Climate Change Adaptation Action Plans – Alberta Process Review

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MIISTAKIS INSTITUTE

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PROJECT BACKGROUND

Biodiversity Management and Climate Change Adaptation Project Background

The Biodiversity and Climate Change Adaptation Project was conceived by the Alberta Biodiversity Monitoring Institute (ABMI) in response to the need to define the scope of change required to effectively manage biodiversity under a changing climatic regime, and to support Alberta's biodiversity management system with essential knowledge and tools for successful adaptation to a changing future climate.

The rationale for this initiative rests on the importance of biodiversity to Albertans, and the complex relationship between climate and biodiversity. Biodiversity, which includes species and their ecosystems, supports the delivery of numerous ecosystem services. These include provisioning services (e.g., food, fibre, fuel, water), regulating services (e.g. water and air filtration, flood regulation), cultural services (e.g., nature recreation, wildlife viewing) and supporting services such as soil formation and wildlife habitat. Because these biodiversity related services are impacted by a changing climate, and because the relationship between climate and biodiversity is uncertain, knowledge gaps constrain effective adaptation. Proactive investments in the knowledge and tools for effective biodiversity management under a changing climate regime will deliver significant benefits to people and avoid crisis-driven interventions that are by their nature reactive, costly and often ineffective.

The goal of the *Biodiversity Management and Climate Change Adaptation* project is to develop essential knowledge and tools to support the management of Alberta's biodiversity and promote successful adaptation to a changing climate. The project is comprised of four objectives:

1. Predicting the impacts of climate change on Alberta's native species and ecosystems

2. Predicting invasive species responses to climate change

3. Assessing strategies to support climate sensitive species-at-risk

4. Developing and evaluating adaptation policy and tools to manage biodiversity in a changing climate

The *Local adaptations for biodiversity-related ecosystem services* sub-project (concisely, the *Local Adaptations* sub-project) lead by the Miistakis Institute directly support s objective 4.

'Local Adaptations' sub-project overview

As the climate changes, Alberta's communities will be required to make decisions that encourage adaptation to the new climate conditions. To make appropriate decisions, communities will need to understand how the ecosystem services on which they rely might be affected by climate change, and what are their potential adaptation strategies. Alberta currently has not adopted a framework to address climate change; filling this gap will enable communities to plot a path forward.

The first step in enabling local community adaptation to climate change is the development of community-based Climate Change Adaptation (CCA) Action Plans. To this end, Miistakis is developing a community decision support toolkit that will help communities identify climate change adaptation strategies that satisfy their goals while maintaining the benefits of biodiversity-related ecosystem services. This toolkit is envisioned to support Alberta-based climate change adaptation (CCA) action planning processes with spatially-explicit tools which allow local managers to visualize the impact a changing climate has on their community's economy, infrastructure, and natural systems.

The central challenge of this sub-project is to connect the vast realm of biodiversity and climate change data to the everyday world of a local community decision-maker. The approach is intended to be pragmatic, seeking a rigorous method while recognizing limits in relevant data and the needs of affected communities, thus ensuring that databases and information are accessible to local decision makers.

Several key concepts will determine the ultimate form and content of this decision-support toolkit:

- The specific needs (i.e., gaps) in Alberta with regard to embracing climate change adaptation (CCA) action plans;
- The identity of the partner community(ies) and their decision-making needs, realizing that the ultimate product will be somewhat specific to the community(ies) chosen (i.e., a proof-of-concept approach);
- The knowledge base (data) required; ecosystem services may be the best way to connect biodiversity and local decision making, but no ecosystem services-specific spatial data currently exist in Alberta;
- The interface between the climate change adaptation (CCA) action plan and the supporting visualization tools (GIS-reliant or otherwise); and
- The value of web delivering tools and products to the greatest degree possible.

INTRODUCTION

Climate Change Adaptation (CCA) Action Plans enable a community to better understand the risks and opportunities associated with climate change and to develop appropriate response strategies. Globally there are numerous examples of CCA action processes. In Alberta there are two CCA action planning processes that are either in use or being considered at a rural municipal level. ICLEI Canada is currently running their CCA Action program called, Building Adaptive & Resilient Communities (BARC), in Calgary, Edmonton, and Red Deer. C3 (formerly Climate Change Central) has plans to implement CCA Action plans in Alberta in the near future, using a similar approach to the Columbia Basin Trust (CBT) process called Communities Adapting to Climate Change Initiative used in SE British Columbia. As the specifics of C3's work is currently not available, we will be reporting on the approach used by the Columbia Basin Trust as this will strongly influence C3's efforts in Alberta.

