ClimateWest, a central hub for climate services in Manitoba, Saskatchewan, and Alberta, is proud to host Alberta's Adaptation Resilience Training module recordings and resources.

Check out climatewest.ca for all training material available through ART and other initiatives.





The aim of the Adaptation Resilience Program (ART) is to build the capacity of professionals in Alberta to adapt to climate change. This module was recorded in September, 2021.

Professionals across the Prairie region may find this training useful.

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



Aberta







Community Resilience in Alberta Stream Specific Module: Community Planning

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September 16, 2021

Outline

• Who am I?

Outline

- What is community resilience?
- Where to start?
- A framework
- All-hazards disaster risk reduction

Outline

- Multi-jurisdictional realities
- Policy windows
- Promoting community resilience
- What matters at the community level?



• Community Resilience – Key Considerations

Business as usual?

Poll: What is the increase in disaster costs for Alberta for the period 2010 to 2016 as a percentage?

- No increase
- 100%
- 500%
- 1000%
- 2000%
- Greater than 2000%

Does it matter?

It does now:

- As of April 1st, 2021, Municipalities and Metis settlement are responsible for 10% cent of damages caused by natural disasters such as floods and wildfires
- The province is instituting a funding cap of \$500,000 and a one-time assistance limit per property
- The 2021 Alberta budget includes \$2.5 billion contingency for disasters and emergencies
- Changes to the Emergency Evacuation Payments (EEP) include requiring a mandatory evacuation order, the evacuation exceeding seven days, and confirmation that the event is uninsurable.

https://edmontonsun.com/news/politics/alberta-bringing-in-cost-sharing-agreement-withmunicipalities-for-disaster-recovery/wcm/e203a228-3a47-4e5d-9c60-d4ff341c02ea

What is Community Resilience?

"The ability of a system, community or society exposed to hazards to resist, absorb, accommodate, adapt to, transform and recover from the effects of a hazard in a timely and efficient manner"

Where to Start?

Where to start (or why is this so hard)?

- Reductionism has its limits
- Understand systems thinking (hard and soft systems)
- Understand your community's vision
- Complexity defies singular solutions

Where to start (or why is this so hard)?

- Think long-term
- Attract the interest of multiple orders of government
- Remain humble

A Global Concern

- Sendai Framework
- Multi-national
- Endorsed by Canada
- Embraces climate change and adaptation from a risk managed perspective

Sendai Framework for Disaster Risk Reduction 2015 - 2030

Sendai – Four Priorities

- Understand disaster risk
- Strengthen disaster risk governance
- Invest in disaster risk reduction for resilience
- Enhance disaster preparedness

Ten Essentials for Making Cities Resilient



9

10

CITY PLAN / RESILIENCE STRATEGY / ACTION PLAN

Risk-Based Decision-Making

- CSA/ISO 31000 Risk Management Guidelines
- <u>Disaster Risk</u>: the potential disaster losses, in lives, health status, livelihoods, assets and services, which could occur to a particular community or society over some specified future time period
- <u>Residual Risk</u>: the risk remaining after risk treatment



CSA Z1600-17: A Helpful Tool

- Emergency and Continuity Management Program
- Merge key tools with CSA 31000
- Expand scope to include climate change
- Structure helps







Resilience Framework

 Social (includes governance and decision making)

Think All-Hazards

Risk Taxonomy: Use an All-Hazards Lens

Atmosp

 Snov Blizza Ice St Hails Light Hurri

 Torna Heat

Hydrolo Flood

Ice Ja Erosi Storn Droug

Wildfire Wildf Wildli Geologie Avala

 Lands Land Tsuna Earth Glaci Volca

Ecologi

Effects of Over-Exploitation

Effects of Excessive Urbanization

- Bad things happen
- Why?
- Understand the impact
- Be proactive
- Integrate climate change

