



MANITOBA CLIMATE
RESILIENCE TRAINING

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Supported by Natural Resources Canada's Building Regional
Adaptation Capacity and Expertise (BRACE) Program



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RESILIENCE TRAINING

A Path Forward

Climate Adaptation Actions for Professional Planners and Landscape Architects

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**MANITOBA CLIMATE
RESILIENCE TRAINING**



**We acknowledge that we are gathered here today
in Treaty 1 Territory, within the traditional territories
of the Anishinaabe (Ojibwe), Ininew (Cree), Oji-Cree
and Dakota peoples, and in the homeland of the
Métis Nation**



Overview of content

1. Introduction
2. Implications for practitioners
3. The case for adaptation
4. Professional practice & standards
5. Existing policies/legislation
6. Why climate solutions fail
7. A path forward
8. References



Learning objectives

Participants will leave today's workshop with:

- A working knowledge of the **professional obligations** of both professional planners and landscape architects
- The ability to identify the **four types of adaptive responses**
- An understanding of how **planning/design tools and approaches** can be applied to bolster climate adaptation
- Other steps that can taken to **chart a path forward** in climate resilience



What we've learned

Climate Change 101 (November 4th) reviewed climate science basics and explained how GHG emissions have resulted in **1.7°C of warming** in Canada

November 4, 2021

Why does Canada warm faster?

- Snow-ice albedo feedback** - loss of snow and ice reduces the albedo of the surface
- Lapse-rate feedback** - warming is close to the surface in the higher latitudes
- Planck feedback** - cooler temperatures in the atmosphere result in proportionally less outward emission of energy than in warmer latitudes
- Cloud feedback** - high latitudes getting cloudier, keeping heat near the surface¹⁴

6.4

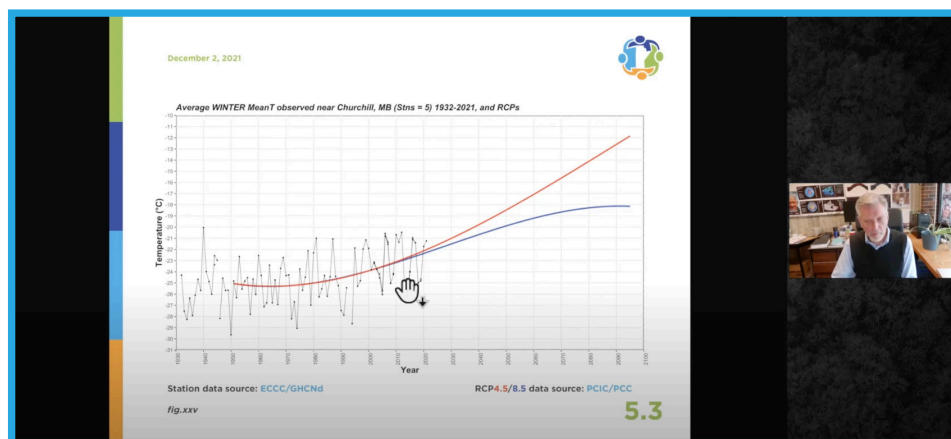
The video inset shows a man in a suit and tie, with a red poppy pinned to his lapel, speaking from his desk. Behind him are several framed maps and charts on the wall.

fig.i http://www.youtube.com/watch?v=O_rGTI7ptVo



What we've learned

Manitoba's Changing Climate (December 2nd) utilized the Climate Atlas of Canada to explore how climate change would impact communities



Main trends: hotter summer temperatures, warmer/shorter winters, and increased precipitation variability

fig.ii <http://www.youtube.com/watch?v=8fndP128sJI>



Implications for practitioners

How do climate impacts affect planning and design decisions?

What are the practical limits to the sphere of influence?

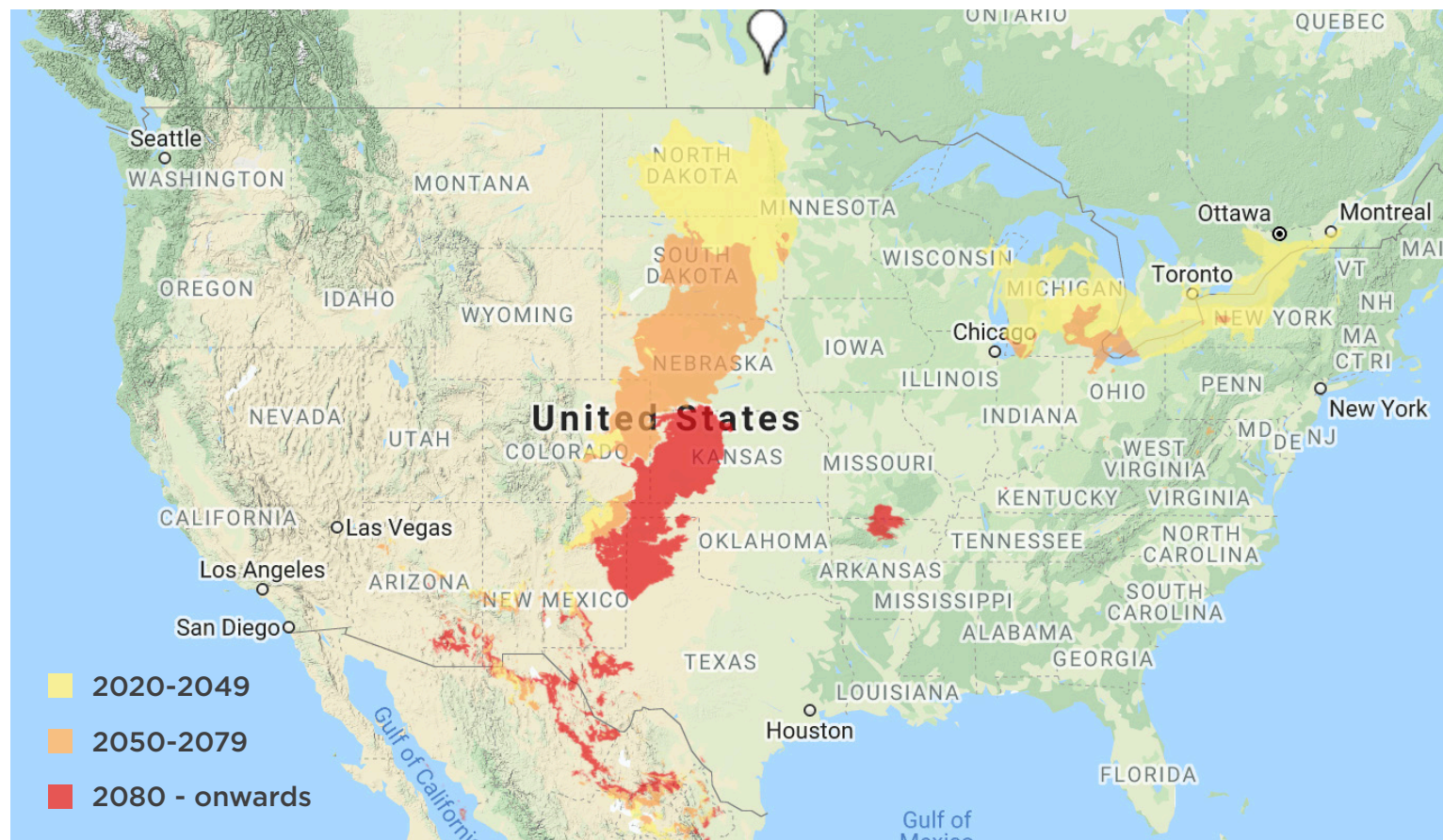


Climate change is resulting in the **forfeiture of norms** which are used to make informed decisions

“Cities need to recognize that it’s not about planning for an average of 2-10 degrees warmer summers; it’s the new extremes in rainfall, flooding, drought, and the duration of heat waves that will really challenge our infrastructure and affect our lives. Cities need to focus on these extremes, and make investments to be more resilient to them in terms of both the duration and the magnitude of these extreme circumstances.” - Kristina Hill, ASLA Interview¹



The challenge we now have is, whose climate are we planning for?



Graphic attributed to **Prairie Climate Centre**

fig.iii <http://prairieclimateatlas.ca/atlas.html>



The decisions that get made in planning/design documents will have **implications for several generations**

One of the strengths of practitioners is your ability to account for long-term projections

- Concept of 'future proofing' communities
- Masterplans are realized iteratively over many years
- Variability and uncertainty are not new concepts

YOU ARE IMPORTANT



The case for adaptation

How do mitigation and adaptation responses differ for planners and landscape architects?

What are the four types of adaptation responses?



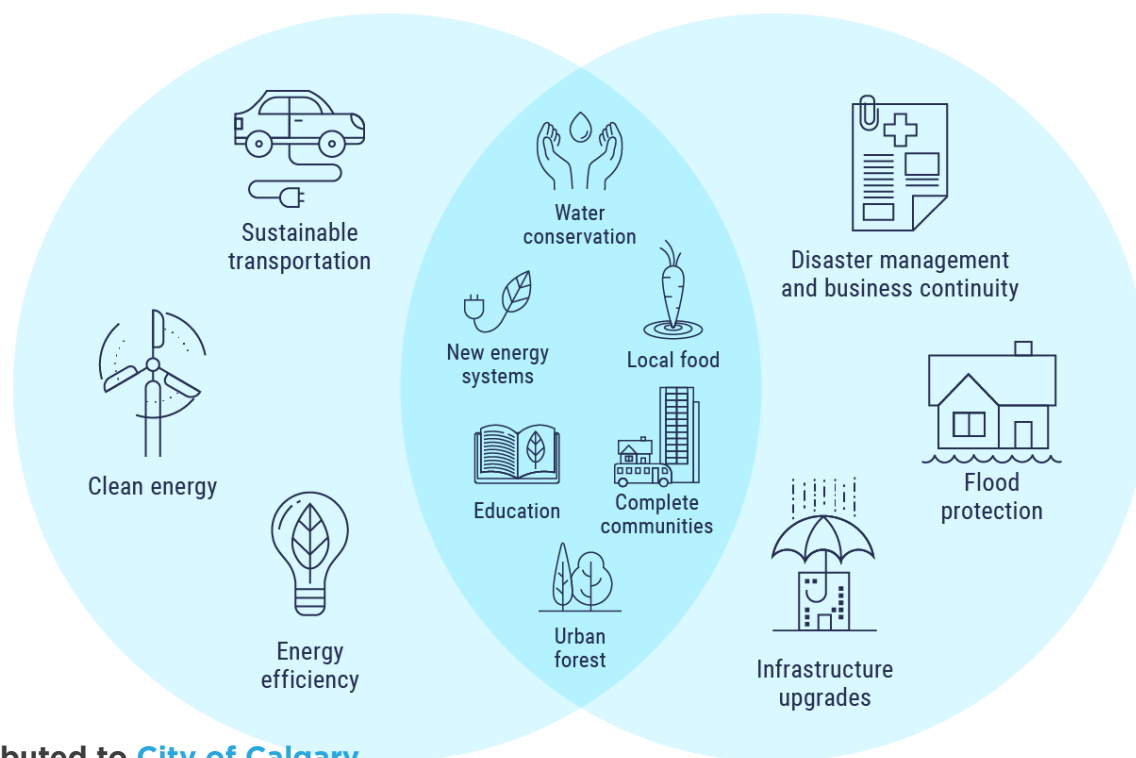
What's the difference?

