



From Flooding to Fire: How the Town of Canmore is preparing for climate change

CASE STUDY

In 2016, the Town of Canmore created a Climate Resilience Action Plan to identify key risks and vulnerabilities as well as to prioritize actions. They used the Climate Resilience Express tool to help guide this process. Completion of their adaptation plan has led to a number of actions, including a flood risk assessment of the Bow River and incorporation of adaptation priorities into budget planning. This case study presents the process used by Canmore to create its action plan and highlights key insights for other communities.

THE TOWN OF CANMORE

The Town of Canmore is located within the Bow River Valley just east of the Canadian Rockies and about 100 km west of Calgary. A major tourism and recreation destination, it has a year-round population of about 13,000 people that can expand to about 17,000 people during the summer months (Town of Canmore, 2018b).

Canmore has been actively engaged in responding to climate change for a number of years. Significant work to reduce the town's greenhouse gas emissions was completed in 2010 through the creation of an

Environmental Sustainability Action Plan (Town of Canmore, 2010). However, in 2014 the town recognized that it had done little regarding climate change adaptation and identified it as a gap in their overall sustainability planning.

Canmore's thinking about the need to build its resilience to extreme weather events was accelerated by a catastrophic flooding event in June 2013. Seven mountain creeks surrounding the town overflowed due to torrential rain and rapid snowmelt, causing extensive damage to infrastructure from flooding and debris.



Figure 1. Flood damage in Canmore

Source: Town of Canmore

In response, the town council put out a request for proposals for the development of a climate change adaptation report in late 2014. All One Sky (AOS), an Alberta-based not-for-profit charitable organization, responded to this opportunity by approaching Canmore about instead piloting the Climate Resilience Express tool (CRE) they were then developing. This inquiry led to a synergistic and mutually beneficial partnership that met the town's objectives while contributing to the development of the CRE tool, which is described in Box 1.

ADAPTATION PLANNING PROCESS

Canmore's adaptation planning process was led by the town's development planner and sustainability coordinator. They focused on developing an internally focused plan specific to corporate and municipal infrastructure. This approach was chosen because Canmore wanted to demonstrate leadership on climate adaptation and set an example for commercial and tourism businesses to follow. In this way, adaptation initiatives could be led by other sectors, with Canmore playing a supportive role (personal communication, Lori Rissling Wynn, January 9, 2018). By gathering input from local stakeholders, the town also started to plant seeds about having a discussion surrounding adaptation within the broader community.

BOX 1: AOS'S CLIMATE RESILIENCE EXPRESS TOOL

The CRE is designed to help municipalities host a one-day workshop to identify climate risks and opportunities, prioritize these risks and opportunities, and, after the workshop, create an action plan. It was created by AOS in partnership with the Municipal Climate Change Action Centre (MCCAC), Alberta Biodiversity Monitoring Institute and the Miistakis Institute. Funders included The Calgary Foundation, Natural Resources Canada, AOS, MCCAC and Alberta Ecotrust. Natural Resources Canada provided initial funding in 2015 to develop and pilot the CRE tool through four workshops incorporating six communities in Alberta.

The approach for risk management is based on the International Organization for Standardization (ISO) 31000, Risk Management – Principles and Guidelines. The tool follows a four-step process:

- “**Step 1:** Establish the local context for the planning exercise;
- Step 2:** Assess potential climate-related risks and opportunities to establish priorities for action;
- Step 3:** Formulate actions to manage priority risks and opportunities, and prepare the Action Plan; and
- Step 4:** Implement the Action Plan, review progress, and update the plan to account for new information and developments.” (AOS, 2016, p. 5).

Step 1 defines the spatial, operational and temporal scope to be included in action planning prior to the one-day workshop. It also involves compiling and analyzing historical weather data and climate projections, as well as developing scales to assess risks and opportunities presented by potential climate impacts.

Step 2 involves a one-day workshop with four sessions that allows stakeholders to discuss local weather and climate trends and future climate impacts, and to prioritize risks and opportunities using a semi-quantitative climate change risk and opportunity assessment. The climate projections used by the CRE are from the Pacific Climate Impacts Consortium’s (2014) Regional Analysis Tool, which includes results from 15 different global climate models, averaged and downscaled to the spatial area and temporal scope identified by the action plan. The climate change risk and opportunity assessment identifies potential climate change impacts using impact statements that outline consequences for specific impacts, analyzes the impact statements using a 1–5 scoring system (negligible, minor, moderate, significant, major), and evaluates climate impacts using risk matrices to position and compare impacts in relation to each other.

Step 3 focuses on formulating actions to address specific priority risks and opportunities identified by participants, including identifying actions currently underway. This step may involve planning meetings beyond the one-day workshop, depending on the level of detail desired by the community (as was the case with Canmore).