Non-Malicious Hazards		Malicious Hazards
Natural	Health	Intentional
mosphere	Pandemics/Epidemics:	Criminal:
Snow Storms	Human Diseases	Individual criminal act
Blizzards	Animal Diseases	Organized Crime
Ice Storms and Fog	Plant Diseases	Extremist Act
Hailstorms	Pest Infestations	
Lightning		Terrorist Act
Hurricanes	Large-Scale Contamination	Terrorist Act
Tornadoes	Drugs and Health Product	
Heat Waves	Contaminant	
	 Food/Water/Air/Contaminant 	
drological:	Environment Contaminant	
Flooding		
Ice Jams	Accidents	
Erosion and Accretion	Accidents:	
Storm Surges	Air Crashes	
Drought	Marine Accidents	
	Motor Vehicle Accidents	
Idfire		
Wildfire	Hazardous Spills (road, rail, sea)	
Wildland Urban Interface Wildfire	Radiation	
	Infectious Materials	
ological		
Avalanches	Structure:	
Landslide	Structural Collapses	
Land Subsidence	Dam Collapse	
Tsunami	Electrical Power Outage	
Earthquake		
Glacier Effects	Explosions, Leaks and Emissions	
voicanic Eruptions/Ash Falls	Oil and Gas Plants	
	Gas and Gas leaks (pipeline)	
ological:	Gas and Gas Leaks (gas wells)	
climate change		

- Mine
 - Other Explosions

Risk Treatment Options – A Single Hazard



Multi-Jurisdictional Realities

A Multi-Jurisdictional Challenge

- Shared governance
- Common understanding
- Funding challenges
- Lengthy timelines



Policy Windows

Policy Windows

- Existing programs
- Emerging needs
- Windows open (and close)

Policy Windows

- Seek opportunities to increase community resilience
- Consider the four environments:
 - Built
 - Natural
 - Economic
 - Social

Promoting Community Resilience - Governance Opportunities

Promoting Community Resilience

- Interdepartmental collaboration
- Multiple lenses
- Long-term budgeting decisions
- Embedded processes

Scope, Context, Criteria ssment ification	Risk Treatment Options Analysis	Your ideas here.
Risk Analysis Risk Evaluation Recording and Reporting		Three questions will be posed.
Risk Assessment Source: CSA/ISO 31000:18 Purpose: Provide an understanding of risks (hazard events, severity, and likelihood) Methodology: Qualitative Risk Assessment Techniques: Consequence/Probability Matrix (EM planning) Business Impact Analysis (CM planning) Approach: Hazard, Risk, and Vulnerability Analysis (HRVA) Immetre Disarter Bible Criteria		Think all-hazards, community-wide.
Risk Treatment Purpose: Select one of more relevant options to change the probability of occurrence, the impact of the threat, reduce vulnerability, or increasecapacity Strategies: Avoid, mitigate, transfer, or accept (strategic, operational and tactical levels) Techniques: Cost/Benefit Analysis for high cost risk treatments (quantitative methodology) Includes a cyclical process of reassessing the new level of risk to determine its tolerability and whether further treatment is required. Should also include public consultation to course public	Land Use Planning & Development Process	We are looking for themes.

Promoting Community Resilience

Scope, Context, Criteria Risk Assessment ification Risk Analysis Risk Evaluation		Risk Treatment Options Analysis
Recording and Reporting	Source: CSA/ISO 31000:18	
Risk Assessment Purpose: Provide an understanding of risks (hazard events, severity, and likelihood) Methodology: Qualitative Risk Assessment Techniques: Consequence/Probability Matrix (EM planning) Business Impact Analysis (CM planning) Approach: Hazard, Risk, and Vulnerability Analysis (HRVA) Inputs: Disaster Risk Criteria Disaster Resilience Scorecard; Vulnerability/Capacity Assessment Critical Infrastructure Inventory; Historical Disaster Data		Land Use Planning & Development Process
Purpose: Select one of more relevant options to change the the impact of the threat, reduce vulnerability, or i Strategies: Avoid, mitigate, transfer, or accept (strategic, oper Techniques: Cost/Benefit Analysis for high cost risk treatment Includes a cyclical process of reassessing the new level of risk to whether further treatment is required. Should also include public acceptability of disaster risks, disaster risk tolerance, and disaster risks.	e probability of occurrence, ncreasecapacity ational and tactical levels) s (quantitative methodology) determine its tolerability and consultation to gauge public isk treatment measures.	/

Poll Question #1: How do we gain broad community support to increase community resilience?