Mitigation

Action to reduce emissions that cause climate change

Adaptation

Action to manage the risks of climate change impacts



Graphic attributed to **City of Calgary**

fig.iv https://changingclimate.ca/regional-perspectives/box/case-story-4-5/pr_11_v2/



Mitigation responses are largely **reactive** and contend with emission sources that have impacts at the **global-scale**

On average, there is a **30-year lag** time in seeing the effects of responsive efforts

Examples of mitigation responses:

- **Protect and fortify carbon sinks (e.g. wetlands, forested tracts)**
- **Plan for sustainable transportation infrastructures**
- **Include by-laws that enshrine energy efficiency**



Mitigation = Sustainability

"...there are two broad approaches [to mitigation]: the use of technology (e.g. promoting electric powered vehicles), and to **change behaviour** such as getting people to consume less and 'live more lightly on the land'."²

Elizabeth Plater-Zyberk



Adaptation responses are **proactive** and attempt to prepare for future climate projections by building in redundancies at **regional/local scale**

“...a continuous stream of activities, action, decisions and attitudes that informs decisions about all aspects of life, and that reflects existing social norms and processes.”³

CSLA Adaptation Primers, Preparing for change

Examples of adaptation responses:

- **Accounting for climate projections in layout, infrastructural decisions**
- **Anticipating maintenance requirements**
- **Utilizing revised palettes that responsive to future states**



Adaptation = Resiliency

“Adaptive capacity the ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences.”⁴

IPCC SR1.5



Four approaches to adaptation

1. Fortify/defend
2. Accommodate/
adapt
3. Retreat/relocate
4. Clean up





Fortification responses rely on building defensive structures or shoring-up existing infrastructures to defend against climate impacts (i.e. overland flooding)

Pros: Good at protecting existing, compact urban areas

Cons: Costly interventions, rarely win-win options (someone will bear the brunt of the displaced impact)



fig.vi <https://www.winnipegfreepress.com/local/todays-opening-of-floodway-unusually-early-417776973.html>



Retreat responses migrate persons and properties away from at-risk areas through relocation programs or zoning policies

Pros: Eliminates immediate risks

Cons: Relocating established persons is very difficult, creates climate change migrants/refugees, largely limited to new developments in 'receiver cities'⁵



fig.vii <https://www.cnu.org/publicsquare/2021/12/09/eight-ways-%E2%80%99receiver-cities%E2%80%99-prepare>



Regardless of the response(s) taken (hazard-specific actions), for communities to be resilient to climate change, they will also need to build in systematic-resilience actions:

- 1. Increasing awareness**
- 2. Incorporating risk**
- 3. Optimizing responses (e.g. redundant emergency service routes)**
- 4. Enhancing financial programs⁶**



Scales of adaptation

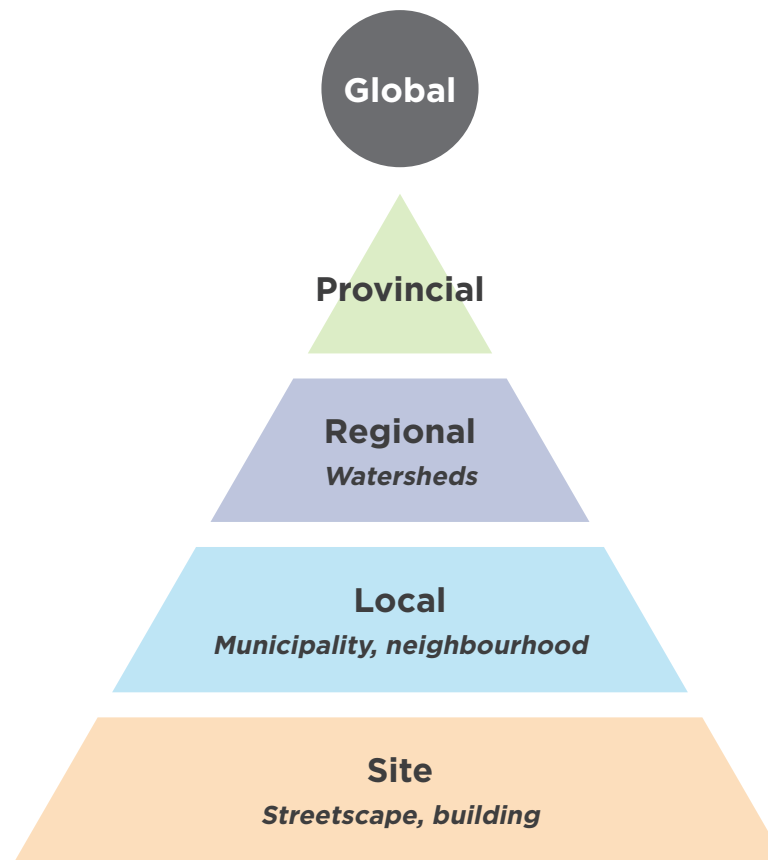


fig.viii



Risks to consider



Flooding



Drought



Wildfires



**Warming summers
& winters**



Extreme weather



Areas of influence

Water

**Agriculture, plants
& animals**

**Settlement areas
& Housing**

**Transportation &
Infrastructure**



Flooding

- **Destruction of homes & buildings within floodplain**
- **Displacement of people due to evacuation**
- **Major damage and disruption to infrastructures**
- **Major disruption to agricultural growing seasons, wildlife**
- **Spring flooding may cause large losses of autumn-applied nitrogen fertilizer from previous year**

fig.ix <https://www.winnipegfreepress.com/local/Assiniboine-River-crests-in-Brandon-265961931.html>

TIM SMITH



Drought

- Major strain in reservoirs and urban water supplies
- Rural wells may dry up, limiting rural residential development
- Death or damage to vegetation
- Crop failures, soil drifting, dust storms
- Increased water scarcity and demand on water sources



Wildfires

- **Destruction of homes & buildings**
- **Displacement of people due to evacuation**
- **Major loss of forested or grassland areas, wildlife habitats**
- **Smoke from wildfires affects air quality, limits ability for people to be outdoors**
- **Severing of vital hydroelectric infrastructure, forced reliance on generators and alternative energy sources**

fig.xi <https://manitobachiefs.com/amc-and-canadian-red-cross-update-on-evacuations-due-to-forest-fires-in-manitoba-first-nations/>



Extreme weather

- More frequent extreme, damaging weather events
- Destruction of homes & buildings, increase property damage
- Increased risk of service loss resulting from storms, longer power outages
- Increased maintenance budgets allocated to repairs and clean-ups
- Negative impacts on water quality resulting from extreme rainfall events (heavy nutrients loading in tributaries)

fig.xii <https://fineartamerica.com/featured/prairie-thunderstorm-south-dakota-douglas-berry.html>

DOUGLAS BERRY



Warming summer & winters

- **Agricultural & planting changes (longer growing seasons, increased heat units)**
- **Shifts in ecosystem composition, increased risk of pest/disease**
- **Increased urban heat island effects**
- **Decreased winter road season, increasing cost of living in northern communities**
- **Loss of permafrost, increased risk to northern infrastructures**
- **Shifts in recreation patterns/uses**

fig.xiii <https://blog.nature.org/science/2015/07/15/hot-times-summer-in-the-city-understanding-the-urban-heat-wave/>



Professional practice & standards

How are professionals currently addressing climate change?

What are the professional obligations of landscape architects and professional planners?

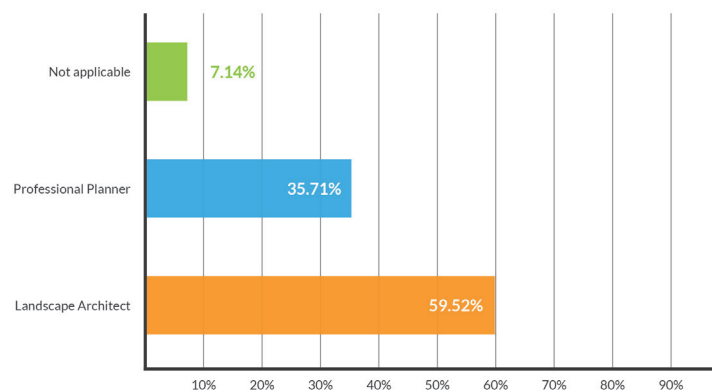
How are climate change considerations enshrined in mandates?



Survey findings:

Roughly 15% of professionals working in Manitoba's planning community responded

What professional title(s) do you currently hold? Please select all that apply





Survey findings:

A significant number already use climate change projections as an influence in their projects or plans

How important are climate change projections as an influence in your projects or plans?

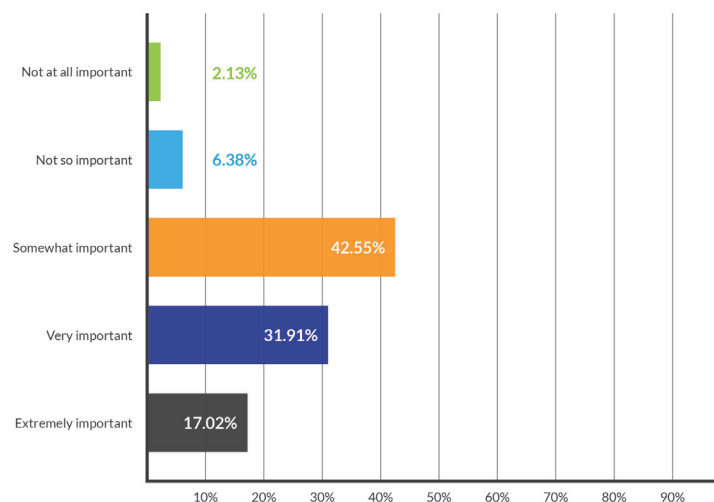


fig.xv



Survey findings:

Several major obstacles to mainstreaming climate conscious efforts included budget limitations and a lack of client interest

What – if any – particular obstacles prevent you from incorporating future climate scenarios into your plans and designs? Please select all that apply.

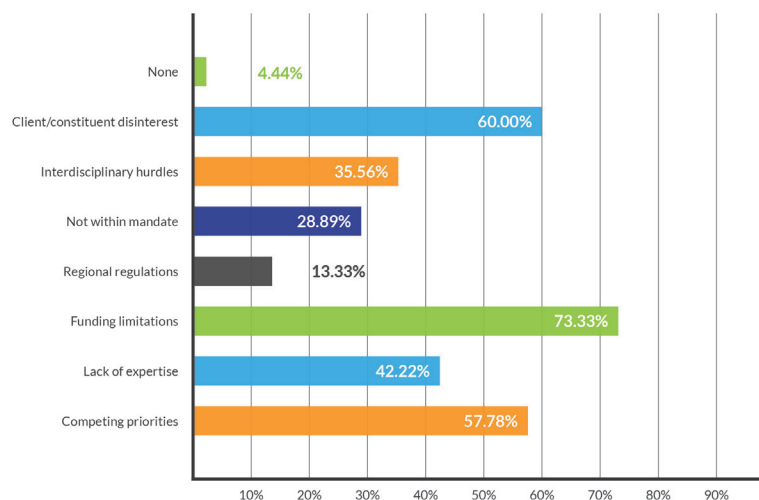


fig.xvi



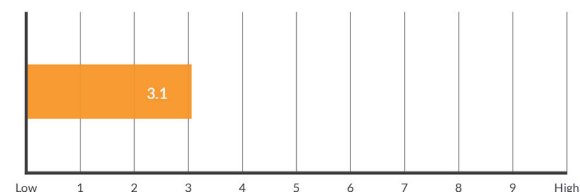
Survey findings:

However, respondents ranked the current demand for climate conscious work as a 3.1

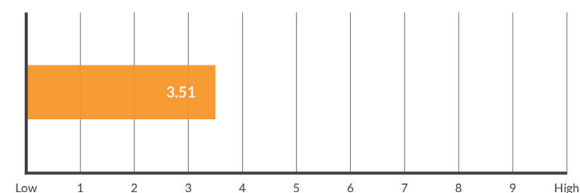
On a scale of 1 - 10 ranking how confident professionals would be in discussing potential impacts of climate change with a client/stakeholder/constituent, respondents averaged only 3.5

