

Climate Change Planning: Understanding Policy Frameworks and Financial Mechanisms for Disaster Relief



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increasing energy efficiency, or changing management practices or consumer behavior (IPCC 2018). Climate change **adaptation**, on the other hand, is the adjustment in natural or human systems (social or economic) in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities (IPCC 2001). Various types of adaptation can be distinguished, including anticipatory and reactive adaptation, private and public adaptation, and autonomous and planned adaptation (IPCC 2018).

Definitions

Climate Change has been broadly defined by the Intergovernmental Panel on Climate Change (IPCC) as “any change in climate over time, whether due to natural variability or as a result of human activity” (IPCC 2014). Consistent with this definition, the United Nations Framework Convention on Climate Change (UNFCCC) defines climate change as “a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods” (United Nations 1992).

Climate change **mitigation** refers to the efforts to prevent or reduce the emission of greenhouse gases into the atmosphere by incorporating the use of new technologies and renewable energies,

Introduction

The definition of climate change planning is important, especially in the context of government’s policies and actions at the regional and local levels. Traditionally, the definition of climate change planning was largely influenced by the view that either changes in climate are due to natural climate variability or, in contrast, as a result of human activities. What is important, however, is the increasing recognition that the geographic location of a community alone is no longer an adequate indicator of a community’s susceptibility to climate change impacts. For example, coastal communities were traditionally considered to be locations most vulnerable to climate change hazards due to sea-level rise and increased storm surges; however, some communities located inland are facing an increased level of precipitation, which has led to an increase in

frequency of overland flooding (Henstra and Thistlethwaite 2017).

While the discussion of what is the root causes of climate change may continue, what is becoming clear from a planning perspective is that government policies with respect to climate change planning must be better informed. Moreover, such policies must provide for the level and type of mitigation and adaptation measures necessary to address diverse community challenges.

National governments have traditionally provided the lion's share of funding for disaster relief, and therefore wielded significant influence over the direction of climate change policies. However, as funding levels are stressed in the face of increasing natural disasters, national governments are increasingly shunting responsibilities to regional and local governments (e.g., Kettle and Dow 2014), as well as nongovernment actors, such as the private sector. As climate becomes more variable, the importance of incorporating climate change into strategic planning increases in importance. Indeed, as evidenced in scholarship, governments are beginning to appreciate the value of programs that combine mitigation and adaptation approaches (e.g., Bulkeley and Tuts 2013).

To understand the mitigation and adaptation planning measures taking shape at a range of scales, the following discussion presents a review of key global and national policy frameworks. The discussion highlights the importance of context and funding programs.

Frameworks on Climate Change

International Frameworks on Climate Change

The United Nations Framework Convention on Climate Change (UNFCCC) was formed in 1992 as a framework for international cooperation to combat climate change. There are 197 Parties to the UNFCCC Convention. Since 1992, three significant international agreements on climate change have been entered into with the similar goal of reducing greenhouse gas emissions.

The first protocol linked to the UNFCCC climate change initiative was the Kyoto Protocol, which

was adopted in 1997 and entered into force in 2005. The Protocol has 192 Parties and their first set of commitments commenced in 2008 and ended in 2012. The second period commenced in 2013 and continues to 2020 (UNFCCC 2018b).

In November 2016, 174 countries signed on to the Paris Agreement, signaling a significant wave of international cooperation on climate change and marking the latest step in the evolution of the UNFCCC. One of the key objectives of the Paris Agreement is to “strengthen the global response to the threat of climate change by keeping a global temperature rise this century well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius. Additionally, the agreement aims to strengthen the ability of countries to deal with the impacts of climate change” (UNFCCC 2018a).

