scotia, 2021).

Disaster Response

By far the most common trigger for retreat—both in Canada and internationally—is an event that causes a local disaster such as riverine flooding, ice jam flooding, pluvial/urban flash flooding, and coastal storm surge/king tide flooding (Saunders-Hastings et al 2020). Disaster response actions that are not established in policy and planned for in advance, should not be considered managed retreat. Disaster response programs are generally run by a different department and/or a different level of government than that which would be involved with coordinating a strategic, proactive approach to retreat.

In Canada, communities impacted by weather-related disasters can receive support from local and regional emergency disaster responders, government bodies, and the military on an as-required case by case basis (Kamal, 2021). Federal funding is only made available when the province determines that damage has exceeded a critical amount and a request is made for federal support.

Traditionally, disaster response funding could only be used to rebuild damaged structures to the pre-damaged state and did not allow for improvements. This condition prevented many property owners from implementing accommodation design standards in the rebuilding process and created a repetitive cycle of funding the rebuilding of the same property multiple times. It is better understood now that the rebuilding phase in disaster recovery is the best opportunity to implement change – either by restricting repetitive repairs, or by encouraging property owners to accept a property buyout as an alternative to rebuilding in place.

Rebuilding Restrictions

Where land use planning and development regulations have been adopted to restrict new development in hazardous areas, restrictions on rebuilding a non-conforming structure in those areas will be triggered by the damage sustained during an extreme event (Siders, 2013). However, where nonconforming status has not been proactively identified, restrictions on whether a property is permitted to rebuild or how they may rebuild, could be tied to the DFAA funding. For example, where property owners opt to use the financial support to rebuild in place, they may be required to enhance the design standards from what was previously existing, and to waive access to future funding if a repeat event occurs.

Property Buyouts

Buyouts are the process governments use to purchase homes and land to take them out of private use (Freudenberg et al. 2016). Property buyout programs were established as an economic solution to address the repetitive rebuild/disaster cycles (Saunders-Hastings et al 2020). The buyout acts to permanently remove people from harm's way by transferring title, clearing the property, and then maintaining the property as open space. In the absence of support for local policy to initiate proactive adaptation measures and risk reduction, the precedent has been set that government will 'buy out' a property on generous terms after extreme events (Young, 2018).

While buyouts are currently the most common form of retreat in Canada, they haven't occurred very often. There are 5 examples on record for Atlantic Canada, with the possible addition of the ongoing programs in response to Hurricane Fiona.

1. In New Brunswick, following flooding in 2008 and 2010, federal funding was used to cover more than 80% of the $1.8M spent to buyout 36 properties at a rate of about $41,000 per property (Partners for Action, 2022)

2. In 2012, approximately 80 properties in the Village of Perth-Andover and Tobique First Nation (New Brunswick) were offered up to $80,000 for a buyout or $100,000 to have their home moved to a safer location (Partners for Action, 2022).
3. By 2019, New Brunswick was offering fair market value (pre-damage) up to $160,000 for primary residences and up to $500,000 for small businesses. Approximately 80 property owners accepted this offer, and the damaged buildings were levelled, and the properties have been retained by the Crown. Those who declined the offer were still eligible for the same amount of funding for repairs but will not be eligible for future DFAA programs (The Canadian Press, 2019).
4. In Nova Scotia, following the Thanksgiving Flood caused by an extreme rain event in October 2016, 18 property owners were offered a buyout at market value. Property owners felt that the coverage fell short of the actual costs incurred, and some challenged the property assessments used in the process. After one year, 17 of the 18 homes had been purchased but several impacted residents who participated in the program were still left without a permanent new home (CBC, 2017).
5. In Newfoundland and Labrador, following Hurricane Fiona in 2022, the proposed financial framework for assistance for communities on the southwest coast, included: a replacement value for a home at a minimum of $200/ft^2 based on a detailed assessment, replacement value of the property contents in accordance with DFAA; and a value for land or provision of a suitable land option (Province of Newfoundland and Labrador, 2022). It is still too soon to know how many properties will be purchased or what the total cost of the program will be.

In the relatively short span of time that buyouts have been used, they have been fraught with issues including inequity, lack of transparency, and inconsistency. The examples described above demonstrate just how different the programs can be between jurisdictions and from one storm to the next.

