
PRIMER for PATHWAYS TO CLIMATE RESILIENCE



A GUIDEBOOK FOR RURAL CANADIAN COMMUNITIES IN FOREST AREAS

Most rural Canadian communities located in forested settings have experienced changes in the local climate in recent years. Some of these changes include:

- warmer and shorter winters;
- hotter summers with longer dry periods;
- more frost-free days and a longer growing season; and
- more intense and more frequent storm events, often with higher winds.

These communities have also seen changes in the natural environment and local ecosystems such as:

- increase in the number, size and intensity of wildfires;
- higher stream flows earlier in the year and lower summer flows that start earlier and last longer into the fall;
- shifts in plant and animal species, with plants dying in some areas and showing up where they have not been seen in the past, and animals roaming where they are not usually seen; and
- unusual insect and disease outbreaks.

These types of changes are expected to increase in the future with a wide variety of environmental, economic and social effects on communities.

Climate change is likely to create unique challenges for rural communities in forested areas because:

- the increased occurrence and scale of wildfires may subject residents to greater risk of property loss, crop loss, job disruptions, travel disruptions, health impacts, and/or evacuation;

- these communities are often located near waterways with increased flood potential;
- residents are closely connected to forests and the environment through recreational, cultural and economic activities which may be impacted, both positively and negatively;
- where the forest industry is the foundation of the local economy, pest outbreaks and wildfires may affect wood supply and change economic opportunities.

Rural Canadian communities have always contended with weather related challenges. The often isolated location of these communities has meant that they have had to cope with disruptions by relying on their own resources. Rural Canadians know how to pull together to support one another through difficulties. The climate changes we are now experiencing, and will experience in the future, will test our ability to adapt, calling for new and different ways of coping created by new climate conditions.

There are also a number of potential opportunities for forest-based communities as the climate changes:

- warming temperatures may increase the wood supply or expand the diversity of timber species that can be grown for local and other timber markets;
- warming temperatures with longer growing seasons may expand agriculture and tourism activities with opportunities to diversify the local economy; and
- a warmer climate may enhance the recreational and cultural activities enjoyed by local residents.

The opportunities and challenges experienced by individual communities will depend on the climate

Weather & Climate are Different

Weather is what we experience day to day and week to week up to months.

Extreme weather event - An event that is rare within the weather conditions at a particular place.

Climate is the long-term average weather conditions over 30 years or more.

changes that occur, how the local environment changes and adjusts, and how each community adapts to these changes. Individuals, families, organizations and governments will need to view climate as an ongoing changing factor, and consider how a changed climate will influence their day to day lives as well as over the long term.

Once the community understands the climate risks, individual households, businesses, other organizations and governments can all decide how to take action to strengthen their resilience to these risks.

The purpose of the Guidebook and this Primer is to assist rural forest-based communities in Canada to become more climate resilient.

Tacking Action Now to Strengthen Resilience

The exact nature of the climate and environmental changes that will be experienced over the long term cannot be defined with complete certainty at this time. In fact, it is likely that some of the changes will not have been expected or planned for, or they may occur earlier than expected. Therefore it is not possible to 'climate proof' any community. However, it is possible to become more 'climate resilient'. This is the purpose of the Guidebook and this Primer.

Some may say we don't know enough yet to decide how to respond to climate change. The summary from the 2007 Canadian assessment *Impacts to Adaptation: Canada in a Changing Climate* urges us to think differently:

'Although further research will help to reduce uncertainties and to address specific knowledge gaps and adaptation planning needs, existing knowledge is sufficient to start undertaking adaptation activities in most situations..

Relevant portions of the *Summary* from this report and the 2014 update is provided on the next page.