	Scope, Context, Criteria Risk Assessment ification Risk Analysis Risk Evaluation	Risk Treatment Options Analysis
8 I	Recording and Reporting	
51	Source: CSA/ISO 31000:18	/
DRN	Risk Assessment Purpose: Provide an understanding of risks (hazard events, severity, and likelihood)	
	Methodology: Qualitative Risk Assessment Techniques: Consequence/Probability Matrix (EM planning) Business Impact Analysis (CM planning) Approach: Hazard, Risk, and Vulnerability Analysis (HRVA) Inputs: Disaster Risk Criteria Disaster Resilience Scorecard; Vulnerability/Capacity Assessment Critical Infrastructure Inventory; Historical Disaster Data	Land Use Planning &
	Risk Treatment Purpose: Select one of more relevant options to change the probability of occurrence, the impact of the threat, reduce vulnerability, or increase capacity Strategies: Avoid, mitigate, transfer, or accept (strategic, operational and tactical levels) Techniques: Cost/Benefit Analysis for high cost risk treatments (quantitative methodology)	Development Process
	Includes a cyclical process of reassessing the new level of risk to determine its tolerability and whether further treatment is required. Should also include public consultation to gauge public acceptability of disaster risks, disaster risk tolerance, and disaster risk treatment measures.	

Poll Question #2: How do we identify the appropriate hazard(s) at the community level to consider for risk treatments?

_		
	Scope, Context, Criteria ssment ification Risk Analysis Risk Evaluation Percerting and Percerting	Risk Treatment Options Analysis
SK I	Source: CSA/ISO 31000:18	
DRN	Risk Assessment Purpose: Provide an understanding of risks (bazard events severity and likelihood)	
	Methodology: Qualitative Risk Assessment Techniques: Consequence/Probability Matrix (EM planning) Business Impact Analysis (CM planning) Approach: Hazard, Risk, and Vulnerability Analysis (HRVA) Inputs: Disaster Risk Criteria Disaster Resilience Scorecard; Vulnerability/Capacity Assessment Critical Infrastructure Inventory; Historical Disaster Data	Land Use Plannin
	Development Pro	
	Includes a cyclical process of reassessing the new level of risk to determine its tolerability and whether further treatment is required. Should also include public consultation to gauge public acceptability of disaster risks, disaster risk tolerance, and disaster risk treatment measures.	

Poll Question #3: How do we influence budgeting over the long-term at the community level to increase community resilience?

se Planning & pment Process

What Matters (at the community level)?
Policy Advice (Risk Treatments)

- Stakeholder Support
- Cost
- Residual Risk



Community Resilience – Key Messages

- Embrace systems thinking
- Employ risk-informed decision making
- Have a framework to guide policy development
- Increasing community resilience is a long-term endeavour
- Build alliances locally and other orders of government

Community Resilience – Key Messages

- Connect to like-minded communities
- Link planning efforts to other departmental processes
- Acknowledge trade offs
- Lead from where you stand

Acknowledgements

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 <u>Retrieved from https://www.unisdr.org/campaign/resilientcities/toolkit/article/the-ten-essentials-for-making-</u>cities-resilient
- United Nations Office for Disaster Risk Reduction. (2017). Disaster Resilience Scorecard For Cities Preliminary Level Assessment. Retrieved from <u>https://www.unisdr.org/we/inform/publications/53349</u>
- Emergency Management Strategy for Canada: Toward a Resilient 2030

https://www.publicsafety.gc.ca/cnt/rsrcs/pblctns/mrgncy-mngmnt-strtgy/index-en.aspx

WHEN YOU REACH THE END OF YOUR ROPE, TIE A KNOT IN IT AND HANG ON.

~ FRANKLIN DELANO ROOSEVELT ~

RVThomas 15

NDATION



Adaptation Resilience Training Stronger Together: Planning Resilient Communities (Part 2)

Jeff Zukiwsky, Director, Climate Resilience and Adaptation

September 16, 2021





Climate adaptation planning – Guidance

- Terms and definitions
- Principles
- Roles and responsibilities
- Guidance on assessing impacts, risks and vulnerabilities
- Guidance on identifying and assessing adaptation measures



Climate adaptation planning – numerous guides



Climate resilience planning approach



- Scope
 - Organizational
 - Geographic
 - Time horizon
- Stakeholder engagement
- Work planning
- Climate trends and projections



CLIMATE RESILIENCE EXPRESS



Organizational scope

- All homes, buildings and infrastructure
- The local economy
- Ecosystem functions and services
- Public health and well-being