Buyouts present an additional challenge in that they are unaffordable as a solution for all at-risk properties (Young, 2018). In the United States, buyouts are funded through Federal Emergency Management Agency (FEMA) Flood Buyout Program, which is partially funded through a mandatory flood insurance program. In contrast, Canadian programs are entirely funded by taxpayers. If properties within a major Canadian urban center were to experience similar types of damage, would the amount of funds available for each property owner be comparable to the level of compensation that is currently being provided? Our programs currently lack a reference of scale, the cost to our system is going to be significantly different if a buyout involves 2,000 homes versus 20.

With regards to the inequities of the programs, it is important to note that buyouts only support property owners, all other residents including renters and individuals who are unhoused living within an impacted community are excluded from current DFAA programs (Dundon and Camp, 2021). Many practitioners have proposed recommendations to improve on certain aspects of buyout programs (Binder and Greer, 2016; Freudenberg, et al. 2016; Siders, 2013). The primary issues to be addressed include increased inclusion of affected communities in the process; the need for a long-term adaptation policy on flood risk at the national, provincial, and municipal levels; and the importance of considering the final resettlement location of buyout participants as part of the process.

Additional Resource:

The Partners for Action, at the University of Waterloo are currently working on an applied research project to help develop Effective Property Buyouts for Flood Risk Reduction. For more information on this ongoing research and program, visit their website at: https://uwaterloo.ca/partners-for-action/current-projects/effective-property-buyouts-flood-risk-reduction

AN ADAPTATION PATHWAY

Key Messages

- Land use planning and development regulations are the first defence for flood risk mitigation and management. The implementation of other adaptation strategies or tools in the absence of planning can lead to conflicting policies and procedures.
- Policies and/or regulations for hazard disclosure of coastal and flood risks are necessary to improve public safety, to correct the market-value of high-hazard properties, and to protect people from making uninformed decisions.
- Current practices prioritize private benefit over public good**,** demonstrating an inequitable distribution of public funds which results in further maladaptation, delayed retreat, and a lack of personal risk management by those who directly benefit.
- In the aftermath of a disaster, programs that support people over property should be prioritized.
- When adaptation is planned, participatory, and people centered it can be a transformative opportunity that not only reduces risk but also improves certain livelihood outcomes.

Thinking Long-Term

The Managed Retreat Toolbox described in the previous section includes tools that work best when used together – we can be preventative, proactive, and have policies and programs in place for a disaster response. The following sections describe some of the groundwork required for an adaptation pathway that achieves long-term goals and objectives through:

1. Education, communication, and risk disclosure
2. Building capacity in land use planning
3. Reserving public funds for public good
4. Applying an equity lens in retreat strategies

Education, Communication and Risk Disclosure

Earlier in this report, it was said that the first step to retreat is ceasing to advance. However, for the purpose of implementation there is another step that must come first, which is to identify and disclose the information about hazards and the areas that are at risk. Researchers and practitioners are well versed in describing the location of current and future hazard areas in our communities, but other community members, including elected officials and residents, are more likely limited to a perceived sense of risk based on past events. There is a continued need to provide information on projected climate change hazards, anticipated impacts, and strategies and tools for adaptation. Community capacity building starts with education and training to ensure that decisions are informed by the best available information on present-day and future hazards.

To date, most educational programs and resources are passive. Resources are made available to the people who seek out the information because they are interested in learning more about hazards and site-specific risks. For example, both Prince Edward Island's Coastal Hazard website (Government of Prince Edward Island, 2021) and New Brunswick's online Flood Hazard Maps (Government of New Brunswick, 2022b) include interactive flood maps with supporting

resources. However, utilization of these tools is primarily driven by individuals or organizations who seek out the information rather than through deliberate dissemination. We cannot assume that decision-makers (e.g., individuals, organizations, or governments) are informed, or that they have accessed the information that is made available to them, unless we adopt policies and programs for targeted education, communication, and risk disclosure.