A Climate Resilient Community

- ▶ Considers a range of potential local climate futures in all decisions and plans.
- ▶ Has a high level of tested emergency preparedness.
- ▶ Invests in public awareness, community technical capacity and adaptive capacity of systems to respond to climate change.
- ▶ Has strong partnerships which can swiftly come together to make decisions and take action to address new challenges and opportunities.
- ▶ Frequently (every 3-5 years) checks for new conditions, information or techniques to update their actions.

From the Summary of *Impacts to Adaptation: Canada in a Changing Climate 2007* and *2014 Update - Sector Perspectives on Impacts and Adaptation*

Climate change adaptation involves making adjustments in our decisions, activities and thinking because of observed or expected changes in climate, in order to moderate harm or take advantage of new opportunities. It is a necessary complement to the reduction of greenhouse gas emissions in addressing climate change at the global level. The following bullets represent key conclusions arising from these national-scale assessments of climate change impacts and adaptation:

- Canada's climate is changing, with observed changes in air temperature, precipitation, snow and ice cover and other indicators. Further changes in climate are inevitable.
- Changes in climate are increasingly affecting Canada's natural environment, economic sectors and the health of Canadians.
- Extreme weather events are a key concern for Canada and there is growing confidence that some types of extreme events will increase in frequency and/or intensity as the climate continues to warm.
- Climate change will exacerbate many current climate risks, and present new risks and opportunities, with significant implications for communities, infrastructure and ecosystems.
- Climate change impacts elsewhere in the world, and adaptation measures taken to address these, will affect Canadian consumers, the competitiveness of some Canadian industries, and Canadian activities related to international development, aid and peace keeping.
- Adaptation is accepted as a necessary response to climate change, complementing global measures to reduce greenhouse gas emissions. Adaptation enhances the social and economic resilience of Canadians to climate change impacts.
- Adaptive capacity in Canada is generally high, but is unevenly distributed between regions and within populations. Resource-dependent and Aboriginal communities are particularly vulnerable to climate changes. This vulnerability is magnified in the Arctic.
- Adaptation is occurring with increasing frequency and enhanced engagement.
- Integrating climate change into existing planning processes, using risk management approaches, is an effective approach to adaptation.
- Continued action will help to build capacity to address information needs and overcome challenges.
- Adaptation can sometimes turn risks into opportunities, and opportunities into benefits.
- Collaboration and adaptive management are approaches that governments and industry are increasingly pursuing to advance adaptation.
- Barriers to adaptation action need to be addressed, including limitations in awareness and availability of information and tools.
- Although further research will help to reduce uncertainties and to address specific knowledge gaps and adaptation planning needs, existing knowledge is sufficient to start undertaking adaptation

Following the Climate Resilience Trail Map

Communities who embark on the climate resilience journey quickly discover it is a new adventure for Canadian communities, and particularly so for small communities. Although there is an overwhelming amount of information about climate change and adaptation to these changes, information specific to rural communities is sparse. As well, every community is different and will need to take the climate resilience journey in their own way, and on their own time.

The Guidebook doesn't provide one specific way to strengthen climate resilient. Rather, it offers a map of the usual activities - the Trail Map - with a number of alternative tools, techniques and approaches - Pathways - for each activity along the way from which communities can choose the best ways to meet their needs.