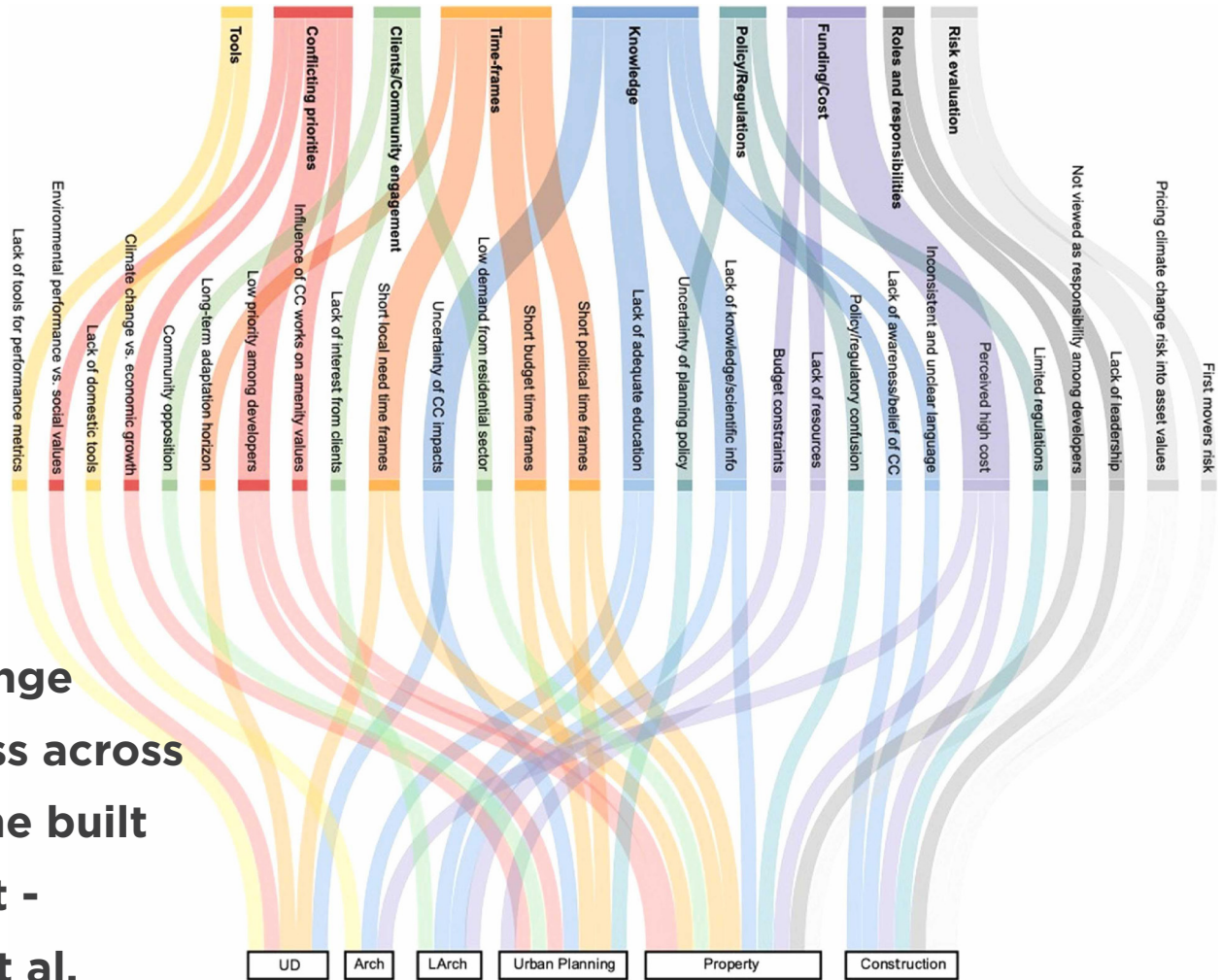
fig.xvii, xviii

How would you currently rank the demand for climate-conscious work in your given region and discipline?



How would you rank your confidence in discussing the potential impacts of climate change and the role it may have on a project with a client/stakeholder/constituent?





Climate change preparedness across sectors of the built environment - Hürlimann et al.

fig.xix <https://www.sciencedirect.com/science/article/abs/pii/S1462901121003518>



CIP - The role of planners

“Canadian Institute of Planners recognizes that planners have a key role to play ... in adapting communities to **environmental changes that are already happening and are forecast to occur in the future.**”⁷

CIP-ICU Policy on Climate Change Planning



fig.xx <https://climateatlas.ca/video/planning-climate-resilience>



Planners have professional obligations to:

- Act in the public interest, incorporating measures to **mitigate climate change** and **adapt to its impacts** in all relevant planning decisions.
- **Champion climate change solutions** that counteract, rather than exacerbate, impacts on vulnerable groups and under-resourced areas
- **Know the climate and hazard projections** for their regions and make decisions accordingly

(CIP-ICU Policy on Climate Change Planning p. 5)



Planners have professional obligations to:

- Account for **increased disruption and unpredictability** by **incorporating flexibility and redundancy** into their plans
- Plan for worst-case scenarios and **incorporate risk-reduction measures** into their plans, in line with the precautionary principle or “no-regrets” approach to decision-making
- Base planning advice on **authoritative climate and energy data and projections**

(CIP-ICU Policy on Climate Change Planning p. 5)



Planners have professional obligations to:

- **Collaborate with each other and other professionals** – including landscape architects, architects, engineers, environmental scientists, public health practitioners, and first responders – on climate change adaptation and mitigation solutions
- **Communicate information to elected officials** – and the public – on how climate change planning will strengthen communities and bring economic, environmental, and social benefits

(CIP-ICU Policy on Climate Change Planning p. 6-7)



Planners have professional obligations to:

- Encourage local, provincial/territorial, and federal governments to **update development standards, planning regulations, and incentives** to address adaptation and emissions
- Encourage the development sector and utilities to update business models and planning processes to **incentivize climate change mitigation and adaptation**

(CIP-ICU Policy on Climate Change Planning p.7)



Landscape architects have professional obligations to:

- Take all due care to **remain current with professional and technical standards** in Landscape Architecture
- Maintain and continue to **develop a greater level of knowledge and skill** including assessment of emerging technologies and research as may be required to provide competent services as a Landscape Architect
- Take available **opportunities to disseminate research** and examples of good practice in Landscape Architecture⁸

(MALA Code of Conduct, 1. General Professional Responsibilities)



Landscape architects have professional obligations to:

- Abide by the *Stewardship Principle*, which **strives to understand, protect, preserve, and enhance the earth's environmental resources** in order to integrate better the built and natural environments
- Be mindful of construction techniques and materials that are conducive to the **tenets of sustainable development** and which **employ principles of life-cycle costs, recyclability and the assimilation of residual wastes by ecological systems**

(MALA Code of Conduct, 1. General Professional Responsibilities)



The landscape architecture profession's goals:

- To promote attitudes of respect, care and responsibility in **conserving the landscapes of human heritage and the habitat of other species**
- **Understanding the physical and cultural environments** in which landscape architects create new places
- To **inspire high respect and confidence in the profession.**
Sustained public acceptance is not only essential for professional achievement and progress, but it is vital in the role of promoting and serving general public welfare

(MALA Code of Conduct)



The landscape architecture profession's goals:

The Canadian Landscape Charter Core Principles

- Show leadership by encouraging management and design processes that are **innovative, resilient and responsive**, and by re-evaluating assumptions and principles to **better anticipate or even influence demographic and environmental changes**⁹

CSLA Strategic Goals (2021 - 2023)

#2: Advocate for and support issues of importance...

- **2.2 Climate Adaptation: To ensure a prosperous future...we must create a society which has an enhanced capacity for resilience, a willingness to transform to a better state, and a commitment to ensuring the long-term sustainability of environments...**¹⁰



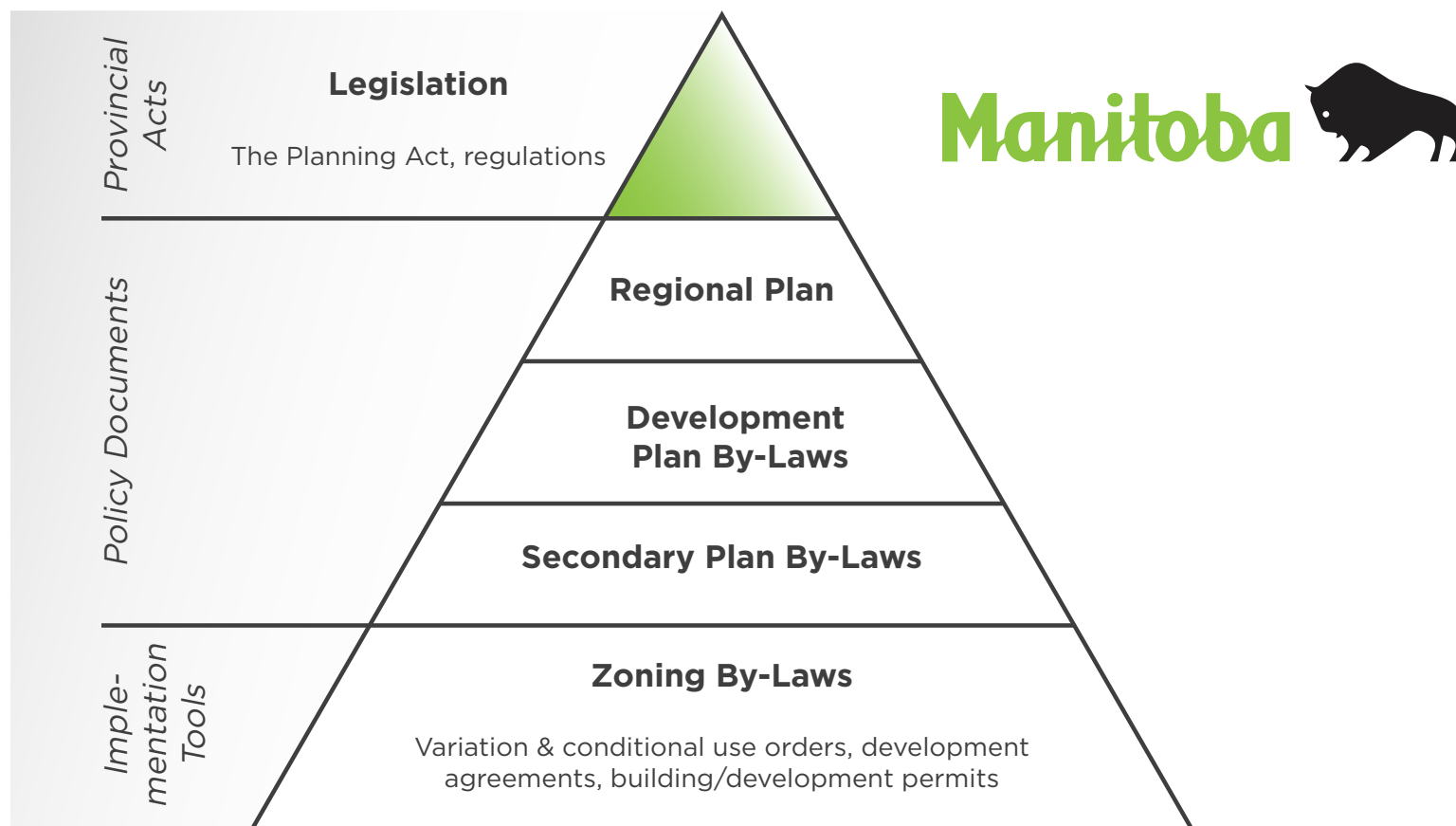
Existing policies/legislation

What climate change responses are currently embedded in Manitoban regulations/plans?

How can climate considerations be holistically integrated at each level of the planning hierarchy?



Manitoba Planning Hierarchy



Graphic modified from **Province of Manitoba**

fig.xxi https://www.gov.mb.ca/mr/land_use_dev/pubs/cywg_planning_analysis_recommendations_report.pdf



Provincial-level

The Planning Act - Provincial Planning Regulation

The Planning Act and its regulations, including the Provincial Planning Regulation, provide framework for all planning in the Province (except Winnipeg in some cases)

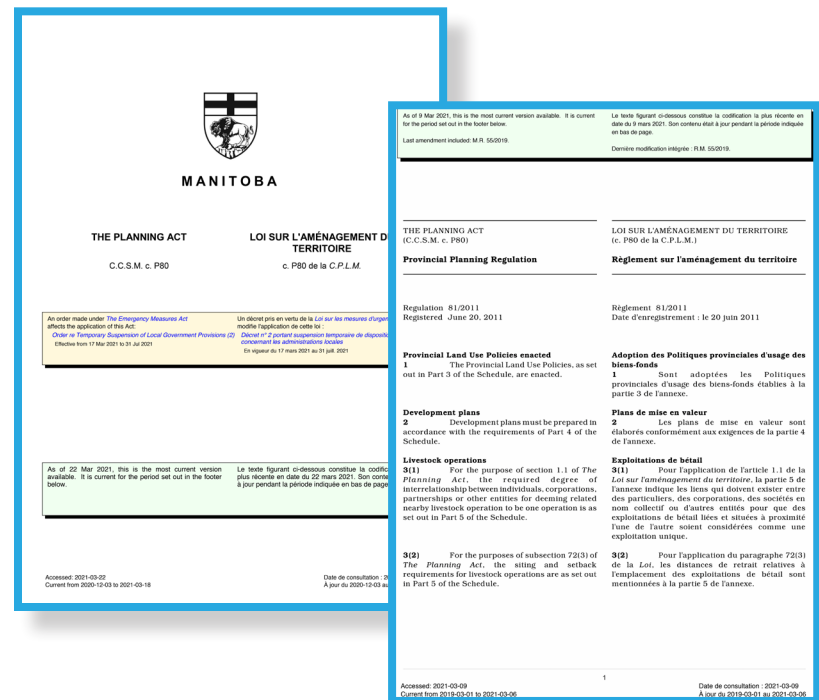


fig.xxii, xxiii https://www.gov.mb.ca/mr/land_use_dev/about_planning.html

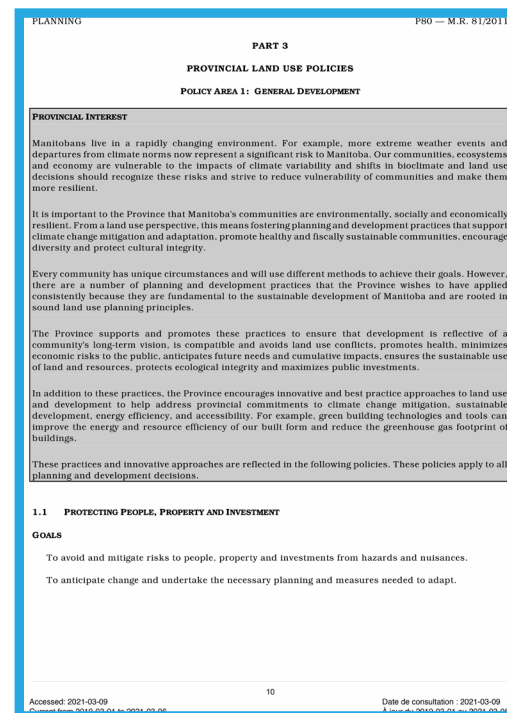


Provincial-level

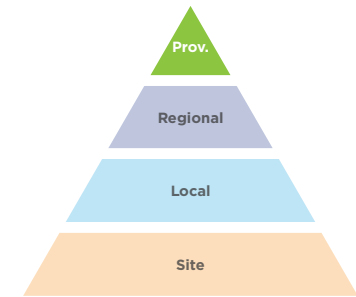
The Planning Act - Provincial Planning Regulation

