Assessing Climate Risk for Smaller Organizations with the PIEVC framework

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Overview

- Main drivers of climate resiliency assessments for smaller communities

- A landscape of climate risk frameworks

- Overview of the PIEVC Protocol

  - Flavours of PIEVC

- Applying the Protocol

  - Sourcing the Data

  - Risk Evaluation - Probability and Severity

- Best practices for a small community context

Smaller communities are interested in climate resiliency

- **Bottom-up** grassroot concerns about damages resulting from weather-driven events

- **Top-down** demonstration of stewardship towards emerging risks

- **Access to grant funding** – climate-specific infrastructure upgrading funds requiring Climate Lens Assessments (e.g. Green Infrastructure / Disaster Mitigation)

*"Climate Lens General Guidance V 1.3"*
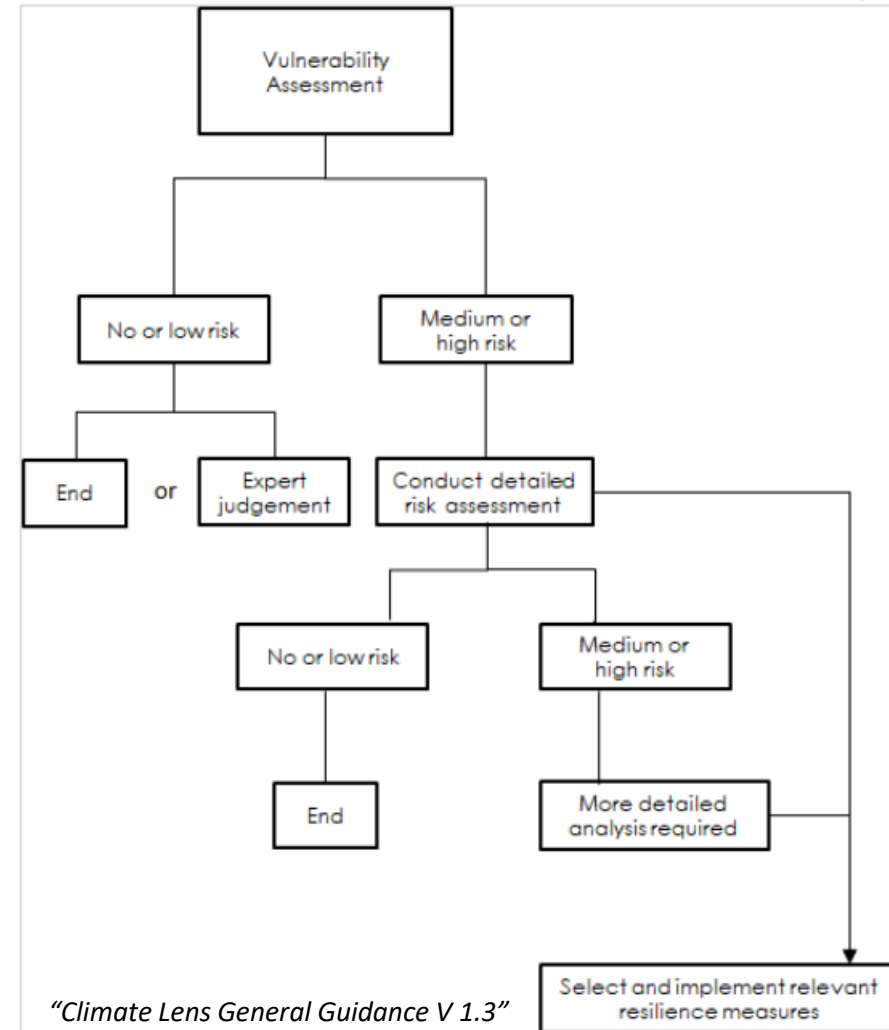
A landscape of frameworks

- Goals of climate resiliency frameworks are to assist in the evaluation of :

  - What changes in climate are likely to happen and to what extent

  - What infrastructure will be impacted by those changes and to what degree

  - What can be done to mitigate the likely adverse impacts of the change on infrastructure