Canada's Framework on Climate Change

Canada is one of the 175 signatories to the Paris Agreement and has made the commitment to meeting or exceeding the 2030 target of a 30% reduction below 2005 levels of greenhouse gas (GHG) emissions (Canada 2017). The implementation of Canada's international commitments on climate, however, is fundamentally an exercise of cooperation among the federal, provincial, and territorial governments and in consultation with Indigenous peoples. This cooperation is necessary and in accordance with the division of powers between the federal government and the provincial governments as set out in the Canadian Constitution (Constitution Act 1982) and the agreements between the federal government and the territorial governments or Indigenous peoples.

In the context of Canada's division of powers, the Government of Canada sought cooperation with provinces and territories to develop and implement the Pan-Canadian Framework on Clean Growth on Climate Change. The development of this Framework was carried out in consultation with Indigenous peoples.

A key measure under the Framework is to implement a price on carbon pollution. The policy objective of the measure is to direct and guide individual businesses and households to seek out

measures to increase efficiencies and to pollute less. It should be noted that energy production and use account for over 80% of Canada's GHG emissions (Canada 2016a). As a result, the transition to a low carbon future will likely require significant investments in clean energy to power households, transportation, and industries as well as policies to encourage more efficient use of energy.

To strengthen the cooperation at the national level, the Government of Canada bolstered the Framework with the promise of financial investments for public infrastructure at the regional and local levels. However, in order to access federal infrastructure funding, provincial and territorial government applicants are required to demonstrate that their proposed projects integrate specific emission-reduction opportunities and the adaptation of clean technologies.

Financing Disaster Relief

Financing Disaster Relief in Canada

The Government of Canada provides financial assistance to provincial and territorial governments through a program called the Disaster Financial Assistance Arrangements (DFAA). This assistance is provided to the province or territory when their individual responses and recovery costs exceed the established thresholds of the DFAA. When the DFAA is triggered, the amount of assistance available to the province or territory in question is assessed based on eligible expenses and is calculated by a predetermined formula (Public Safety Canada 2017).

Since the inception of the program in 1970, the Government of Canada has paid out more than \$3.4 billion in postdisaster assistance to help provinces and territories with the costs of response and of infrastructure and personal property rehabilitation (Canada 2016b). The increase in demand for federal government assistance is notable in the change of the program's average of \$118 million per year for the period of 1996–2011 to \$280 million per year in the period of 2012–2015. The average far surpassed the program's initial \$100 million budget.

As a response to the growing demands for funding under the DFAA, changes were made to the program with the overall effect of reducing the level of available federal assistance for disaster relief. One of such changes is to the expense thresholds at which federal funding is triggered: the threshold was raised from \$2 per capita to \$6 per capita. With costs estimates of flood losses projected to increase to more than \$650 million annually over the next 5 years (Henstra and Thistlethwaite 2017), it is inevitable that the additional pressures will be placed more squarely on the provinces and territories as well as local governments.

Financing Disaster Relief in the United States

Equivalent to Canada's DFAA, the United States has the National Flood Insurance Program (NFIP), which was created in 1968. Administered by the Federal Emergency Management Agency (FEMA), the stated goal of the NFIP is to help people in flood-prone areas get insurance for their properties and reduce the impacts of flooding.

Historically, the NFIP was limited to using flood insurance premiums, available surplus, and borrowing capacity from the US Treasury; in limited circumstances, direct appropriations from Congress have been made to pay flood claims. However, the increase costs associated with natural disasters and subsequent increase in property insurance premiums have led to many individuals opting out of coverage. Consequently, many residents have been left vulnerable to responding to natural disasters and the aftermaths on their own (FEMA 2018).

Recent disasters, such as hurricanes Katrina, Rita and Wilma, resulted in the United States Congress increasing the level of borrowing to pay claims in the aftermath of the 2005 hurricane season (King 2008). Hurricane Sandy in 2012 resulted in a further increase in FEMA's borrowing limit to \$30.425 billion and helped push the flood insurance program into significant deficit, namely, an approximate \$24 billion debt (American Academy of Actuaries 2017). While costs associated with the 2017 hurricane season are not yet finalized, FEMA has already paid over \$8.2 billion in claims for Hurricane Harvey alone

(Horn 2018). As a result, there are growing pressures to curtail repeat claims under the program, while encouraging more private insurance involvement.