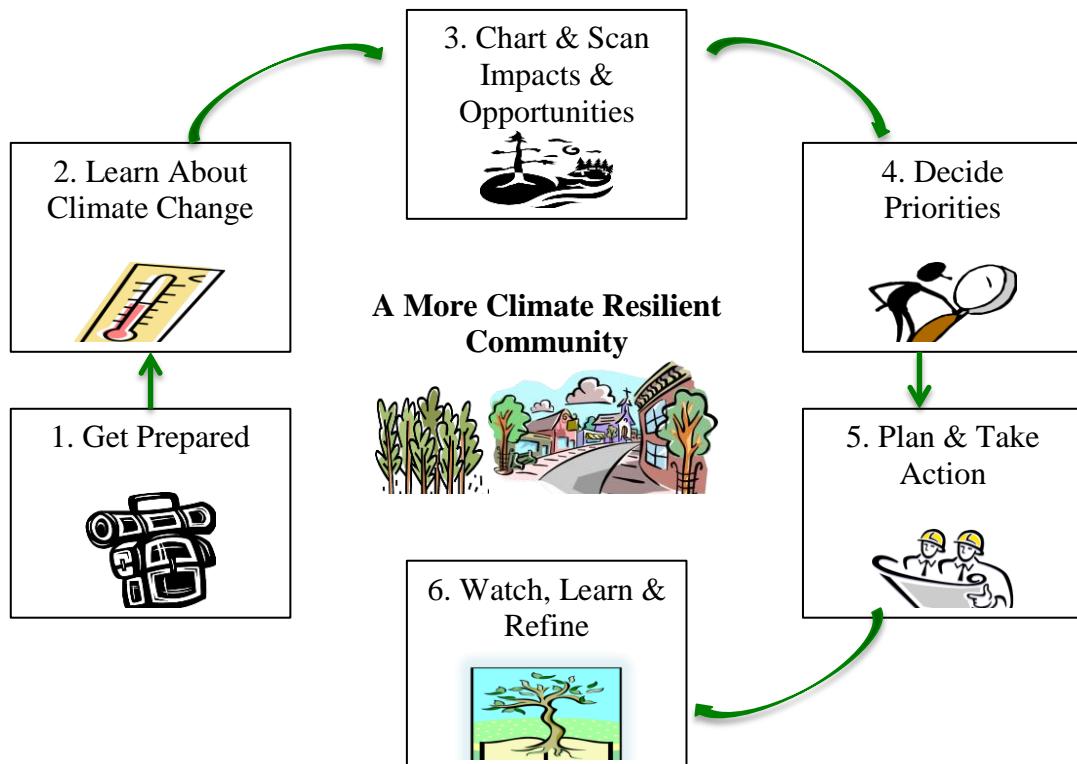
The Trail Map below shows the steps towards community climate resilience. Each step is described in the table on the following pages.

Strengthening climate resilience will be an ongoing long-term activity for rural Canadian communities located in forest settings. The *Pathways to Climate Resilience Guidebook* is designed to support communities in this effort

Black River First Nation Case Study

The Black River First Nation is located 140 km northeast of Winnipeg, on the edge of Lake Winnipeg and at the interface of the aspen parklands and the boreal forest. There are about 700 band members living on reserve. In 2012 this First Nation piloted the *Guidebook* to create a Climate Resilience Plan. This case study is described alongside the description of each steps in the Climate Resilience Pathway.