Step 4 implements the priority actions from the action plan. It also monitors and reviews the action plan implementation, adjusting actions as new information becomes available.

The CRE tool kit has been facilitated by AOS in a further eight communities in Alberta, in addition to the six pilot communities. Further information about the tool is available at <http://allonesky.ca/climate-resilience-express-project/>

Consistent with the steps of the CRE tool, following some preparatory work, Canmore hosted a two-day workshop in which it sought to identify, assess and evaluate climate-related risks.¹ Workshop participants were mainly municipal staff from

Canmore, including the asset management coordinator and project engineers and managers of areas such as Public Works, Protective Services, and Planning and Development. A city councillor, the Epcor manager for Canmore and three members

¹ Canmore wanted a more detailed investigation of climate-related risks and opportunities and corresponding adaptation actions than offered through the basic one-day CRE workshop. Consequently, Step 2 in Figure 1 was spread over 2 days, as opposed to the standard one-day workshop. Adaptation action planning, Step 3 in Figure 1, which would normally take place during the afternoon of the standard one-day workshop, subsequently took place over a series of bilateral meetings with stakeholders and municipal staff.

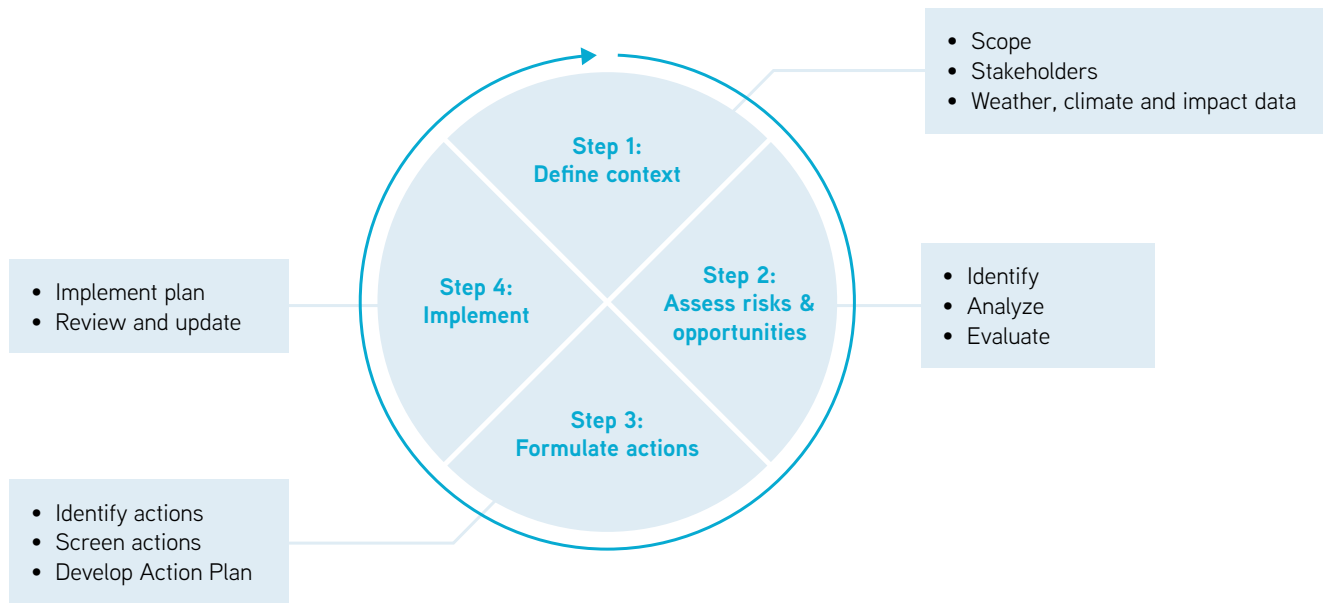


Figure 2. Climate change adaptation and resilience planning process used in the CRE tool

Source: AOS, 2016, p. 5.

of the Environmental Advisory Review Committee also participated.² A few key external stakeholders participated as well, including representatives of The Rockies Institute, the Bow Valley Builders and Developers Association, Canmore Business and Tourism, and Alberta Environment and Parks. These local stakeholders were also engaged in the risk and opportunity assessment meetings held after the workshop to establish 51 priority actions, in addition to those already underway by Canmore (AOS, 2016).

Step 1: Defining the context

Prior to the workshop, AOS compiled the historical climate data from six local climate stations and climate projections for the Bow Valley Corridor from the Pacific Climate Impacts Consortium's Regional Analysis Tool (AOS, 2016). Consultants with AOS then facilitated a workshop over a period of two days in November 2015. The first day of the workshop was held in conjunction with the Town of Banff. It began by having participants identify recent weather and climate-related events in the Bow Valley Corridor. The consultants then presented climate projections and environmental changes for the region. This was followed by a brainstorming session of potential positive and negative impacts to Banff and Canmore.