- **PIEVC** has been developed with Engineers Canada (now ICLP/CRI/GIZ) to provide a streamlined process for such assessments
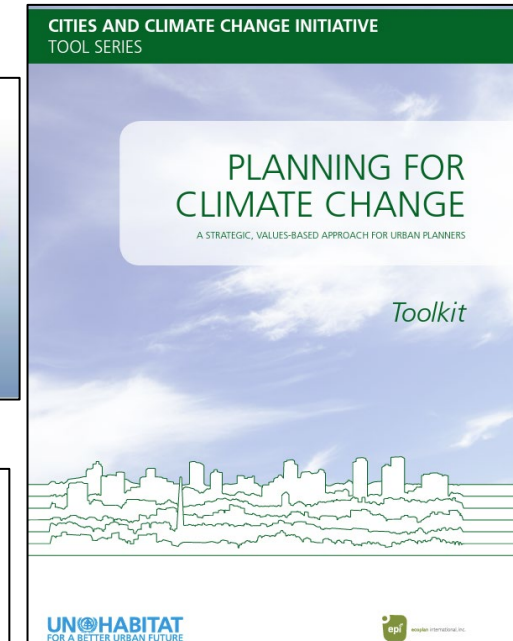
Overview of PIEVC

- Systematic method of identifying infrastructure at risk and delineating probability and consequence for mitigation prioritization and plan development

- Includes worksheets and guides that assist in working through stages, aggregating data and organizing analysis

- Core concept is on the need for multi-disciplinary workshopping and facilitation
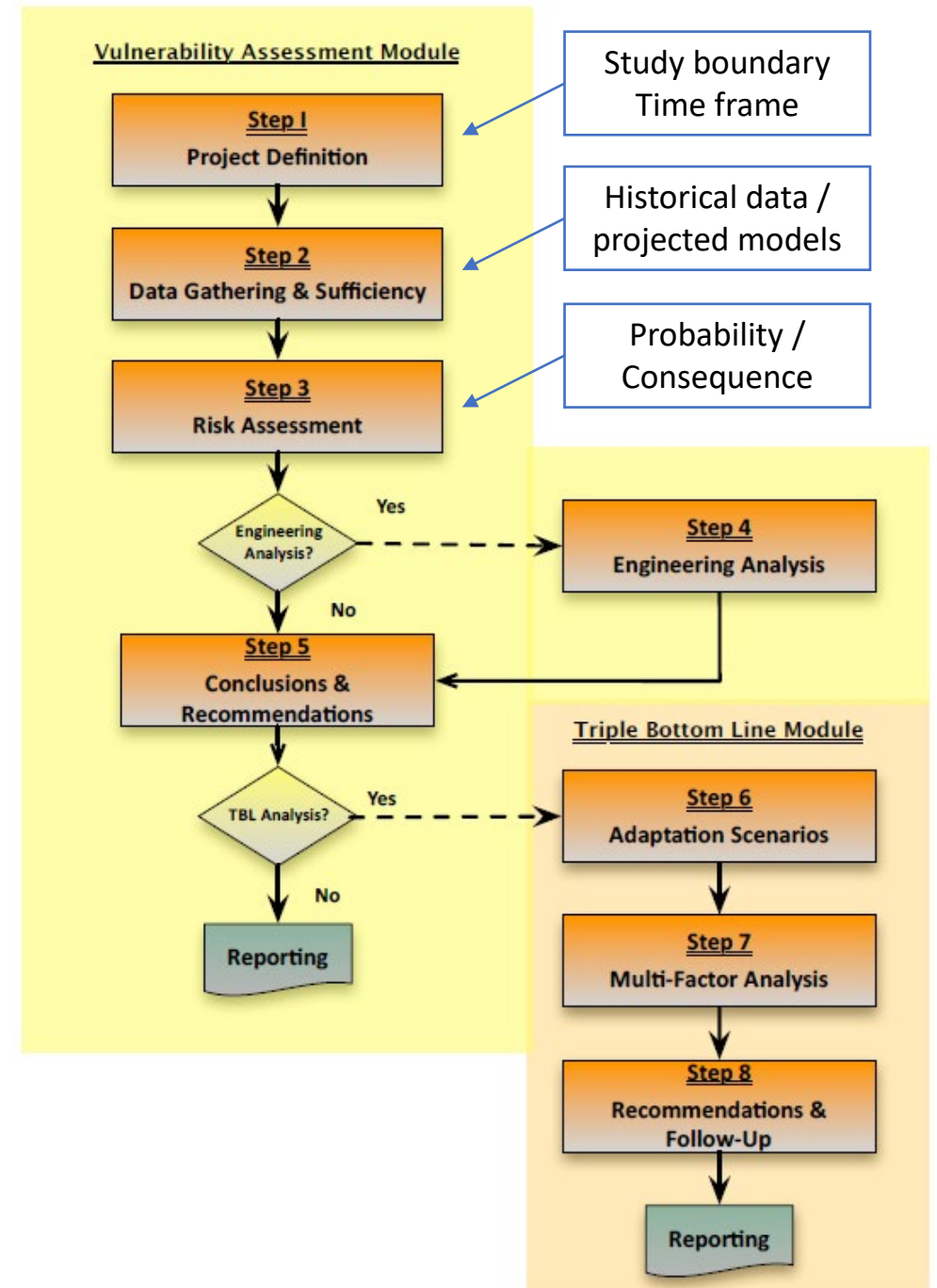
Flavours of PIEVC

