MANITOBA CLIMATE RESILIENCE TRAINING

Capacity Enhancement in Vulnerability and Risk Assessment (CEVRA) Project Workshop

Municipalities and Watershed Districts

Beausejour, MB

March 20, 2024

AGENDA

10:00 – 10:15	**Introductions**
10:15 – 10:30	**Getting Started**
10:30 – 12:00	**Assessing Current and Future Climate Risks**
	Stage 1: Getting Started
	Stage 2: Assessing Climate Risks
12:00 – 12:30	**Lunch Break**
12:30 – 1:30	*Stage 2: Assessing Climate Risks, cont.*
1:30 – 3:00	**Next Steps**
	Stage 3: Adaptation Actions

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INTRODUCTIONS

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Introductions - HTFC

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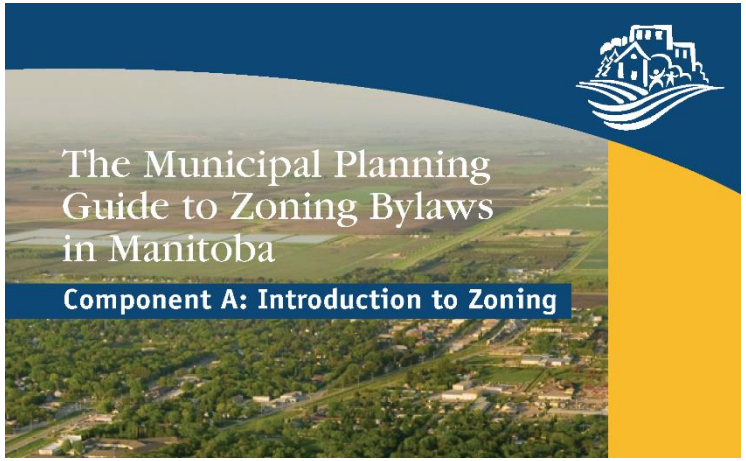
The Leaf / Diversity Gardens

Oodena Celebration Circle



Zoning Bylaw Guide

Kelsey Planning District Development Plan

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Introductions - HTFC

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HTFC's Environmental Planning and Design Projects

Bioswales

Green Roofs

Rain Gardens

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Introductions

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We now invite you to share:

- Your name
- Your municipality, watershed district or organization
- Your role

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Program Context

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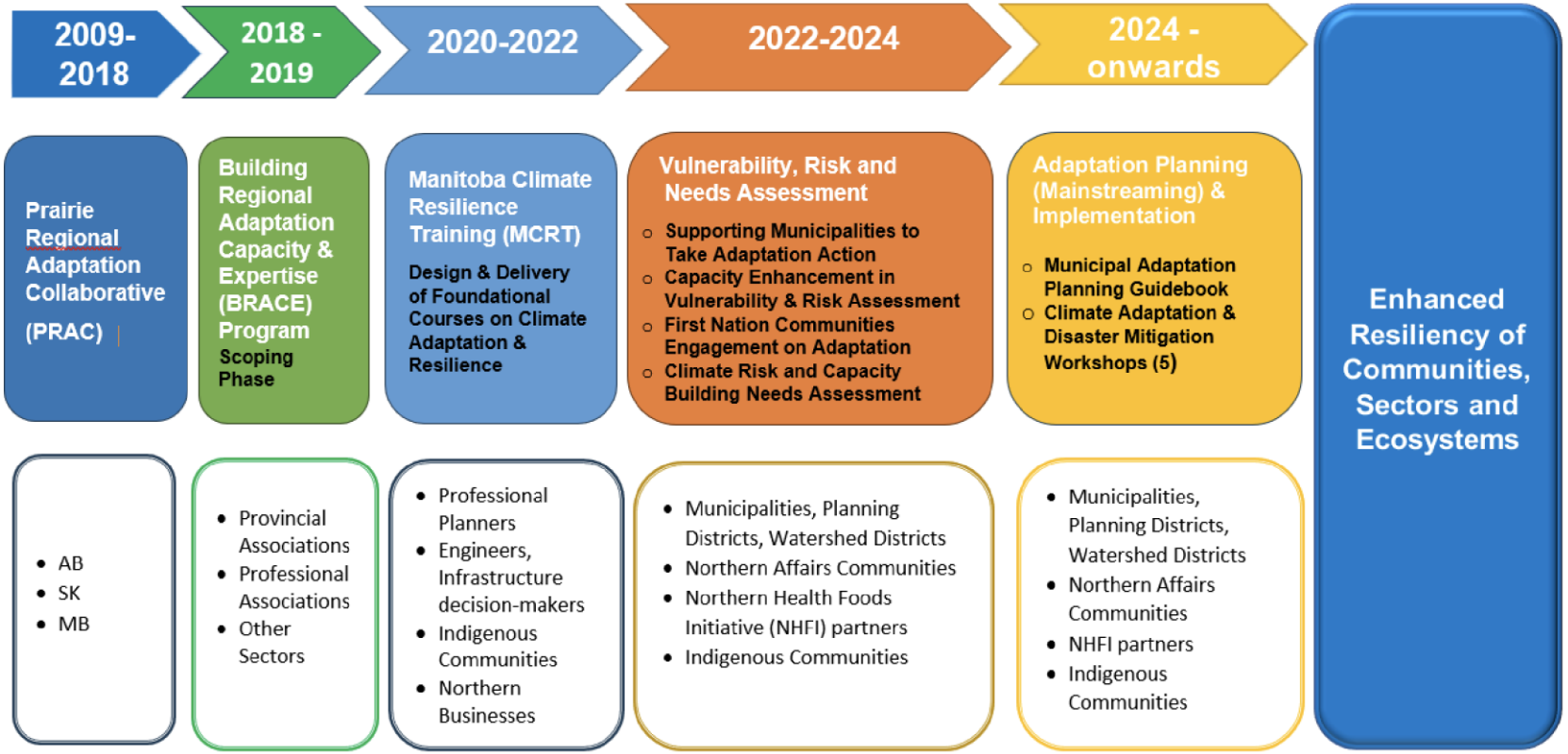
Manitoba Climate Adaptation Initiatives

Climate Adaptation and Disaster Mitigation Workshops



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Manitoba's Adaptation Objectives

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- Make MB a safe & desirable place to live and invest in under a changing climate.
- Invest in training and information to make the best decisions going forward.

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Manitoba's Adaptation Objectives

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- Capture the adaptation & resiliency work already occurring across the province and document best practices
- Consider policy and programs that support broader climate mitigation and adaptation efforts

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What We Heard

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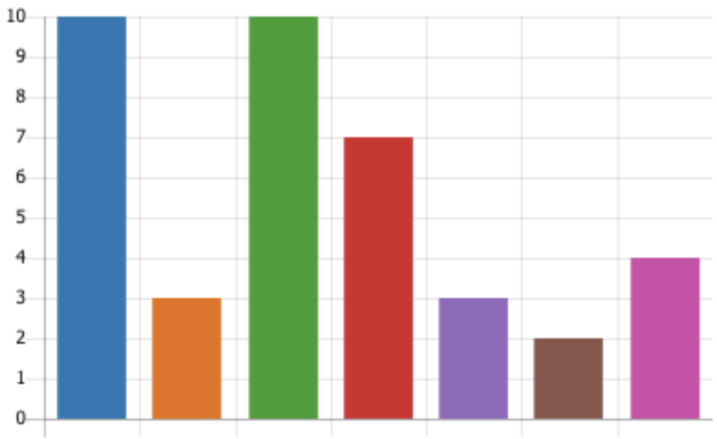
- **We asked:** What work has your municipality or district done to date to prepare for a changing climate?



- Nothing specifically for climate change
- Nothing yet, but we plan to
- Research into the effects of climate change
- Incorporated climate change projections into a development plan or integrated watershed management plan
- Started or completed a climate vulnerability and risk assessment
- Started or completed a climate adaptation plan
- Other

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What We Heard

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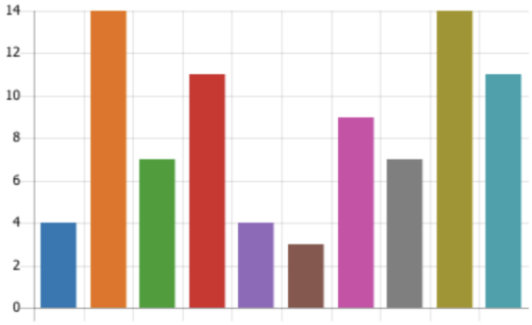
- **We asked:** What areas of focus would help you get the most out of this workshop?



- Background information on climate change
- **Understanding future projections for your municipality**
- How to use online tools like the Climate Atlas of Canada
- **Identifying climate-related hazards in your community**
- Exploring the impacts of climate-related hazards
- Predicting how these hazards will change in the future
- **Walking through a vulnerability & risk assessment together**
- Prioritizing climate-related risks to prepare for in planning
- **Discussing actions to prepare for a changing climate**
- **Learning more about green infrastructure**

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Today's Key Takeaways and Goals

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1. **Understand** the projected climate future for your community or district
2. **Recognize** climate hazards and how they could change in the future
3. **Identify & assess** the risks to your community
4. **Start to Plan** how to mitigate and adapt to the risks
5. **Adopt** a mentality of planning for the worst while hoping for the best

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CLIMATE ACTION PLANNING PROCESS

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Climate Action Planning Process

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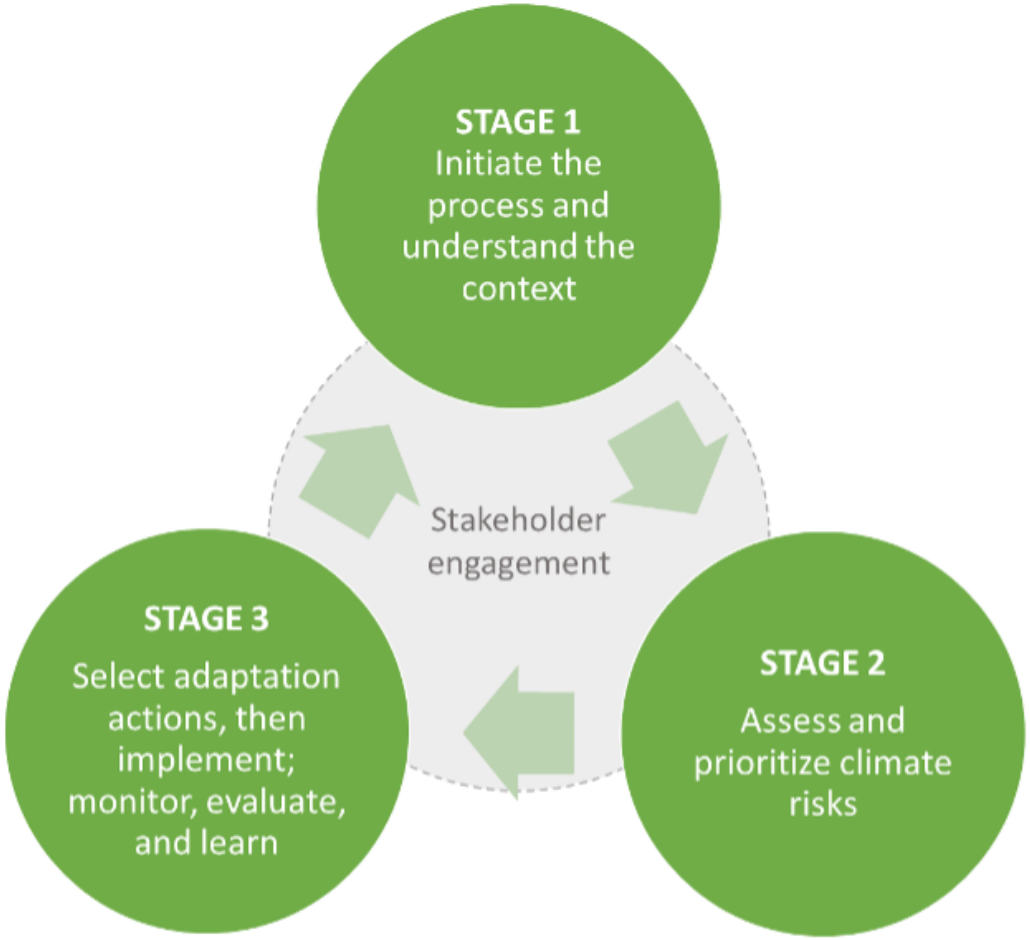

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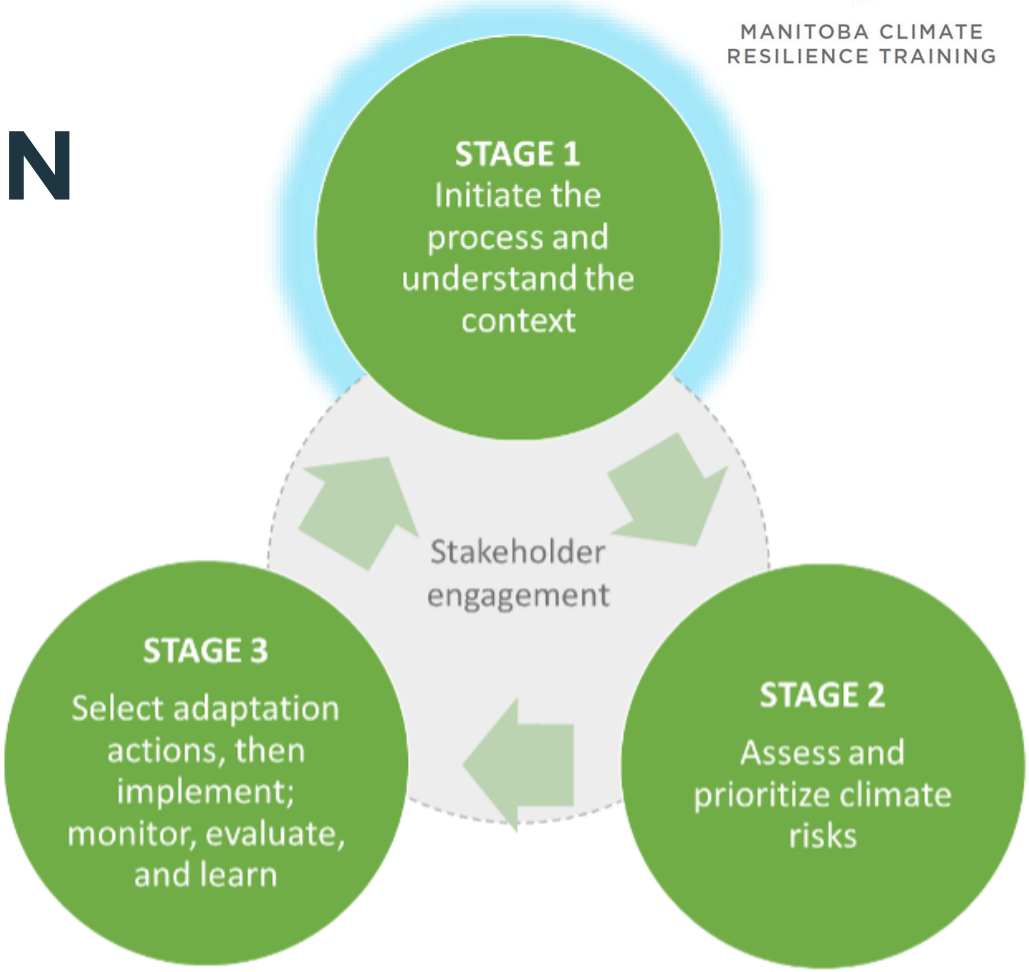
CLIMATE ACTION PLANNING

STAGE 1: GETTING STARTED



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Climate Action Plan Stage 1: Getting Started

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Stage 1: Getting Started

- Learning More About Climate Change

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What We Heard

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- **We asked:** How would you describe the average citizen's attitudes towards the changing climate in your municipality or watershed district?

- 7% The average citizen doesn't believe the climate is changing
- 25% The average citizen is indifferent to the changing climate
- 72% The average citizen is somewhat concerned about the changing climate
- 0% The average citizen is very concerned about the changing climate
- 3% I don't know

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What We Heard

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- **We asked:** How would you rate your personal confidence in discussing climate change with the average citizen in your municipality or watershed district?

- 17% - I do not feel confident at all discussing climate change
- 29% - I can't discuss it, but I can direct people to resources
- 36% - I can discuss it at a surface level and provide resources
- 0% - I can discuss several aspects of climate change in depth
- 18% - I feel complete confidence discussing climate change

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Climate Change Basics: Weather vs Climate

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Weather

- Changes by the hour, day, or week
- Readily observable

"Climate is what we expect, weather is what we get"
– *Mark Twain*

Climate

- Changes with the seasons
- A generalization of regional weather over time

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Climate Change Basics:
Earth's Temperature Over Time

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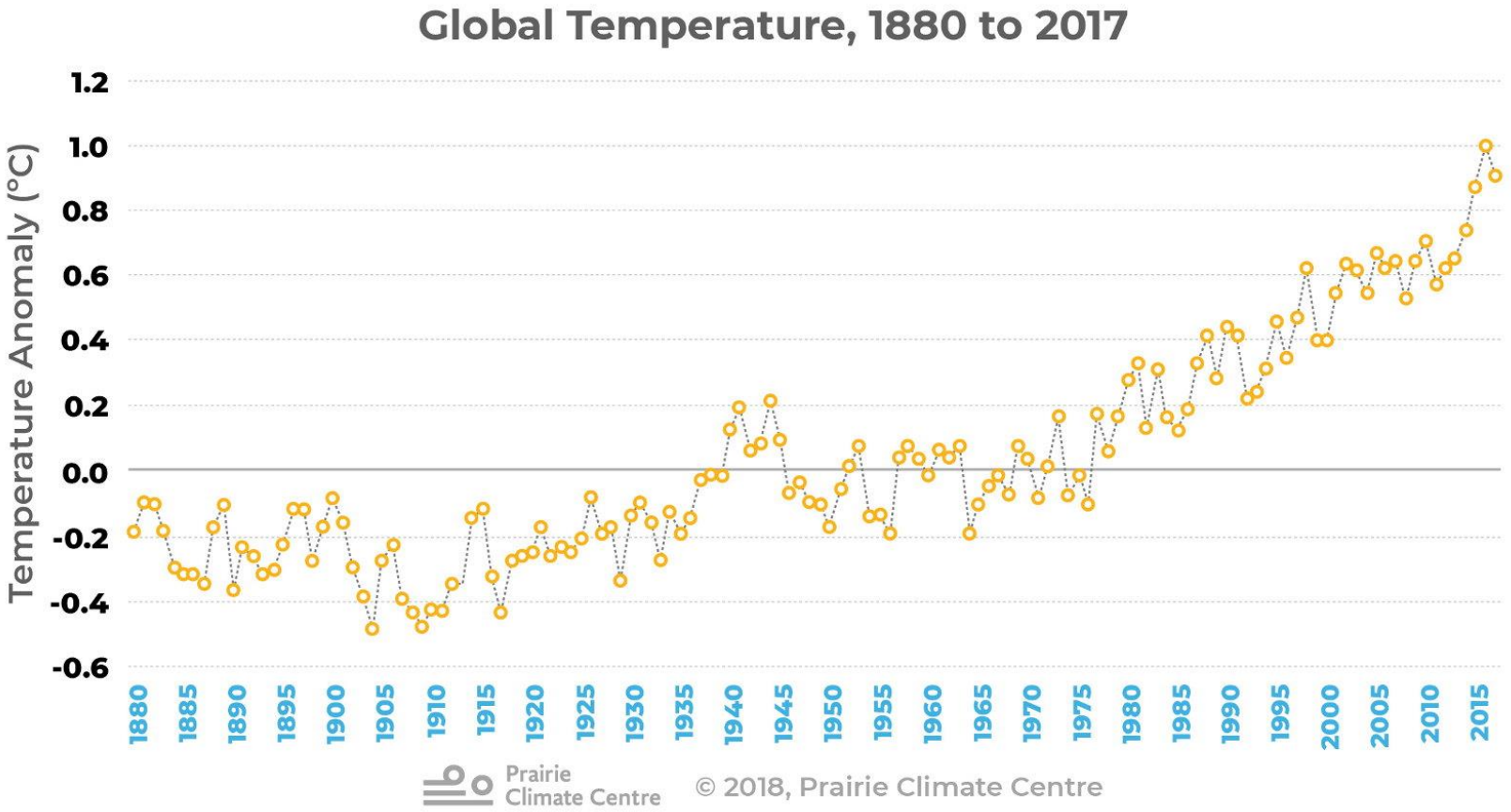

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Source: https://climateatlas.ca/climate-change-basics