Step 2: Assessing risks and opportunities

The second day of the workshop involved only Canmore staff and local stakeholders. These stakeholders were directly involved in refining the climate impacts from the list created on the previous day, rating those impacts using digital voting software and evaluating priorities for action using risk/opportunity matrices. Eight priority risks were identified for adaptation action planning at subsequent bilateral meetings with stakeholders and municipal staff (see Table 1). The three highest risks from the matrix were:

- Forest fires (high priority), due to the potential for drier summers to fuel large fires in the even-age stand forest that surrounds Canmore.
- Flooding of the Bow River (high priority), given climate projections of increased rain in winter months and earlier snow melt in the spring.
- Flooding from mountain creeks (moderate-high priority), based on the increasing frequency of extreme weather events, such as occurred in 2013.

Three priority opportunities for action were also identified, including an increase in summer recreation opportunities, an extended construction season and an increased competitive advantage for winter tourism relative to other destinations.

² The Environmental Advisory Review Committee provides input and advice to the town council on environmental issues and policies (Town of Canmore, 2018a).

Table 1: Priority risks and opportunities for action planning

PRIORITY RISKS FOR ACTION PLANNING	
Forest fire	Extreme wind
Bow river flooding	Water supply shortage
Creek flooding	Heavy snowfall event, blizzard
Stormwater system overwhelmed, localized flooding	Freeze-thaw cycles
PRIORITY OPPORTUNITIES FOR ACTION PLANNING	
Increase in summer season recreation opportunities	Extended construction season
Increase in winter tourism competitive advantage	

Source: AOS, 2016, p. 2

Step 3: Formulating actions

Following the two-day workshop, those involved in the workshop participated in a series of meetings to identify actions to address the identified priority risks and opportunities. Resilience objectives were identified for each priority risk and opportunity, and current and potential new actions were brainstormed by participants to create a preferred action portfolio. Candidate actions were then “scored” using a list of criteria including effectiveness, affordability, feasibility, acceptability, equitability and flexibility. Candidate actions were then ranked based on their criteria scores and consideration of life-cycle costs (investment needs and annual costs). A timeline for implementation was then created and implementation leads assigned (AOS, 2016).

AOS created the *Town of Canmore Climate Change Adaptation Background Report and Resilience Plan* based on workshop activities and action planning from subsequent meetings. It includes a description of climate trends and projections for the Bow Valley Corridor, risks and opportunities identified through the two-day workshop, and priority actions identified through the subsequent meetings. Other components included in the action plan were a vision statement, strategic goals, resilience objectives, and information related to resources and timelines for actions.

HIGH-PRIORITY ACTIONS IDENTIFIED

As previously described, after the two-day workshop, Canmore and AOS organized additional meetings to identify planned actions in relation to their eight prioritized risks and three prioritized opportunities. The outcome of this process with respect to Canmore’s three highest ranked risks—forest fires, flooding along the Bow River and mountain creek flooding—are described below.

The town set two objectives for addressing **forest fire risk**: reducing property damage caused by forest fires and promoting recovery from forest fires. In subsequent meetings with town staff and other local stakeholders, the highest-ranked actions included updating the FireSmart mitigation strategy and improving communication with land managers to reduce the risk for the town and lands identified for new subdivision development within Canmore and the surrounding area. Emergency preparedness and education campaigns and the development of a smoke alert and health advisory policy were also listed as actions to address safety concerns and the health effects of wildfire smoke through increased communication with town residents.

Participants also prioritized engaging in more landscape-level regional fire planning and risk mitigation by developing active relationships with adjacent landowners, including Parks Canada, the Province of Alberta and the Rural Municipality of Bighorn. A goal was set to create a new position for either a part-time municipal emergency plan coordinator or a full-time regional coordinator whose cost would be shared with regional partners. Finally, participants prioritized updating the Engineering Design and Construction Guidelines as well as the Land Use Bylaw to better address fire risk and provide incentives for use of FireSmart techniques on private properties (AOS, 2016).

To reduce the risk of **Bow River flooding**, the town set two objectives: reducing property and environmental damage caused by flooding and promoting quick response and recovery from flooding. Key actions identified to achieve these objectives included the installation of backflow prevention valves in vulnerable civic facilities and buildings, especially those identified as operation centres during emergencies. Other actions identified included better storm water management, incorporating resilient design into municipal infrastructure such as bridges, purchasing equipment for the management of flood events, increasing flood awareness through signage, tracking real-time flow of the Bow River within Canmore and conducting a Bow River Flood Risk Assessment (AOS, 2016).