- PIEVC has evolved to be more accessible for various application types and user groups

  - *Classic* – original protocol

  - *High Level Screening Guide* (HLSG) – streamlined five step workflow with simplified risk evaluation

  - *Green* – Broader integration of ecosystem based adaptation, vulnerability indicators and impact chains

  - *Large Portfolio* – focuses on complex mixes or high numbers of assets

Step 1 Scope/Context/Criteria	Step 2a Elements	Step 2b Climate	Step 3 Assessment	Step 4 Reporting
Objectives	Define Elements	Establish Scenario	Exposure Analysis	Risk Analysis
Scope	Define Timeframe	Establish Horizons	Consequence Score	Study Limitations
Context	Define Boundaries	Establish Thresholds	Risk Score	Vulnerability Statement
Work Plan	Sit Visit	Likelihood Score	Risk Summary	Recommendations

Elements of the HLSG (based on O'Driscoll, 2023)
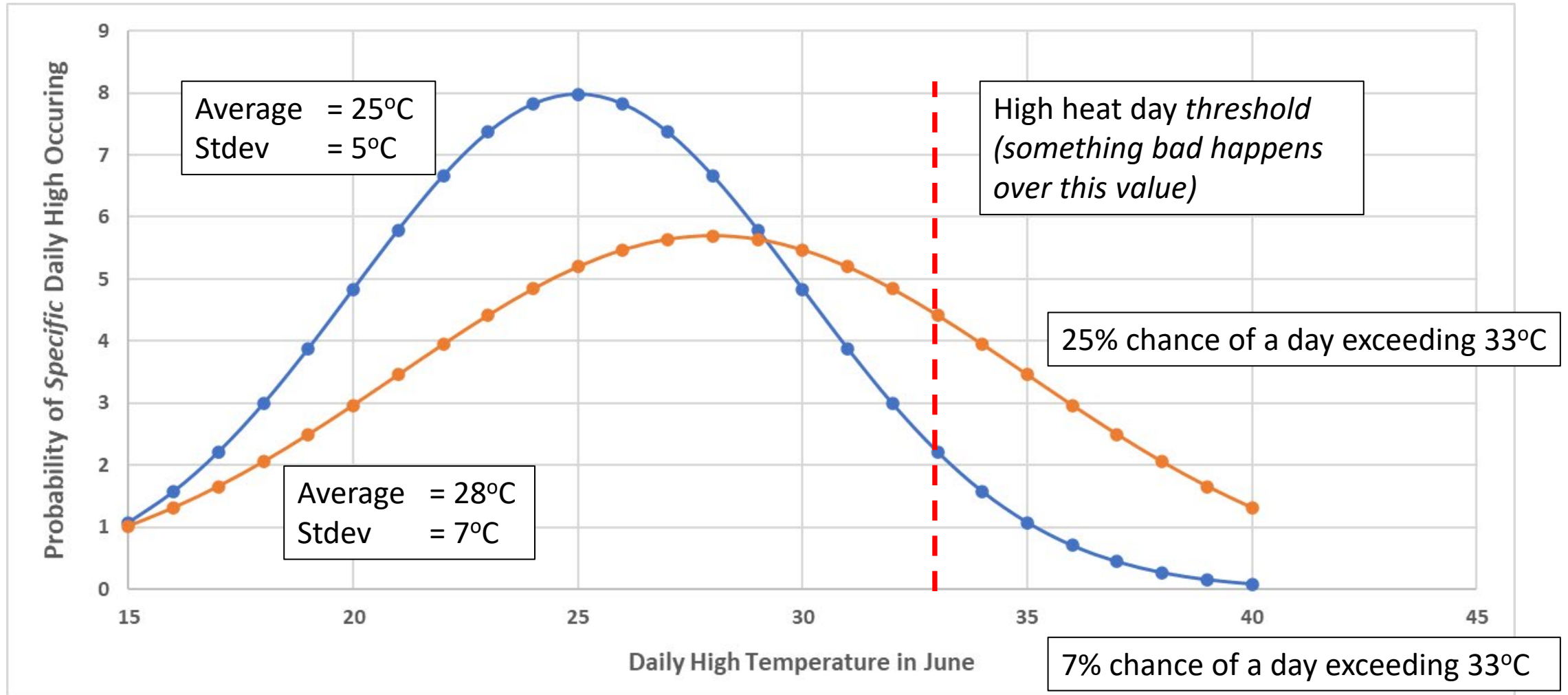
Applying PIEVC – Sourcing the Data