This report is a detailed generic "CCA Action Planning" process description to provide clarity of the concept for all Project Team members, external partners, and potential partner municipalities. This report is:

- a framework to assess gaps/strengths of various processes;
- a basis for identifying future work needed in applying these processes in Alberta;
- and a basis for describing the specific points at which the Miistakis-created resources would be supportive.

The articulation of the climate change adaptation action planning process strives to describe the common structure, how that structure varies within the two processes active in Alberta, breaks the structure down into specific steps and identifies what decisions are made as part of those steps and lastly identify where Miistakis tasks would fit within the described process.

THE PROCESS

CBT and ICLEI have a similar 2-3 year planning process involving 5-6 steps that walk a team through CCA in their community. However in the last few years CBT has moved away from the more extensive multi-year planning process to a faster, rapid assessment process. The planning process is similar, but much more condensed; however the primary focus is on implementation of adaptation measures to address top priority risks. It is expected that C3 plans to employ a similar rapid assessment approach in Alberta, followed by targeted implementation support, which is likely to include multi-year projects.

It is entirely possible that a community could do both of these processes by starting with a rapid assessment and moving to the more comprehensive approach of the ICLEI or the longer CBT process.

The CBT rapid assessment approach is very focused with a goal to develop a climate adaptation implementation project in each community. The workshops provide climate science education to communities, discuss climate change issues, identify the most important issues for the community, and to develop strategies on priority issues. The CBT rapid assessment approach was developed in response to the needs of local governments in the region in order to achieve cost-efficient adaptation planning. Communities have significant time and resource constraints, but also want to be climate resilient. The rapid assessment approach allows communities to move quickly from planning to implementation, focused on top priority risks, without the need to undertake a multi-year CCA planning process. Dr. Richard Boyd, Senior Economist with C3, described the approach:

> *Adaptation planning should be tiered - always starting simple, with "high level risk screening" (tier 1) - and only progressing to more detailed qualitative (tier 2) and quantitative (tier 3) assessments where deemed absolutely necessary (e.g., when our understanding of a potentially serious risks is insufficient to make decisions, when multiple adaptation actions are available and it is not obvious what the best course of action is, when formal economic analysis is required before a decision can be approved by council). A tiered approach like this will reduce the burden of the exercise on communities by avoiding unnecessary expenditure on tier 2 and 3 assessments - e.g., it obviates the need for developing detailed localized climate projections until they are really needed (typically only for tier 3 assessments).*

The ICLEI process is a more comprehensive approach to how climate change (CC) will impact a community. ICLEI focuses on all issues related to CCA and provides a more complete picture of not only what is most pressing now, but how those priorities might change in the future. This detailed approach also creates a stronger level of engagement with the local community. A consequence of using the ICLEI process is the time required to complete, meaning actions at the ground level will not happen right away.

While both processes have similar steps, the approaches are different. The CBT process is organized primarily by CBT and its delivery partners who then create a process designed for the needs of the specific community. The ICLEI process provides a framework, tools and support throughout the process, but the community itself pushes the process forward.is more community driven with ICLEI providing logistical and technical support throughout the process.

In British Columbia the CBT helps communities undertake a rapid assessment and then provides funding to help with implementation of community priorities. How the funding component of the program will be delivered in Alberta, is currently unknown. With the ICLEI process the community pays a membership fee to the program at a cost of $10,000-$20,000 per year, depending on the size of the community. Membership fees cover a number of benefits including access to the web-based Adaptation Tool that assists the community through every step of the process.

BIODIVERSITY AND THE PROCESS

A third process was reviewed as part of early stages of the ABMI BMCC project, called ClimateWise. As this process has not been identified for use in Alberta in the near future, and is similar to the CBT rapid assessment process, it was not included in this assessment. It is, however, worth mentioning that the ClimateWise process did a very good job of including Biodiversity and Ecosystem Services into the process as a whole and included strategies that focused on both green and grey infrastructure.

Green infrastructure is the natural resources (forests, wetlands, etc.) that provide essential ecosystem services. Grey infrastructure is the man made features that provide services. For example as a green infrastructure, forest and wetlands absorb precipitation from storm events. A man made storm water system would fill the equivalent service, as grey infrastructure.