Community-wide

- Parks and open spaces
- Civic buildings
- Critical infrastructure
- Municipal services

Corporate assets, services, operations

• A facility, building, or neighbourhood

Site-specific

Climate Trends and Projections

www.climateatlas.ca



Source: Climateatlas.ca

Climate resilience planning approach



- Understand vulnerability
- Identify impacts
- Analyze risks
- Evaluate risks

Understanding Vulnerability



Source: Alberta Flood Maps

Identify risks and opportunities



"Climate Impact Scenarios"

Identify risks and opportunities





Example from Beaver County Climate Action Plan

Climate Risk Assessment



Likelihood Scale

Category	Single event (slow onset change)	Recurring event (hazards)
(1) Low	Very unlikely to occur in the next 30 years, less than 1%	Unlikely to occur in the next 30 years, less than 1%
(2)	Somewhat likely to occur in the next 30 years, 1 – 30%	Likely to occur at least once in the next 30 years, 1 – 30%
(3) Medium	<i>Likely</i> to occur in the next 30 years, 30 – 50%	<i>Likely</i> to occur about once per decade in the next 30 years, 30 – 50%
(4)	Highly likely to occur in the next 30 years, 50 – 99%	<i>Likely</i> to occur about once per year in the next 30 years, 50 – 99%
(5) High	<i>Extremely likely</i> to occur in the next 30 years, greater than 99% chance	<i>Likely</i> to occur several times per year , greater than 99% chance

Consequence Scale

Score	Description
(1) Negligible	 Negligible impact on health & safety and quality of life for residents Very minimal impact on local economy Insignificant environmental disruption or damage Slight damage to property and infrastructure, very short-term interruption of lifelines, or negligible cost to municipality Negligible impact on vulnerable groups and on existing disparities, inequalities and deprivation
(2)	
(3)	
(4)	
(5) Major	 Many serious injuries or illnesses, some fatalities, or long-term impact on quality of life for most residents Long-term impact on businesses and economic sectors, major economic costs or disruption Widespread and irreversible damage to wildlife, habitat and ecosystems, or long-term damage, disruption to environmental amenities Widespread damage to property & infrastructure (including critical facilities and lifelines), extensive and long-term interruption of services, widespread evacuations, or major cost to municipality Many vulnerable groups are significantly affected resulting in long-term increases in existing disparities, inequalities and deprivation

How significant would the consequences be of a heat wave (3 days above +30) be for your community?

Discussion





Climate Risk Assessment



Climate Change Benefits or Opportunities

	Major			Longer growing season		
BENEFITS	High					Increased summer tourism
	Moderate			Longer construction season		
	Γοw					
	None				Reduced heating/fuel demand	
		Rare	Unlikely	Possible	Likely	Almost certain
			LIK	(ELIHOOD		

Quantitative Risk Assessment



Quantitative Risk Assessment

S((\$	JCIAL COST 2016]		GDP COST (\$ 2016)						
	+\$18.7 billion	+6.0°C	+\$7.7 billion						
	+\$13.9 billion	+5.0°C	Warming in Edmonton by the 2080s +\$5.7 billion						
An additional 22,000 adverse health episodes in the population	+\$9.8 billion	+4.0°C	+\$3.9 billion Warming in Edmonton by the 2050s						
resulting in 2,400 lost years of 'healthy life'.	+\$6.4 billion	+3.0°C	+\$2.5 billion						
	+\$3.6 billion	+2.0°C	+\$1.4 billion						
	+\$1.5 billion	+1.0°C	+\$550 million						
mean annual temperature in recent past: 2.1°C Source: Climate Resilient Edmonton: Adaptation Strategy and Actio									



Climate resilience planning approach



- Identify actions
- Assess and Prioritize actions
- Develop action plan

The goal of adaptation planning



The goal of adaptation planning



Identify climate resilience actions

- ✓ Research
- ✓ Policies, Plans, Regulations, Standards
- Operations & Maintenance
- Building new or upgrading existing infrastructure
- Awareness and education

- ✓ Diversification
- ✓ Emergency management
- ✓ Human resourcing

Identify climate resilience actions



Assess and Prioritize Actions

Guidance from ISO 14092 on assessing and prioritizing adaptation measures.