Requiring coastal hazard and flood risk disclosure at the time of sale for all real-property transactions would contribute significantly to stopping the cycle of investments into high-risk properties (Siders, 2013). This is a very important step needed to support a proactive retreat approach. Disclosure is already required for flood history, but if damage has not yet occurred there is no requirement to inform a potential buyer that the property is (i) located in a known floodplain or high-hazard area; (ii) that the property is not eligible for financial assistance if/when there is an event that causes damage (Public Safety Canada, 2007); (iii) that there are design and/or land use conditions that were accepted as part of the development approval process; or (iv) that under new development regulations the future use or development opportunities of the property may be restricted if it is now considered a non-conforming use. Current practice is a 'buyer-beware' approach and as a result the market-values of properties in hazardous areas remain distorted (Young, 2018) and people continue to make uninformed decisions and investments.

Risk disclosure policies should not be limited to point-of-sale transactions, rental leases also contribute to a lack of informed decision-making. Dundon and Camp (2021) examined the increased vulnerabilities faced by renters due to a lack of knowledge, lack of resources to mitigate risk on a property that they do not own, and lack of disaster-relief programs to support renters following an event that damages their residence and contents, and/or displaces them from the property entirely. As a result of this study, they made three recommendations to improve equity considerations for renters: first, to improve outreach to renter communities about risks and insurance options; to require landlords to inform tenants of prior flood history and risks associated with a property; and, to include renters in the distribution of disaster response financial assistance by splitting funds between both landlords and tenants impacted by an event. Unfortunately, in communities suffering from the current housing crisis, landlords have an advantage because tenants are more likely to accept a higher level of risk than they would if alternate housing options were available. Low vacancy rates further impact renters following an event that damages rental units and removes them from the housing inventory, driving the cost for rental units in the safer (undamaged) locations even higher.

The responsibility of risk disclosure sits with multiple organizations and levels of government – including mortgage lenders, insurance brokers, real-estate agents, real property lawyers, and governments. Work is needed to improve or to regulate disclosure of coastal and flood risks across agencies to improve public safety, to correct the market-value of high-hazard properties, and to protect people from making uninformed decisions relating to investments and housing choices.

Building Capacity for Land Use Planning

Land use planning is the first defence for flood risk mitigation and management (NRCan, 2022). Successful development and implementation of a retreat strategy is contingent upon the presence of land use planning which enables, promotes, and directs land use and development towards low hazard areas. In the absence of planning, one government department could be rolling out a buyout program following a disaster for an area that another department, or a different level of government, is still allowing or even encouraging new development to occur. Land use planning guides the best and most efficient use of land for societal benefit in accordance with the vision and goals established by a society (Manuel, et al. 2023).

Unfortunately, land use planning in Atlantic Canada is not being used to its potential as is seen in other jurisdictions where long-term planning strategies are realized. One of the primary reasons for this is the small size and lack of resources available to municipalities, who are enabled by provincial legislation to provide planning services and to regulate land use and development. In Nova Scotia and New Brunswick almost the entire province (except for First Nations Reserves) is incorporated into municipalities which allows the province to adopt legislation with regulations that can be implemented province-wide through municipal planning and development control processes. However, a large percentage of both Prince Edward Island and Newfoundland and Labrador remain unincorporated. The unincorporated land areas, as well as small municipalities that do not have capacity to provide land use planning services, fall under provincial planning authority. In these jurisdictions where a planning framework has not yet been established, efforts to implement retreat by way of land use policy are likely to fail.

Whether the provinces have the necessary planning framework in place, the municipalities in the Atlantic provinces currently do not have clearly legislated responsibilities to consider, manage and disclose climate change flood risks (Northrup, 2022). Proactive adaptation through land use planning is therefore further challenged because implementation of the retreat strategy by the municipality is optional – and it may limit the revenue collected from property taxes on high-risk properties (Golnaraghi, et al. 2020).

Municipal reform would contribute to building capacity of municipalities. Larger municipalities can be empowered to function autonomously with regards to owning and maintaining local infrastructure, managing emergency response, and having jurisdiction to address issues that are more regional in nature. And by enabling and requiring local land use planning, priorities can be established, and an adaptation strategy can be implemented in accordance with the community's long-term goals.

Local governance reform, as recently undertaken by New Brunswick in 2021, demonstrates that change is possible with regards to building capacity in local municipalities. By reducing the number of entities from 340 to 89 (77 local governments and 12 rural districts) New Brunswick will now be fully incorporated, with all residents represented by a local government and with improvements to service delivery, including land use planning, and infrastructure planned (Province of New Brunswick, 2022c).