Climate Resilience Trail Map for Rural Canadian Forest-based Communities



**Revisit Steps 2-5 as needed*

Climate Resilience Step	Black River First Nation Case Study
<h2>1 - Get Prepared</h2> <p>Purpose: Decide the most efficient way to integrate climate resilience into community decisions, who should be involved, what expertise may be needed and where to access information, expertise and funding if needed.</p> <p>Critical tasks:</p> <ul style="list-style-type: none"> Identify at least one respected community member who is willing to be a climate resilience champion to encourage community engagement and action. Describe climate change community impact examples showing how climate change is now affecting the community, and how it may in the future. Reach out to selectively engage community leadership, staff and key community organizations using the impact examples to explain the importance of climate resilience. 	<p>Champion and engagement - The community's Project Manager was the champion for the project. He secured Council approval for the project. An existing Technical Advisory Committee served as a community 'core team' with elders, youth and Nation staff involved in the project when needed.</p> <p>Climate change community impact examples - From recent climate change workshops and actual events, the Manager was aware of increasing wildfire risks to the community.</p> <p>Expertise, information and funding - The community partnered with the Manitoba Model Forest to continue to build on past joint activities. A project team was created with Dr. David Price from the Canadian Forest Service, who studies climate change and boreal forest impacts, a local wildfire expert and the lead author of the Guidebook. The community secured funding from Aboriginal Affairs and Northern Development Canada's Climate Change Adaptation Program.</p> <p>How to integrate climate resilience - As the community doesn't currently have a planning structure to 'mainstream' climate resilience into, it was decided that a stand-alone Climate Resilience Plan would be prepared.</p>
<h2>2 - Learn about Climate Change</h2> <p>Purpose: Community members understand historical and future climate change in the local context.</p> <p>Critical tasks::</p> <ul style="list-style-type: none"> Share community observations about changes in climate, weather and extreme events locally as well as how local ecosystems have changed, and how this has affected our community Prepare a climate profile that describes changes in historical seasonal temperature and precipitation over the past 50 to 100 years to help communities understand how seemingly small changes in climate can result in substantial effects on rural lives. 	<p>The project team and the core committee met for a two day workshop to kick off the project. The first day was focused on learning about climate change.</p> <p>Community observations - The core team began by defining community goals and documenting observations about changes in local climate, weather and the environment, and community implications.</p> <p>Climate profile - Dr. Price showed that, over the past 60 years, the average seasonal temperature has increased the most in winter and fall, and precipitation has increased mainly in fall and summer. These findings were consistent with the</p>

<ul style="list-style-type: none"> Understand projections of future climate changes and what these changes might mean to community life. <p>All community members should have an opportunity to learn more about the changing climate, as the impacts in rural Canadian communities are likely to impact everyone in some way.</p>	core team's observations of changes. Projected future climate - Using the results from global climate models, Dr. Price then explained the projected future climate changes, which generally intensified the changes that were already being observed. Dr. Price also summarized the expected environmental changes from these changes including northward movement of the aspen parkland and grassland ecosystems found in southern Manitoba, more frequent and intense wind events and longer, hotter wildfire seasons with more large, uncontrollable wildfires.
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3 - Chart Impacts, Risks and Opportunities

<p>Purpose: Identify current and potential future climate, weather, environmental and community impacts to begin to define possible risks and opportunities.</p> <p>Critical tasks:</p> <ul style="list-style-type: none"> Create impact charts by diagraming the potential implications of the projected seasonal climate changes and changes in weather to environmental then community impacts to identify climate risks and opportunities. Use checklists of climate change impacts and actions for Canadian communities in the Guidebook for community members to check their ideas with scientific findings. Complete a technical review by climate change adaptation specialists to support the community to identify risks and opportunities - especially to imagine future impacts. 	<p>On the second day of the workshop, based on their new understanding of climate change and impacts locally, the core team focused on charting impacts, risks and opportunities.</p> <p>Impact charts - The team worked in small groups to create separate impact maps showing how expected changes in storms, wildfire, river/lake conditions and forest/wildlife were currently impacting the community and implications for the future.</p> <p>They also noted actions the community could take to become more resilient to these impacts and opportunities.</p> <p>Checklists/technical review - The core team compared their findings to the checklists in the Guidebook and added information they had missed, which was minimal. Dr. Price and the Guidebook lead author reviewed the charts, with few additions.</p> <p>That evening a community feast was held as a forum to share information from the workshop.</p>
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4 - Decide Priorities