Use one of the following approaches:

- Cost benefit analysis
- Cost effectiveness analysis
- Multi-criteria decision analysis
- Real-options analysis
- Adaptation pathway
- SWOT analysis



Assess and Prioritize Actions

A Simple Cost-Benefit Analysis Approach

Costs	1	2	3	4	5
Lifecycle costs	Very low	Low	Moderate	High	Very high
Negative impacts (externalities)	Negligible	Minor	Moderate	Considerable	Major
Feasibility	Very high	High	Moderate	Low	Very low
Acceptability	Very high	High	Moderate	Low	Very low

	1	2	3	4	5
Benefits					
Savings (e.g., energy bills)	Very low	Low	Moderate	High	Very high
Effectiveness	Very low	Low	Moderate	High	Very high
Relevance	Moderate	Considerable	Major	Very major	Extreme
Mitigation co-benefits	Negligible	Minor	Moderate	Considerable	Major
Other co-benefits	Negligible	Minor	Moderate	Considerable	Major
Equity	Very poor	Poor	Neutral	Good	Very good
Urgency	Very low	Low	Moderate	High	Very high
Flexibility	Very low	Low	Moderate	High	Very high

Promising adaptation options

Ratio of most promising option

																						\
	1.00	1.00	1.20	1.40	1.60	1.80	2.00	2.20	2.40	2.60	2.80	3.00	3.20	3.40	3.60	3.80	4.00	4.20	4.40	4.60	4.80	5.00
	1.20	0.83	1.00	1.17	1.33	1.50	1.67	1.83	2.00	2.17	2.33	2.50	2.67	2.83	3.00	3.17	3.33	3.50	3.67	3.83	4.00	4.17
	1.40	0.71	0.86	1.00	1.14	1.29	1.43	1.57	1.71	1.86	2.00	2.14	2.29	2.43	2.57	2.71	2.86	3.00	3.14	3.29	3.43	3.57
	1.60	0.63	0.75	0.88	1.00	1.13	1.25	1.38	1.50	1.63	1.75	1.88	2.00	2.13	2.25	2.38	2.50	2.63	2.75	2.88	3.00	3.13
	1.80	0.56	0.67	0.78	0.89	1.00	1.11	1.22	1.33	1.44	1.56	1.67	1.78	1.89	2.00	2.11	2.22	2.33	2.44	2.56	2.67	2.78
	2.00	0.50	0.60	0.70	0.80	0.90	1.00	1.10	1.20	1.30	1.40	1.50	1.60	1.70	1.80	1.90	2.00	2.10	2.20	2.30	2.40	2.50
	2.20	0.45	0.55	0.64	0.73	0.82	0.91	1.00	1.09	1.18	1.27	1.36	1.45	1.55	1.64	1.73	1.82	1.91	2.00	2.09	2.18	2.27
	2.40	0.42	0.50	0.58	0.67	0.75	0.83	0.92	1.00	1.08	1.17	1.25	1.33	1.42	1.50	1.58	1.67	1.75	1.83	1.92	2.00	2.08
L&,I 0:::	2.60	0.38	0.46	0.54	0.62	0.69	0.77	0.85	0.92	1.00	1.08	1.15	1.23	1.31	1.38	1.46	1.54	1.62	1.69	1.77	1.85	1.92
u u	2.80	0.36	0.43	0.50	0.57	0.64	0.71	0.79	0.86	0.93	1.00	1.07	1.14	1.21	1.29	1.36	1.43	1.50	1.57	1.64	1.71	1.79
V') T	3.00	0.33	0.40	0.47	0.53	0.60	0.67	0.73	0.80	0.87	0.93	1.00	1.07	1.13	1.20	1.27	1.33	1.40	1.47	1.53	1.60	1.67
0.	3.20	0.31	0.38	0.44	0.50	0.56	0.63	0.69	0.75	0.81	0.88	0.94	1.00	1.06	1.13	1.19	1.25	1.31	1.38	1.44	1.50	1.56
Z	3.40	0.29	0.35	0.41	0.47	0.53	0.59	0.65	0.71	0.76	0.82	0.88	0.94	1.00	1.06	1.12	1.18	1.24	1.29	1.35	1.41	1.47
	3.60	0.28	0.33	0.39	0.44	0.50	0.56	0.61	0.67	0.72	0.78	0.83	0.89	0.94	1.00	1.06	1.11	1.17	1.22	1.28	1.33	1.39
	3.80	0.26	0.32	0.37	0.42	0.47	0.53	0.58	0.63	0.68	0.74	0.79	0.84	0.89	0.95	1.00	1.05	1.11	1.16	1.21	1.26	1.32
	4.00	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.05	1.10	1.15	1.20	1.25
	4.20	0.24	0.29	0.33	0.38	0.43	0.48	0.52	0.57	0.62	0.67	0.71	0.76	0.81	0.86	0.90	0.95	1.00	1.05	1.10	1.14	1.19
	4.40	0.23	0.27	0.32	0.36	0.41	0.45	0.50	0.55	0.59	0.64	0.68	0.73	0.77	0.82	0.86	0.91	0.95	1.00	1.05	1.09	1.14
	4.60	0.22	0.26	0.30	0.35	0.39	0.43	0.48	0.52	0.57	0.61	0.65	0.70	0.74	0.78	0.83	0.87	0.91	0.96	1.00	1.04	1.09
	4.80	0.21	0.25	0.29	0.33	0.38	0.42	0.46	0.50	0.54	0.58	0.63	0.67	0.71	0.75	0.79	0.83	0.88	0.92	0.96	1.00	1.04
	5.00	/ 0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	0.80	0.84	0.88	0.92	0.96	1.00