**Provincial Land Use Policies (PLUPs)
within the Provincial Regulation
"guide sustainable land use and
development in the province" (these
apply to Winnipeg, too)**

**All other plans in the planning
hierarchy must be generally
consistent with these land use
policies**



Provincial-level

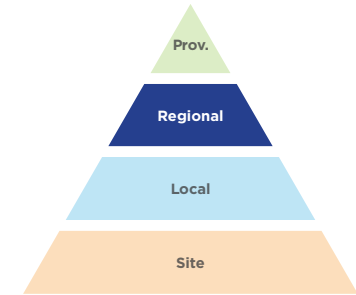


The Planning Act - Provincial Planning Regulation

“In moving toward the sustainable development of Manitoba, planning must address a number of strategic priorities concurrently, such as sustainable infrastructure, clean energy, public health and safety, **climate change mitigation and adaptation, economic diversification and competitiveness, housing affordability, resource conservation and water quality protection.”¹¹**

(Part 2 – Introduction)

Regional-level



Capital Planning Region: Plan 20-50

Bill 37, The Planning Amendment & City of Winnipeg Charter Amendment Act, received royal assent on May 20, 2021. Once proclamation occurs, these changes will come into effect:

- **The establishment and operation of planning regions in Manitoba under The Planning Act (replacing the existing Regional Strategies division of the Act)**
- **The Capital Planning Region will be created, which includes the cities of Winnipeg and Selkirk and 16 other municipalities¹²**



Regional-level

Winnipeg Metropolitan Region

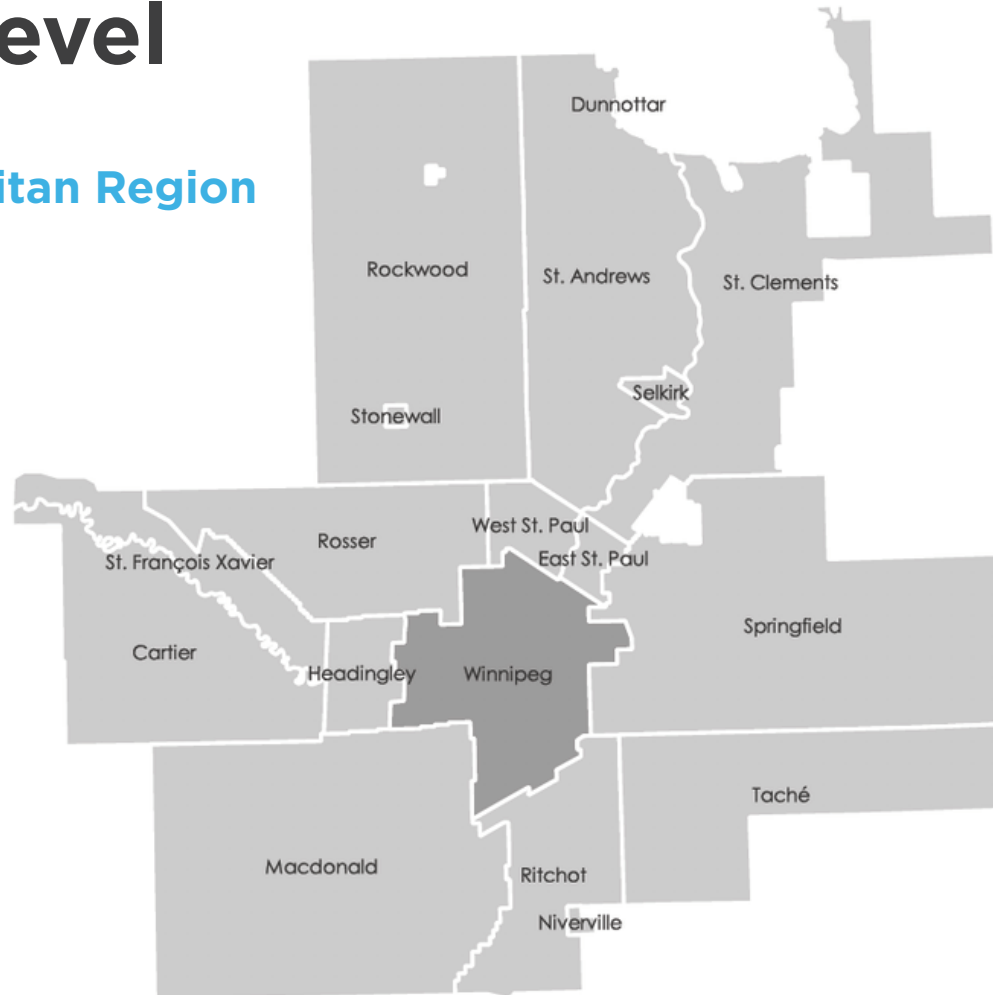
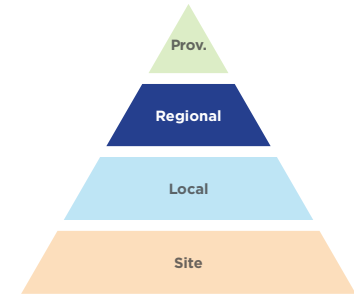


fig.xxv <https://winnipegmetroregion.ca/>

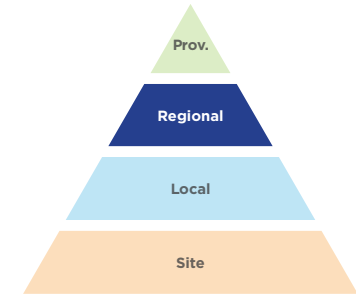
Regional-level



Winnipeg Metropolitan Region: Plan 20-50

- **Within 2 years of its formation, a planning region must adopt a regional plan. The Capital Planning Region's regional plan will be called "Plan 20-50."**
- **A regional plan must be generally consistent with the Provincial Land Use Policies**
- **Local planning by-laws (development plans, secondary plans, and zoning by-laws cannot be inconsistent with the regional plan**

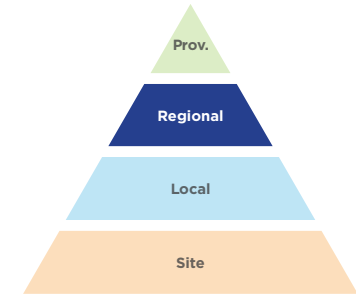
Regional-level



Winnipeg Metropolitan Region: Plan 20-50

- To build regional resilience, climate change risk and hazard prevention and management shall be pursued by municipalities by:
 - Ensuring solutions to prepare for, respond to, and recover from climate change, specifically **updating risk and hazard vulnerabilities mapping**, are incorporated into local emergency preparedness programs and plans
 - Supporting enhanced public awareness in identifying risks and hazards

Regional-level

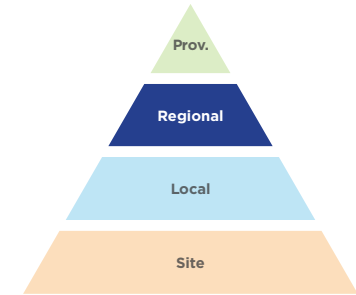


Winnipeg Metropolitan Region: Plan 20-50

...continued

- **Protecting, restoring, and enhancing linkages of natural assets**, systems and corridors to maximize ecosystem function
- Investing in and **incorporating risk based planning tools, incentives, and green technologies** into the planning of land use and infrastructure assets

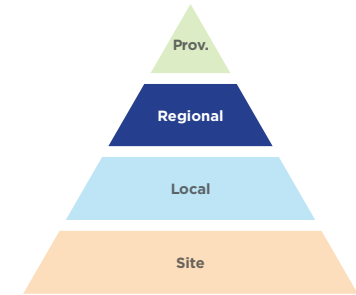
Regional-level



Winnipeg Metropolitan Region: Plan 20-50

- To mitigate greenhouse gas emissions, the WMR shall prepare a **Regional Climate Action Plan** reflecting the provincial direction and reduction targets. The plan shall, at minimum:
 - Include an inventory that identifies emission sources and intensities, consolidates this information regionally, and establishes a regional emissions baseline
 - Identify regionally common emission sources

Regional-level



Winnipeg Metropolitan Region: Plan 20-50

...continued

- Identify regional greenhouse gas emissions reduction priorities
- Establish regional greenhouse gas emissions reduction targets
- To support climate action, **municipalities shall prepare Local Climate Action Plans** that align with the Regional Climate Action Plan

Regional-level

Winnipeg Metropolitan Region: Plan 20-50

- To identify regional natural assets to protect, restore, and enhance linkages, the WMR shall prepare a **Natural Assets Network Priorities Plan**

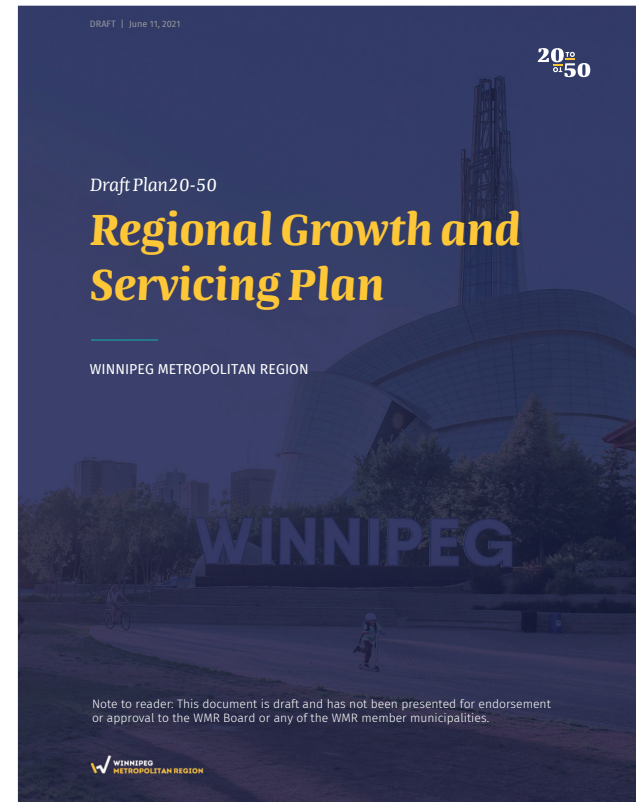
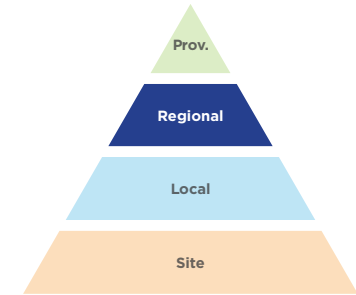
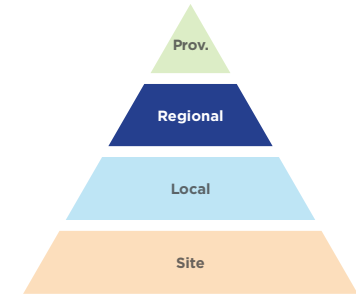


fig.xxvi https://data.winnipegmetroregion.ca/dataset/c6956f1a-cec3-49c4-afd0-261457e45e65/resource/c04c392b-5d57-4e27-ae7d-332126606a91/download/plan20-50_draft.pdf

Regional-level



Integrated Watershed Management Plans

In Manitoba, Integrated Watershed Management Plans (IWMPs) are documents:

- **Developed cooperatively between all levels of government, Indigenous communities, stakeholders and residents**
- **Made for the protection, restoration, and improved management of water, aquatic ecosystems and drinking water sources within a watershed**

Regional-level

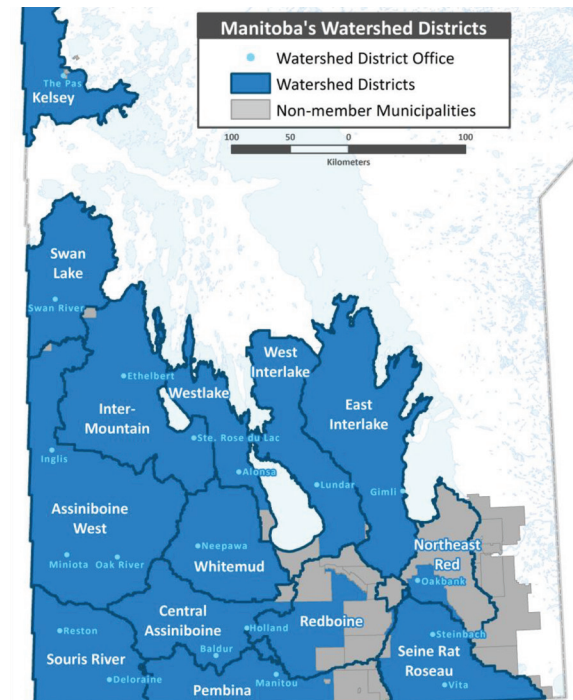
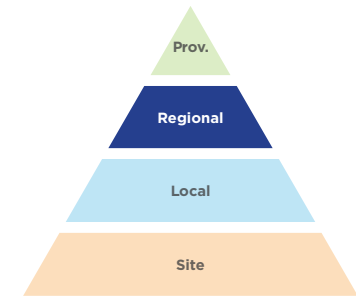
Integrated Watershed Management Plans

...continued

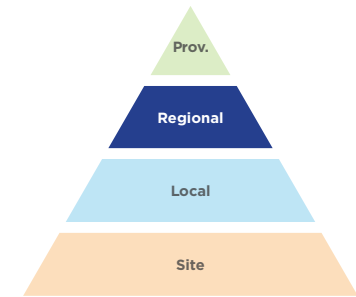
- Enabled through The Water Protection Act (2006)
- Now led by Watershed Districts* (who are designated as the Water Planning Authorities)
- Watershed Districts **overlap municipal boundaries**

*On January 1st, 2020, Manitoba's 18 Conservation Districts transitioned into 14 Watershed Districts

fig.xxvii <https://manitobawatersheds.org/districts-1>



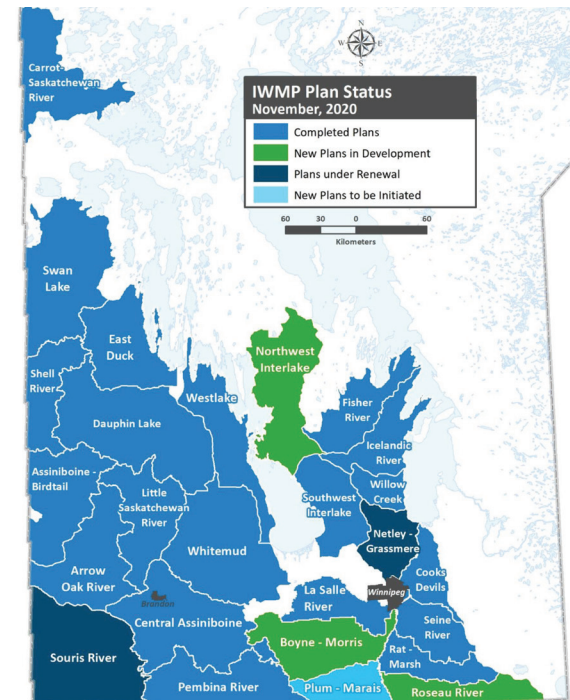
Regional-level



Integrated Watershed Management Plans

...continued

- Currently 26 IWMPs in Manitoba in various stages of completion
- Early plans (2006 – 2014) less detailed
- Later plans (2015 – present) have more detailed Surface Water Management Plans, drought preparedness, identify potential retention sites, implementation plans

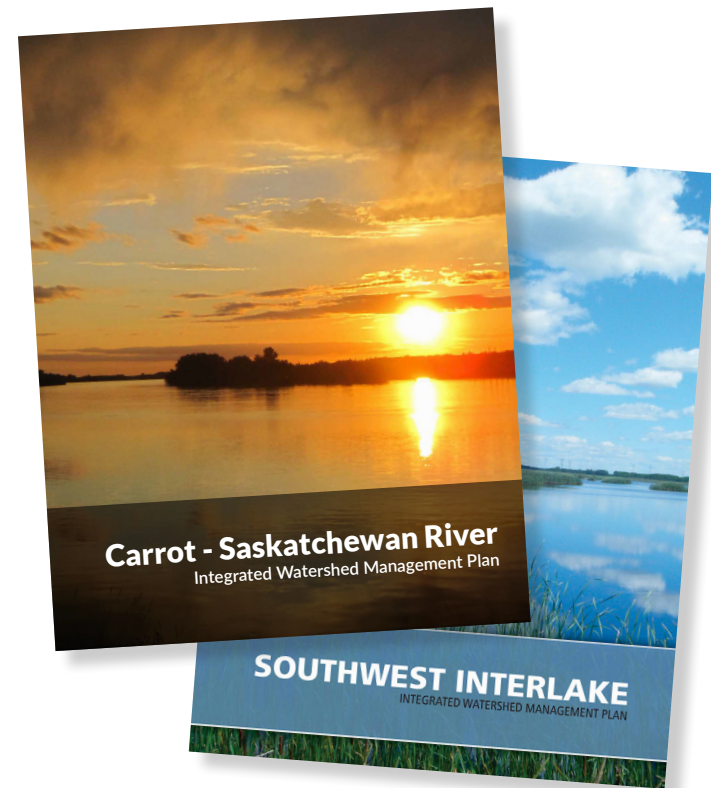
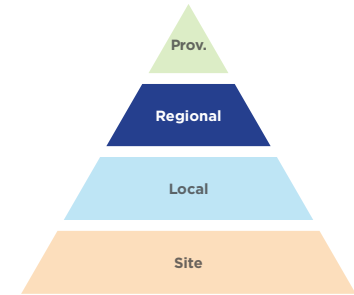


Regional-level

IWMPs

A watershed management plan must:

(c) specify linkages between water management and land use planning so as to facilitate the adoption, in a development plan or other planning instrument, of some or all of the provisions of the watershed management plan¹³

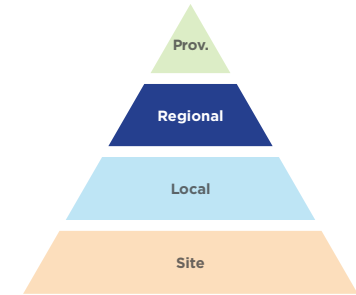


(Province of Manitoba, The Water Protection Act, 2011, s.16.1)

fig.xxix http://kelseywatersheddistrict.com/docs/carrot_skriver_final.pdf,

fig.xxx https://wiwd.ca/uploads/southwest_interlake_iwmp_dec2018_final.pdf

Regional-level



IWMPs

Goals included in most IWMPs:

- **Storage capacity for surface water needs to be increased and better management (both in response to overland flooding and drought events)**
- **Improve water quality**
- **Enhance ecosystem health**

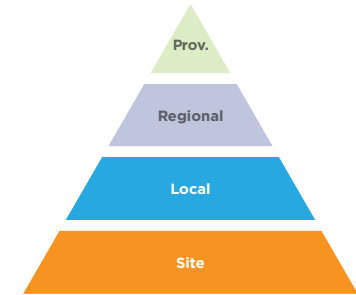
Site-Specific Water Retention Opportunities										
Priority	Project Name	Purpose					Maximum Storage Capacity		Drainage Area (km ²)	Depth of Runoff Retained (mm)
		Flood Control	Water Supply	Wildlife	Recreation	Water Quality	dam ²	acre feet		
High Priority	Cooks Creek	Y	Y	Y		Y	120	97.3	67.0	0.1
	Queen's Valley	Y		Y		Y	1050	851.2	1.7	612
	Oakwood Road	Y	Y				725	587.8	6.9	105
	Hnat's Landing	Y					700	567.5	9.5	74
	Edie Creek 1	Y		Y		Y	665	539.1	15.2	15
	Melrose Road	Y					77	62.4	2.1	37
	Hazelglen	Y					175	141.9	6.0	29
	St. Genevieve Peatland	Y				Y	1280	1037.7	3.8	340
Medium Priority	Airport Road	Y		Y			500	405.4	16.0	31
	Edie Creek 2	Y		Y		Y	200	162.1	16.2	13
	Kirkness	Y					60	48.6	1.4	43
	Spruce Road	Y					76	61.6	2.5	31
Low Priority	Pleasant Road	Y		Y			545	441.8	1.7	321
	Edie Creek 3	Y		Y		Y	105	85.1	6.0	17
	Road 48N	Y		Y			45	36.5	37.3	1
	Shkolny Creek	Y		Y			20	16.2	0.7	27
	Park Road	Y					35	28.4	0.2	147
	Dundee-Garson Road	Y					35	28.4	1.1	32

(Cook's Creek IWMP, *Storage capacity goals*, 2014)

fig.xxxi https://www.gov.mb.ca/water/watershed/iwmp/cooks_devils_creek/documentation/cooks_devil_creek_iwmp.pdf

5.18

Local-level



Development Plans, Secondary Plans & Zoning By-Laws

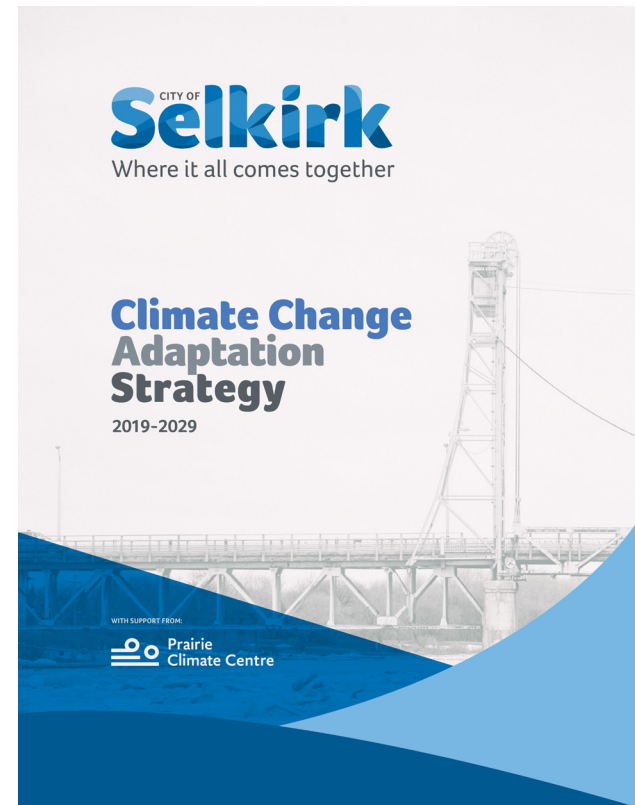
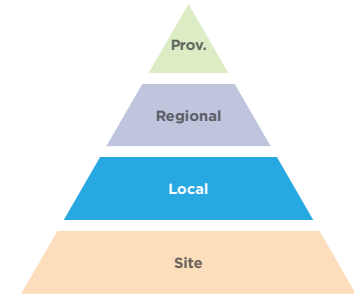


Local-level

Community Climate Adaptation Strategies & Plans

- **Winnipeg's *Climate Action Plan* (2018)**
- **City of Selkirk *Climate Change Adaptation Strategy* (2019)**
- **Town of Churchill *Climate Change Adaptation Strategy* (2020)**
- **RM of East St. Paul *Climate Change Implementation Strategy* (2021)**

fig.xxxiii <https://www.myselkirk.ca/wp-content/uploads/2019/07/Climate-Change-Adaptation-Strategy-Final-May2019.pdf>





Why climate solutions fail

Are Manitoba municipalities successfully using these tools to build climate resilience?

What are some shortcomings in existing climate adaptation policies and why do some climate solutions fail or lack meaningful uptake?