Climate Change Basics:
Carbon Dioxide Levels Over Time

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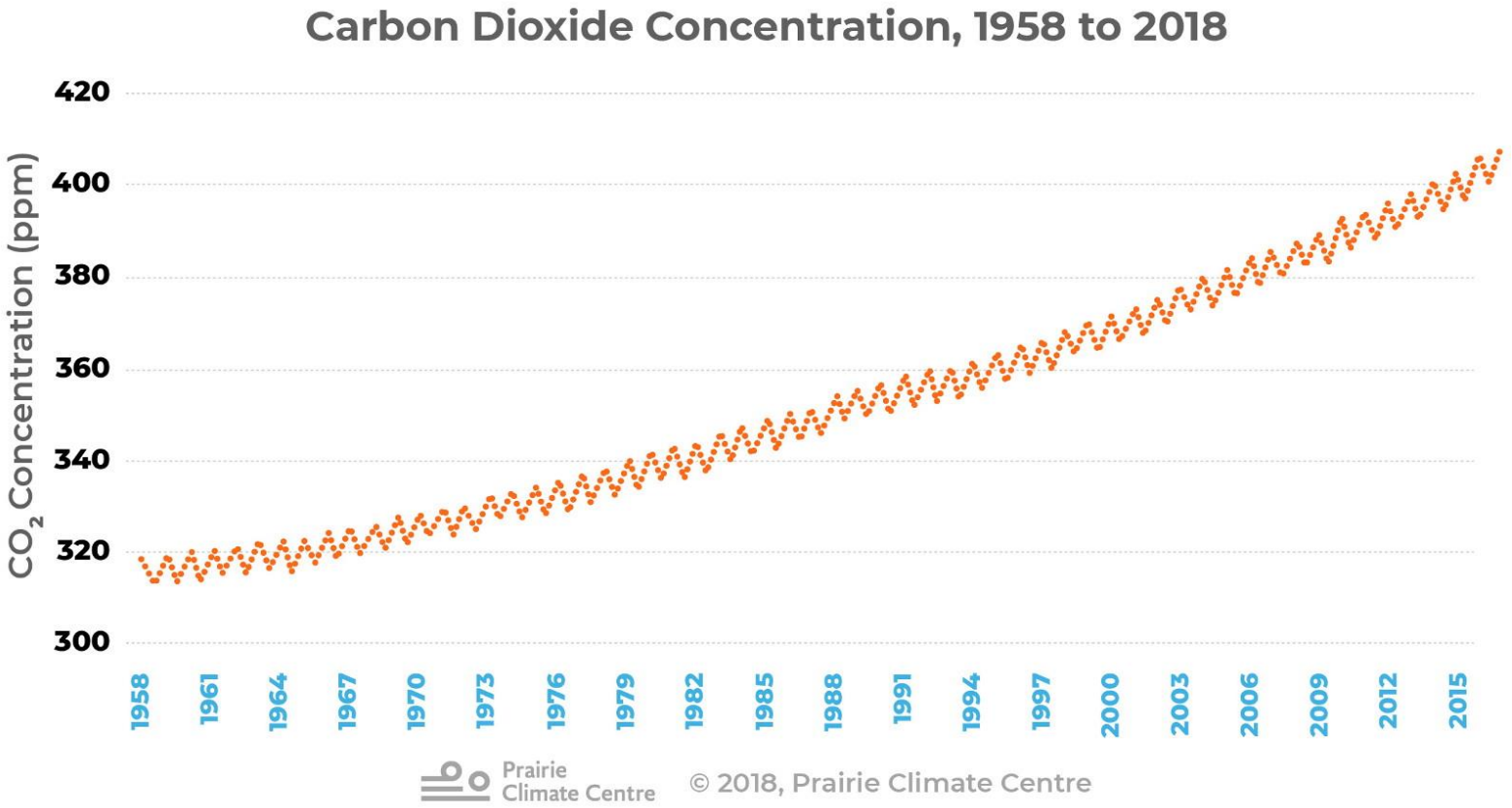

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Source: https://climateatlas.ca/climate-change-basics

Climate Change Basics:
Temperature & CO2 Compared

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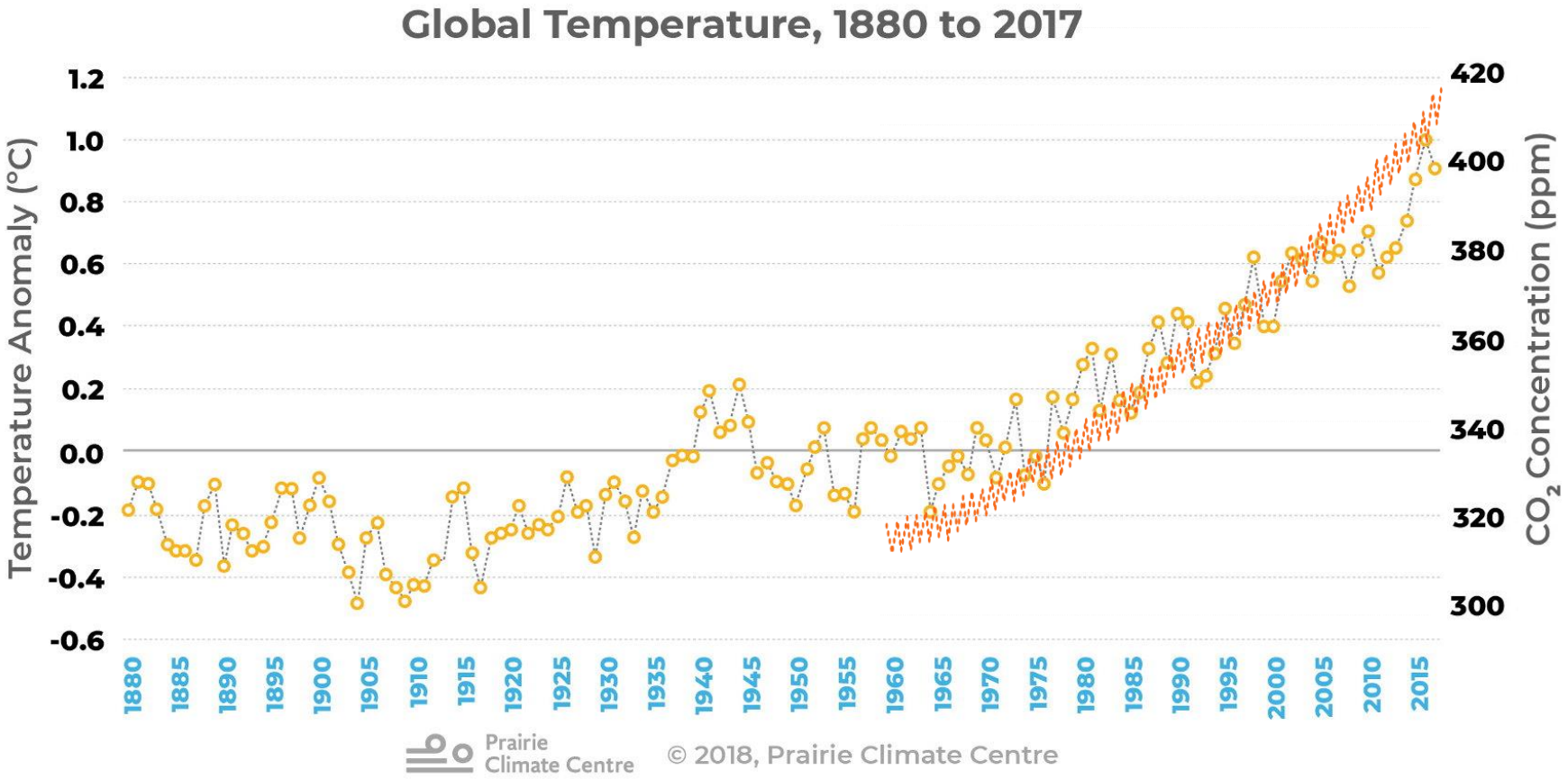

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Source: https://climateatlas.ca/climate-change-basics

The Costs of Climate Change

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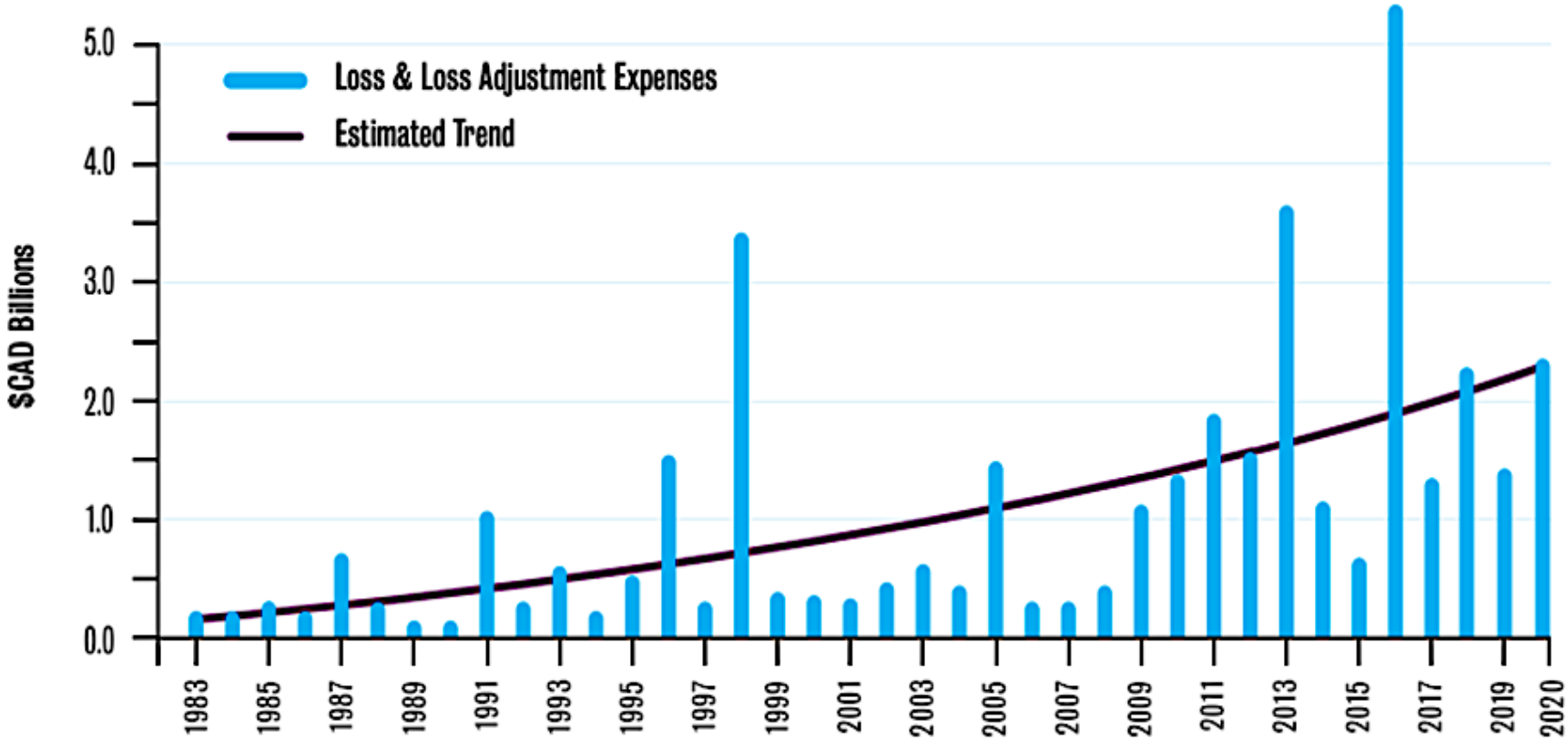
Private Insured Catastrophic Losses in Canada



Source: Insurance Bureau of Canada / Intact Centre for Climate Adaptation

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The Costs of Climate Change

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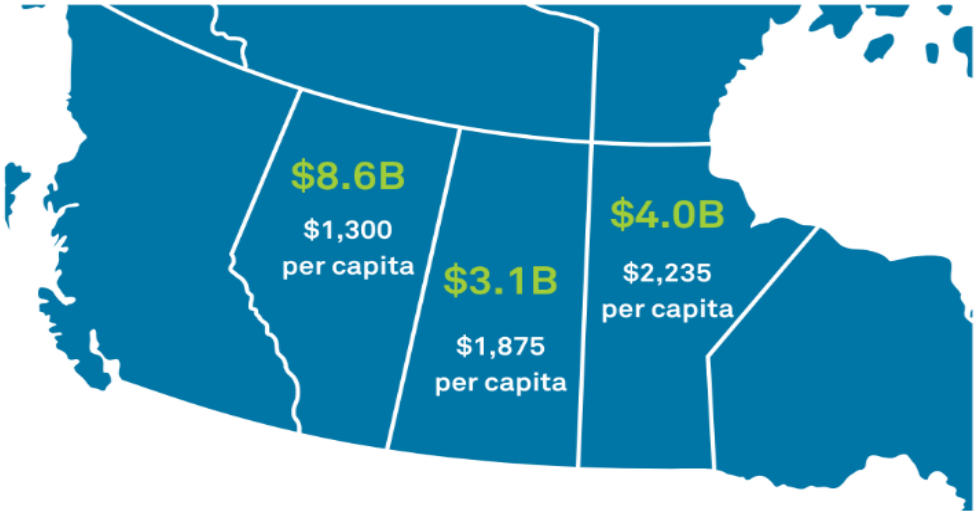
Projected total annual costs across the Prairie provinces (2050s)



= $15.7B

economic losses attributable to climate change across all three provinces, based on a high emissions scenario

Read the full report: climatewest.ca/publications

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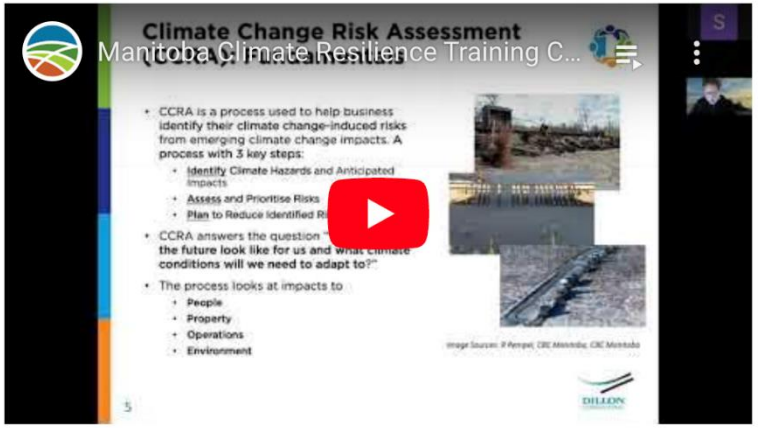
CLIMATE CHANGE 101

A climate change primer course for professionals and practitioners in Manitoba to better understand the causes, future projections, and effects of climate change in the Canadian context. This course serves as a foundational primer for the rest of the MCRT training to be undertaken by select audiences.

RISK ASSESSMENT: CORE PRINCIPLES

Climate Change Risk Assessment: Core Principles

This foundational module provides a foundation of core climate change risk assessment principles and approaches for all BRACE sector audiences. It explores core concepts such as hazard identification, vulnerability assessment, risk assessment and how to use a CCRA process to identify, assess, prioritize climate impacts to inform climate adaptation planning.



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Start here:

MCRT Foundational Training Modules:

https://climatewest.ca/mcrt-foundation-modules

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Climate Action Plan Stage 1: Getting Started

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Stage 1: Getting Started

Determining How to Use the Information

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What We Heard

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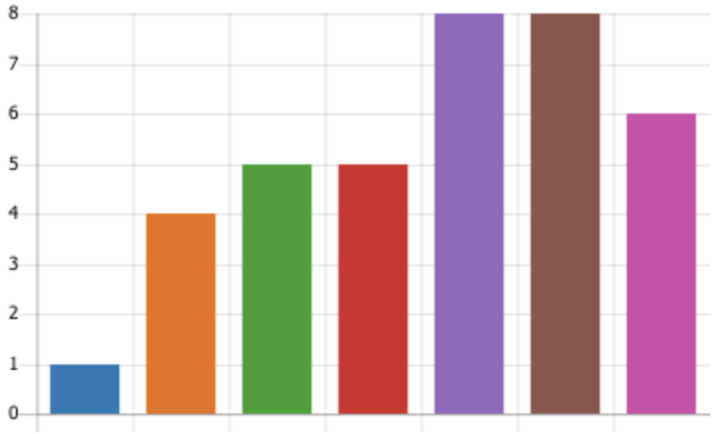
- **We asked:** What actions would you like to see taken in your community to adapt to a changing climate?



Add climate information to a municipal HRVA	1
Prepare a Climate Adaptation Plan	4
Add adaptation policies to our Development Plan	5
Add regulations to support adaptation in our zoning by-law	5
Add climate information to an Integrated Watershed Management Plan	8
Support green infrastructure projects	8
Protect natural assets	6

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Municipal Workshop Applications

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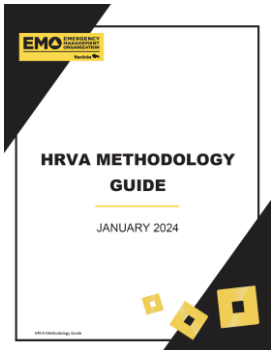
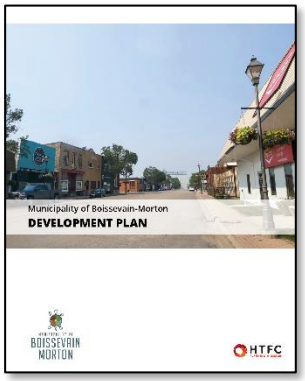
You can apply today's content to:

Climate Vulnerability & Risk Assessment

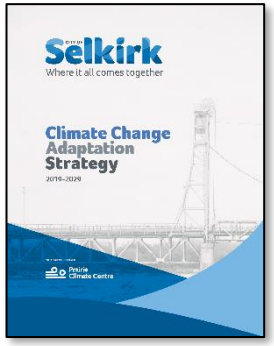
Your Next HRVA



Development Plan / Zoning By-laws



Climate Action Plan



Shared Concerns:
Increased frequency and/or intensity of climate related hazards

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Watershed Workshop Applications

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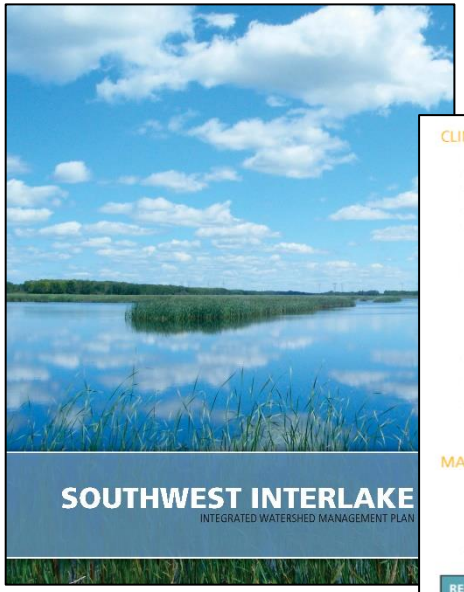
You can apply today's content to:

- Your next Integrated Watershed Management Plan (left)
- A standalone Climate Change Adaptation Strategy or Action Plan (right)



CLIMATE CHANGE ADAPTATION

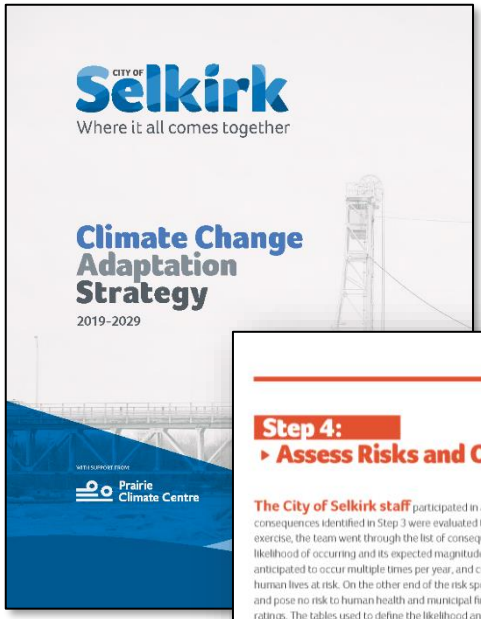
There is consensus among scientists that climate change is occurring, and in some cases effects are already being felt. Climate change projections for this region generally indicate warmer and wetter winters and longer, warmer and drier summers. Precipitation is likely to vary more from year to year and extreme weather events will likely become more common. This will have implications for our economy, natural environment, health and well-being. Adapting to climate change will bring opportunities as well as challenges. The Prairie Climate Center predicts that over the next few decades, Manitoba could experience significant climatic changes and recommends that municipalities start preparing for the anticipated impacts of these changes. To prepare, municipalities should be learning more about the potential impacts and associated risks, discussing necessary updates to their Development Plans and Zoning By-Laws, and developing actions to improve community resiliency.

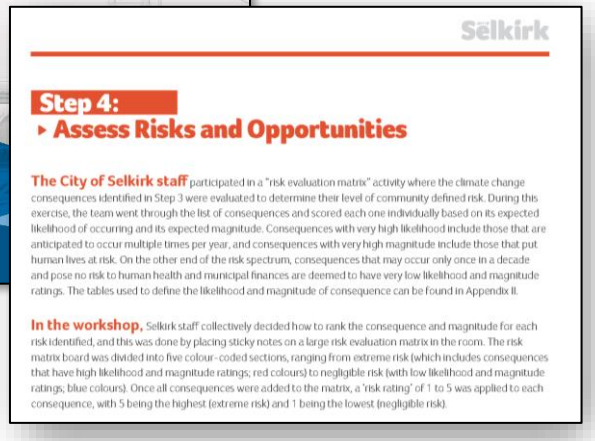
Droughts and floods are natural parts of the climatic cycle and can have devastating impacts on landscapes and communities. Both are difficult to predict and adapt to. The most recent climate change models are predicting higher average temperatures and more days above 30 degrees Celsius over the next 30 to 50 years throughout most of Manitoba. It is possible that these warmer conditions could lead to droughts that are more severe and longer in duration and floods that occur more frequently and with higher water levels. Droughts and floods can create an environment that is more susceptible to erosion, forest fires, disease, and the invasion of less desirable species. It can also cause severe and long-term socioeconomic impacts to farmers and communities.

MANITOBA DROUGHT MANAGEMENT STRATEGY

In January 2016, Manitoba Sustainable Development released the Drought Management Strategy. The strategy proposes to assess drought preparedness of basins across Manitoba using variables such as water sources and their reliability, current management of water supply infrastructure, socioeconomic conditions, drought mitigation strategies currently in place, and existing communication networks. The intent of the strategy is to help increase drought resiliency throughout Manitoba.