Figure 3. Flood damage in Canmore

Source: Town of Canmore

The objectives for addressing **mountain creek flooding** were to reduce property and environmental damage caused by flooding and to promote quick response and recovery from flooding. Participants in subsequent meetings identified securing funding for long-term flood protection infrastructure already defined in detailed assessments focused on individual creeks as a key priority for action.

Other moderate priority risks identified by participants from the two-day workshop included stormwater flooding, extreme wind storms, water supply shortage, heavy snowfall events and blizzards, and freeze-thaw cycles. Opportunities identified by participants included an increase in summer recreation opportunities, an extended construction season and an increase in winter tourism competitive advantage. Priority actions for each risk and opportunity were established in subsequent meetings (AOS, 2016).

INITIAL ADAPTATION ACTIONS

Since completing its adaptation plan in 2016, Canmore has taken steps to implement the priority actions it identified. Initial results stemming from its adaptation plan include:

- Initiation of a flood risk assessment of the Bow River.
- Completion of plans for mitigating risk along nearby mountain river creeks, including temporary structures to prepare for potential flooding events.
- Communication with concerned residents and media about preparations for catastrophic forest fires.
- Incorporation of actions into budget planning, including synergies with upgrades for certain facilities as well as planning for stand-alone projects that require dedicated resources.

- Promotion of action items with other departments such as public works.
- Participation in the Covenant of Mayors, a program that encourages municipalities and large cities around the world to address climate change. Membership requires communities to have a greenhouse gas reduction action plan as well as an adaptation plan.
- Two focus group sessions on adaptation, one for residents and one for businesses, in preparation for a community workshop (to take place in 2019).

LESSONS FOR OTHER COMMUNITIES

The following points highlight lessons learned by Canmore through its adaptation process using the CRE tool that may inform similar efforts by other communities.

- **Interest in adaptation planning is increasing.** The dialogue around adaptation is becoming more commonplace, and communities should not be fearful of engaging in this type of planning. Creating a climate change action plan demonstrates that climate change is a priority and that there are plans in place to address potential risks and impacts. For Canmore, starting the conversation surrounding climate change adaptation planning has signalled to stakeholders and the broader community that future climate-related risks are real and that it is necessary to start preparing now.
- **Use existing planning tools and climate data to inform the adaptation planning process.** Planning tools can provide a framework to help communities use local climate projections and modelling to inform adaptation planning. Through using the CRE tool for adaptation planning, Canmore gained a greater understanding of how climate projections are generated and what the climate for their area may look like in 2050. A climate modelling exercise for the Eastern Canadian Rockies or the Bow Valley had not been completed prior to initiating this adaptation planning process. The projections provided by AOS therefore were a valuable source of information to inform the town's adaptation planning and are now available for business and community groups to use in their own adaptation initiatives and plans.

There are many resources and tools available to communities online that can be selected based on needs, objectives and resources available for planning. These include the Miistakis Institute (2014) AdaptAction Tool; ICLEI's *Changing Climate, Changing Communities: Guide and Workbook for Municipal Climate Adaptation* (Jackson, Barry,

& Marzok, n.d.) and online Building Adaptive and Resilient Communities (BARC) Tool (ICLEI, n.d.); and the Canadian Institute of Planner's *Climate Change Adaptation Planning: A Handbook for Small Canadian Communities* (Bowron & Davidson, 2011).

- **Planning tools can streamline the adaptation planning process.** Finding the time to participate in workshops and planning meetings can be a challenge, even when adaptation is a strong desire and priority. Canmore found that using the CRE tool helped town staff and stakeholders focus their time to create an action plan with concrete next steps to be incorporated into municipal planning and budget cycles.
- **Hire a consultant that meets your community's adaptation planning needs.** Finding the right consultant to do climate modelling and facilitation for your community planning process is key to instilling confidence in the work on which you are basing your actions. It is also important to ensure that the consultant understands what your community may contribute to the planning process as well as what your community needs in terms of advice and expertise. These factors are critical in creating a robust and effective plan.
- **Incorporate costing into adaptation plans.** Municipalities may want to consider incorporating more work around costing into their adaptation plan to balance the costs of action against the resulting benefits (i.e., the dollar equivalent of avoided consequences from climate-related impacts). Although Canmore's adaptation plan did not go into great depth in terms of investment and annual costs related to action items, enough information was generated to begin acting within priority areas. More analysis, such as detailed costing, is still required for the implementation of some actions; completion of this analysis would help inform which actions realistically can be done within a given time frame.

ACKNOWLEDGEMENTS

We would like to thank Lori Rissling Wynn and Richard Boyd for their contributions and support for completion of this case study.

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