Reserving Public Funds for Public Good

There is no refuting the economic benefit of proactive, long term adaptation strategies. The Canadian Institute for Climate Choices (2021) recently reported that "flood damage to homes and buildings could increase from $60 million annually to as much as $300 million annually by mid-century and tenfold by end of century, with costs as high as $13.6 billion annually". And the Global Commission on Adaptation and the Insurance Bureau of Canada calculated that for every $1 invested proactively in community resilience there is a return on investment of $2–$10 in future averted losses (Global Commission on Adaptation, 2019).

In the absence of policy, how a community (or province) spends its money on program delivery and infrastructure improvements is a reasonable measure of their priorities and long-term goals. In many communities, the current practices support the prioritization of private benefit over public good. For example:

- by allowing the alteration of a public space (i.e., the beach and shoreline) for the protection of an adjacent private property;
- by subsidizing repeated costs of repairs or rebuilds of private property; and,

- by implementing property buyouts at pre-damaged market value for homes that are no longer habitable.

These practices not only demonstrate an inequitable distribution of public funds, but they also contribute to continued maladaptation, delayed retreat, and a lack of personal risk management by those who directly benefit, as further described below.

Shoreline armouring and other methods of hard infrastructure that are constructed on the coastline to protect private property, regardless of who is paying for the infrastructure, will occupy what is otherwise a public space. Cumulative impacts of the infrastructure on the watercourse, sandy beach and adjacent properties, are additional costs incurred for the benefit of the private property. In many cases, the natural shoreline features which were once considered most desirable, are ultimately the most damaged by these actions. If a decision is made to use a protection adaptation strategy, the impacts to the natural environment and/or loss of public space should be justifiable as critical to the greater public good, and that which outweighs other public priorities.

Typically damage or harm caused by a natural hazard is not considered to be our fault – historically referred to as an "Act of God" with respect to legal or insurance claims. When such events can not be anticipated, we have come to expect that the government will step in with financial relief to support those who are unprepared (and uninsured) deal with their losses. Coastal hazards and flood risks can no longer be considered 'events that cannot be anticipated'. However due to low uptake of flood insurance in Canada (Golnaraghi, et al. 2020), disaster financing programs have continued to subsidize repeated damages. As a result, we have become locked into a broken cycle where the flood insurance industry is being undermined by the disaster financing programs that were originally intended to support uninsurable losses (Public Safety Canada, 2022). To incentivize adaptation and effective use of public funds, we need to call an end to the costly cycle of subsidized rebuilds following disaster events (Saunders-Hastings, et al. 2020).

Finally, the practice of using property buyouts as a tool for implementing retreat is intended to reduce risk by converting high-risk land uses (i.e., residential) into public space and areas that enhance natural capacity of the hazard area. But the purchase of residential properties at a pre-damaged market value, when the property no longer contains a safe or functional dwelling, is counterproductive to achieving community goals and objectives for several reasons. First, it is an unaffordable solution for all at-risk properties; and second, because it provides an incentive for further development in high hazard areas (Young, 2018). Alternatives to the property buyout as a disaster-response strategy have been proposed. A proactive buyout strategy would see government purchasing high-risk properties at market value before damage is sustained, and renting the property back to the original owner until such time as the property becomes uninhabitable (Siders, 2013). This strategy ensures that people are not prematurely displaced from their home and supports a public financial investment in housing, rather than in damaged properties. Alternatively, Young (2018) suggests that as a disaster response strategy, government should enter a long-term agreement to rent the vacant land from landowners after the structure on the property has been damaged beyond repair. This strategy would remove the property from its current land use designation, and provide a source of income to the landowner, while supporting a shift in the market-value of high-risk properties.

It is promising to see that the Government of Canada has recently committed to advancing work on possible low-cost national flood insurance programs and exploring relocation for those at the highest risk of repeat flooding (National Adaptation Strategy, 2022), however it is still too early to know what funding will be made available for preventative and proactive retreat or relocation strategies.