RECOMMENDATIONS	LEAD
1. Prepare for the anticipated impacts of climate change by learning more about the potential impacts and associated risks, updating Development Plans and Zoning By-Laws and developing an action plan to improve community resiliency.	Municipalities
2. Work with municipalities and key stakeholders to complete a drought preparedness assessment for the Southwest Interlake Watershed.	Manitoba Sustainable Development - Water Science and Watershed Management Branch





Selkirk

Step 4:
▸ Assess Risks and Opportunities

The City of Selkirk staff participated in a "risk evaluation matrix" activity where the climate change consequences identified in Step 3 were evaluated to determine their level of community defined risk. During this exercise, the team went through the list of consequences and scored each one individually based on its expected likelihood of occurring and its expected magnitude. Consequences with very high likelihood include those that are anticipated to occur multiple times per year, and consequences with very high magnitude include those that put human lives at risk. On the other end of the risk spectrum, consequences that may occur only once in a decade and pose no risk to human health and municipal finances are deemed to have very low likelihood and magnitude ratings. The tables used to define the likelihood and magnitude of consequence can be found in Appendix B.

In the workshop, Selkirk staff collectively decided how to rank the consequence and magnitude for each risk identified, and this was done by placing sticky notes on a large risk evaluation matrix in the room. The risk matrix board was divided into five colour-coded sections, ranging from extreme risk (which includes consequences that have high likelihood and magnitude ratings; red colours) to negligible risk (with low likelihood and magnitude ratings; blue colours). Once all consequences were added to the matrix, a "risk rating" of 1 to 5 was applied to each consequence, with 5 being the highest (extreme risk) and 1 being the lowest (negligible risk).

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Determine scale and scope: Climate Action Plan

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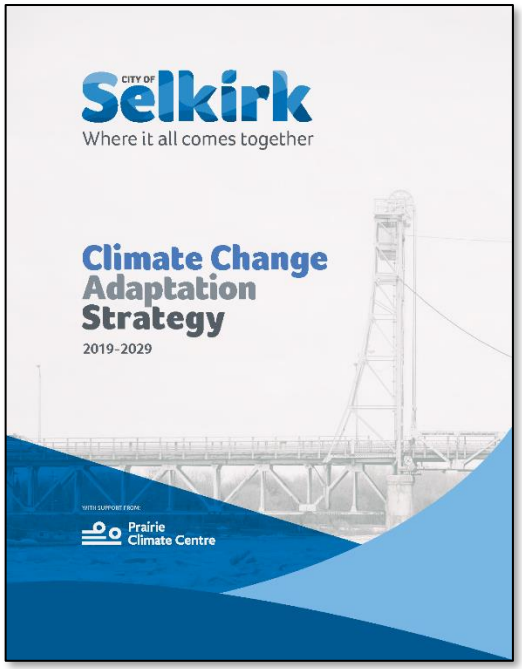
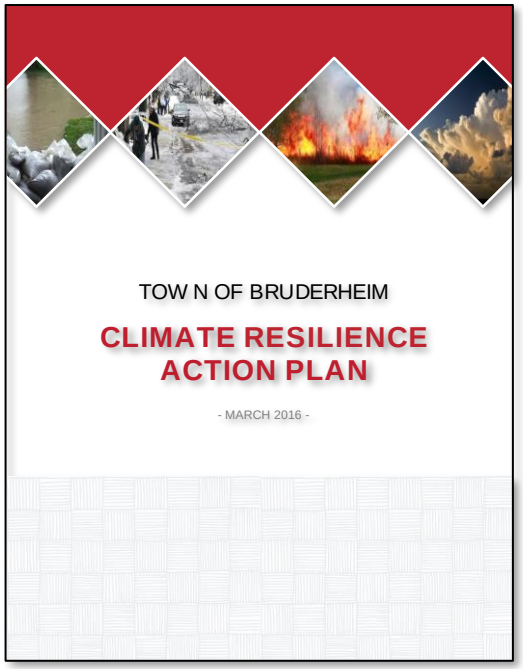


City of Selkirk, MB
Population: 10,504



Town of Bruderheim, AB
Population: 1,308

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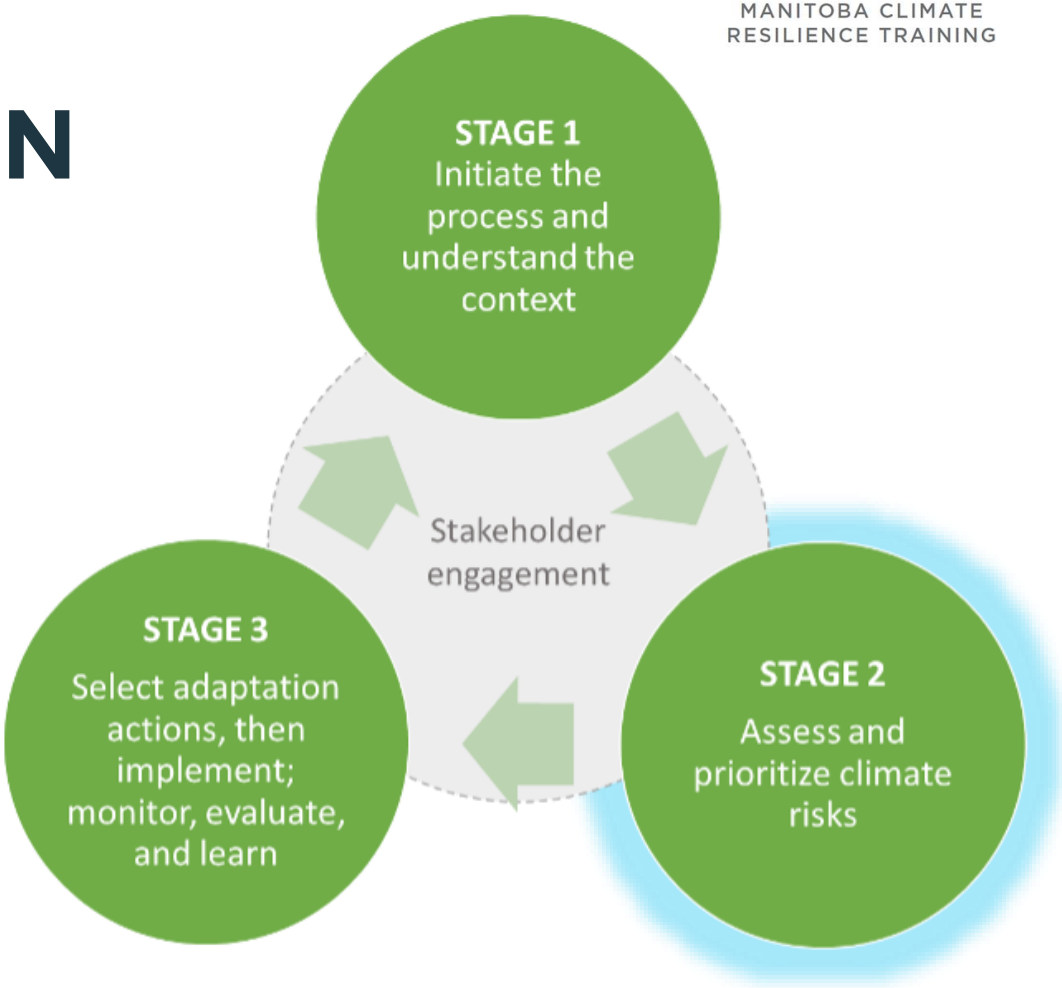
MANITOBA CLIMATE RESILIENCE TRAINING

CLIMATE ACTION PLANNING

STAGE 2: ASSESSING CLIMATE RISKS



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A Note of Caution

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- While our goal is to help you walk through the steps of a vulnerability and risk assessment, in practice this process takes much longer and requires a team and expert opinion to properly complete

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Climate Risk Assessment Workbook

For Municipalities

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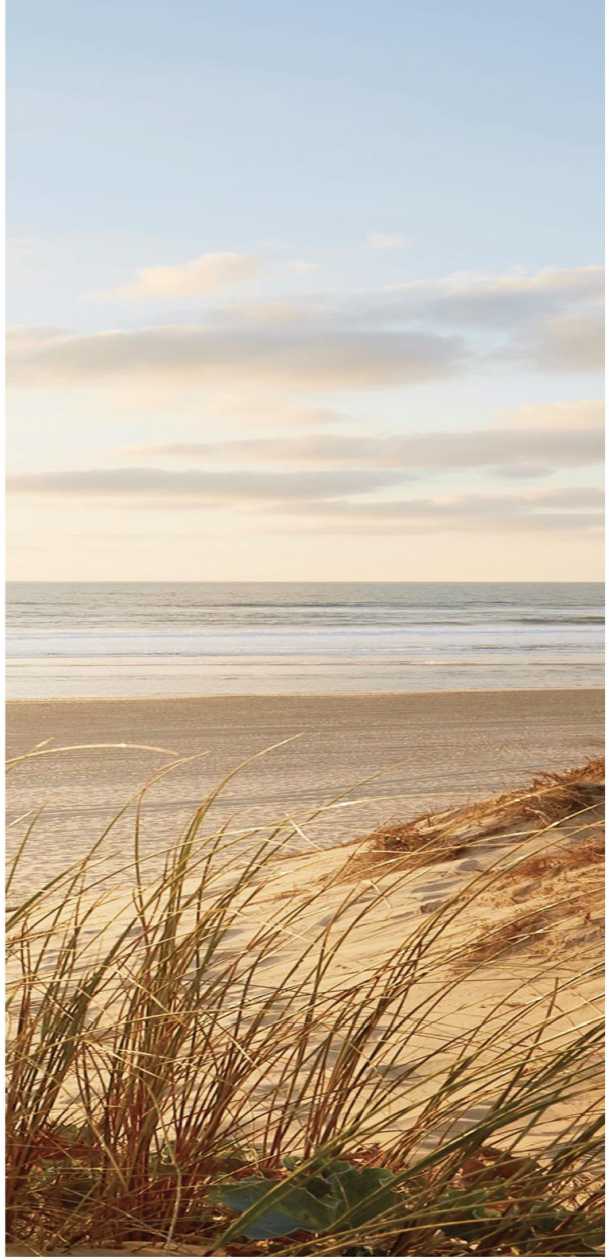

Municipality or District: _____

Email Address: _____

Climate Risk Assessment Workbook

For Municipalities

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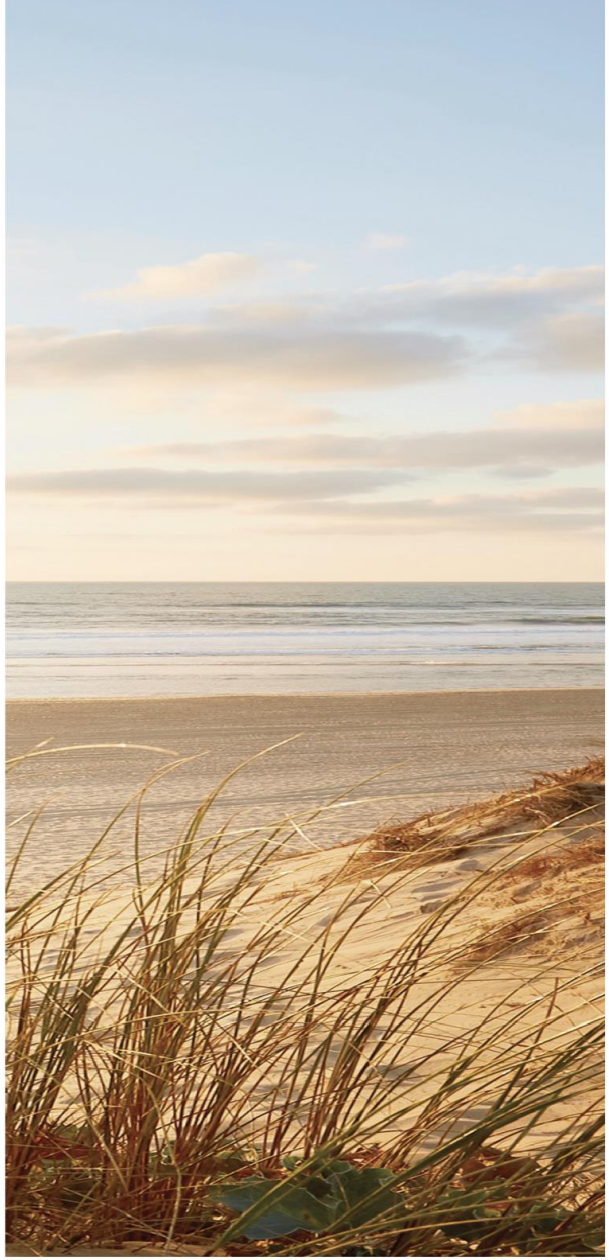

Municipality or District: _____

Email Address: _____

Fill this in!

Climate Action Plan Stage 2: Assessing Current and Future Climate Risks

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Assessing Current and Future Climate Risks

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Stage 2 Objectives:

- To understand the degree to which a changing climate will impact important aspects of your district
- To help your team prioritize climate change risks to prepare for through adaptation

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Climate Action Plan Stage 2: Assessing Current and Future Climate Risks

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Step 1:
Climate Hazard Assessment

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The goal of this step is to:

- Identify the climate hazards that already affect or will affect your community; and
- Understand how the climate hazards are predicted to change.

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Examples of Climate-Related Hazards Affecting Manitoba in Recent Years

CBC

'We are short on water': Morden seeks additional source as droughts become more frequent

A southern Manitoba city that recently declared itself to be in a moderate drought stage after a drier than normal winter says it needs more...

2 weeks ago

CBC

Abnormally mild January full of joy, grief for Manitobans as winter on track to break record

Unexpected warm winter weather in the province has been enjoyable for some people, but not everyone is a fan of the mild temperatures.

1 month ago

Global News

Manitoba hail storm decimates crops, hail insurance claims pour in

Watch Manitoba hail storm decimates crops, hail insurance claims pour in Video Online, on GlobalNews.ca.

Aug 29, 2023

Wildfires continue to cause air quality issues in northern Manitoba

Kayla Rosen
CTVNewsWinnipeg.ca
Published July 22, 2022 8:20 a.m. CDT

Manitoba floods continue to wreak havoc on communities across the province

By Sam Thompson • Global News
Posted May 4, 2022 9:30 am · Updated May 4, 2022 9:31 pm

What We Heard

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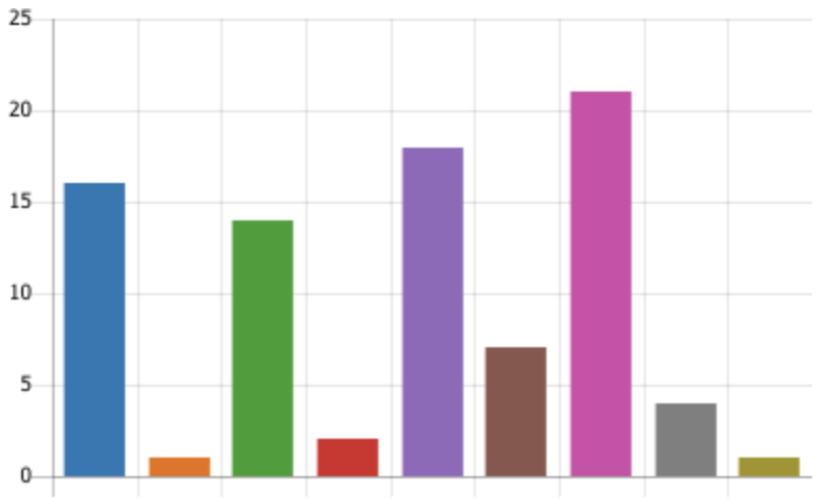
- **We asked:** What climate hazards do you think pose the greatest risk to your municipality or district in the future?



- Extreme winter storms (blizzards, freezing rain, etc)
- Extreme cold
- Extreme summer storms (thunderstorms, tornadoes, etc)
- Extreme heat
- Droughts
- Wildfires
- Floods
- Invasive species
- Other

Task 1.1: Develop a list of climate-related hazards

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Group Discussion:

- What climate-related hazards have impacted your community in the past?
  - Examples:
    - Annual heatwaves
    - Red River Flood of 1997
    - Pukatawagan Wildfire of 2022

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Task 1.1: Develop a list of climate-related hazards

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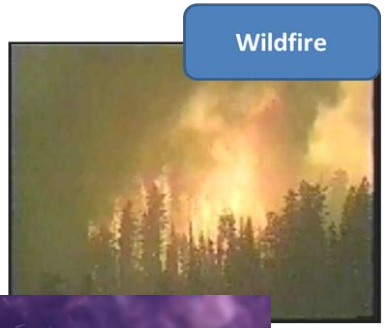
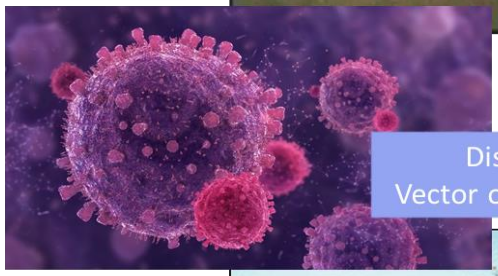
Examples of Climate-Related Hazards





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Task 1.1: Develop a list of climate-related hazards

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- Consider the attributes of these hazards and write your answers in **Box 1.1.**

Climate Hazard	When was it?	What was experienced?	How long did it last?
Heatwave	July 2022, August 2023	Day temperatures of +30°C, Night temperatures of +20°C	3-4 days at a time

Box 1.1: Identify past climate hazards in your community.

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Task 1.2: Identify how climate hazards are predicted to change

MANITOBA CLIMATE RESILIENCE TRAINING

- Let's review your area's **climate profiles**
- See more at **climateatlas.ca**

Prairie Climate Centre
From Risk to Resilience

Prairie Communities

Virden
MANITOBA

Virden and Climate Change
The climate determines almost everything about how we design, build, and live in our communities. As the climate continues to change, the safety and prosperity of our communities are put at risk. Climate change is a challenge that requires us to work together, locally, nationally, and globally. With technical know-how, political will, targeted investments, and collective commitment, we can mitigate the severity of climate change and build resilience to its hazards and impacts.

Climate Change and Health
High temperatures can be hazardous, especially for the elderly, the chronically ill, and those without air conditioning. High and prolonged heat can also impact air quality, facilitate the spread of harmful diseases, inhibit outdoor activities, and cause stress and anxiety. We can adapt with measures such as shaded areas, green roofs, and supports for those who need help during heat waves.

Climate Change and Extreme Weather
A warmer climate increases the chance and severity of more extreme weather, including high winds, flash floods, hail, lightning, tornadoes, drought, and wildfires. Communities must improve their planning and engineering, emergency preparedness, and water management to build resilience.

Climate Change and Infrastructure
Climate change threatens the integrity of infrastructure such as roads, bridges, water supply, and telecommunications, most of which has not been built to withstand current and future extremes. Emergency preparedness, planning, and construction practices for retrofits and new development that take the new climate reality into account can increase our adaptive capacity. Acting now will reduce economic risk and save on the rapidly increasing long-term damages and costs associated with climate change.

High-Carbon Climate Change Projections*

Change	Recent Past	2051-2080 10th percentile Low	2051-2080 Mean	2051-2080 90th percentile High	direction of change
Typical hottest summer day	34.6 °C	35.8 °C	**39.29 °C**	43.8 °C	↑
Typical coldest winter day	-36.7 °C	-34.3 °C	**-28.8 °C**	-23.5 °C	↑
Number of +30 °C days per year	15	26	**53**	78	↑
Spring precipitation	101 mm	61 mm	**120 mm**	192 mm	↑
Summer precipitation	198 mm	101 mm	**191 mm**	302 mm	↓
Number of below-zero days per year	194	134	**156**	177	↓
Number of +20 °C nights per year	0	1	**13**	28	↑

*See back page for details and source of climate model data

Wetter springs, drier late summers

Much warmer winters

Many more hot days

Climate Change and Manitoba's Communities climateatlas.ca

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“High Carbon” Projections

MANITOBA CLIMATE RESILIENCE TRAINING

Change	Recent Past	2051-2080 10th percentile Low	2051-2080 Mean	2051-2080 90th percentile High	Direction of change
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Task 1.2: Identify how climate hazards are predicted to change

MANITOBA CLIMATE RESILIENCE TRAINING

- Use the Climate Atlas of Canada to fill in the blanks in **Box 1.2.**

Variable	Recent Past: 1976-2005	Near-term Projection: 2021-2050	Long-term Projection: 2051-2080	Change (+/-)
Very Hot Days (+30°C)	days	days	days	days
Very Cold Days (-30°C)	days	days	days	days
Annual Mean Temperature	°C	°C	°C	°C
Mean Spring Precipitation	mm	mm	mm	%
Frost-Free Season	days	days	days	days

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Round Table Questions

MANITOBA CLIMATE RESILIENCE TRAINING

- Did anything surprise you from looking at the data?

- Are there hazards or opportunities related to climate change that you hadn't thought of before?

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Future Climate Hazards

MANITOBA CLIMATE RESILIENCE TRAINING

- Identify four top future climate hazards in your area in **Box 1.3.**

#	Climate Hazards
0	Example: Heatwaves
1	
2	
3	
4	

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Task 1.2: Identify how climate hazards are predicted to change

MANITOBA CLIMATE RESILIENCE TRAINING

- Now, find the Climate Impact Assessment Sheets in your workbook.
- Fill out the blue boxes for each of the 4 top climate hazards.

Climate Hazard:	Heatwave

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Task 1.2: Identify how climate hazards are predicted to change

MANITOBA CLIMATE RESILIENCE TRAINING

- How are these hazards projected to change in the future from how they were in the past?
- On your Climate Impact Assessment Sheets, fill out the yellow boxes for each of the 4 top climate hazards.

Climate Hazard:	Heatwave
How is the Hazard Projected to Change in the Future?	
• An average of 2.3 more heatwaves each year • The average heatwave is 1.8 days longer. • The average summer temperature is 2.1°C warmer. As summer temperatures and the number of days above +30°C increase, future heatwaves may be hotter, more frequent, and last longer.	