ICLEI has acknowledged the importance of resilience based strategies and green infrastructure in a report released in the past year called *"Finding the Nexus: Exploring Climate Change Adaptation and Biodiversity"*. This report can be viewed here: http://www.icleicanada.org/resources/item/55-adaptation-nexus-series

THE STEPS

Most CCA planning processes consist of a series of steps to walk a community toward resiliency through the development of a CCA Action Plan. Generically the steps involve:

1. Initiate: Establish a local coordinator and steering committee to develop objectives and desired outcomes relating to climate change adaptation.
2. Information: Learn about climate change, what that change will be for the community and determine the expected effects.
3. Planning: Communicate the information back to the community in a meaningful way. Identify key impacts and priorities, evaluate who is at the table and get anyone missing, and come up with a plan to address the issues.
4. Implement: Implement and monitor the plan, constantly reviewing progress and adjusting as need be.

Both of the CBT and ICLEI have organized their process into 5-6 steps, as observed by figures 1 and 2. The steps for both processes are similar, differing slightly in wording and how items are split into the different steps, but for the most part very comparable. It should be noted here that the CBT rapid assessment approach also follows these steps, however it is heavily weighted towards step 6 – implementation. Steps 2-5 are completed through a one-day workshop.

Figure 2: CBT Six Step Process

Six Steps to Successful Adaptation Planning

Step 1 - Get Started
- Make the commitment
- Establish a local coordinator/consultant
- Establish a local steering committee
- Develop a work plan
- Locate resources

Step 2 - Learn About Climate Change
- Seek out local knowledge and observations
- Research historical and available information
- Obtain future climate projections for your region
- Share ideas with your community

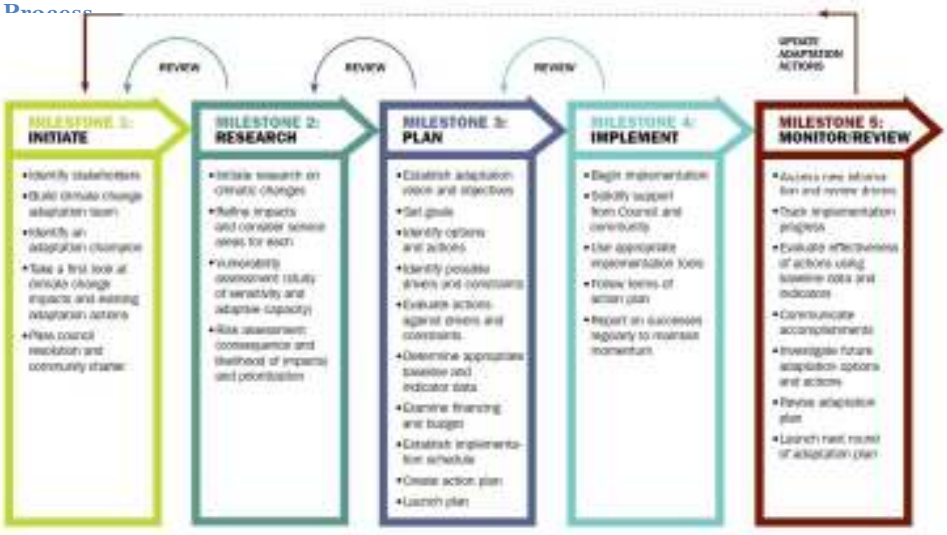
Step 3 - Identify Priorities In Your Community
- Investigate potential impacts
- Identify what is important to the community
- Talk with people about the issues
- Confirm priority issues for further investigation

Step 4 - Assess Vulnerability and Risk
- Complete sensitivity analysis
- Evaluate adaptive capacity
- Determine probability of events
- Establish priority risks and opportunities

Step 5 - Develop Adaptation Strategies and Actions
- Establish goals
- Determine actions
- Assign people to act

Step 6 - Implement and Monitor Plans
- Implement plans
- Monitor progress
- Revise plans with new information

Figure 2: ICLEI Five Step Process



The summarized step descriptions below pertain to just the CBT and ICLEI processes and when necessary are lumped for discussion purposes. Both of these processes have very detailed descriptions and a wealth of information on how to complete each of their respective steps and are worth reading.

- CBT Adaptation Resource Kit http://adaptationresourcekit.squarespace.com/
- ICLEI Guide and Workbook for Municipal Climate Adaptation http://www.icleicanada.org/images/icleicanada/pdfs/GuideWorkbookInfoAnnexes_WebsiteCombo.pdf

Step 1: Initiate/Get Started

The ICLEI guide describes their Initiate step as follows:

> *Milestone One, Initiate, involves the first steps of your climate change adaptation effort. In this chapter you will go through the process of establishing the context of your adaptation plan,*

building your adaptation team, identifying an adaptation champion and solidifying the adaptation planning process through a political commitment.