<p>Purpose: Identify the climate risks that are priorities for your community to take action to reduce, and the priority opportunities.</p> <p>Critical tasks:</p> <ul style="list-style-type: none"> Define the scale of potential implications from each climate change in terms of achieving community goals such as safety, infrastructure, economy and quality of life. Identify community resilience strengths and challenges in terms of human resources as well 	<p>During the second two-day workshop, the core and project team first revisited the climate change information, as it usually takes a few discussions for this new learning to be fully understood.</p> <p>Scale of potential implications - The core team evaluated potential implications from the identified climate risks in term of achieving their community goals of a safe community,</p> <p>Community resilience strengths and challenges - The team agreed that the community has strong human and cultural resilience, however financial</p>
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<p>as technical, financial and organizational capacities - think about how well the community fared during a recent challenging situation, especially a weather related event.</p> <ul style="list-style-type: none"> Identify the highest priority climate risks which have the greatest implications for the community, and the community has the least resilience to. Identify highest priority opportunities that the community could act on easiest, with the greatest benefits. 	<p>resources, technical expertise, access to equipment/technology and poorly designed and/or constructed infrastructure were identified as challenges.</p> <p>Highest priority climate risks and opportunities - By comparing the scale of potential implications with community's resilience challenges, the core team identified increased emergency events with infrastructure damage (hydro, telephone, water and sewer), flooding, reduced wild foods, and wildlife-human incidents were defined as high priorities in the short term.</p> <p>Shorter ice season was not a short term priority, but might become a priority in the future. Economic impacts were difficult to evaluate as there were very limited economic activities locally at the time. However, employment and business opportunities were identified in wildfire suppression and infrastructure weather-proofing.</p>
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5 - Plan and Take Action

<p>Purpose: Define goals and priority actions, then implement actions to reduce climate risks and benefit from opportunities.</p> <p>Ideally this step should be integrated or 'mainstreamed' into all relevant community plans and decisions for ongoing activities such as emergency preparedness and response, road maintenance and construction; water management; and building construction. Alternatively a stand-alone Climate Resilience Action Plan can be created. Households, businesses and community organizations will also likely need to plan and take action to reduce climate risks.</p> <p>Critical tasks:</p> <ul style="list-style-type: none"> Create an action plan which defines community goals to describe the desired outcomes, lists and evaluate potential actions to define priority actions and defines leadership and timelines for priority actions. Implement the action plan over time. 	<p>Action Plan: On the second day of the second workshop the core team worked in small groups again to develop a Climate Resilience Action Plan for six climate resilience goals:</p> <ol style="list-style-type: none"> Safe drinking water Improved sewage treatment and discharge Strengthen emergency preparedness and response Reduce wildfire risks Stop shoreline erosion Mainstream climate change in all community and household decisions <p>The action ideas the team had posted on the impact charts were listed under each goal and the team reviewed the Guidebook Action checklists for more ideas. Priority actions were identified based on criteria such as community implications, funding available and feasibility, then defined timeframe and leadership were decided for each priority action. The high priority actions in 2012 are shown in the table on page 9.</p> <p>Implementation - In late 2012 AANDC initiated upgrades to the water treatment plant that address some of the identified climate risks. AANDC has also</p>
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	<p>initiated a study to upgrade the sewer treatment plant.</p> <p>In 2013 and 2014 the community again partnered with the Manitoba Model Forest to secure funding from AANDC to act on four of the urgent actions: preparing an Emergency Preparedness and Response Plan, a Community Wildfire Protection Plan, and a Wildfire Protection Plan for the planned cottage development, as well as conduct a shoreline erosion assessment. These plans were prepared through workshops with community leadership, staff and the community core team.</p> <p>In 2013 a 4-page Infosheet was prepared to share the learnings with all Band members. During a community feast following a project workshop in 2014 handouts about household and tornado emergency preparedness were distributed, along with the Infosheet.</p>
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6 - Watch, Learn and Refine