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Climate Action Plan Stage 2: Assessing Current and Future Climate Risks

MANITOBA CLIMATE RESILIENCE TRAINING

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Step 2:
Climate Impact Assessment

MANITOBA CLIMATE RESILIENCE TRAINING

The goal of this step is to:

- Consider impacts of the identified climate hazards
- Explore how these impacts might be felt in the future
- Understand the consequences for your community

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Task 2.1: Develop an inventory of climate change hazards and impacts

MANITOBA CLIMATE RESILIENCE TRAINING

- For each climate hazard, think of general **impacts** that may occur as a result. Look at climate profile for ideas.
- On your Climate Impact Assessment Sheets, fill out the **green boxes**. Consider:
  - *What are the general impacts of this hazard?*

Climate Hazard	What Are the Impacts of This Hazard?
Example: Heatwave	-More hot days and night -Reduced water supply -Loss of soil moisture -Increased risk of wildfires -Amplification of drought conditions

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Task 2.2: Identify the climate risks to your community

MANITOBA CLIMATE RESILIENCE TRAINING

- For each climate hazard, imagine a **worst-case scenario event** that could occur in your municipality or district between now and 2050.

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Task 2.2: Identify the climate risks to your community

MANITOBA CLIMATE RESILIENCE TRAINING

- EXAMPLES -

- A 1-in-300-year flood
- A prolonged drought
- Extended summer heat wave
- Extreme rainfall event or summer storm
- Major snowstorm or ice storm

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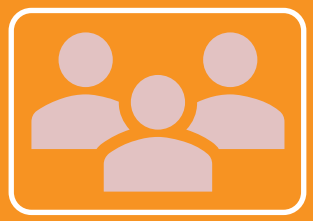
Task 2.2: Identify the climate risks to your community

MANITOBA CLIMATE RESILIENCE TRAINING

- Starting with **Community & People,** write down a bullet point list of potential consequences that could occur in a **worst-case scenario** event. Fill out the first row under the purple box for each hazard.



Community & people

Fatalities, injuries, medical treatment, hospitalization, temporary or permanent displacement, mental health and emotional well-being

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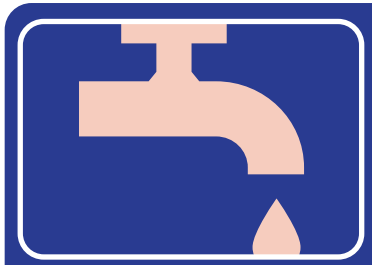
Task 2.2: Identify the climate risks to your community

MANITOBA CLIMATE RESILIENCE TRAINING

- Write down a bullet point list of potential consequences that could occur in a **worst-case scenario** event.



Critical services

Loss of services such as transportation, water, electricity, etc.

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Task 2.2: Identify the climate risks to your community

MANITOBA CLIMATE RESILIENCE TRAINING

- Write down a bullet point list of potential consequences that could occur in a **worst-case scenario** event.

Buildings and infrastructure

Damage to buildings, equipment, vehicles, infrastructure.

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Task 2.2: Identify the climate risks to your community

MANITOBA CLIMATE RESILIENCE TRAINING

- Write down a bullet point list of potential consequences that could occur in a **worst-case scenario** event.

Local economy

Disruption or loss of ability to produce, consume, and trade goods and services, and to generate income supporting livelihoods

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Task 2.2: Identify the climate risks to your community

MANITOBA CLIMATE RESILIENCE TRAINING

- Write down a bullet point list of potential consequences that could occur in a **worst-case scenario** event.

Natural environment

Impacts to land, water, air, plants, and animals, and the provision of ecosystem services

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Climate Action Plan Stage 2: Assessing Current and Future Climate Risks

MANITOBA CLIMATE RESILIENCE TRAINING

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Climate Risk Assessment

MANITOBA CLIMATE RESILIENCE TRAINING

The goal of this step is to:

- Understand how susceptible your community is to each of the impacts and consequences you have previously identified
- Determine priorities for the adaptation planning phase and consider solutions

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Severity of Identified Risks

MANITOBA CLIMATE RESILIENCE TRAINING

- Return to your Climate Impact Assessment.
- For each consequence you have identified, assign a level of anticipated severity were that consequence to occur.
- Use the numbers 1 – 5 (with 1 being lowest).

	What Consequences Might Occur in a Worst-Case Scenario?	Severity
Community & People	- Seniors/vulnerable community members suffer heat stroke	4
	- Food security threatened by crop loss	5
	- Cancelation of outdoor events, sports, and gatherings	1

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Severity of Identified Risks

MANITOBA CLIMATE RESILIENCE TRAINING

Severity Level	Description
1 Insignificant	• Impact may be observed but does not change day-to-day life • No deaths, injuries, or effects on health and safety • No impact to the economy, environment, property, or services.
2 Minor	• No deaths or injuries, minor short-term effects on health and safety • Very minimal impact on local economy • Insignificant environmental disruption or damage • Slight damage to property and infrastructure, very short-term service interruptions, or negligible costs • No liabilities or significant extra costs
3 Moderate	• Few injuries, or modest temporary impact on quality of life • Interruptions to business revenue and employment for less than one week • Isolated and reversible damage to wildlife, habitat, and/or ecosystem • Potential damage to property/infrastructure, short-term service interruptions, localized evacuations • Modest to higher cost events
4 Major	• High possibility of injuries or chronic health issues or major temporary impact on quality of life • Interruptions to business revenue and employment for more than one week • Irreversible damage to wildlife, habitat, or ecosystems • Damage to property and infrastructure, longer-term service interruptions, major delays, and evacuations • Community complaints; dissatisfaction or anger with situation; legal liabilities and lawsuits possible
5 Catastrophic	• Many serious injuries or illnesses, fatalities, and/or long-term impacts on quality of life • Interruptions to businesses and revenue for more than a month, extending to entire sectors at a major economic cost • Widespread and irreversible damage to wildlife, habitat, and ecosystems • Widespread damage to property and infrastructure, long-term interruption of services, widespread evacuations • Major costs to municipality, high possibility for legal liabilities and lawsuits

Likelihood of identified risks

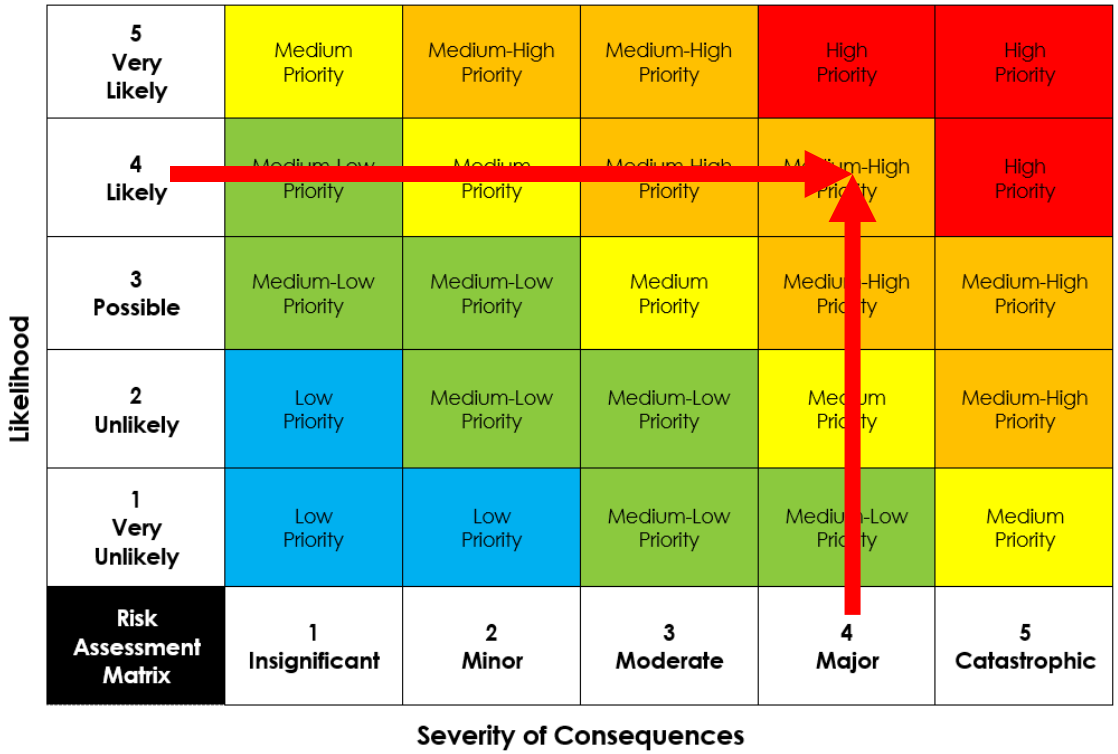
MANITOBA CLIMATE RESILIENCE TRAINING

Consider how likely this consequence is to occur.

Likelihood level	Definition
1 - Very Unlikely	This has never happened in our area, or it happened a long time ago. / This is not likely to happen until far in the future.
2 - Unlikely	This may have occurred in our area in the past, but it was at least 20 years ago. / This could happen 20 years from now.
3 - Possible	This has occurred in our area once in the past 20 years. / This might occur once in the next 20 years.
4 - Likely	This happened in our area a few times in the past 20 years. / This might occur several times in the next 20 years.
5 - Very Likely	This has occurred in our area yearly or every other year, during the past 20 years. / This might occur every other year or so.

Prioritizing Climate Risks

MANITOBA CLIMATE RESILIENCE TRAINING



- Plot each consequence you identified in **Box 2.2** onto the blank Matrix in **Box 3.1.**

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Climate Risk Assessment

MANITOBA CLIMATE RESILIENCE TRAINING

Activity:

- Write each consequence on a sticky note
- Put sticky notes up on wall posters according to the identified climate hazard

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Prioritizing Climate Risks

MANITOBA CLIMATE RESILIENCE TRAINING

Likelihood

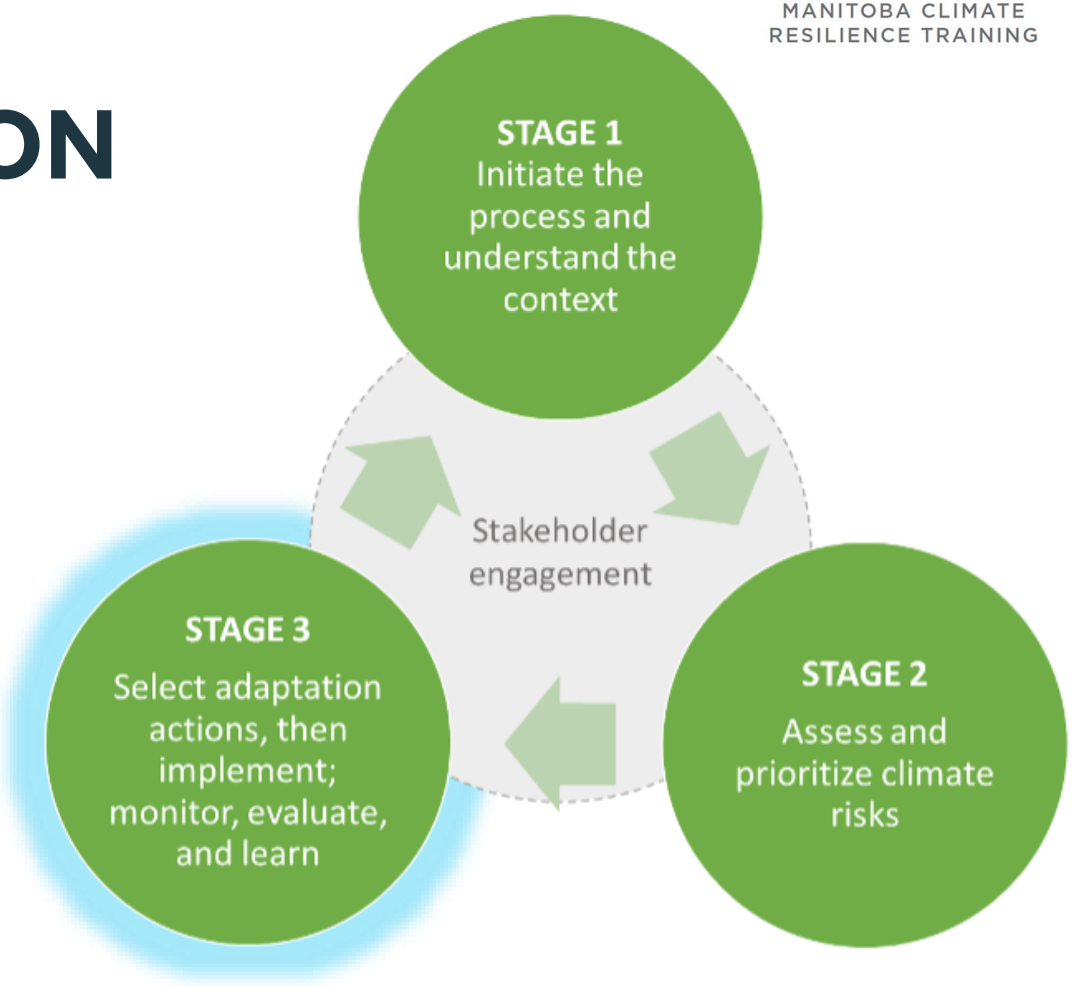
5 Very Likely	Medium Priority	Medium-High Priority	Medium-High Priority	High Priority	High Priority
4 Likely	Medium-Low Priority	Medium Priority	Medium-High Priority	Medium-High Priority	High Priority
3 Possible	Medium-Low Priority	Medium-Low Priority	Medium Priority	Medium-High Priority	Medium-High Priority
2 Unlikely	Low Priority	Medium-Low Priority	Medium-Low Priority	Medium Priority	Medium-High Priority
1 Very Unlikely	Low Priority	Low Priority	Medium-Low Priority	Medium-Low Priority	Medium Priority
Risk Assessment Matrix	**1 Insignificant**	**2 Minor**	**3 Moderate**	**4 Major**	**5 Catastrophic**

Severity of Consequences

MANITOBA CLIMATE RESILIENCE TRAINING

CLIMATE ACTION PLANNING

STAGE 3: ACTION PLANNING



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Climate Action Plan Stage 3: Action Planning

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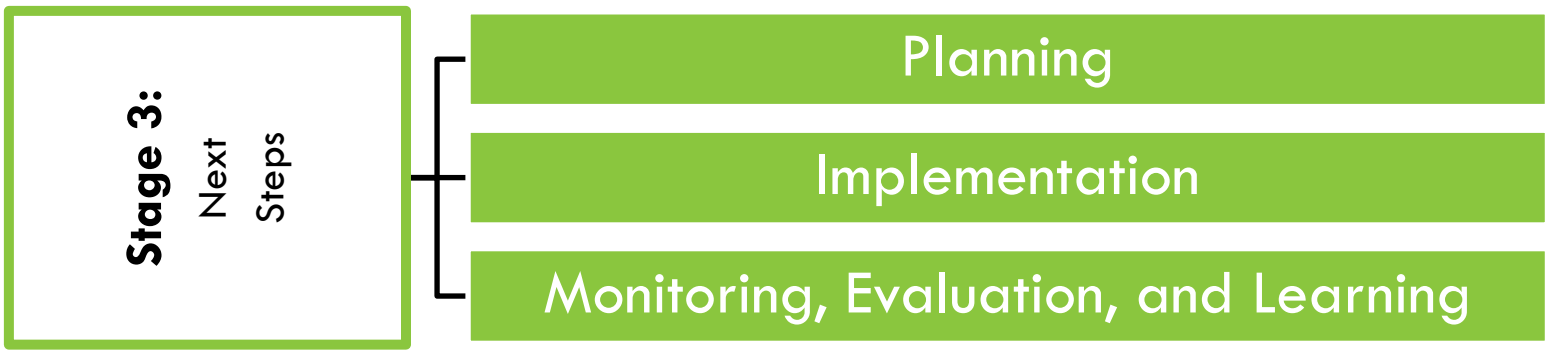

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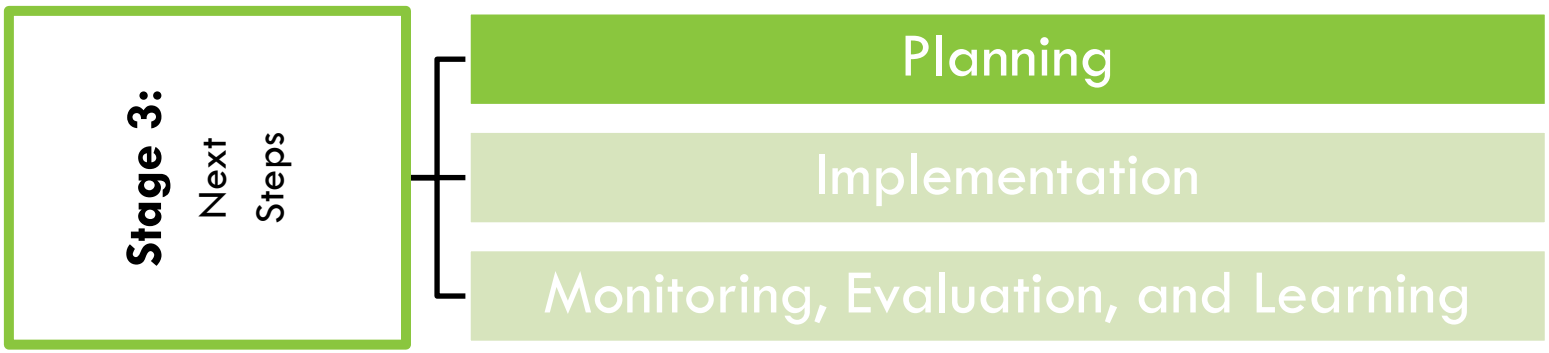
Climate Action Plan Stage 3: Action Planning

MANITOBA CLIMATE RESILIENCE TRAINING



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Mitigation vs Adaptation

MANITOBA CLIMATE RESILIENCE TRAINING

- **Mitigation –** Efforts to slow the process of a changing climate

- **Adaptation –** Response to a new climate reality

"**Mitigation** will help avoid the unmanageable.

Adaptation is essential to manage the unavoidable."

- All One Sky

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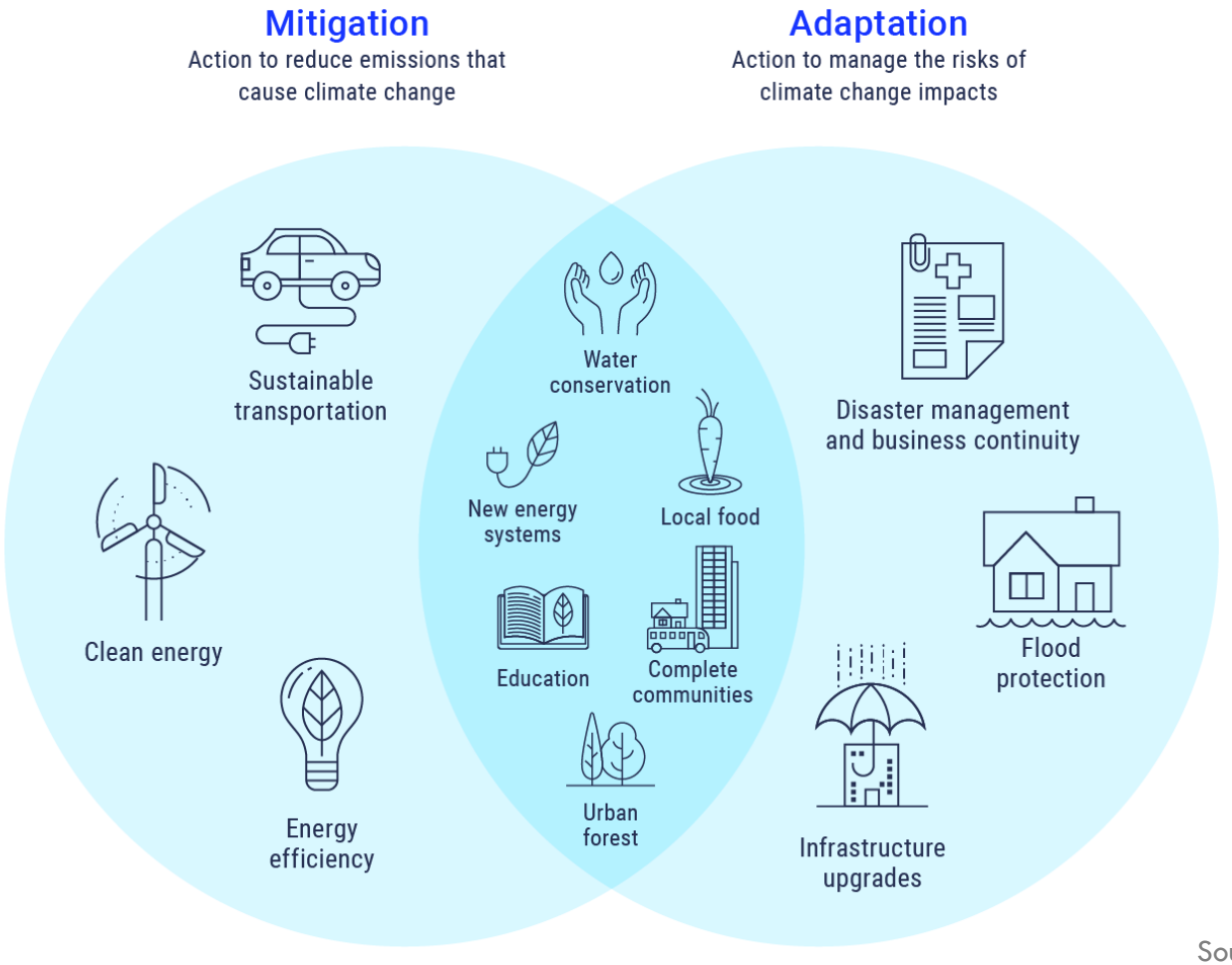
Mitigation vs Adaptation

MANITOBA CLIMATE RESILIENCE TRAINING



Source: City of Calgary

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MANITOBA CLIMATE RESILIENCE TRAINING