While both processes break this down differently, the overall intent is the same. Selecting a local champion and/or coordinator, a team of people to help do the work involved, a group of stakeholders to help inform the process, and a commitment from the community are all vital to the success of the process. The importance of this being done properly cannot be understated in order to have a successful process.

An initial discussion about climate change, what it means for the local community and how its impacts might be mitigated through adaptation will help with selecting the right stakeholders and ensuring you have everyone needed at the table.

Creating a work plan and identifying the resources needed for the work plan is also a critical first step for a successful process.

CBT offers a pre-assessment process as to those interested in a CCA action plan process, but are unsure where to start.

Costs at this step will be time and the costs associated with hosting and attending meetings, the overall value differs greatly depending on the size of the community and process being undertaken.

Step 2: Information

CBT and ICLEI have very similar second steps, but CBT has expanded this step into steps three and four as well, while ICLEI has them all as step two. CBT refers to them as "Learn about Climate Change", "Identify Priorities", and "Assess Vulnerability and Risk" while ICLEI refers to the entire step as "Research". The ICLEI guide describes this section as follows:

This segment of the planning process will provide a critical foundation on which all later stages of your adaptation effort will rest. An important part of assessing climate change impacts is not only obtaining information about changes in basic climatic variables such as temperature and precipitation, but also gathering information on what these changes will mean for the resources, infrastructure and residents of your community.

For the purposes of this description the three CBT steps will be combined into step 2 of this generic process description.

Local communities often hire consultants to gather and organize information for step 2, depending on the specific process. In the case of CBT rapid assessment process, downscaling climate data is completed in partnership with the Pacific Climate Impacts Consortium (PCIC). Preliminary impacts on the local community are completed by the local community through a process facilitated by a local coordinator, consultant, or CBT delivery partner. The climate information and impacts are explained to the local community in a way people can relate to, making it meaningful to the community. ICLEI process will use consultants or various available sources for the downscaling of climate data.

In both cases a resulting climate data report is completed and provided back to the community as a reference.

Costs associated with this step include consultants, time and the costs associated with hosting and attending meetings, the overall value differs greatly depending on the size of the community and process being undertaken and how much they are doing themselves.

DOWNSCALING CLIMATE DATA

One of the first parts of this step will be to review climate change data and downscale the data to more accurately reflect the impacts at the scale of a local community. Climate change data by default has a very broad scale being regional at best but more often national in scale. Using local data to inform the climate model creates a more accurate and useful dataset for a local community.

The process of downscaling climate data varies based on approach and the availability of data for a specific area. The work is usually done by a consultant. ICLEI has a number of sources they use to pull together what is needed. CBT has historically used the Pacific Climate Impacts Consortium (PCIC).

This downscaled climate data can be used to estimate changes to local climate. Only factors with long term trends can be downscaled, such as:

- Precipitation, how much and when
- Minimum and Maximum Temperatures
- Specific Humidity
- Incident Solar Radiation
- Fractional Cloud Cover
- Derived Soil Moisture
- Mean Sea Level Pressure
- Relative Humidity
- Surface Temperature
- Soil Moisture Content
- Snow Depth
- Snow Melt
- Degree-Days Below Specific Temperatures
- Number of Frost-Free Days
- Snow fall

These are but a few of a long list of potential factors. Specific communities may have issues or priorities that require very specific information that would be gathered at this point.

Determining Local Impacts

Locally significant climate data can then be used as a foundation for determining the impacts of climate change on the local community. This information will be detailed and specific to the local community and as comprehensive as possible. The more detailed the list of impacts, the better able to see overlaps and risk areas.

Using precipitation as an example, how will the change in amount and timing of precipitation impact flood events? Can the communities' storm drainage system handle this change? Will there be increased drought? What will the impacts be on the flow of the river? Will wells go dry or get polluted with contaminants during flood events? Will there be an increased fire risk? These are just a few of the many impacts that can result from a changing climate.

The CBT rapid assessment process will work with the community to discuss and identify impacts. The CBT has gathered information on a number of common impacts from past processes which are a great resource that outlines the potential impacts on a community.