In face of the enlarging debt, without any immediate solutions to solve the growing pressure, discussion surrounding the program's fate suggests the possibility of ending the federal flood insurance program for new construction in areas most at risk of flooding (Flavelle 2017).

Increasing Financial Pressures on Relief Programs

National programs in Canada and the United States, such as the Disaster Financial Assistance Arrangements and the National Flood Insurance Program, are experiencing significant financial pressures due to the increase in size, and frequency of natural disasters attributable to climate change.

Programs and associated funding levels that were originally designed for disasters occurring once every hundred years are now being triggered at rates three to four times more frequently within the same period. Moreover, climate projections suggest increasing risk moving forward (e.g., Wu et al. 2018). Disasters that occurred typically every two or three hundred years are occurring in rapid succession and, as a consequent, imposing more stress on the already burdened programs.

Government's response, as in the case of Canada, has been to change program qualification thresholds. The result is a decrease in government's overall financial assistance for natural disasters, and increased costs that must be borne by the affected parties, including municipalities most vulnerable (Henstra and Thistlethwaite 2017).

National Influence in Climate Change Planning

In Canada, the provincial and territorial jurisdiction, except for the Territory of Nunavut, has autonomy over land-use planning, including the responsibility and legislative powers to direct planning actions. As a result, the ability of the

federal government to influence municipal planning is generally tied to funding agreements.

An important example of federal funding agreement is the Federal Gas Tax Fund. Under this federal program, the Government of Canada is committed to providing a permanent source of funding to provinces and territories, which individual jurisdictions then transfer to their municipalities to support local infrastructure priorities.

The initial Gas Tax Funding Agreements required many provincial and territorial local governments to develop Integrated Community Sustainability Plans (ISCPs). The plan is required to be developed in consultation with community members and generally provides long-term direction for the communities to realize their sustainability objectives with respect to a broad range of environmental, cultural, social, and economic issues. Pickets et al. (2014) identified the general statements of objectives and the lack of a clear definitive policy as a potential weakness of the ICSPs.

Effectively, the communities decide how to spend the guarantee by selecting what programs or area of services to direct the funding. Under this approach, the communities can make investments across 18 different project categories, including public transit, wastewater infrastructure, brown-field redevelopment, disaster mitigation, and community energy systems (Infrastructure Canada 2018b).

In 2014, however, the Gas Tax Funding Agreements were renewed with an emphasis on cooperation between the jurisdictions. In particular, under the new Agreements, all signatories must agree that a priority of the funding must be directed to strengthening local governments' capacity to undertake asset management (Infrastructure Canada 2018a).

Impacts on Local Governments

Climate change will continue to occur as a result of the accumulation of greenhouse gases already in the atmosphere, regardless of mitigation measures currently underway; this has, as a result, emphasized adaptation as a necessary measure in

the immediate and longer-term (e.g., Bosello et al. 2010). Although climate mitigation is the long-term solution to address the effects of climate change, and indeed has been the focus for many governments around the world (e.g., Birchall 2014, 2017), undertaking adaptation measures have become a necessity for local governments (Picketts et al. 2014; Birchall and Bonnett in review). To be sure, adaptation is particularly relevant at the local scale, where communities are at the forefront of climate impacts (e.g., Forino et al. 2017).

However, a policy choice to combat climate change that is heavily reliant on adaptation, without striking a balance with mitigation measures, may result in less effective adaptation strategies. Effectiveness in this context is in relation to the potential costs of the strategies, including social, environmental, and economic costs (Hamin and Gurran 2009).