- Increasing availability of sites that provide forward-looking predictions of specific manifestations of climate models (indices)

- Need to decide on the emissions scenario (RCP 4.5 vs 8.5) and planning horizon (25 vs 50 years)

- Worthwhile to compare several sites to confirm trends
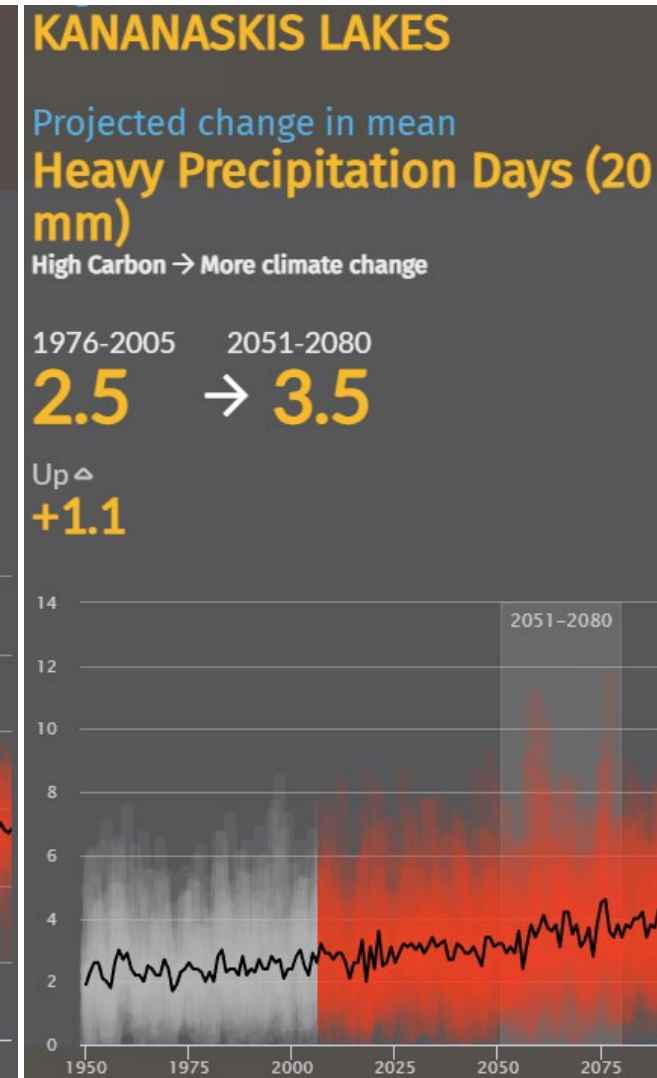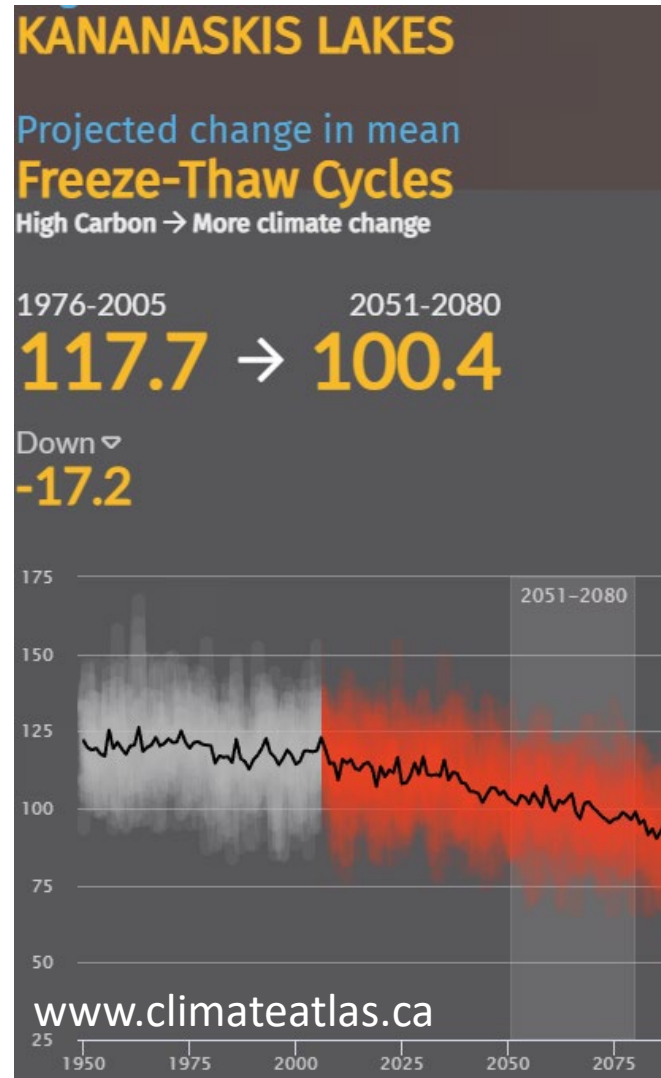
Changing Climate Leads to More Extreme Outcomes