Determining Vulnerability and Risk

Given the list of impacts of climate change on a local community it is then important to determine their vulnerability. Vulnerability is a measure of the service or impact's capacity to adapt to the effects of a changing climate which takes into account its exposure, sensitivity and adaptive capacity. As an example if a communities' storm water system is at or near capacity already and climate change is expected to bring increased flood events, then the system would be considered vulnerable. If the communities' storm water system is not close to capacity then it would not be as vulnerable.

Vulnerability levels of impacts can then be used to determine the level of risk. Risk is a measure of likelihood of a negative event occurring combined with the negative consequences of that occurrence. Continuing the storm water system example above, the chance of the system failing and what happens when it does fail would determine its risk. A good chance to fail and flooding people's homes as a result, would be a higher consequence than flooding into a discharge area, and thus a higher risk.

It is important to assign some measure of vulnerability and risk to all of the impacts as this will be considered in the process to determine priorities..

Identify Priorities

ICLEI assigns priorities as part of planning, step three, while CBT has priorities as part of steps two through four. While their location in the process is different, the intent is the same. Using the information from the vulnerability and risk assessment, determine those impacts that are most important to the community.

The CBT rapid assessment process focuses on three priority areas for the bulk of the process. One downside to this approach is that the community tends to address their top three concerns, which does not lead to the development of a complete list of strategies that are needed for a

climate resilience community. ICLEI however focuses on all issues of concern, an important component for becoming a climate resilient community. Time, resources and capacity are determining factors in how many priorities a community can focus on

Step 3: Planning

The third step is where the bulk of the CCA action planning process takes place. CBT refers to this step as "Develop Adaptation Strategies and Actions", and ICLEI refers to the step as "Plan". Both processes use this step for the same purpose, with the only notable difference being that only the priority issues are addressed by the CBT process. The ICLEI guide describes this section as follows:

> *Milestone Three, Plan, will help you establish a vision, goals and objectives for your community's adaptation effort. In addition, in this chapter you will use the impacts you identified as well as the results of the vulnerability and risk assessment that you conducted in the previous milestone to help you prioritize the impacts your community faces. Based on these priorities you will develop both short and long term actions to address significant impacts. As you develop your actions, you will also examine the constraints and drivers which may affect your ability to implement your actions. From there you will address the financial aspects of these actions. Finally, using this information you will create and finalize your climate change adaptation action plan.*

The planning step establishes the vision, goals and objectives of the resulting action plan and ultimately determines the adaptation options and strategies to address the issues facing the community and assist them in becoming a climate resilient community. This information becomes the foundation for creating a short and long term action plan that will drive the process towards implementation.

Costs associated with this step include consultants, time and the costs associated with hosting and attending meetings. Writing, printing and distributing the resulting plan is also an expected cost. The overall value differs greatly depending on the size of the community and process being undertaken and how much they are doing themselves.

Vision

The ICLEI guide writes "*Establishing a vision for you adaptation plan provides an opportunity to integrate your adaptation goals into the broader vision of your entire community*". This step while not mandatory allows the team to consider how the plan fits within what you are already doing as a community.

Goals and Objectives

Goals are the high level intentions of the plan. They are broadly stated and reflect the vision of the community; what they want the plan to accomplish, not at a specific level, but over-arching. For example a goal might be "To manage existing water supplies so that no additional sources of water are required".

Objectives are the short and long term intentions of how to meet the goals of the plan and address the impacts of climate change. An objective to match the goal mentioned above might be "Develop plan for conserving water through educational outreach and policy reform".

STRATEGIES

Strategies are the specifics of the objectives, the higher level action items on how the objectives will be accomplished. This takes into account the options available for adapting to climate change and what is driving the climate change issues. Continuing the example from above, an action item might be "Install water meters on all commercial and residential buildings to determine how and when water is being used" or "Complete integrity audit of water mains and system to fix all leaks".

Step 4: Implement

Implementation is not just about running out and ticking off action items from the plan, it is also about setting the stage so that success can be achieved. Just a few of the thoughts that should be considered before embarking on implementation:

- Depending on how involved the public was with the creation of the plan, it may be necessary to spend time to get the community caught up and on side of the plan.
- Evaluate if people need training, and get them what they need.
- Ensure that the community has all the tools needed for implementation and if not, determine how to get them.
- If and what outside expertise is needed?

CCA Action Plans are just starting to reach the implementation stage in other areas and as such the amount of information on implementation is limited. Even less information is available on how best to review progress on the plan.