Although climate change adaptation and mitigation planning are relatively new concerns to local governments, these measures have much in common with planning processes currently applied in the development of municipal land use plans. For example, planning for climate change actions are similar to local land use planning in that both exercises start with the collection of relevant environmental (including natural hazard mapping), cultural, social, and economic information.

In particular, climate change planning encompasses many activities that may be best viewed from the perspective of the responsibilities of, and associated actions, at the local or regional levels of government to plan for natural hazards (Berke and Stevens 2016; Stevens and Senbel 2017).

Generally, mitigation planning requires the creation of a local GHG emissions inventory, containing information and data on the quantity and source of local GHG emissions (Birchall 2014). The information would be reviewed and transmitted to form the baseline for projection of potential future emission levels. The emissions inventories also provide a baseline from which to measure progress on the implementation of local plans. Without access to this information, municipalities are limited in making informed

decisions regarding how best to reduce their emissions in an effective way (Stevens and Senbel 2017).

Adaptation planning requires a proactive approach in order to better prepare a community in responding to an extreme weather event, which may include providing support for rapid recovery and helping reduce future risk. Planning for climate adaptation should benefit from the extensive collection of information and data used to plan for natural hazards, including information on local hazards, such as sea level rise, wildfires, overland flooding, and drought. It goes without saying that planning exercises should be based on the best and most current information available (Berke and Stevens 2016).

Despite the reality of increasing demands for climate change planning, many local governments working towards the adoption and implementation of adaptation measures are coming up against barriers, including the lack of adequate resources, and an increase of responsibilities being downloaded from senior levels of government (Birchall and Bonnett, in review). The barriers to local governments are further exacerbated by the competing political priorities and capacity related challenges (Picketts et al. 2014; Antonson et al. 2016). One way of addressing these barriers is to encourage an approach to climate change planning that incorporates adaptation and mitigation measures into existing plans and planning processes. Integrating climate change considerations into the decision-making process by including climate change adaptation and mitigation measures in local planning documents is not an overnight process (e.g., Kithiia and Dowking 2010). However, with the recognition that climate change planning is necessary and must inform local government's planning decisions, the process of updating the official community plans can quickly become an intuitive exercise for all local governments.

Land use planning has been identified as one of the most effective processes to facilitate climate change adaptation efforts with preventative land use planning as the most promising long-term solution to mitigating the negative effects of climate change hazards. Local governments have

used land use planning tools such as official plans, zoning, and development permits to minimize risks due to floods, wildfires, landslides, and other hazards. These tools are also critical to guide growth beyond the current and forecasted geographical areas vulnerable to natural hazards (Richardson and Otero 2012; Gerber 2015; Berke et al. 2015).

Smart Growth

Smart Growth has been identified as an important step towards achieving climate change mitigation goals by supporting denser housing and services near transit stations, taking advantage of compact building design, creating walkable neighborhoods, and preserving open spaces. Under smart growth strategies, local land use policies must limit sprawl and create denser forms to mitigate greenhouse gas emissions, while maintaining urban forests where possible (Hamin and Gurran 2009).

A growing number of local governments are incorporating smart growth principles into their climate change plans. Some of the principles developed by the Smart Growth Network, which are based on the experience of American communities that have used smart growth approaches to create and maintain neighborhoods, can support climate change adaptation planning. For example, principles supporting the preservation and enhancement of green spaces, the integration and harmonization of adjacent regions, and towns, effective community engagement, and implementation of planning strategies are principles that can support climate change planning and smart growth outcomes.

Smart Growth principles have been the hallmark of good planning practice. These principles are being considered by a growing number of local governments as they review and update their official community plans. Smart growth principles also offer local governments practical guidelines in addressing both climate change mitigation and climate change adaptation plans. As Hamin and Gurran (2009) note, one of the challenges of incorporating climate change planning is the potential conflict in land use policies that support both adaptation and mitigation measures.

Local governments therefore need to ensure that any actions in support of adaptation do not detract from mitigation efforts.