Applying PIEVC – Risk evaluation

- Risk is based on semi-quantitative probability / consequence scoring and ISO 31000 principles

- Emphasis is on risk *prioritization* as opposed to a strict evaluation of risk

- Risks may vary depending on type of asset and how climate impacts (e.g. not all assets are impacted by a given climate index change)

5		5	10	15	20	25
4	Consequence	4	8	12	16	20
3		3	6	9	12	15
2		2	4	6	8	10
1		1	2	3	4	5

Likelihood

1	2	3	4	5

Probability under HLSG

- "Likelihood of ... a climate event, triggering a defined *threshold*, during the time horizon of the assessment" (PIEVC, 2020)

- Define a climate index threshold at which a *significant* functional impact to an asset will occur – this becomes the bar for further evaluation

- Difficult to strictly detangle consequence from probability

Scoring Probabilities

Score	Probability	
0	Negligible	<1 in 1000
1	Improbable	1 in 100
2	Remotely Possible	1 in 20
3	Occasional	1 in 10
4	Normal	1 in 5
5	Frequent	1 in 2.5
6	Often	1 in 1.4
7	Highly Probable	1 in 1.01

(Per PIEVC, 2016)

Probability of threshold being exceeded over the *design life*!

Score	Probability	
		Change from current baseline value
1	Likely to occur less frequently	50-100% reduction in frequency / intensity
2		10-50% reduction in frequency / intensity
3	Likely to occur as frequently	+-10% from current baseline
4		10-50% increase in frequency / intensity
5	Likely to occur more frequently	50-100% increase in frequency / intensity

(Based on O'Driscoll, 2023)

Severity under HLSG

- Establish relevant severities along multiple dimensions (economic, enviro, social, etc.)

- "1-5" scoring can be difficult to standardize. Often easier to focus on max/min and scale between limits (possibly logarithmically).

- Evaluate consequence of *threshold* being exceeded for a given asset class

Score	Severity of Consequence	Economic *(Sample)*	Operation *(Sample)*
1	Very Low	< $1 000	Delay of 1 hour or less
2	Low	$ 1 000 – $ 50 000	Disruption for 1 day
3	Moderate	$ 50 000 – $ 250 000	Disruption for 1 week
4	High	$ 250 000 – $ 1 000 000	Closure for 1 month
5	Very High	> $ 1 000 000	Closure for Season

Conclusions in a Small Community Context

- Many of the same challenges as in traditional asset management!
  - Budgets
  - Buy-in
  - Domain Expertise / "Qualified Party"
  - Developing / executing action plans

- FCM Climate Adaptation Maturity Scale is a good starting point for discussion

- Evolving viewpoint that climate adaptation is becoming a normal part of business

Competency: Human resources and governance
Ensuring staff and council are equipped with the mandate, understanding, skills and knowledge needed to support local climate adaptation.

	1		2		3		4		5	
	Concept Level		**Preliminary Level**		**Implementation Level**		**Operational Level**		**Continuous Improvement Level**	
	Working on Level 1 ☐	Completed on Level 1 ☐	Working on Level 2 ☐	Completed on Level 2 ☐	Working on Level 3 ☐	Completed on Level 3 ☐	Working on Level 4 ☐	Completed on Level 4 ☐	Working on Level 5 ☐	Completed on Level 5 ☐
Maturity level →	We have council support[1] to establish a cross-functional climate adaptation team.[2]		We have established a clear mandate for our climate adaptation steering committee.[2] Council has approved use of funding for internal or external awareness raising regarding climate risks and potential adaptation initiatives.		Our climate adaptation steering committee and team[2] have clear responsibility and the support needed for preparing a draft climate adaptation plan.		Our climate adaptation plan is in place. Our climate adaptation team[2] is guiding and supporting climate adaptation on an ongoing basis, and has ongoing council support. Adaptation-related roles and responsibilities are operationalized.		Our staff and council are continually improving our understanding of climate risks and our approach to managing them.	

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