Costs associated with implementation are greatly dependent on the CCA impacts being addressed.

MIISTAKIS INPUTS

The Miistakis Institute has reviewed these CCA Action planning processes to understand how we can assist rural communities in Alberta to become climate resilient. We have identified the CCA action planning process as an important process to support. One of our key objectives was to avoid duplication of effort, to increase efficiencies of those working on addressing climate change and climate change adaptation in Alberta.

After careful consideration of the two processes currently being used or most likely to be used in Alberta, the Miistakis Institute has identified several potential areas where Miistakis may be able to contribute to CCA Action Planning Processes.

Task Description	Location within Process
Downscale and Represent Climate Data	Step 2
Link Local Climate Change Impacts to Biodiversity and Ecosystem Services	Step 2 and Step 3
Link Ecosystem Services and Biodiversity management to Local CCA Action Plan Resiliency Strategies	Step 3
Review Plans and Polices for Rural Municipalities	Step 3
Create Climate Resilience Communication Materials	Pre-Step 1, Step 4

Downscaling Climate Data

Downscaling Climate Data can be an important part necessary part of any community based CCA adaptation planning process as part of Step #2: "Information". Miistakis Institute plans to explore the process of downscaling climate data, including a dialogue exchange with ICLEI and C3 on how they plan to approach this important step in Alberta, and determine what, if anything can be done to make this more efficient for both processes and communities in Alberta.

Link Local Climate Change Impacts to Biodiversity and Ecosystem Services

Given that many issues and solutions are related to Biodiversity and Ecosystem Services (ES) to some extent, it is important that CCA impacts be included as part of the process. However, very few CCA Action Plan processes include strategies that address biodiversity and ecosystem services. ICLEI in the last year published a Nexus document explaining why this is an important part of the process (http://www.icleicanada.org/resources/item/55-adaptation-nexus-series). Another process, ClimateWise, that is very similar to the CBT rapid assessment, was inclusive of biodiversity within the process.

Miistakis Institute plans to explore how we can inform the discussion around impacts in Step 2: "Information" to encourage the inclusion of Biodiversity and ES information. Using the grasslands natural region as an example Miistakis hopes to create an understanding of environmental changes likely to occur due to climate change and an assessment of the implications to ecosystem services a rural community depends on.

Link Ecosystem Services and Biodiversity Management to Local CCA Action Plan Resiliency Strategies

As mentioned in the section above, biodiversity and ecosystem services are often a part of the issues and solutions for many impacts and can be useful in creating strategies for dealing with those impacts. In many CCA planning process strategies focus on grey infrastructure when determining strategies to deal with a changing climate. There are case studies where a green infrastructure approach was more cost effective and also contributed to more ecosystem services than a grey infrastructure approach.

In the context of the grasslands natural region Miistakis plans to inform the discussion in Step #2: "Information" by creating an understanding of the relationship between the impacts and the related biodiversity and ecosystem services while provide suggestions for including green infrastructure strategies where appropriate.

Review Plans and Polices for Rural Municipalities

Often actions to assist with CCA are already being completed within existing plans and policies. In order to help inform the discussion in Step #3: "Planning", Miistakis plans to create documentation to provide a high-level sense of how resilience-based climate change adaptation strategies might fit into existing municipal plans and policies, which can inform the development of generalized but plausible and inspiring examples.

Through its CCA planning process, CBT works with communities to on integrate CCA strategies into existing planning, policy and operations. They are currently working on a climate resiliency model bylaw for storm water drainage, and have supported communities to integrate climate science, impacts and adaptation measures into:

- A regional flood hazard study;
- A corporate communications strategy;
- A streamflow monitoring project;
- A source water protection plan;
- Official community plans and development permit areas;
- A wetland restoration project;
- Infrastructure renewal projects; and
- A geotechnical hazard assessment.

Create Climate Resilience Communication Materials

Miistakis plans to create story-based, Alberta specific, solution-oriented communication materials which help local decision-makers to embrace a proactive, resilience-based approach to climate change adaptation.

These materials could be used in many ways. One of these would be to get the discussion started and help people understand climate science and impacts, and the importance of doing a CCA planning process within their community. They could also be used to inform a community of why climate change adaptation is important in preparation for the release of a CCA Action Plan.

CONCLUSION

It is encouraging that at least two CCA Action Plan processes are being used in Alberta. The similarities between the two processes provide an opportunity to collaborate and work together on common tools that will benefit both processes as well as the communities in Alberta.