Strategies for Climate Resilience

1. Reservoirs and Sinks

   Ways to increase storage capacity – heat, water, carbon

2. Redundancy – "Belt and Suspenders"

   Multiple pathways to success

3. Decentralized / Distributed Networks

   Reduce reliance on vulnerable hard infrastructure

4. Capitalize on Positive Feedback Loops

   Natural systems are often self reinforcing, multiply benefits

5. Monitor and Adjust

   The most important feedback loop

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Green Infrastructure

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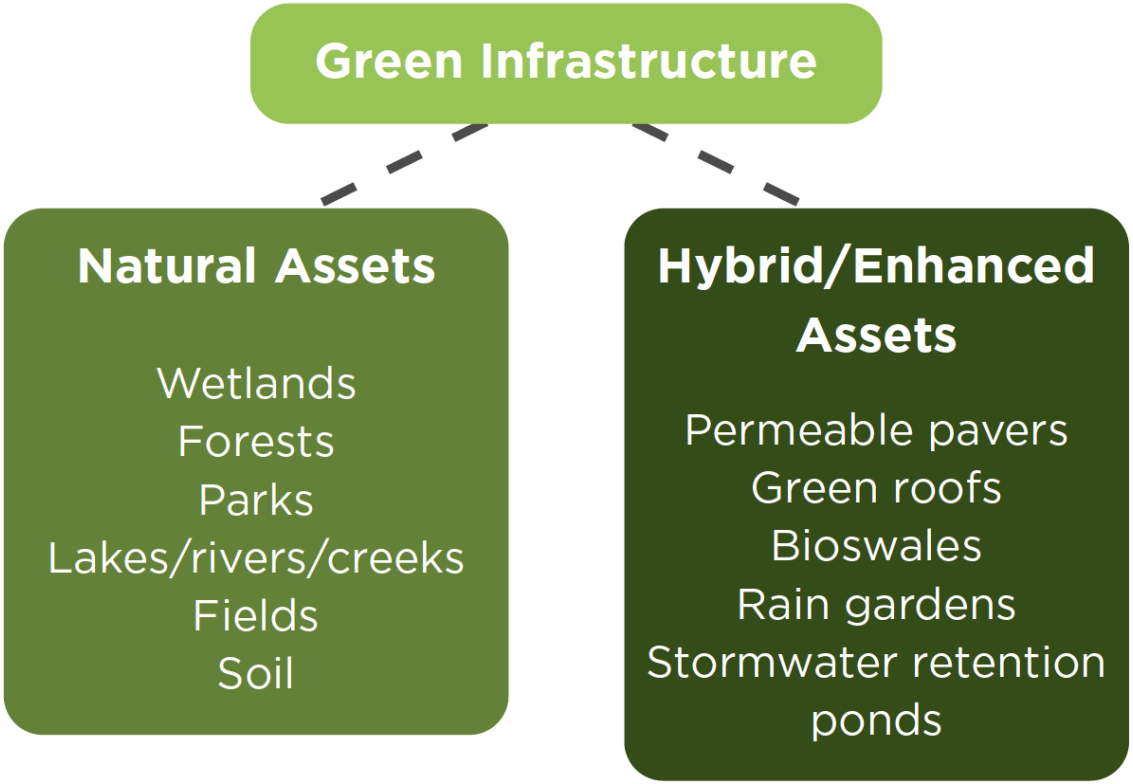

Graphic reproduced from Municipal Natural Asset Initiative (MNAI)

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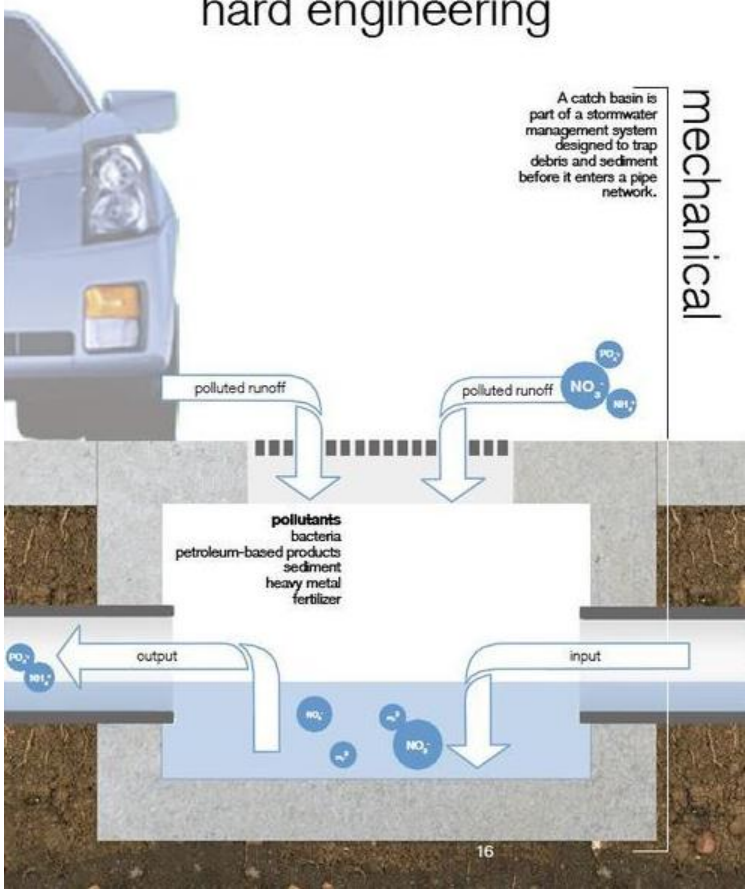
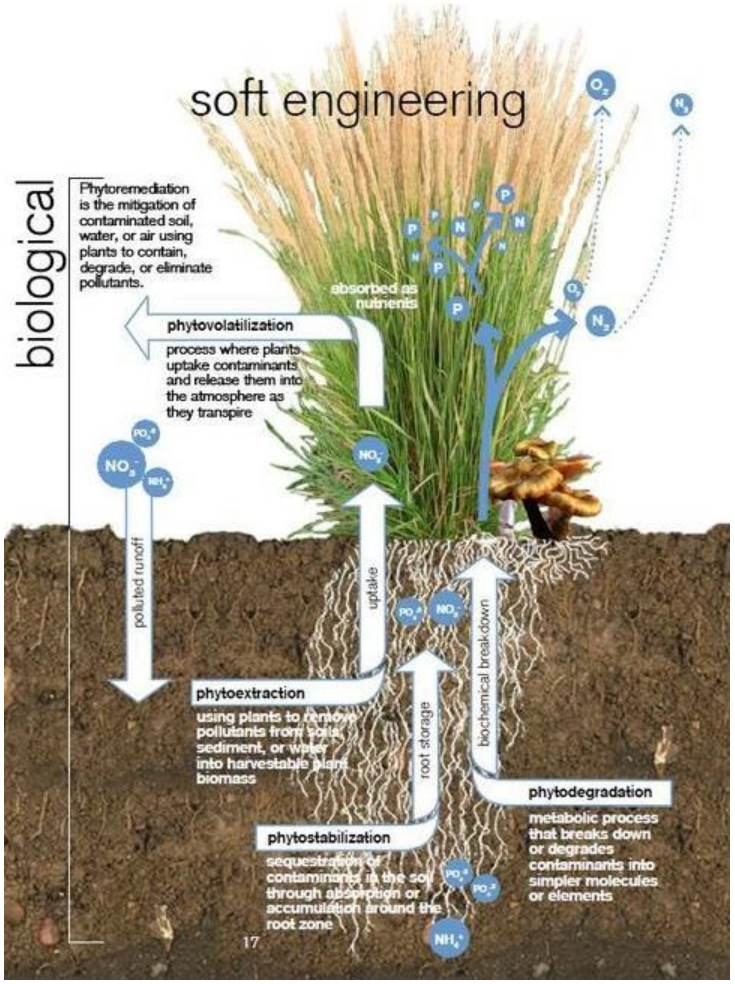
MANITOBA CLIMATE RESILIENCE TRAINING

hard engineering



soft engineering



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Types of Green Infrastructure

MANITOBA CLIMATE RESILIENCE TRAINING

1. Functional Tree Planting

- Urban Forest
- Shelterbelts
- Soil Bioengineering

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Adaptation: Types of Green Infrastructure

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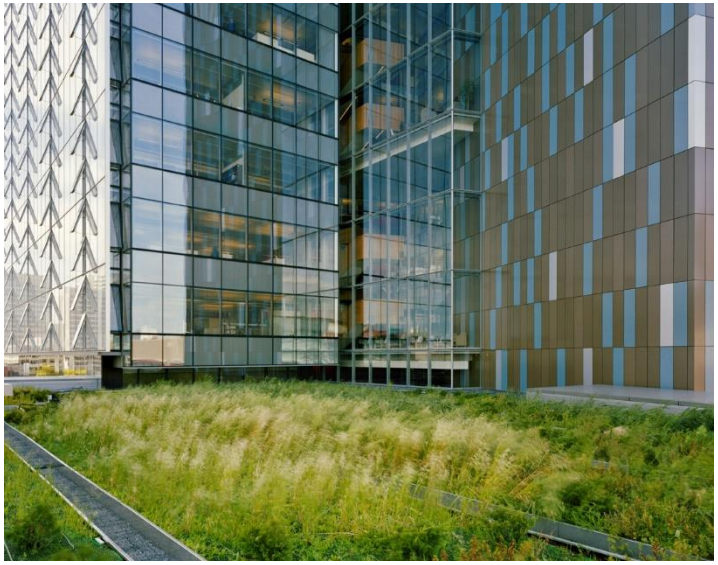
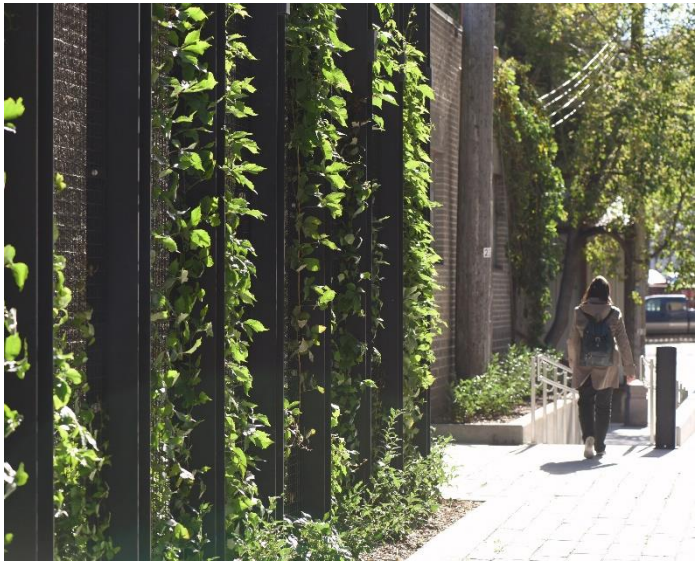
2. Living Architecture

- Green Roofs
- Green Walls



Manitoba Hydro Building, Winnipeg



Bertha St, Winnipeg

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Adaptation: Types of Green Infrastructure

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3. Bioretention + Infiltration

- Bioswales
- Rain Gardens
- Constructed Wetlands
- Permeable Paving

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Adaptation: Types of Green Infrastructure

MANITOBA CLIMATE RESILIENCE TRAINING

4. Water Harvesting

- Rainwater Collection
- Dew and Fog Harvesting

5. Productive Landscapes

- Urban Agriculture
- Beekeeping

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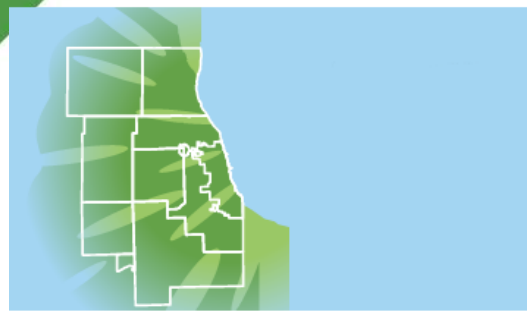
MANITOBA CLIMATE RESILIENCE TRAINING



Scalability

Regional

Protect diverse ecological and social functions and connect these areas to community-scale open spaces e.g. Red River Floodway

Community

Encourage natural infrastructure that provides multiple benefits in parks and city-scale open spaces

e.g., Bishop Grandin Greenway

Site

Incorporate natural infrastructure practices in rights of way, building sites, homes

e.g., Portage la Prairie Saskatchewan Avenue bioswales

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Adaptation: Functional Tree Planting

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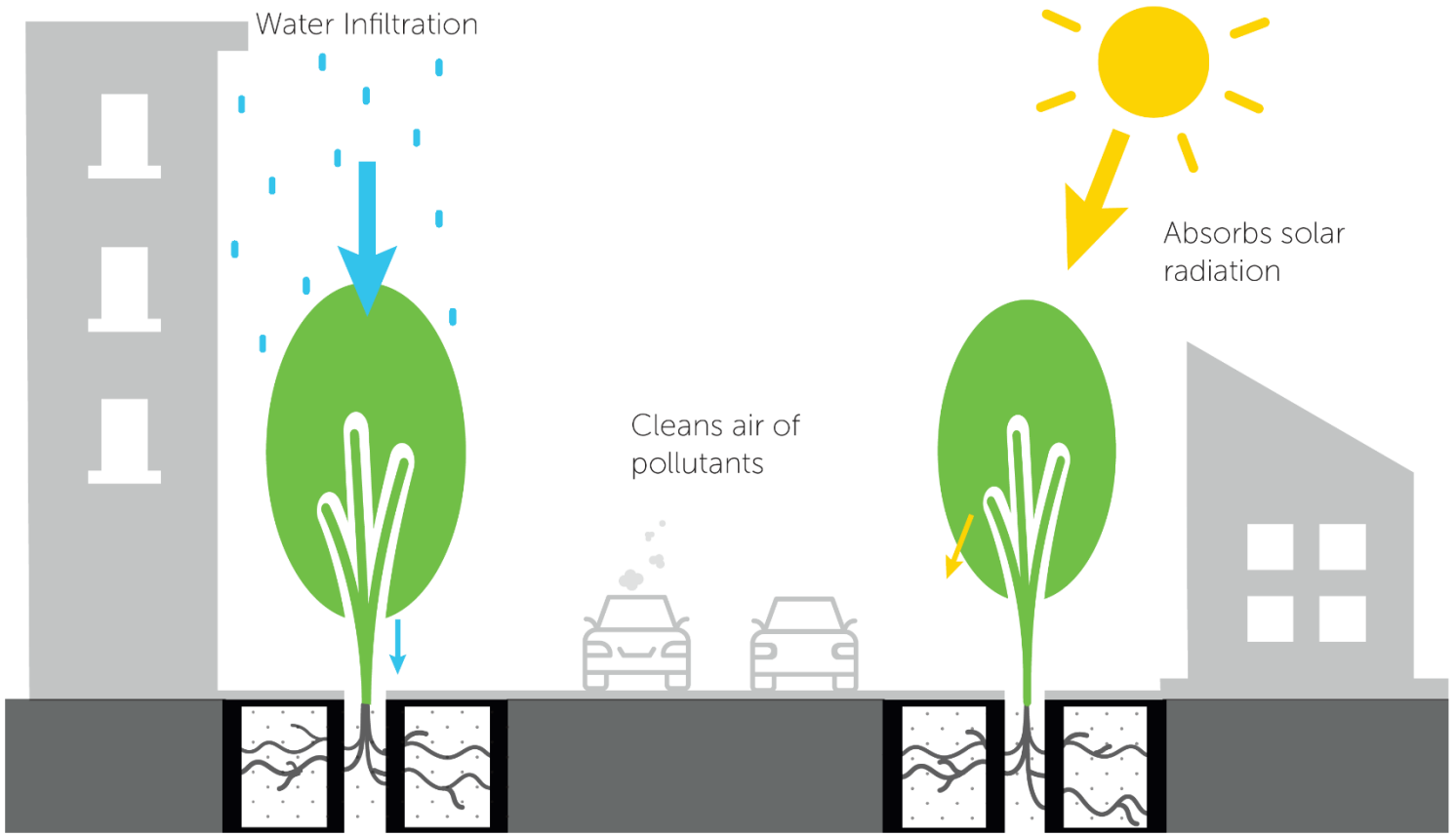

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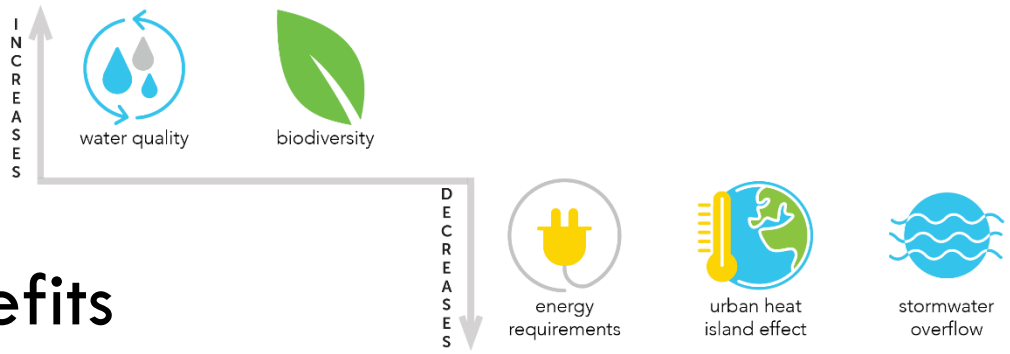
Adaptation: Functional Tree Planting

MANITOBA CLIMATE RESILIENCE TRAINING



Environmental Benefits

- Less runoff in the pipes (30% absorbed by leaves, 30% transpired)
- Reduced Heat Island Effects (temperature differential of 5 to 15 degrees under a tree canopy)
- Prolonged pavement life with less expansion/contraction
- Soil conservation
- Air quality (harmful gases converted to oxygen)
- Habitat and biodiversity

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Adaptation: Functional Tree Planting

MANITOBA CLIMATE RESILIENCE TRAINING

Socio-Economic Benefits of Trees

- Safer sidewalks (physical and psychological traffic barrier)
- Boulevards/growing spaces make room for amenities
- Treed streets attract 12% more pedestrians on average, increasing business, vibrancy, and sense of security.
- Mental and physical health
- Increased Property Value
- Aesthetic appeal

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Adaptation: Functional Tree Planting

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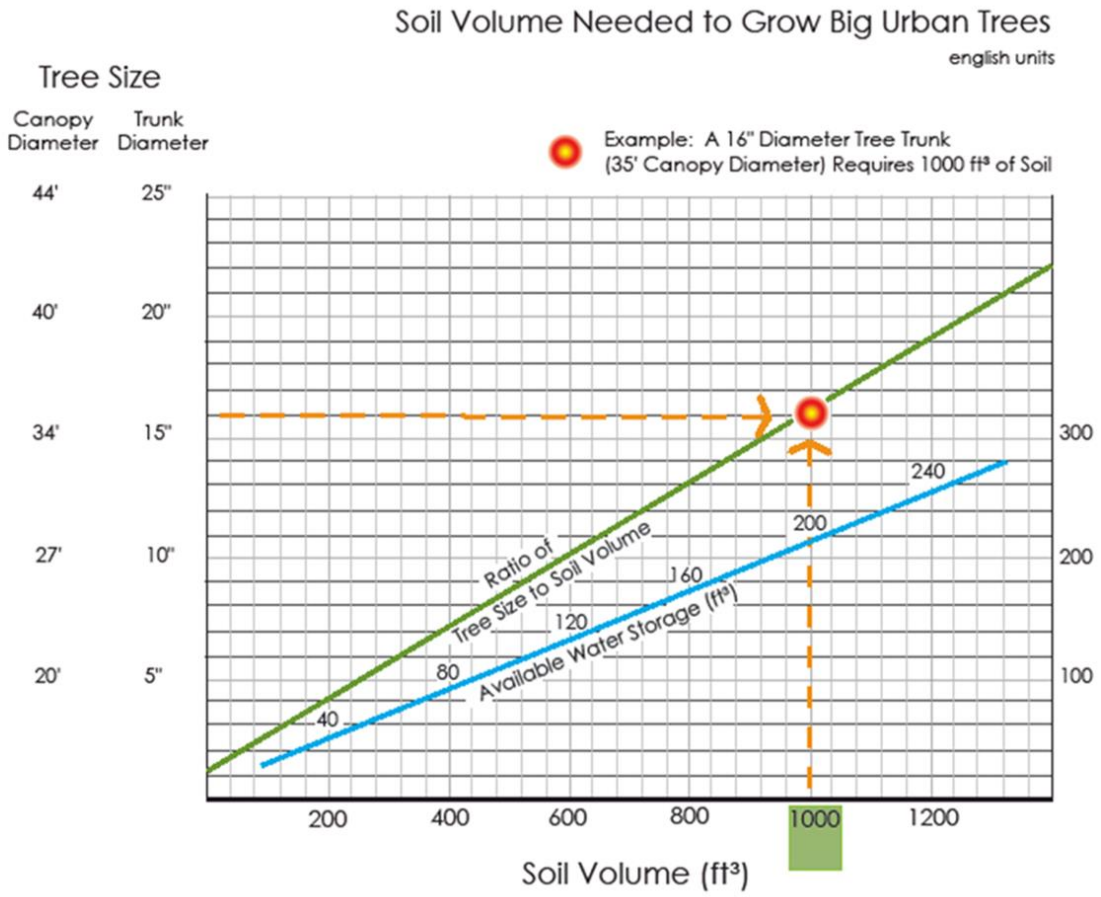

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Adaptation: Functional Tree Planting Soil Cells / Urban Canopy