Additional Resource:

For more information on the current state of flood insurance in Canada and the recommendations of the Task Force on Flood Insurance and Relocation, see their report *Adapting to Rising Flood Risk An Analysis of Insurance Solutions for Canada,* at: https://uwaterloo.ca/partners-for-action/current-projects/effective-property-buyouts-flood-risk-reduction

Applying an Equity Lens in Retreat Strategies

When an entire community is affected by an event, marginalized populations who are already vulnerable tend to be most impacted (Kamal, 2021) including but not limited to Indigenous peoples, racialized persons, 2SLGBTQI+, persons living with mental and physical disabilities, and low-income households. As such, climate change adaptation initiatives need to take the experiences of people who typically possess fewer resources and have lower adaptation capacity into account, otherwise we risk perpetuating oppression and increasing the negative impacts of climate change (Arnold and Ali-Faisal, 2023).

We can apply an equity lens in adaptation frameworks by first asking questions such as, who is impacted by the hazard, who receives resources before and after an event under current programs, and whose voices are included in the decision making that influences or impacts future land use, planning and management (Peck et al., 2022). In other words, equitable adaptation strategies prioritize programs that are designed for and by people, over property and property owners.

Inequities based on socioeconomic status are particularly relevant to retreat strategies for coastal and flood hazards. Studies have shown that low-income residents are more likely to live in floodplains due to the lower cost of land and housing; whereas affluent residents are more likely to live in coastal areas due to the elevated property value for waterfront properties, despite being subject to impacts of sea level rise, storm surge and erosion (Lieberknecht and Mueller, 2023). While both populations are subject to similar flood hazard risks, inequities persist in how adaptation is handled for these different communities. Affluent coastal communities tend to have more influence over political decisions and investments into hard infrastructure that benefits their private properties, and which results in these residents being able to stay in place longer than for those properties without additional defence structures (Lieberknecht and Mueller, 2023). Following a damaging event, property owners in affluent communities are also more likely to receive a larger buyout offer (Saunders-Hastings et al., 2020).

Low-income or disadvantaged communities are more likely to include marginalized populations who are disproportionately impacted by the hazard due to existing vulnerabilities; people who are renting rather than who own property; and, people who do not have the resources for mitigating their own vulnerability (i.e., purchase of additional, optional insurance policies). Following a damaging event, these vulnerable populations are more likely to be restricted in their options to find alternative housing, temporary or otherwise. We discussed earlier how damage that reduces the inventory of rental properties in a community can further impact the affordability of the remaining rental housing in the same community due to the sudden increase in demand (Dundon and Camp, 2021). In another study from the United States, a retreat strategy involving a buyout and relocation plan for an at-risk community was blocked based on racial discrimination by the receiving community of primarily white residents (Carey, 2020).

Tools for preventative action, including land use planning and environmental protections, are particularly important to ensure that hazardous lands that are at high risk of flooding are

restricted from development. Otherwise, hazardous lands that cannot be sold for any other purpose, may be used for low-income or affordable housing. Risk reduction tools including development regulations and restrictions on the use of shoreline armouring, can be used to support more equitable outcomes by ensuring that all residents in a hazardous area are equally encouraged to retreat (to move away from the hazard) rather than allowing only those who can afford to invest in private infrastructure to adapt in place. Finally, disaster response programs that prioritize finding suitable housing following displacement can ensure that no impacted residents are left behind – whether they were previously renters or property owners.

Practitioners recommend that to secure more equitable outcomes, the most appropriate solutions are those that are developed by the impacted communities rather than one that is administered through a top-down approach. McNamara et al. (2018) suggests that if relocation of populations can be planned, participatory, and people centered than it can be a transformative opportunity for people and could even improve certain livelihood outcomes.

FINAL REFLECTIONS

This discussion paper likely raises as many questions about retreat as it provides answers. While retreat may at first appear to be a daunting adaptation strategy, it doesn't need to be. When communities, municipalities and provinces establish policies based on long-term objectives, the priorities that naturally emerge are common-sense hazard management principles, as were those recommended by Dronkers, et al. (1990) so long ago:

1. Avoid development in areas that are vulnerable to inundation.
2. Ensure that critical natural systems continue to function.
3. Protect human lives, essential properties, and economic activities against the ravages of the seas. (Dronkers, et al., 1990)

Identifying the principles on which we should act, is perhaps the easy part. Having to make decisions going forward based on these principles, with long-term outcomes in mind and at a cost of short-term disruptions to the status quo, is where we currently find ourselves. But if we can agree on the preventative and proactive strategies, they may be easier to implement as a first step towards making the harder decisions. And in doing so, as we face more frequent disaster events, we may just save ourselves from making the situation more difficult than it currently is.

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