Community Climate Adaptation Strategies & Plans

Evaluating the quality of municipal climate change plans in Canada, an analysis of 63 Canadian communities revealed 3 key findings:

- Plans **prioritize mitigation** over adaptation
- Implementation, monitoring and evaluation are weak
- Insufficient consideration for stakeholder engagement



International Institute for Sustainable Development (IISD) 2019 report

Reviewed planning documents in Manitoba that reference or consider climate change

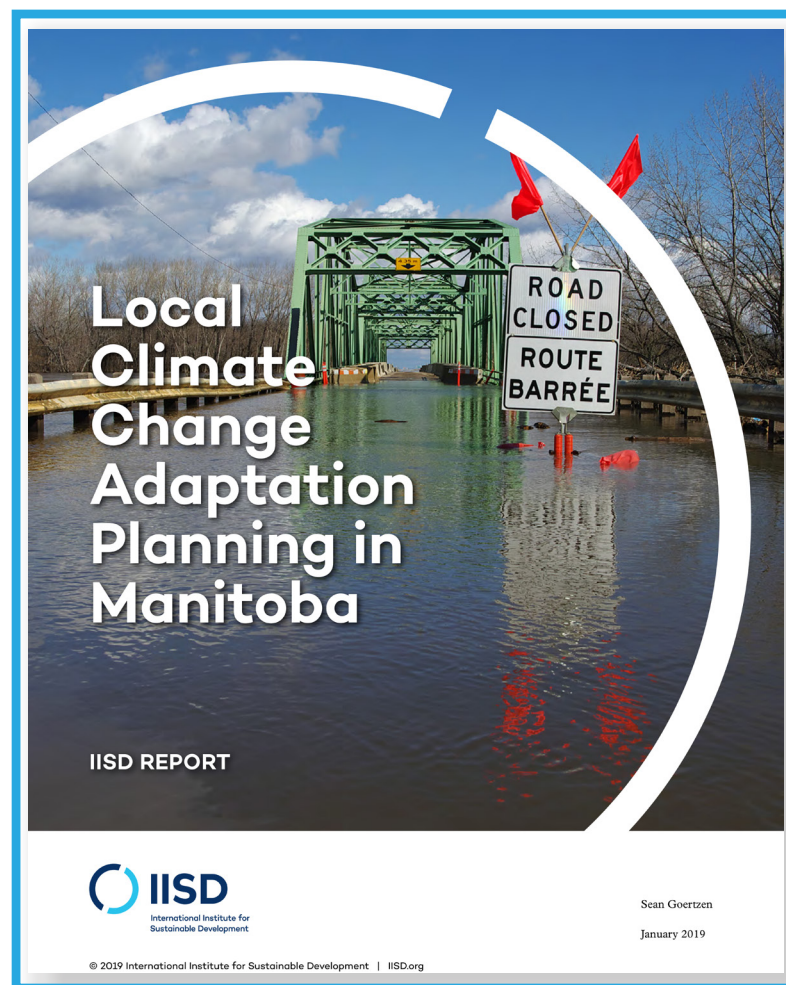


fig.xxxiv <https://www.iisd.org/system/files/publications/climate-change-adaptation-planning-manitoba.pdf>



Review of planning documents in Manitoba that reference or consider climate change (IISD, January 2019)

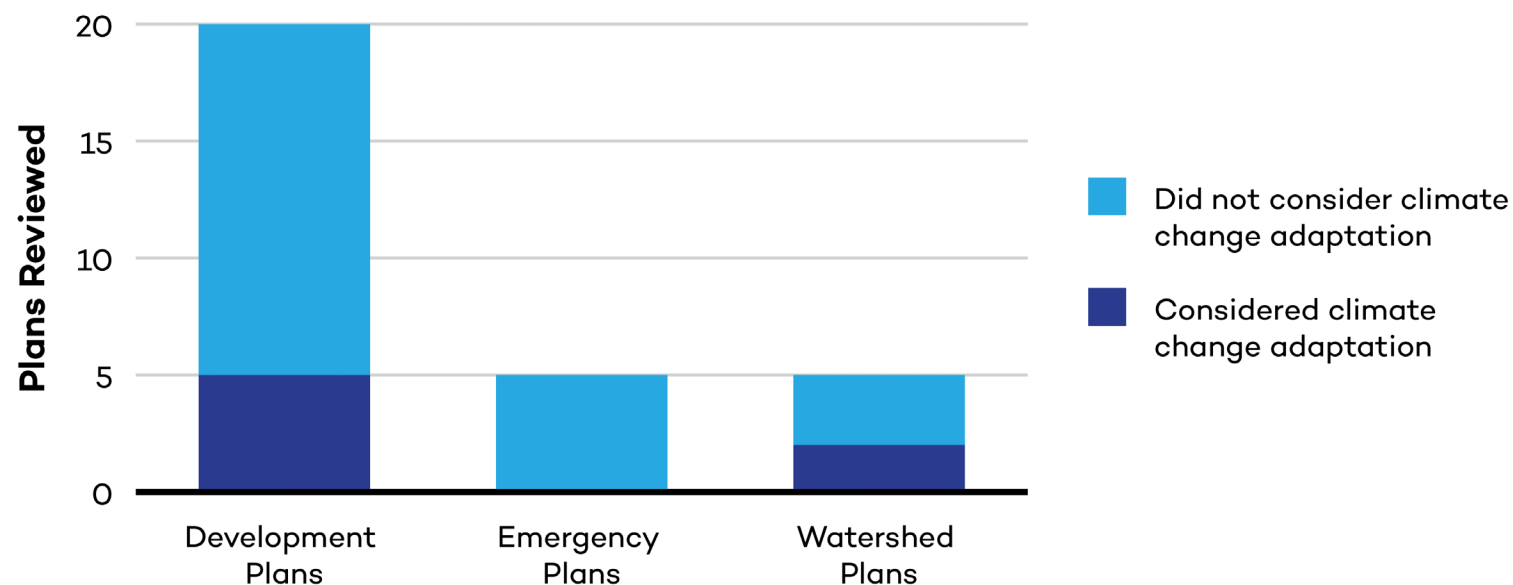


fig.xxxv <https://www.iisd.org/system/files/publications/climate-change-adaptation-planning-manitoba.pdf>



Landscape Designs

- The limits to the project are not the limits to the effect
Tie back to different scales of development to address climate change
- Failure to collaborate with Planners, Engineers, Watershed Planners, Municipal Leaders
Consult earlier in the development phase and reference climate change research provided in background reports
- Tendency to accept failure rather than forensically analyzing what went wrong and applying lessons to ensure future success
Updated completion of work terms/obligations and allocate time for adequate performance review



...continued

- The risks of applying business-as-usual solutions may not have been adequately communicated to the client
- Solutions may be abandoned ahead of implementation because of "cold feet"

The risk of the solution failing to perform may outweigh the projected climate risk in the eyes of the client



...continued

- Some solutions may rely on technology that is expensive and/or prone to failure

Cost of repairing/replacing tech may be higher than the perceived cost of using traditional tried and true solutions



fig.xxxvi <https://wiki.sustainabletechnologies.ca/wiki/Bioswales>



A path forward

What is a path forward for climate adaptation in our respective professions?

At what stage(s) of a project are climate change considerations most effective?



Applying adaptation thinking in landscape architectural practice

- There is no 'normal' anymore

We have to prepare for variability

- Understand the scope and scale of changes

A broad range of conditions must be considered

- Our projects depend on the ecological services provided by natural systems

Identify, augment, adapt these systems to be resilient to change



Challenges and opportunities faced in landscape architectural practice

- Shifts in hardiness zones
Planting palettes will need to reflect more resilient species
- Greater emphasis on water retention and water budgeting
Variability in stormwater management practices
- Increase in the UHI effects
Higher demand on irrigation in cities/urban centres
- Anticipated increase in storm events
New maintenance demands



Key insights gained from past set-backs and obstacles:

- **Communicate early**

Make the client understand the risk of not acting

Let other consultants on the project know of your intent

Be an advocate! Don't just talk risk, but benefits and co-benefits

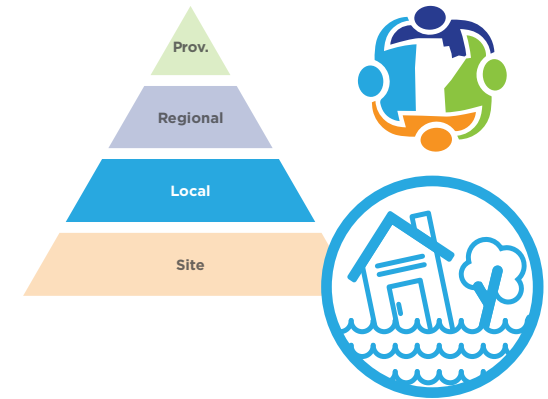
- **Consult with the appropriate experts**

*Don't just specify a product. Understand what makes it work
and anticipate what might go wrong*

Ask the manufacturer or experts pertinent questions

- **Use risk assessment tools where possible**

Risks & Responses



Flooding

Typical Development Plan Policy

Land Subject to Flooding

No permanent building or structure shall be constructed on **land subject to flooding**, unless the top of the foundations of structures are constructed two feet above the **design flood level**.

*Design flood means a flood magnitude on a water body, that, on average, is expected to occur once during a one hundred year period.*¹⁴

Provincial Planning Regulation



Risks & Responses

Flooding - A path forward

In Saskatchewan, new official community plans and zoning bylaws prohibit development of new buildings and additions to buildings within the **1:500 year flood elevation** of any watercourse or water body

They also require that new development in the flood fringe of a 1:500 year flood be proofed to an **elevation of 0.5 metres** above the 1:500 year flood elevation



Manitoban successes

Secondary Plan - Assiniboine Gardens, Brandon (2020)

Employs fortification and relocation approaches to adaptation

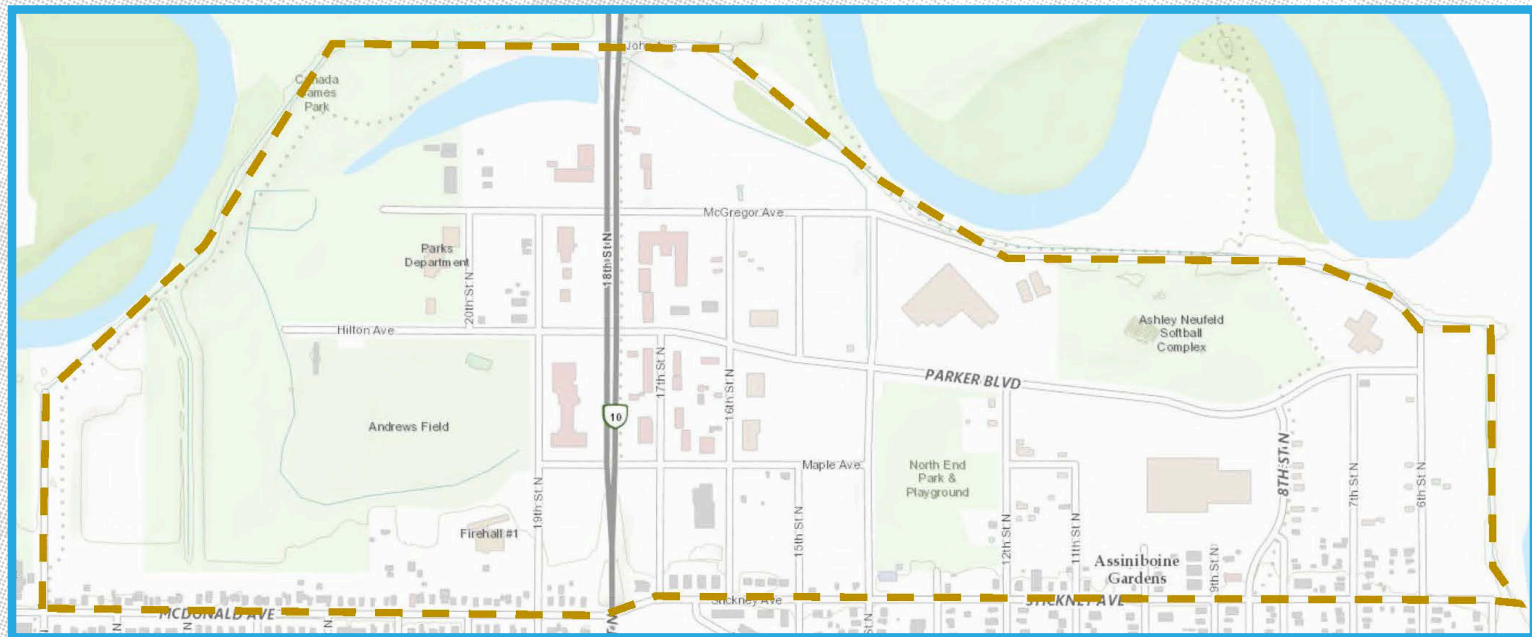


fig.xxxvii https://www.brandon.ca/images/planning/Projects/Floodplain_Development/2_The_Assiniboine_Gardens_Secondary_Plan_-_2020-07.pdf