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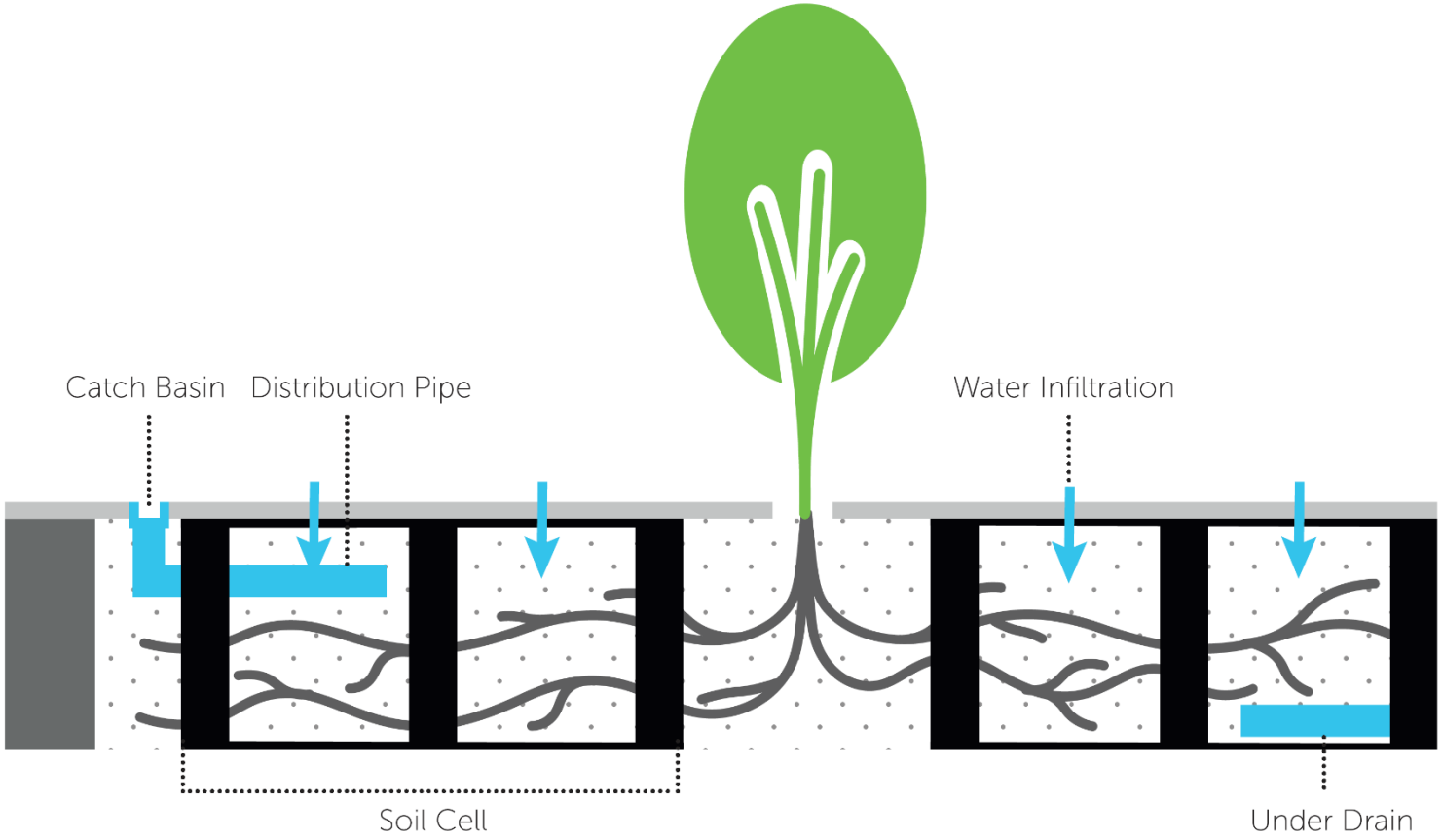

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Adaptation: Functional Tree Planting Soil Cells / Urban Canopy

MANITOBA CLIMATE RESILIENCE TRAINING

John Hirsch Place, Winnipeg

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Adaptation: Functional Tree Planting Shelterbelts

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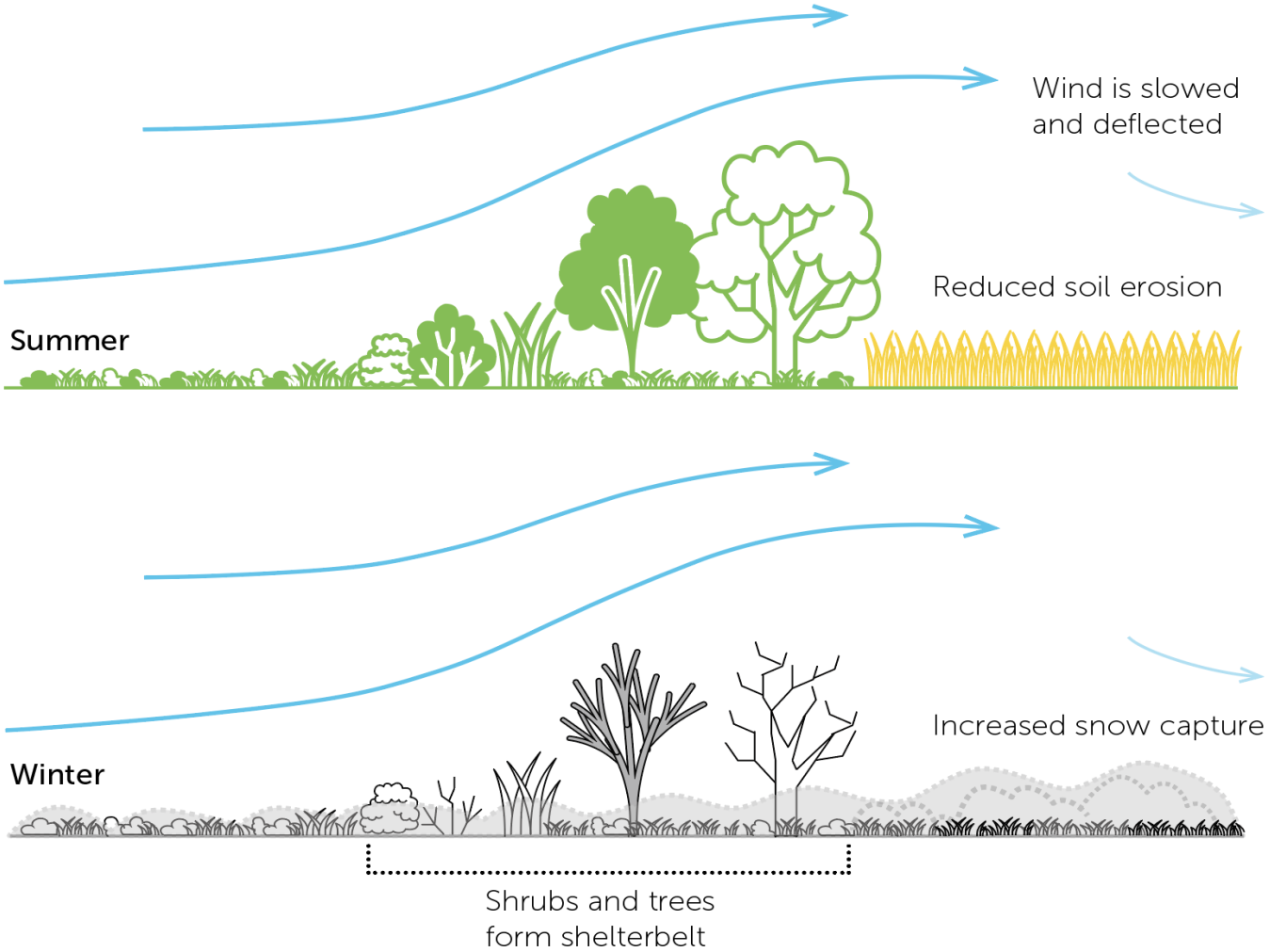

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Adaptation: Functional Tree Planting Shelterbelts

MANITOBA CLIMATE RESILIENCE TRAINING

Manitoba Habitat Heritage Corporation Eco-Buffer Project near Elie, MB

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Adaptation: Functional Tree Planting Shelterbelts

MANITOBA CLIMATE RESILIENCE TRAINING

Manitoba Habitat Heritage Corporation Eco-Buffer Project near Elie, MB

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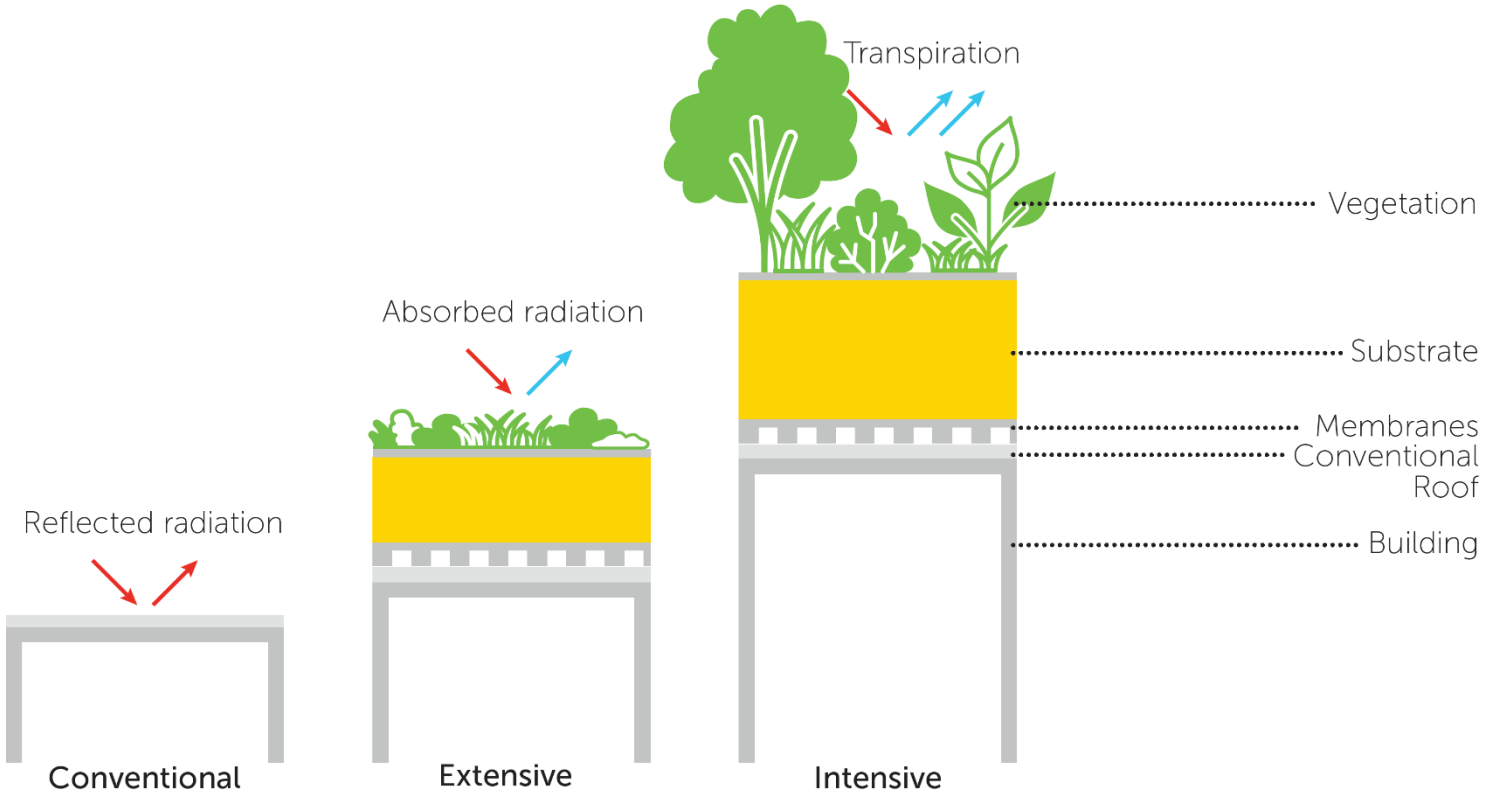
Adaptation: Living Architecture
Green Roofs

MANITOBA CLIMATE RESILIENCE TRAINING



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Adaptation: Living Architecture
Green Roofs

MANITOBA CLIMATE RESILIENCE TRAINING

CMHR, Winnipeg

Bird's Hill Park

Ducks Unlimited Headquarters,
Oak Hammock Marsh

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Adaptation: Living Architecture
Green Roofs

MANITOBA CLIMATE RESILIENCE TRAINING

To a roofer, green roofs:

- Add weight
- Add cost
- Add complexity
- Hold water on roof
- Restrict access for repairs
- Restrict ability to trace leaks

To a grower, green roofs:

- Expose plants to hot, dry and windy extremes
- Limit installation access
- Limit soil depth
- Add cost
- Create unpredictable interactions with surrounding structures
- Limit access to monitor, maintain and enjoy

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Adaptation: Living Architecture
Green Roofs

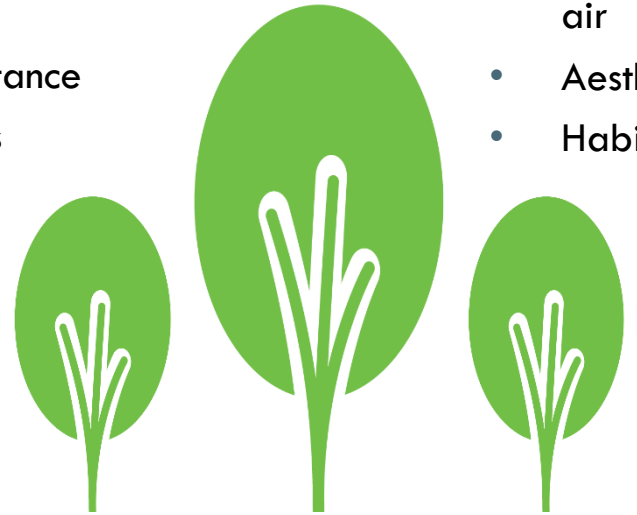
MANITOBA CLIMATE RESILIENCE TRAINING

Private Benefits:

- Protect and prolong membrane life (up to twice the lifespan!)
- Potential to reduce costs and fees related to drainage
- Save on heating and cooling
- Sound attenuation
- May improve public acceptance
- Amenity space & aesthetics
- Option of food production

Public Benefits:

- Stormwater treatment and detention
- Health and welfare
- Temperature regulation in building and surroundings
- Produce oxygen and filter particulate from air
- Aesthetics & recreation
- Habitat & biodiversity



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Adaptation: Living Architecture
Green Roofs

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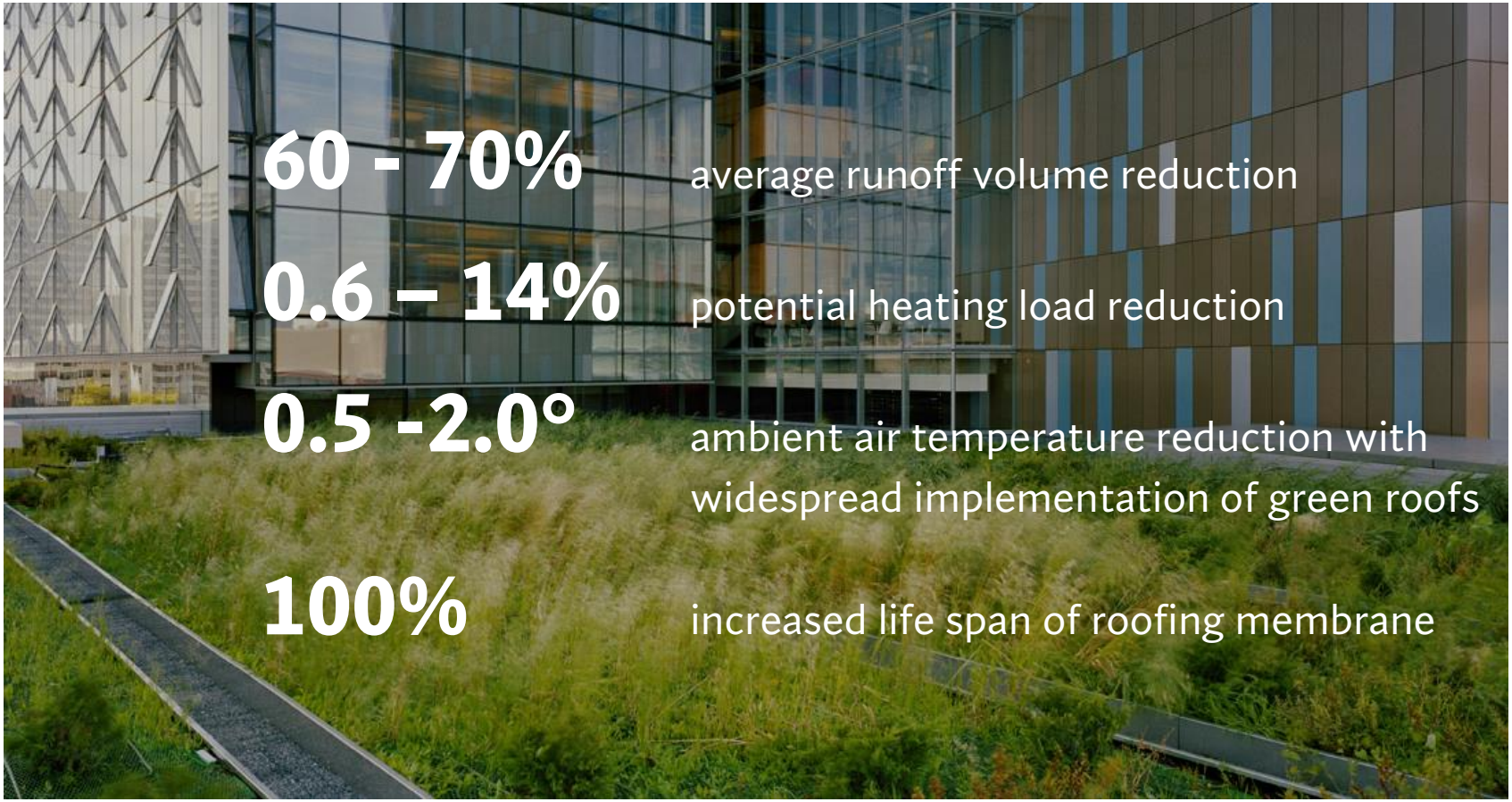

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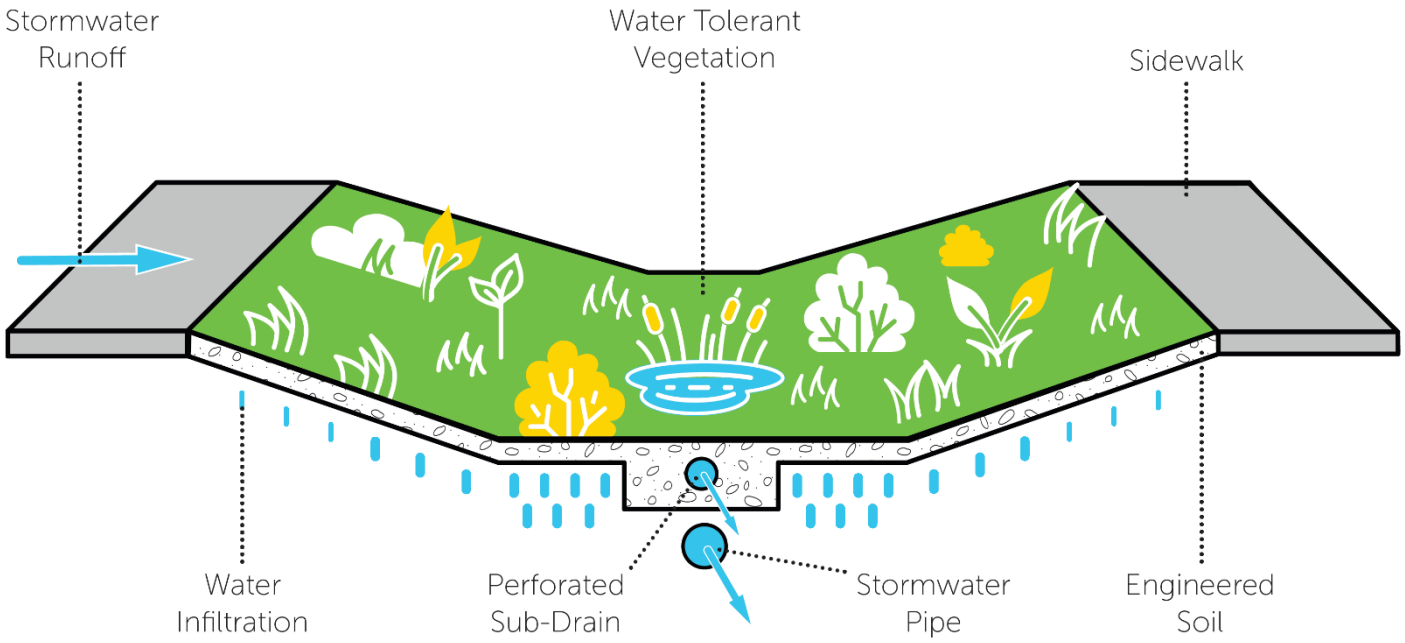
Adaptation: Bioretention + Infiltration

MANITOBA CLIMATE RESILIENCE TRAINING



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Adaptation: Bioretention + Infiltration

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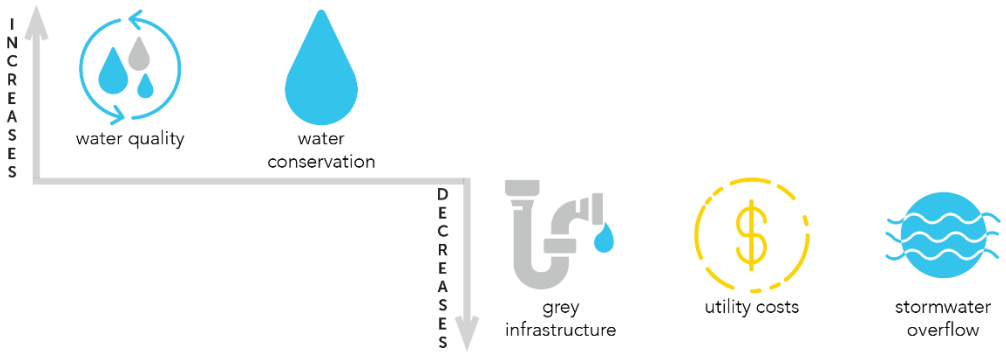
Benefits of Bioretention:



- Reduces Stormwater Runoff
- Improves Water Quality
- Reduces Atmospheric CO_2
- Increases Groundwater Recharge
- Improves Air Quality
- Reduces Urban Heat Island
- Improves Community Livability
- Improves Habitat

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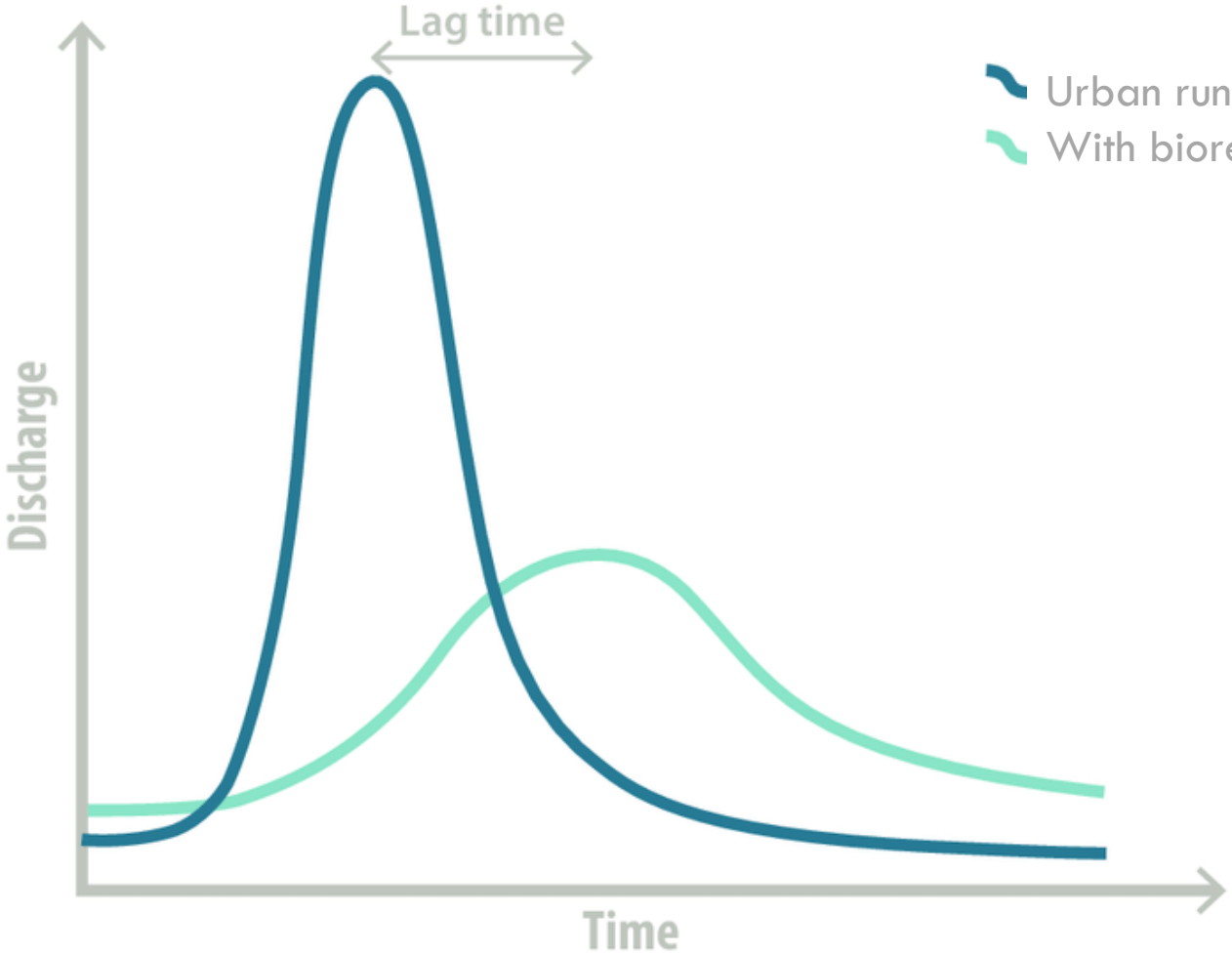

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Phytoremediation

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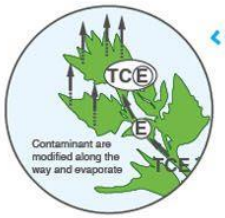
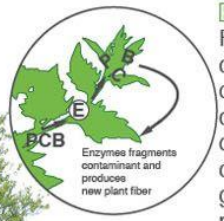
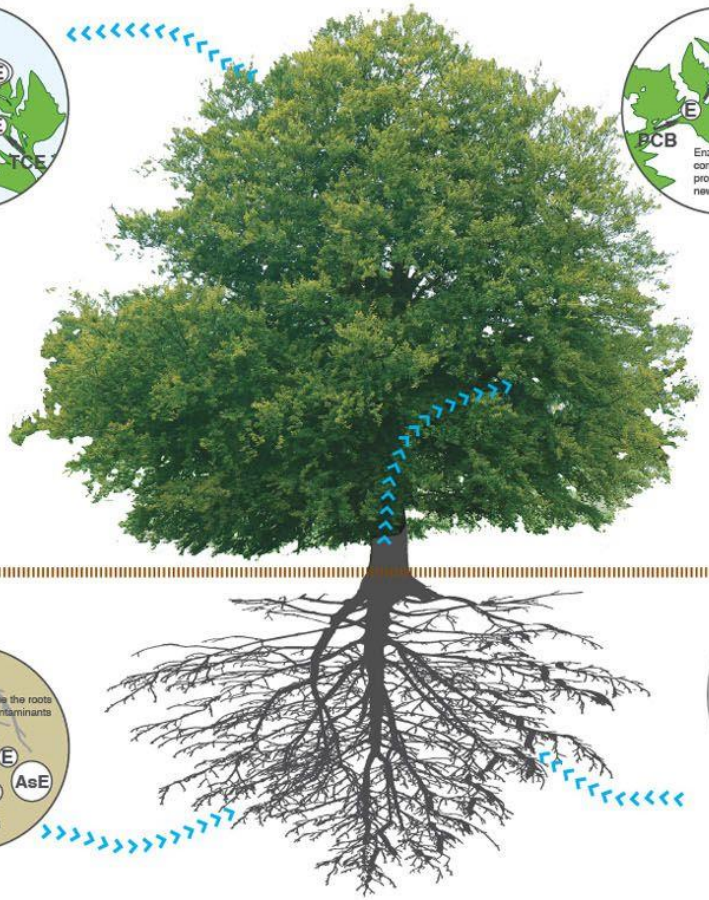
PHYTO VOLATILIZATION:
Some plants take up volatile contaminants and release them into the atmosphere through transpiration. The contaminant is transformed or degraded within the plant to create a less toxic substance before and then released into the air.



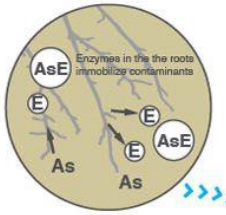


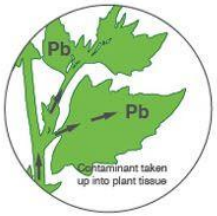
PHYTO DEGRADATION:
Plants take up and break down contaminants through the release of enzymes and metabolic processes such as photosynthetic oxidation/reduction. In this process organic pollutants are degraded and incorporated into the plant or broken down in the soil.



PHYTO EXTRACTION:
Plants take up contaminants - mostly metals, metaloids and radionucleids- with their roots and accumulate them in large quantities within their stems and leaves. These plants have to be harvested and disposed as special waste.

PHYTO STABILIZATION:
Some plants can sequester or immobilize contaminants by absorbing them into their roots and releasing a chemical that converts the contaminant to a less toxic state. This mechanism limits the migration of contaminants through water erosion, leaching, wind, and soil dispersion.





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Adaptation: Bioretention Rain Gardens

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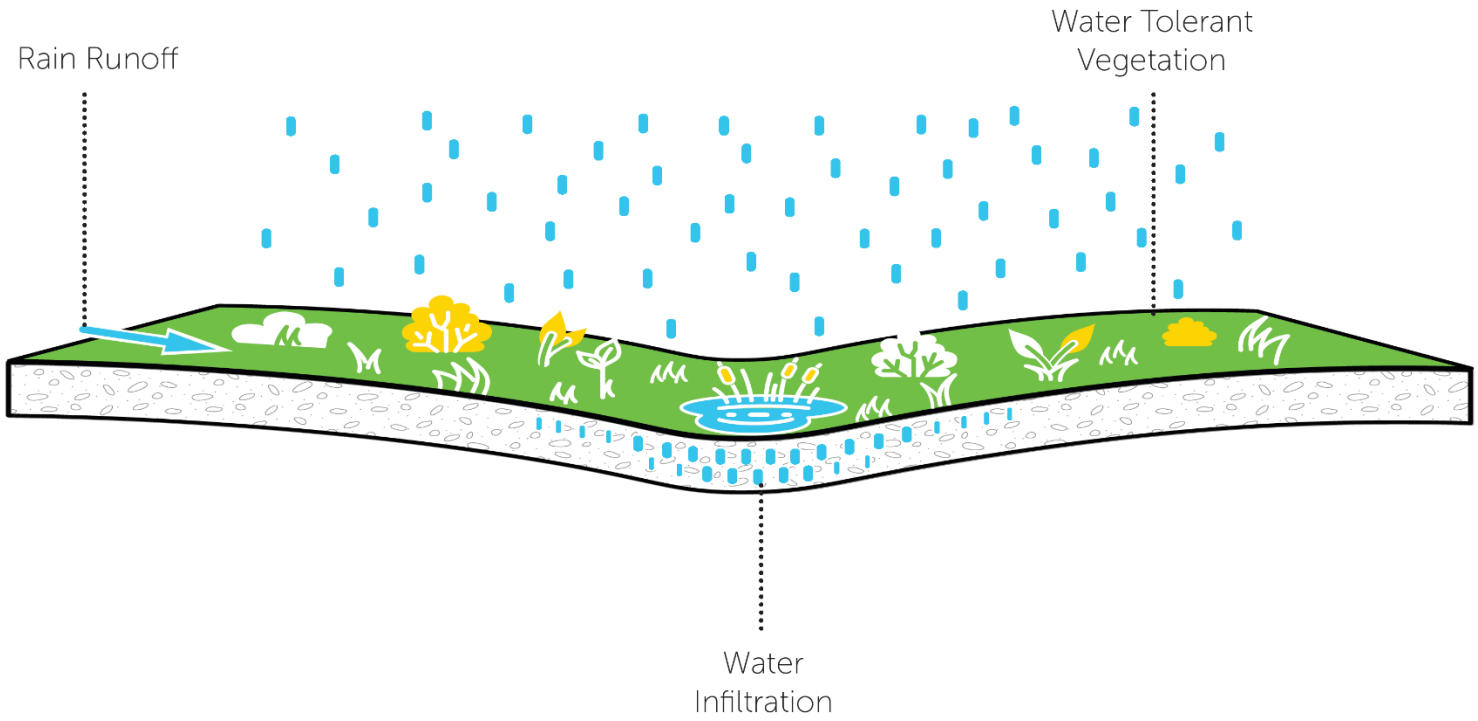

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Adaptation: Bioretention + Infiltration

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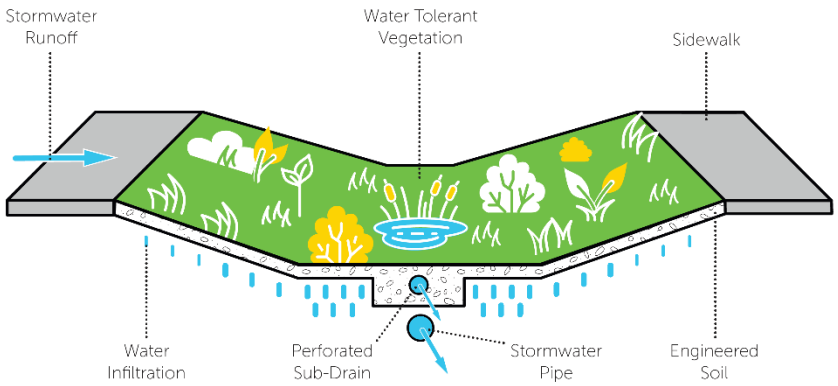

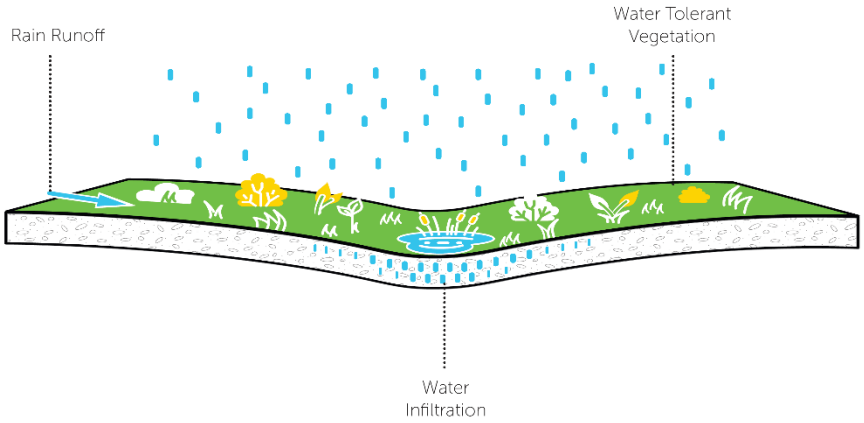

Bioswale vs. Rain Garden

What's the difference?

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Adaptation: Bioretention + Infiltration

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Saskatchewan Ave Bioswale, Portage La Prairie

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Adaptation: Bioretention + Infiltration

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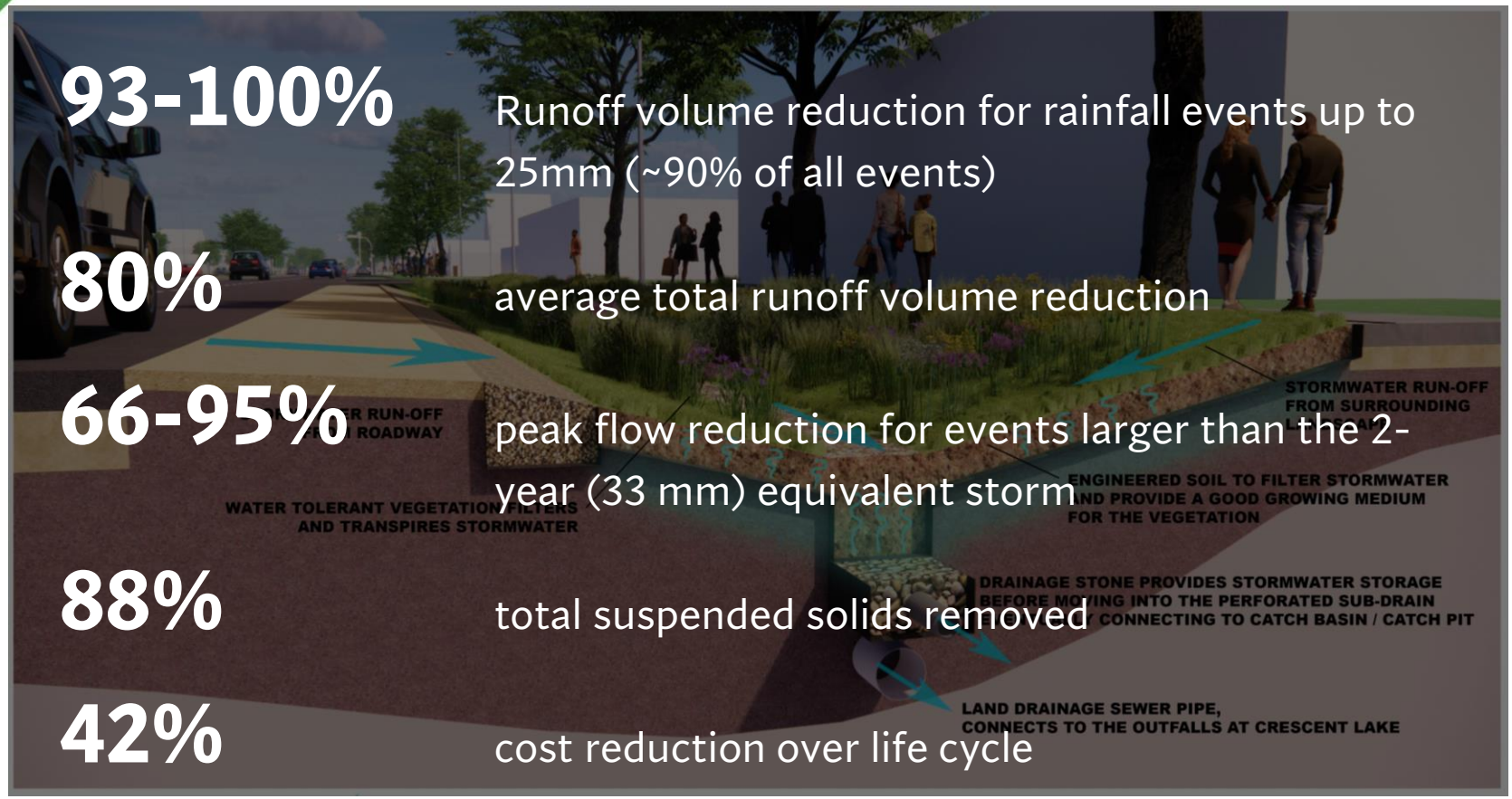

Saskatchewan Ave Bioswale, Portage La Prairie

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Adaptation: Bioretention + Infiltration
Permeable Paving

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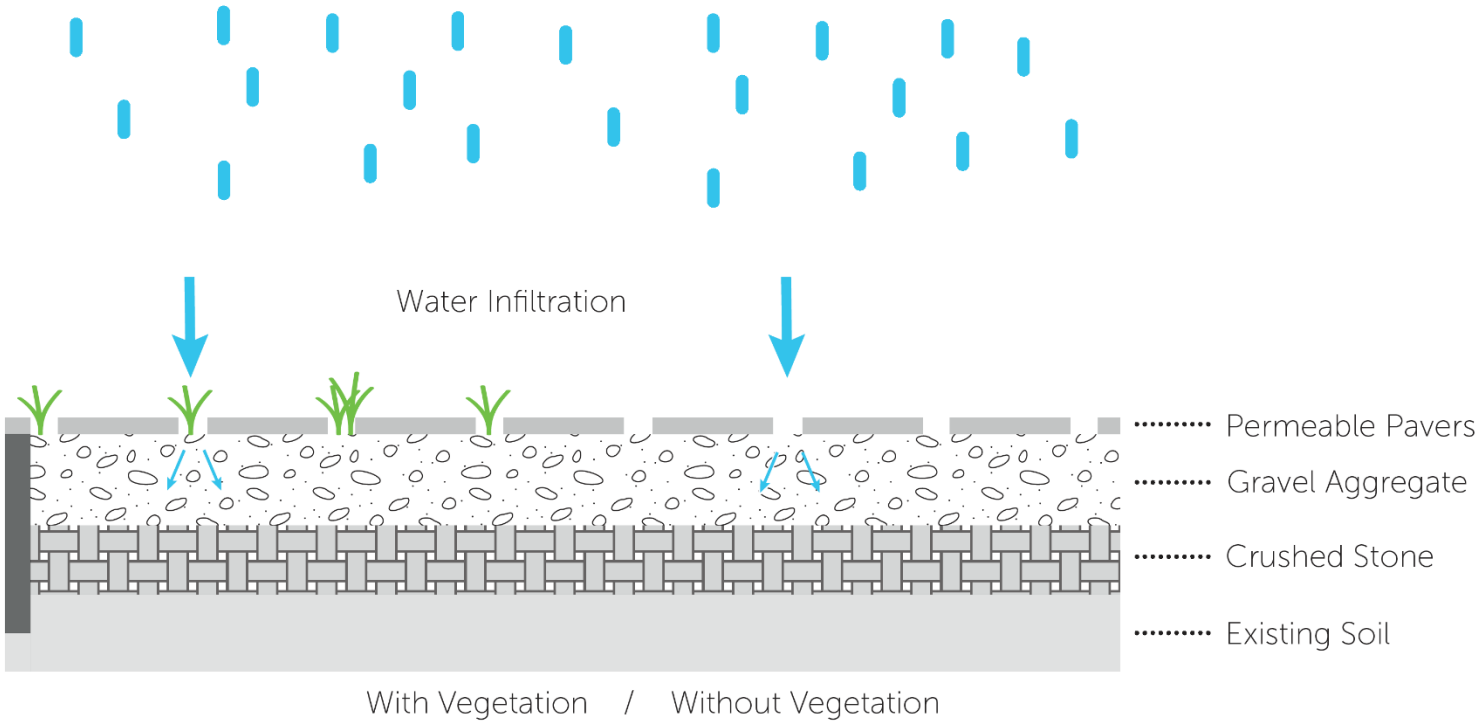

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Adaptation: Bioretention + Infiltration
Stormwater Ponds / Wetlands