Assess and Prioritize Actions

A Simple Cost-Benefit Analysis Approach


Climate resilience planning approach



Implementation Example

Edmonton Climate Adaptation Collaborative

 Support municipalities in the Edmonton Metro Region to collaboratively implement coordinated actions to reduce regional climate change vulnerability and to build resilience to the impacts of climate change



Implementation Example

Agreement to implement five projects to enhance regional resilience:

- 1. Climate resilient tree planting and management
- 2. Managing invasive species and pests
- 3. Climate resilient homes
- 4. Climate change impacts on water security
- 5. Best practices for managing climate change risks to water security

Project 1 – Guide to Tree Planting & Management

How should we manage urban trees to enhance climate resilience?

- ~ 80 recommended actions related to:
 - 1. Planning
 - 2. Resistance to extirpation
 - 3. Resilience to disturbance
 - 4. Transition
- * Report includes a list of climatically suitable tree species based on cold hardiness and drought tolerance



Project 1 – Guide to Tree Planting & Management

Report includes a list of over 100 tree species common in the EMR and rates their climatic suitability

Species		Species Tolerance					Species Characteristics			Placement	Climate Suitability	
Botanical name	Common name	Shade ¹	Drought	Water- logging ¹	Branch breakage potential ²	Salt ⁴	Size Class ³ (height)	Deciduous	Shade density in leaf ²	Suitable as street tree	USDA lower hardiness zone ²	Future Climate Suitability
Pinus banksiana	Pine, Jack	L	Н	L	М		М	No	Н	No	2	Suitable
Pinus cembra	Pine, Swiss Stone	М	М	L			М	No	Н	No	4	Sometimes suitable
Pinus contorta latifolia	Pine, Lodgepole	L	Н	Tolerant			L	No	М	No	3	Suitable
Pinus flexilis	Pine, Limber	L	Н	L	М		L	No	М	No	4	Suitable
Pinus monticola	Pine, Western White	М	L	L	М		L	No	М	No	4	Marginal
Pinus mugo	Pine, Mugo	L	Н	L		М	S	No	Н	No	2	Suitable
Pinus nigra	Pine, Austrian	L	Н	L	М		L	No	Н	No	4	Suitable
Pinus ponderosa	Pine, Ponderosa	L	Н	L	L	М	L	No	Н	No	3	Suitable
Pinus strobiformis	Pine, Southwestern White	L	М	L			L	No	М	No		Sometimes suitable
Pinus strobus*	Pine, Eastern White	М	L	L	Н	L	L	No	М	No	3	Marginal
Pinus sylvestris*	Pine, Scots	L	Н	Tolerant	М		L	No	Н	No	2	Suitable
Pinus uncinata	Pine, Mountain	L	Н	L			L	No	М	No	2	Suitable
Platanus x acerifolia	Plane, London	М	М	Tolerant			L	Yes	М	Yes	5	Sometimes suitable
Populus alba*	Poplar, Silver	L	М	L	Н		L	Yes	М	No	3	Sometimes suitable
Populus balsamifera	Poplar, Balsam	L	L	Tolerant	Н	М	L	Yes	М	No	2	Marginal
Populus deltoides	Poplar, Cottonwood	L	L	Tolerant		L	L	Yes	Н	No	3	Marginal
Populus tremula	Aspen, Swedish Columnar	L	М	L		L	М	Yes	М	Yes	2	Sometimes suitable
Populus tremuloides	Aspen, Trembling	L	L	L	Н	М	М	Yes	М	No	1	Marginal
Populus x canescens	Poplar, Grey	М	L			М	L	Yes	М	Yes	2	Marginal
Populus x jackii	Poplar, Northwest					М	L	Yes	М	Yes		Sometimes suitable