Manitoban successes

Secondary Plan - Assiniboine Gardens, Brandon

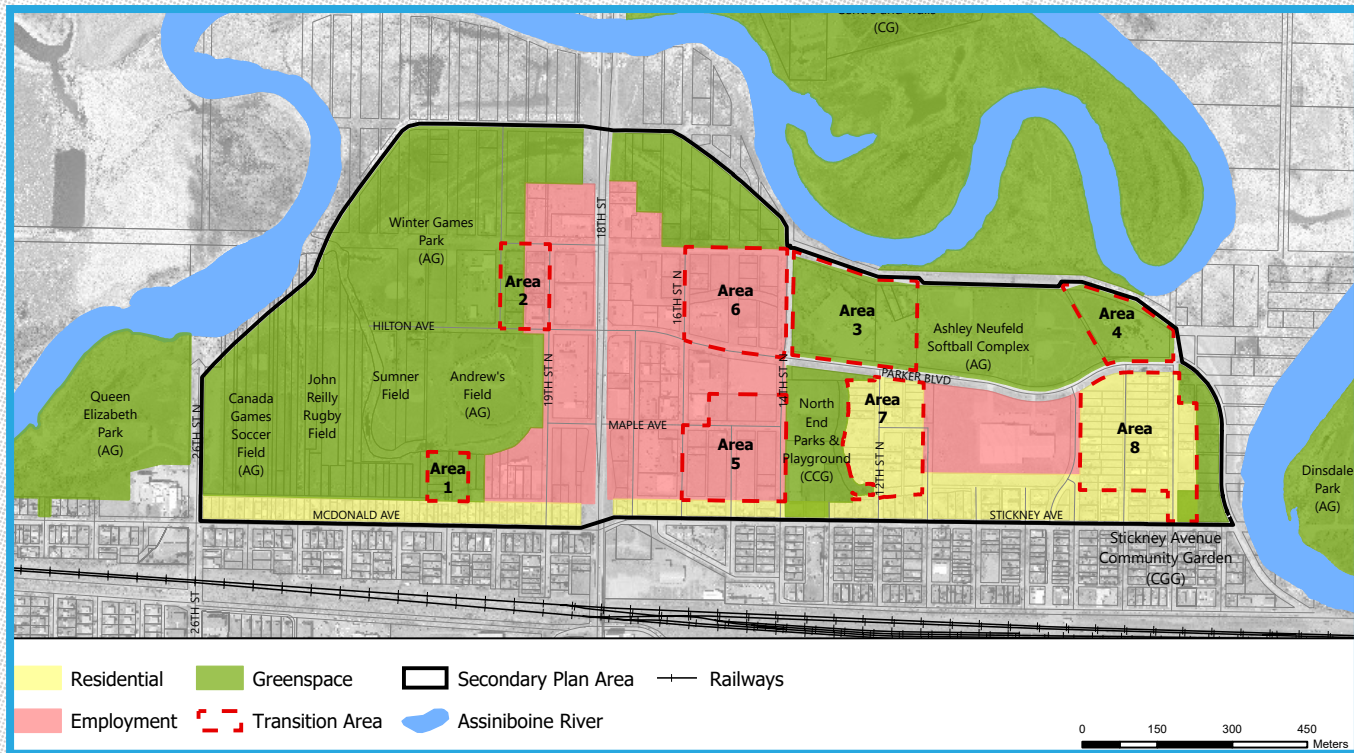


fig.xxxviii https://www.brandon.ca/images/planning/Projects/Floodplain_Development/Map_A_-_Land_Use_and_Transition_Areas.pdf



Manitoban successes

Brandon Riverbank Discovery Centre



Demonstration wetland

HTFC Planning & Design with Brandon Riverbank Inc., Manitoba Habitat Heritage, Ducks Unlimited Brandon and Seaco Marine Inc.

fig.xxxix <https://www.discoverwestman.com/articles/a-busy-place-at-the-riverbank-discovery-centre>
fig.xl <https://www.facebook.com/randyshandphotography/community/>



Festival ground

HTFC Planning & Design

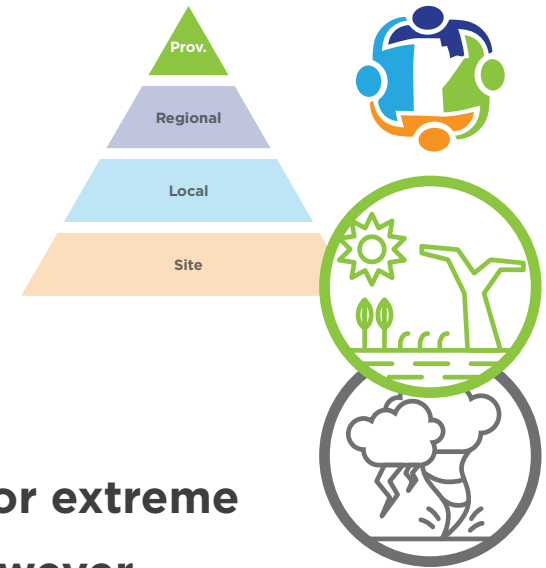
Risks & Responses

Drought and Extreme Weather

No specific goals or policies related to droughts or extreme weather in the Provincial Planning Regulation, however...

"With increasing water demand from a variety of users, more water sources nearing full allocation, and the risk of drought, water scarcity is a real threat. To reduce vulnerability to such a risk, communities need to develop strategies for prioritizing water allocation and implementing water conservation measures."¹⁵

Part 3 - Provincial Land Use Policies Area 5: Water



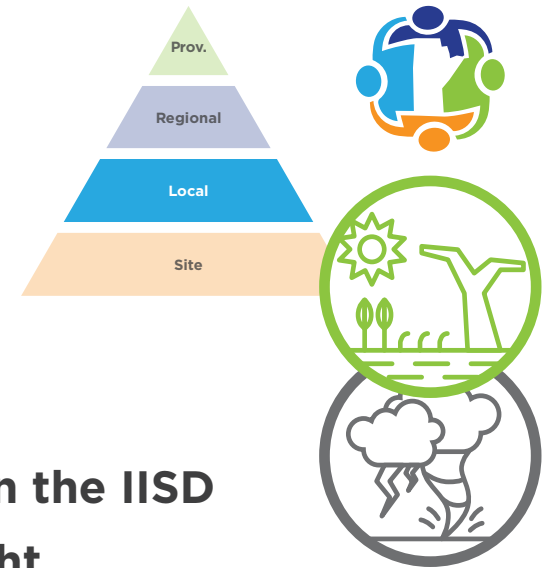
Risks & Responses

Drought and Extreme Weather

- Only 2 of the 20 development plans reviewed in the IISD study had policies specifically related to drought
- 3 of the 20 considered extreme weather in the context of climate change; two others considered extreme weather

"Prepare for future increases in extreme weather events such as drought and flash flooding."

"Promote emergency planning to respond to extreme weather events like flooding, tornadoes and drought."¹⁶

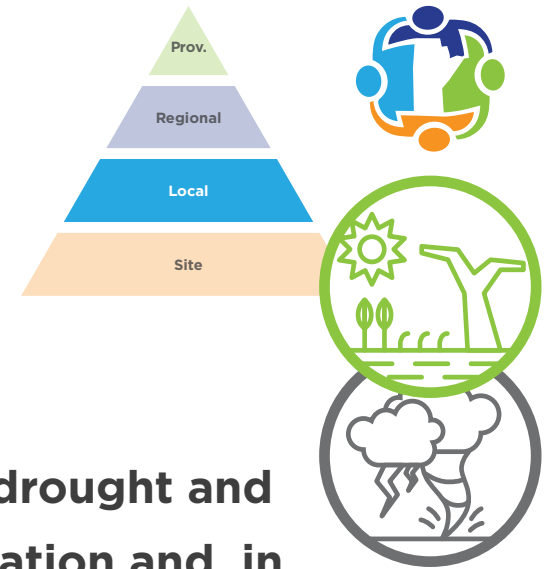


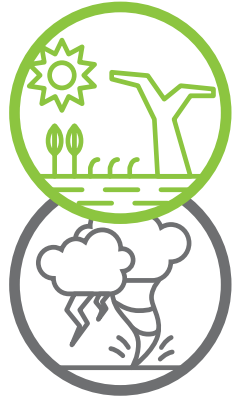
Risks & Responses

Drought and Extreme Weather - A path forward

Include goals and policies specifically related to drought and extreme weather in the Provincial Planning Regulation and, in turn, Development Plans

This may include policies that encourage or require development to include **green infrastructure** that retains water, controls flow, mitigates flash floods, and provides resilience from these events, such as:





Risks & Responses

Drought and Extreme Weather - A path forward

Some examples of green infrastructure include:

- Wetlands (natural or constructed)
- Sloughs
- Retention ponds
- Shelterbelts
- Rain gardens
- Bioswales
- Underground stormwater retention



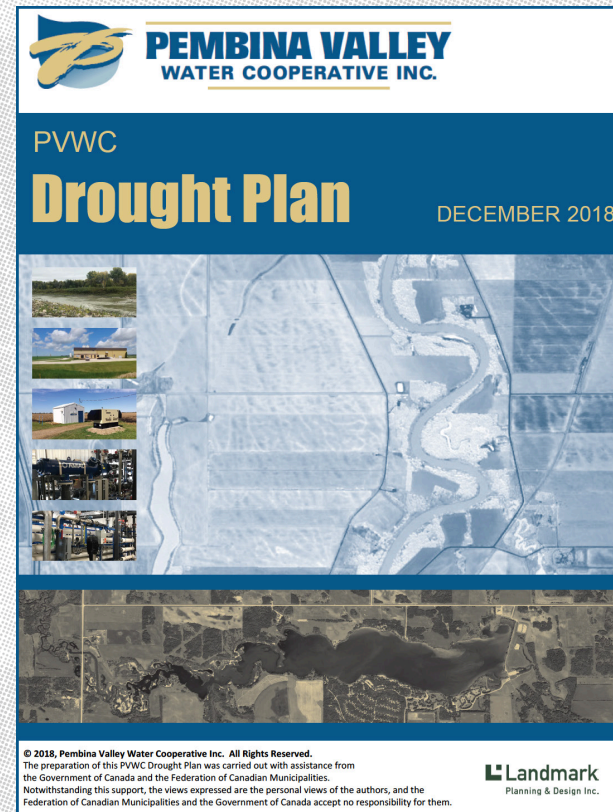
fig.xli <https://twitter.com/cityofvancouver/status/1276606704088645633>

Manitoban successes

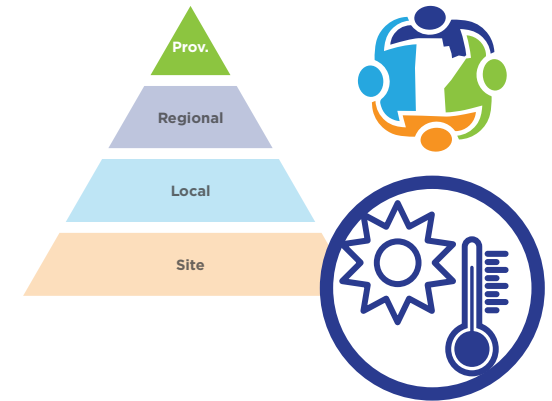
Pembina Valley Water Co-Operative Drought Plan (2018)

Both a proactive and reactive document that addresses the impacts and aftermaths of drought events in southern Manitoba and provides a playbook on how to respond in instances of water shortages

fig.xlii <https://pvwc.ca/wp-content/uploads/2015/02/PVWC-Drought-Plan-Final-Approved.pdf>



Risks & Responses



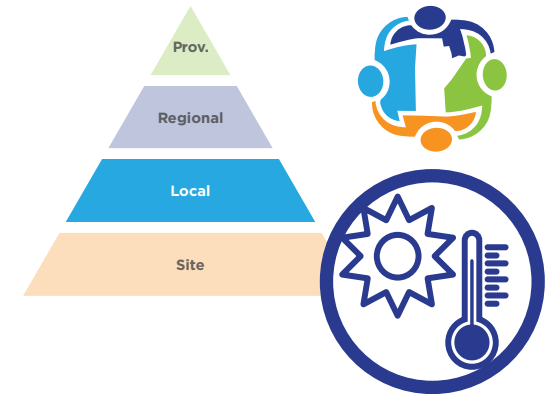
Warming Summers and Winters

Provincial Planning Regulation - Provincial Interest Statement

"Decisions about infrastructure should also consider the impacts of climate change...for example, **warmer temperatures have the potential to cause increased melting of permafrost that could reduce the length of winter road use. Decisions about where to locate new roads, pipes and other key infrastructure facilities **need to consider potential vulnerabilities**, and adaptation measures should be built into construction."**¹⁷

Part 3 - Provincial Land Use Policies Area 6: Infrastructure

Risks & Responses



Warming Summers and Winters - A path forward

In Development Plans, **identify risks and opportunities** related to warming summers and winters for the planning area, which may be related to:

- Transportation infrastructure
- Active transportation demand (due to warmer annual temps.)
- Tourism (particularly in the North)
- Need for more urban shade trees
- Population shifts

Provide policies that specifically address these risks and opportunities

Manitoban success

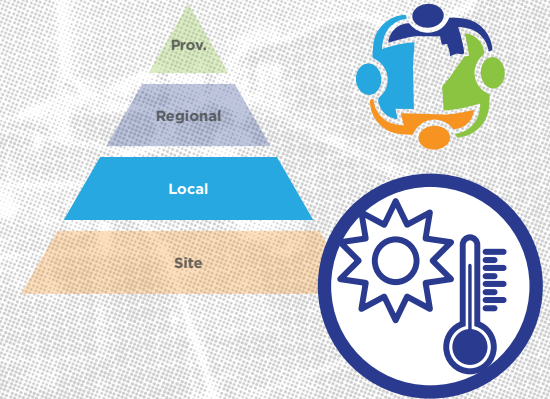
Town of Gillam Development Plan (2012)

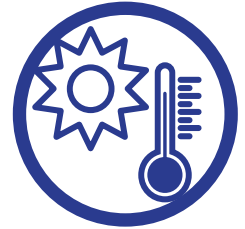
Contains policies that advise against developing on permafrost

"Encourage developmnt on soil with the least permafrost..."