<p>Purpose: It will take many decades for the earth's atmosphere to adjust to the past and ongoing greenhouse gas emissions. Consequently, the climate will continue to change somewhat, for several decades. Communities will need to watch, learn and refine their actions to continuously strengthen their climate resilience.</p> <p>Critical tasks:</p> <ul style="list-style-type: none"> • Monitor media and science reporting on climate change and community climate resilience and bring relevant information to the community. Monitor action plan implementation to facilitate completion of actions and learn about the effectiveness of the actions. • Update priority climate risks, plans and actions based on new scientific information; local observations and knowledge; and learning by your community and others about how climate impacts your community, and which climate resilience actions are most effective. 	<p>The Black River community is at the beginning of implementing their action plan. They now have several action plans that need to be fully implemented. It can be expected that the community's identified resilience challenges of finances and technology will make full implementation difficult in some cases.</p> <p>Monitor - The community could identify a series of indicators that would signal whether the actions are strengthening community resilience, such as number of days without potable water; number of weather-related emergency events and how well the community responds to each event, etc.</p> <p>Update - The Climate Resilience Action Plan should be updated in no later than 10 years, or earlier if the majority of the actions are completed.</p>
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Black River Nation Climate Resilience Action Plan 2012

Community Goal	Priority Action	Priority-Timeframe -Lead
1. Safe drinking water	<ul style="list-style-type: none"> • Bottled water available to everyone • Relocate treatment plant intake and upgrade treatment level 	Most urgent - Underway – Council/AANDC 
2. Improved sewage treatment and discharge	<ul style="list-style-type: none"> • Increase treatment capacity to eliminate overflows to O'Hanly River 	Most urgent – Study underway – Council/AANDC 
3. Strengthen emergency preparedness and response	<ul style="list-style-type: none"> • Create and test an emergency preparedness and response plan • Support households to improve preparedness 	Most urgent – 2013 – Council/Project team 
4. Reduce wildfire risks	<ul style="list-style-type: none"> • Assess community wildfire risk • Develop and implement community wildfire protection plan 	Most urgent – 2013 – Council/Project team 
5. Stop shoreline erosion	<ul style="list-style-type: none"> • Map risk areas • Prepare and implement shoreline protection plan 	Most urgent – 2013 – Council/Project team 
6. Mainstream climate change in all community and household decisions	<ul style="list-style-type: none"> • Comprehensive community plan will address housing, health and other topics 	2013 – 

The *Black River Climate Adaptation Summary Report, 2012* summarizes this process. This report and other project reports are available from the Black River First Nation office (204-367-4411) or from the Manitoba Model Forest website - www.manitobamodelforest.net.

Alternative Pathways - The City of Revelstoke Case Study

There are many *pathways* that individual communities might follow to strengthen climate resilience. This case study describes how the City of Revelstoke in B.C. has strengthened their climate resilience over the past decade.

The City is located in the mountainous southeast portion of B.C. It has a year-round population of about 8,000, as well as a growing winter and summer tourist and seasonal worker population. The City has 'mainstreamed' climate change into ongoing community decisions through two processes described in the table below.

2006 Pathways	2011 Pathways
1. Get Prepared	
The City was updating its Community Development Action Plan, a comprehensive plan that includes and prioritizes actions across a wide ranging set of social, economic and environmental goals. A Steering Committee with representatives from City Council, key community organizations and citizen appointees identified climate change as one of four challenges to be incorporated in the plan. For the climate change challenge, the City invited a team of scientists who were working on a compilation of climate change science and impact information for the regional area to support the Committee.	To reassess climate risks, the City decided to participate in a regional climate change adaptation initiative ¹ . City Council approved the project and the City Environment Coordinator was the champion, with senior engineering and other staff also on board.
2 - Learn about Climate Change and 3 - Chart Impacts and Opportunities	
The team provided an evening presentation on their work, held a breakfast meeting with City Council and participated in a day long workshop with representatives of community organizations and community members. This workshop resulted in lists of local observations, climate change impacts and potential actions for tourism, forestry, transportation infrastructure and water that were compiled and shared through existing email lists.	The Initiative provided a climate scientist and four community facilitators to lead the community process. An evening public event was held where participants provided their observations of local climate changes, the climate scientist made a presentation about historical and future climate conditions, and in small groups participants charted impacts and opportunities. The same activities were held at a workshop the next day with City staff and some members of City Council.
4 - Decide Priorities and 5 - Plan and Take Action	
The project team and the Steering Committee then prepared a draft Action Plan that 'mainstreamed' the suggested climate change actions. Community members were invited to prioritize these actions, and the Steering Committee and City Council approved the final Plan.	Participants at the City workshop were asked to identify four priority climate risks/opportunities from their perspectives. Wildfires, tourism/recreation, infrastructure and water supply were cited most often. The workshop participants then met in small groups to list actions to increase climate resilience to the identified risks, define the most important to implement and indicate leadership and partnerships for successful implementation. The table on the next page shows the resulting 'Starter' Action Plan.
6 - Watch, Learn and Refine	
The City hosted an annual review and update of the Action Plan.	The 'Starter' Action Plan was incorporated in the 2012 Integrated Community Sustainability Plan which will be reviewed annually.