Incorporating smart growth principles, community hazard mapping, and rebuilding in areas less prone to climate change impacts should be a priority. The resulting effect is often the recommendation that residents not rebuild in areas prone to natural hazards. Other smart growth principles can also be used to advance climate change planning with a focus on mitigation, such as smart building designs which incorporate the use of green building technologies, the use of green infrastructure to save money and protect the environment, and transportation options that support diverse transportation alternatives such as cycling and public transit options.

Tough Choices Ahead

The frequency and intensity of natural disasters are impacting every aspect of our lives, especially our societies, communities, and residents. At the local level, responding to natural disasters is a significant drain on municipal operations and finances. As a result, where and how communities can, or should, rebuild and grow is a necessary question in the discussions of local governments' climate change planning.

Typically, the questions relating to rebuilding efforts are most acute after a natural disaster has occurred and the community is faced with rebuilding. In particular, local governments must decide if they should permit rebuilding whilst knowing certain locations are vulnerable to severe climate events such as overland flooding, coastal erosion, or sea level rise and have a likely probability of reoccurring. From a climate mitigation and adaptation planning perspective, such questions should be addressed prior to any rebuilding.

As more local governments experience the impacts of climate change, it is becoming clear that there is insufficient financial assistance from the national and subnational disaster relief programs. Where there is a gap in government financial assistance, it is often the case that residents are left responsible for some rebuilding efforts while also facing increasing insurance premiums

imposed by insurers to protect the industry against future losses.

More recently, local governments have undertaken risk management assessment to better identify and manage their exposure to the effects of climate change. This shift involves expanded role for government and nongovernment stakeholders involved in the design and implementation of climate change policies (Henstra and Thistlethwaite 2017; Stevens and Senbel 2017).

Future Directions

Insurance claims in Canada resulting from severe weather events averaged approximately \$373 million a year between 1983 and 2004. In the decade from 2005 to 2015, the average amount has tripled to \$1.2 billion a year (Demerse 2016). Estimates by the National Round Table on the Environment and the Economy suggest that by 2050, the costs of insurance claims as a result of climate change could range from \$21 billion to \$43 billion per year (Henstra and Thistlethwaite 2017). If these trends continue, climate change adaptation planning initiatives will require a significant shift from the status quo to ensure vulnerable communities minimize risks.

As increasingly severe climate events take a toll on communities, local and regional governments must address their role in the rebuilding of communities, but also the climate change planning measures necessary to respond to future events. These policy decisions will largely be driven by the experience and/or awareness of local residents.

A key component of the policy discussion may relate to financial implications at the local government level, where officials will see a decrease in disaster relief funding from upper levels of government. From the perspective of the individual resident, property insurance premiums may become prohibitively high.

The increased financial demands on government programs and the growing role of private insurance providers may result in the need to modify the eligibility requirements to address elements such as where communities may rebuild

after a climate event, or under what conditions. Accessing disaster relief funds may be limited if communities choose to rebuild in areas with known vulnerability, and private property insurance premiums will continue to rise. Ensuring vulnerable communities minimize risks associated with climate events may well require clearer direction on where and how communities rebuild.

Cross-References

- ▶ [Adaptation](#)
- ▶ [Climate Change Adaptation \(CCA\)](#)
- ▶ [Climate Change and Anthropogenic Impacts](#)
- ▶ [Climate Change Effects Natural and Human Systems](#)
- ▶ [Climate Change Impacts](#)
- ▶ [Climate Change Impacts and Resilience](#)
- ▶ [Climate Resilient Communities](#)
- ▶ [Community Planning Opportunities](#)
- ▶ [Immediate Climate Vulnerabilities](#)
- ▶ [Long-Term Climate Vulnerabilities](#)
- ▶ [The Green Climate Fund](#)
- ▶ [Vulnerability](#)
- ▶ [Vulnerable Communities](#)

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