Project 2 – Managing Invasive Species

How should we manage invasive species in a changing climate?

- 37 recommendations:
- Detect invasive species and pests early and accurately.
- Prevent the introduction and spread of invasive species and pests
- Control invasive species and pests through effective use of best management practices, restoration and monitoring programs
- Engage with municipal staff, the community, organizations and institutions
- Sustain efforts through regional coordination, support and funding



Project 2 – Managing Invasive Species

Report includes a list of over 70 invasive species and pests of concern in the EMR, with species information, impact descriptions, and photos

SPECIES INFORMATION	TYPE OF IMPACT	PHOTOS
NORWAY RAT	Agricultural: Will forage on small	
Rattus norvegicus	livestock and agricultural crops or grain in storage bins.	A CONTRACTOR
Habitat Type: Various	Ecological Rats are omnivores and	Selar Se
Stage of Invasion:	can be destructive to native wildlife	S. C.
Introduction	by eating fish, birds insects and other small mammals.	- 24 M
Regulatory Status:	Public health & safety: Can carry	- State State State
Pest (Agricultural Pests Act)	diseases, parasites, and pathogens	CREDIT AnemoneProjectors creativecommons
BMP Information: Alberta Invasive	affect human health.	
Species Council		
Province of Alberta		

SPECIES INFORMATION	TYPE OF IMPACT	PHOTOS
LEAFY SPURGE	Agricultural: Contain a milky-	
Euphorbia esula	coloured latex that can poison	
	livestock. Contaminates hay and	State La
Habitat Type:	other forage crops.	
Open grassland/range	Ecological: Prolific seed production	
Stage of Invasion:	can quickly out-compete native	
Post-expansion	species. Produces chemicals that	
	inhibit growth of other plants	CREDIT Alberta Invasive Species Counci
Regulatory Status:	(allelopathic) and can lead to a	
Noxious Weed (Weed Control Act)	dense monoculture.	8
BMP Information: Alberta Invasive Species Council	Public health & safety: Plants contain a milky-coloured latex that	
Province of Alberta	can cause skin irritation in humans (blisters and swelling).	

CREDIT Alberta Invasive Species Council

Project 3 – Climate Resilient Home Goal:

- Develop a virtual climate resilient home demonstrating design features which address key climate impacts facing the Edmonton Metro Region.
- An education and outreach tool, and road map to help homeowners, builders, municipal staff and elected officials make investment and policy decisions to improve the climate resiliency of homes.



Climate Resilient Home



www.calgary.ca/uep/esm/climate-ready-home-guide.html

Project 4 – Water Security and Climate Change Meta Analysis

What is currently known about the impacts of climate change on water security in the Edmonton Metro Region?

Key findings:

- Changes in streamflow
- Changes in water quality
- Changes in water use and demand
- Impacts to the operations and structural integrity of water infrastructure



Project 5 – Water Management Best Practices for Climate Change

What are the Best Management Practices for mainstreaming climate change into water management?

- Source Water Protection
- Water efficiency
- Communication and education
- Collaboration and coordination
- Appendices with case studies from cities across North America



Key Messages

- There are a variety of approaches to climate adaptation planning, ranging from simple to complex. Choice of option depends on your capacity and resources.
- Many different guidance documents and options. No silver bullet.
- Many simple and cost-effective actions your community can implement right not.

Most important: **Consider the climate of the future in every decision your community/organization makes**!

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