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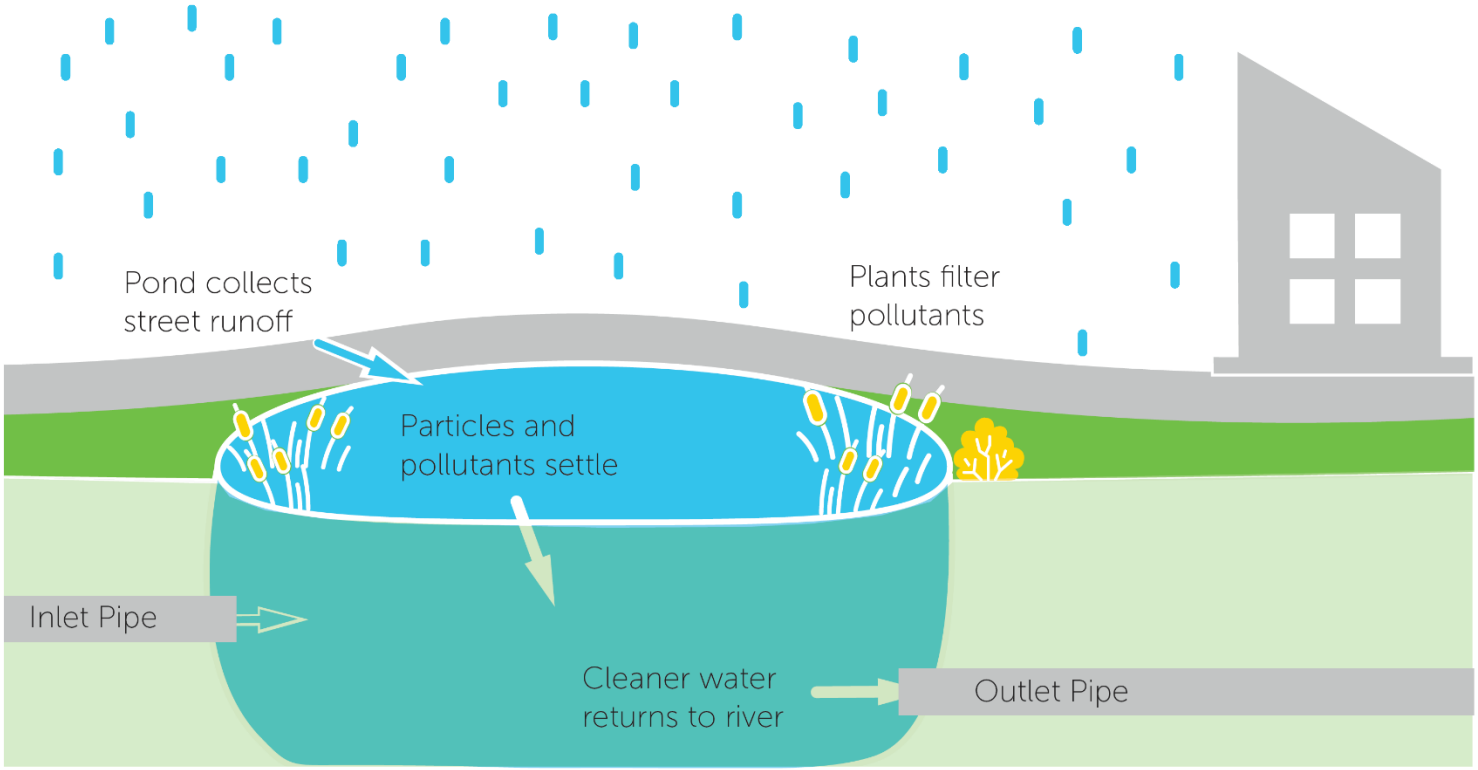

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Adaptation: Bioretention + Infiltration
Stormwater Ponds / Wetlands

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Older style retention pond

Royalwood Housing Development, Winnipeg

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Adaptation: Bioretention + Infiltration
Stormwater Ponds / Wetlands

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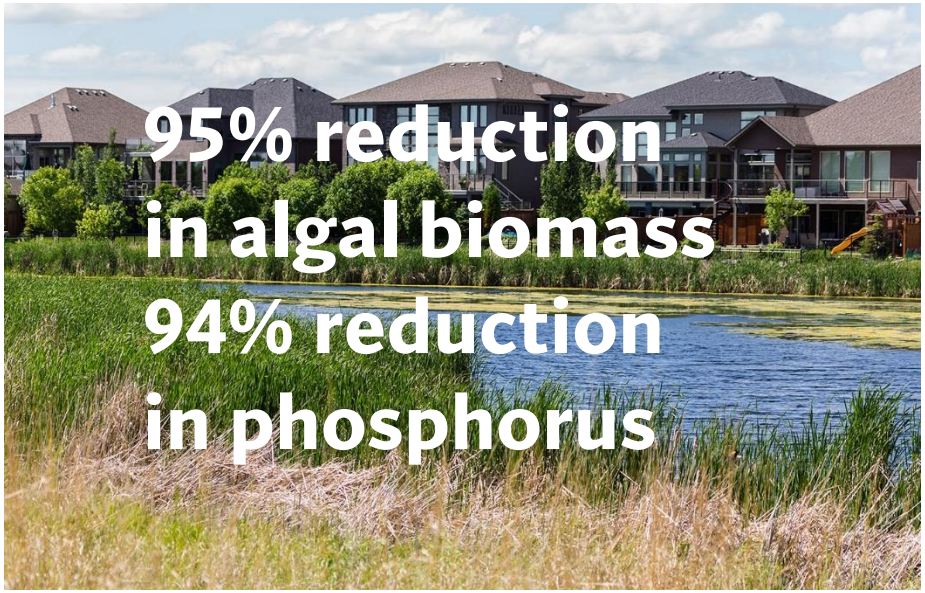
Older style retention pond



Royalwood Housing Development, Winnipeg

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Decentralized Network

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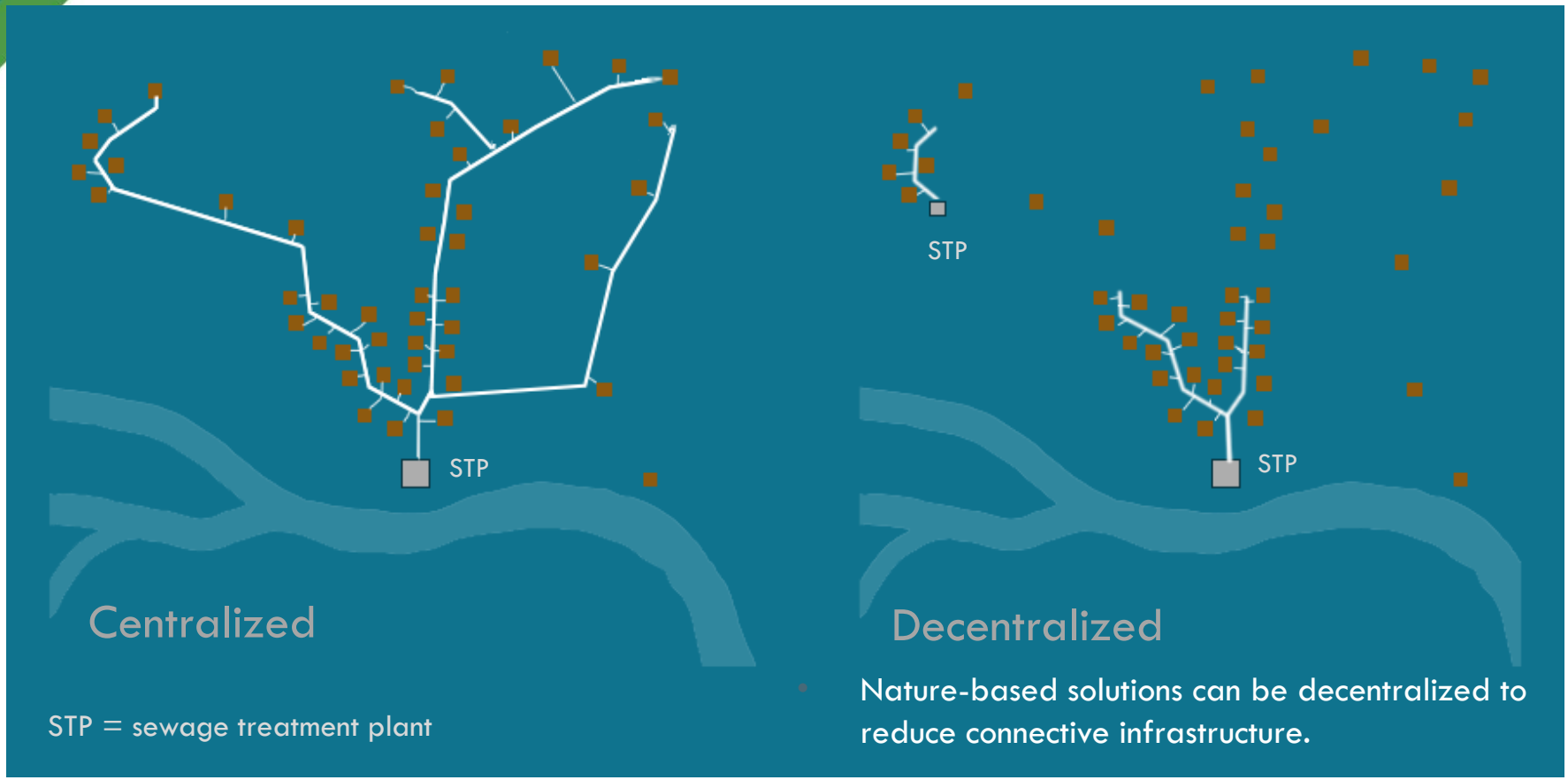

STP = sewage treatment plant

Nature-based solutions can be decentralized to reduce connective infrastructure.

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Planning Actions

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- Zoning and permitting
- Development agreements
- Taxation, user fees, incentives
- Conservation agreements

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Climate Adaptation in Development Plans & Zoning

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Flooding:

- Designate / zone flood-prone areas for recreational use instead of residential, commercial, etc.
- Adopt higher flood protection standards for developments (beyond 1-in-100 year levels).
- Include policies to preserve wetlands.

Icon by Freepik

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Climate Adaptation in Development Plans & Zoning

MANITOBA CLIMATE RESILIENCE TRAINING

Drought & Extreme Weather:

- Encourage or require development to include green infrastructure that retains water, controls water flow, mitigates flash floods, and provides resilience from these events.

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Climate Adaptation in Development Plans & Zoning

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Warming Summers & Winters

- Prepare for increased housing demand in climate-resilient communities and population decline in areas that are at risk.
- Changes to crops grown may affect land use demands (e.g. viability to grow specialty crops on smaller parcels of land, etc.)

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Climate Adaptation in Development Plans & Zoning

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Wildfires

- Include policies in Development Plans to locate development away from areas of high forest fire danger
- Ensure new developments account for fire risk
- Encourage resilient design through site layout and fire-resistant landscaping

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Next Steps: Planning Actions

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Climate Hazard:	
Highest Priority Consequences	**Potential Mitigation & Adaptation Actions**
Example: People need to be evacuated due to wildfires	- Explore the creation of a firebreak around the community - Take inventory of vulnerable buildings, like healthcare centres, nursing homes, and schools - Plan evacuation routes and backup routes - Educate citizens on ways to reduce the risk of wildfires - Encourage citizens to make their own evacuation plan

- For every **medium-high** **or** **high** priority in the matrix, identify some potential mitigation and adaptation actions.

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Next Steps: Planning Actions

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Round Table Question:

- What kind of potential actions did you identify?

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Climate Action Plan Steps

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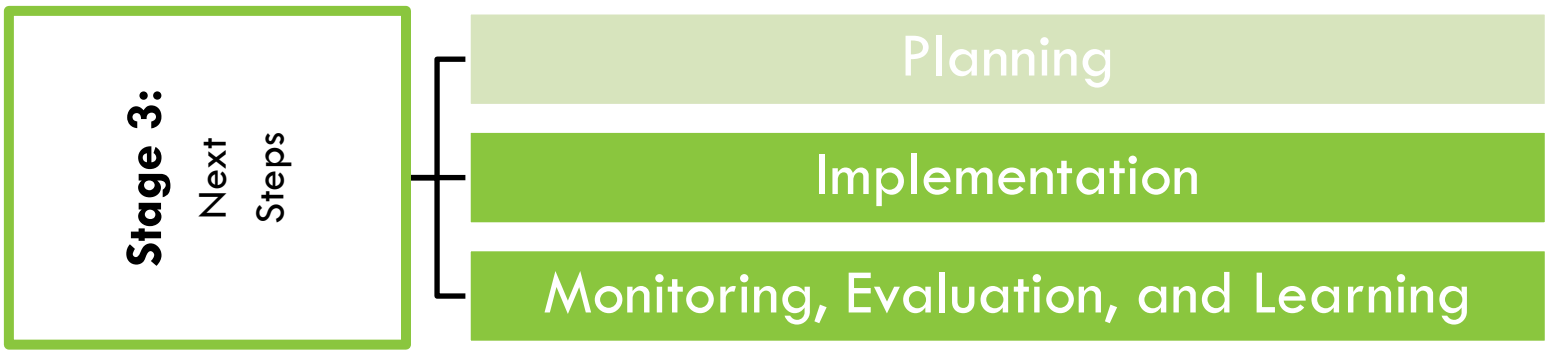

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Implementation

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You may need to think about:

- Timing
- Funding
- Expertise

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What We Heard

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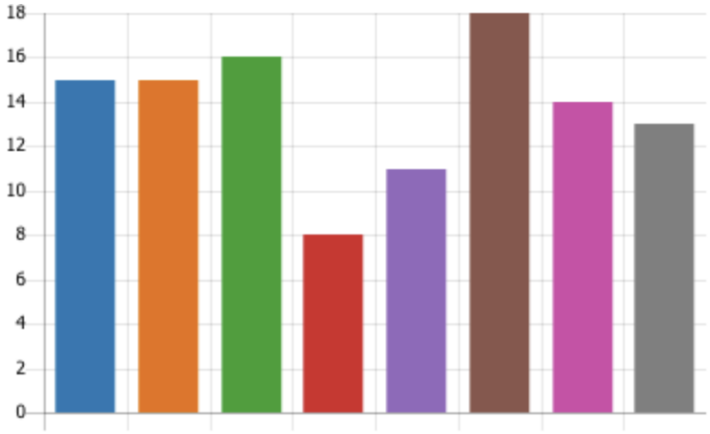
- **We asked:** What barriers to adaptive action, if any, has your municipality or district encountered?



Lack of information on local impacts of climate change	15
Lack of funding for studies	15
Lack of funding to implement adaptation projects	16
Lack of political support	8
Lack of support from the general public	11
Shortage of staff to do the work	18
Lack of technical support and training	14
Uncertainty on where to begin	13

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Federal Funding Opportunities

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Français

Government of Canada | Gouvernement du Canada

Search ECCC

MENU

Canada.ca > Environment and natural resources > Climate change > Canada's climate plan > Adapting

Funding opportunities to support adaptation action

Federal investments are key to supporting adaptation measures at the national, regional and local level. This page provides further details on funding opportunities for climate change adaptation by department, including a comprehensive list of adaptation programs.

Environment and Climate Change Canada

Climate Action Fund: provides up to $3 million annually for projects that raise awareness and increase participation in climate change action across Canada. Selected projects focus especially on youth, students, Indigenous Peoples and organizations, and small and medium businesses.

EcoAction Community Funding Program: provides funding to protect, rehabilitate, enhance and sustain the natural environment.

Nature Fund: supports the protection of Canada's ecosystems, landscapes and biodiversity including species at risk. The fund is available to non-profit and Indigenous organizations, provinces and territories, and others.

Go to: canada.ca/en/environment-climate-change/services/climate-change/adapting/funding.html

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Provincial Funding Opportunities

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– Conservation & Climate Fund

The Conservation and Climate Fund provides support to projects occurring in Manitoba that incorporate actions to address and adapt to climate change and protect the environment in alignment with the priorities and implementation of the Climate and Green Plan.

Projects will deliver on one or more of the following:

- Reduce greenhouse gas emissions;
- Address the effects of climate change, including measures to adapt to climate change;
- Promote sustainable development while ensuring natural resources are managed in a manner that ensures availability for future generations

The Fund is a project funder and it is not the intent to provide on-going operating or maintenance support to an organization.

As an initiative of the Manitoba Climate and Green Plan, the Fund supports a green and climate resilient province.

Who can apply?

Eligible applicants include:

- Incorporated non-profit organization
- Academic and educational institution
- Manitoba Municipality
- Northern Affairs and Indigenous Community in Manitoba
- Business, including Social Enterprise Businesses

Organizations must be active and have established operations within Manitoba for at least one year before applying. Business must be registered with the Province of Manitoba.

Ineligible applicants include Individuals, Crown Corporations, Federal Government, Provincial Governments, and Watershed Districts.

Go to: gov.mb.ca/grants/grant-name.html

CATEGORY	SUB-CATEGORY	OUTCOMES	CROSS SECTOR FOCUS AREAS
Climate and Green Technology	Clean Energy	• Foster more clean energy production (e.g. renewable or low carbon energy sources) and used in Manitoba • Contribute to overall emissions reductions for Manitoba • Promote growth in the clean technology sector • Advance key infrastructure partnerships under the Climate and Green Plan (e.g. to municipalities, international experts and indigenous communities)	Clean technology pathways that fulfill market needs and provide job and economic stimulus. (e.g. Clean tech or clean energy investments and jobs created) Circular economy development that focuses on provincial industries and associated economic opportunities. (e.g. Redirect by-product streams into higher value added processing or reuse.) Municipal climate action projects to reach the carbon emissions reduction potential of municipalities; and/or to advance implementation *of the community's adaptation plans.* Advance innovative knowledge sharing of climate change sciences, which fosters sustainable action, for a prairie specific context.
	Sector Emissions Reductions		
	Innovation and Cleantech		
	Green Infrastructure		
Water	Agriculture and Land Use	• Maintain and enhance healthy agro-ecosystems • Contribute to effective forecasting, mitigation and response to flooding and drought • Target clean water throughout Manitoba for drinking, habitat and economic development	
	Flood and Drought		
	Water Quality		
Nature and Resilient Landscapes	Park and Protected Areas	• Encourage a greater connection and enjoyment with nature and natural tourism for Manitoba families • Promote healthy and productive forests and natural areas • Support Manitoba's active conservation efforts	
	Forestry and Natural Areas		
	Conservation		

Other Funding Opportunities

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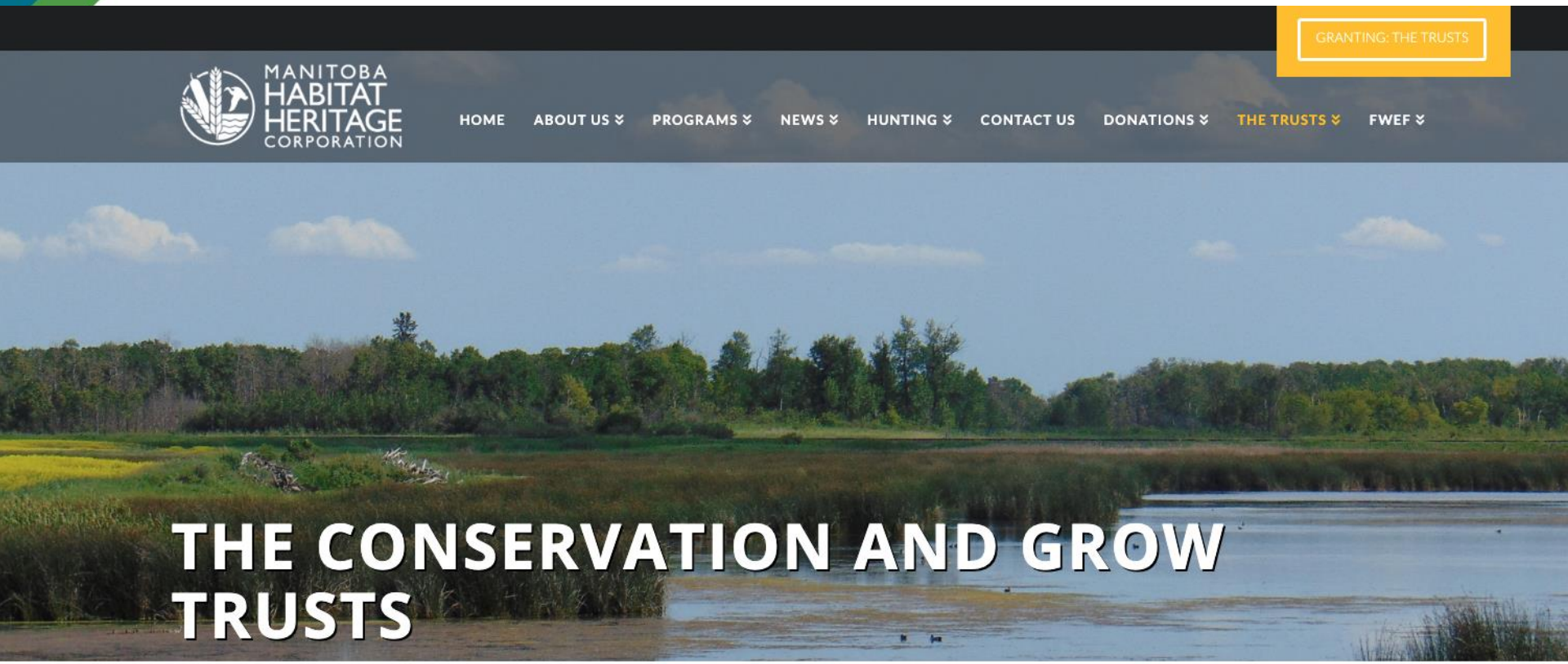

Go to: www.mhhc.mb.ca

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Other Funding Opportunities

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ClimateWest

Adaptation in Action Program

Go to: climatewest.ca/adaptation-in-action-program

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Other Funding Opportunities

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ClimateWest

ClimateWest Forum: Building Climate Resilience

The 2nd annual ClimateWest Forum is set to take place on May 8-9, 2024 in Edmonton and online

Go to: climatewest.ca/2024-climatewest-forum/

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Partners for Climate Protection

Join this national network of 400+ municipalities and learn how to reduce greenhouse gas emissions and act on climate change.

Visit here: https://fcm.ca/en/programs/partners-climate-protection

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COMPLETE EXIT SURVEY & HAND IN WORKBOOKS

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MANITOBA CLIMATE RESILIENCE TRAINING

THANK YOU!

If you would like a digital copy of the materials presented today, or have further questions, please contact us!

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Manitoba CGPIO
Email: ccinfo@gov.mb.ca

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