"Encourage the Office of the Fire Commissioner to consider standards above building code that reflect soil and permafrost conditions for foundations...periodically review these standards as climates change."

"Soil testing by the developer on each lot shall be required prior to the issuance of a development permit..."¹⁸





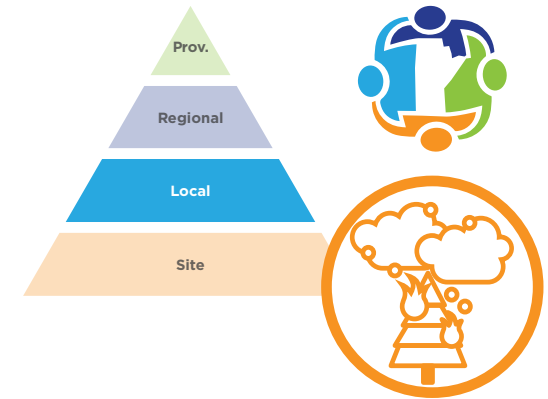
Risks & Responses

Warming Summers and Winters - A path forward

Design responses might include:

- Adding trees to increase canopy coverages
- Using soil cell technology to improve soil volume in paved surfaces
- Reduce the amount of highly reflective materials
- Include shade structures
- Adding heat tracing/radiant heating to hard surfaces to reduce ice forming

Risks & Responses



Wildfires

- Wildfires/forest fires are not mentioned in the Provincial Planning Regulation/PLUPs
- 4 of the 20 Development Plans reviewed in IISD study considered wildfires; however, meaningful policies still lacking

Typical Development Plan Policy

"Ensure the quantity and rate of (water supply services) delivery is adequate to meet present and future domestic and fire protection needs."

Manitoban success

Community Wildfire Protection Plan - City of Thompson (2019)

**Seeks to reduce Wildfire Urban
Interface risks within 8km of
the city through vegetation
management strategies, building
permit requirements and
educational outreach**

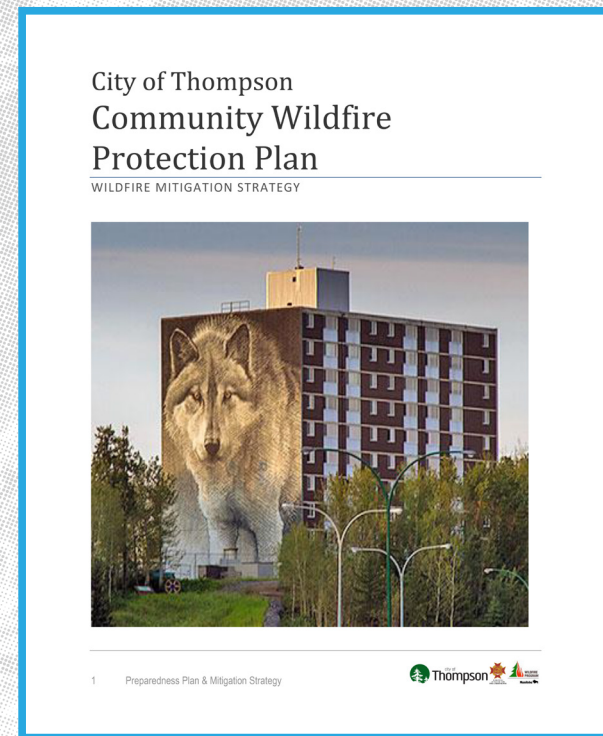
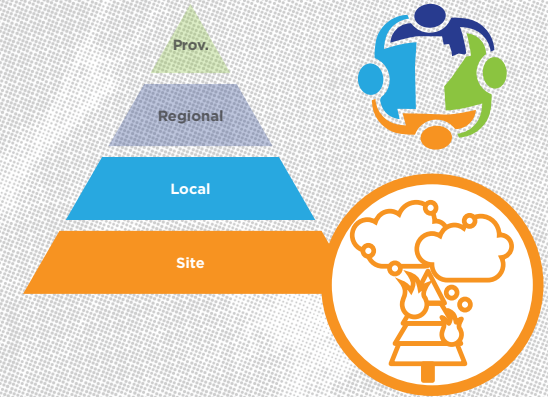


fig.xliii https://thompson.municipalwebsites.ca/Editor/images/documents/Public%20Safety/NE_CWPP_Mitigation%20Plan_V6_03192019.pdf

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Risks & Responses

Wildfires - A path forward

Design responses might include creating defensible spaces in fire prone areas by:

- Planting fire-resistant trees and plants farther away from properties
- Hardy plantings organized into concentric zones that become taller and less water-intensive the farther they are from the building¹⁹

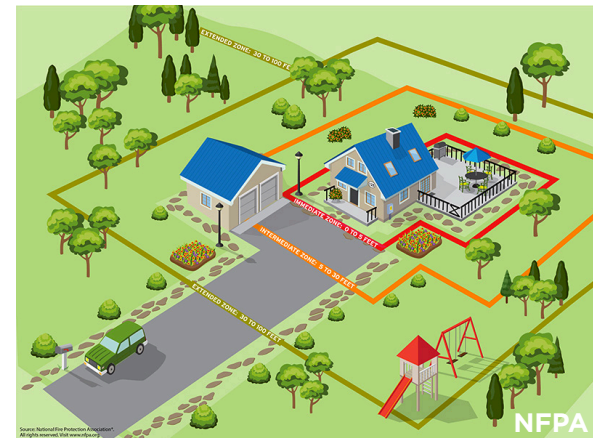


fig.xliv <https://www.nfpa.org/Public-Education/Fire-causes-and-risks/Wildfire/Preparing-homes-for-wildfire>



Guiding principles for adaptation:

- Think *about the carbon footprint*
- Understand *the implications on your projects*
- Consider *the consequences of future climate on your projects*
- Educate *your clients about the risks*
- Assess *the risks and opportunities*
- Collaborate *with your client*
- Innovate *creative solutions*



Guiding principles for adaptation

Ensure the **voices of those who are most vulnerable to climate change are heard and represented** in climate governance and adaptation responses:

- Indigenous people
- Low-income people
- People in small, rural and remote communities
- Newcomers, etc.

Also a need to **incorporate Indigenous knowledge** (which encompasses detailed local and historical observations of changes associated with climate) in climate science and adaptation planning



There are actions that can be undertaken at every stage of a project

RFP/Proposal

- **Gauge the client's awareness of potential adaptation measures and ask relevant questions**

Project start-up

- **Make adaptation solutions an agenda item from the very beginning**

Design stages

- **Evaluate your design and adjust accordingly**



...continued

Tender and construction

- **Ensure contractors and subcontractors understand their roles**

Close-out

- **Make sure the client has the tools for sustained maintenance.**



fig.xlv https://www.edmonton.ca/residential_neighbourhoods/gardens_lawns_trees/trees-construction



Conclusion

Practitioners have an important role in **educating clients** about the risks and opportunities associated with climate change, and to **anticipate future land use/design challenges** before they adversely affect communities

"[Both professions] are made up of generalists who can bring together specialists in order to learn specifics. [It is practitioners] who put the disparate pieces together in a coherent and executable reality."²⁰

Martha Schwartz, CSLA 2021 Congress



Conclusion

A call to form a climate adaptation group with our professional organizations

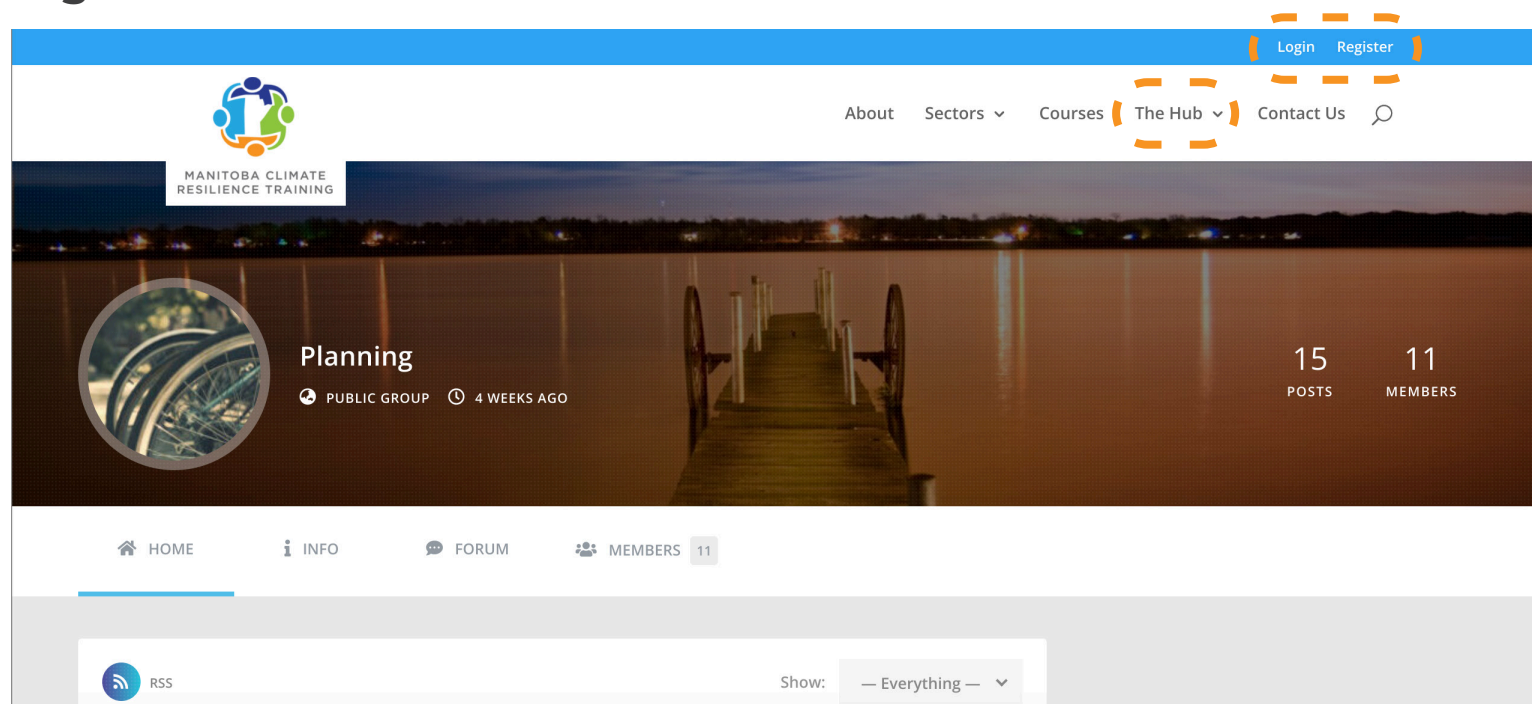


fig.xlvi <https://mcrtproject.ca/groups/planning/>

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