¹ [Columbia Basin Trust Communities Adapting to Climate Change Initiative](#)

Summary of Priority Climate Impacts and Actions – Revelstoke 2011

Wildfires	Tourism / Recreation	Infrastructure	Water Supply
Implement enhanced wildfire risk mapping and updated wildfire protection recommendations from Community Wildland Fire Protection Committee	Incorporate climate change into future plans	Develop Stormwater Management Plan	Implement water metering
	Conduct tourism market research	Ensure adequate water for fire response	Develop water conservation education program
	Develop economic diversity and balance strategy	Develop Illecillewaet Flood Management Plan	Develop Watershed management plan
		Consider climate change in future development	Conduct leak detection and repair

Note: Actions in shaded boxes are being implemented as of 2015.

Who is the Guidebook and this Primer for?

The Guidebook and this Primer are designed for small (less than 10,000 population) rural Canadian communities located in forested areas. These communities are especially exposed to the impacts of climate and climate change, and in some situations, there are unique opportunities for these communities to benefit from climate change.

Many rural community residents and senior governments are turning to municipal, First Nations and other forms of local government to take leadership in responding to climate change. While it is essential that local governments be involved in strengthening local climate resilience, it isn't essential that they lead the process. The Guidebook and this Primer can be used by any community organization or individual who seeks to better understand local climate changes and take actions to strengthen their community's resilience or the resilience of a specific part of the community (e.g. their workplace or business, or community organizations they are involved with).

Climate change is likely to touch the lives of every resident in more than one way in Canadian forest-

based communities. Flooding may damage property and roads, blocking travel and supply routes; hot summer days may tax older residents without air cooling; and workers in forestry, tourism, agriculture and mining may experience work disruptions from wildfire risks, droughts or unstable snow conditions. Over time, most residents will need to change some of their activities to adjust to climate changes.

As a result, it is important that information about climate change be 'mainstreamed' to as many community members and organizations as possible. Regardless of who leads a climate change resilience initiative, opportunities should be created for the broader community to share their views and learn about local climate changes and how to strengthen climate resilience.

How the Guidebook Can Help

The Guidebook provides a simple framework or Trail Map that rural Canadian forest-based communities can follow as they assess and decide on actions to strengthen local resilience as the climate changes.

The Guidebook includes one chapter for each step on the climate resilience Trail, with the following information:

- tools and techniques for accessing and using information including:
 - the types of information that will be needed;
 - information sources (people, reports and websites);
 - alternative ways to organize, present and evaluate the information;

- advice from communities that have worked to strengthen climate resilience and references to these communities;
- alternative approaches to inform and involve community members, technical specialists, managers and community sectors (e.g. forest industry, emergency services, municipal governments, First Nations,,etc.); and
- definitions for important terms.

A separate **Community Resource Collection** document has been compiled with lists of useful references, example community planning approaches and samples of community learning materials and information.

For More Information

This is an initiative of the Canadian Model Forest Network. The full Guidebook and Community Resource Collection can be found on the Network website at www.modelforest.net.

You can contact the Guidebook lead author, Cindy Pearce at 250-837-8505 or cindypearce@telus.net.