

Climate Change Adaptation

Research Group

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How to evaluate effective climate change adaptation in a permafrost environment

A pilot study using the Terrain Analysis in
Nunavut (TAN) Project in Arviat, Canada



Background: Why is Monitoring & Evaluation key?

WHAT DOES M&E GIVE US?



Provides
accountability¹



Adaptive learning and
management¹



Reduces vulnerability¹
& maladaptation²

SO... WHY AREN'T WE DOING IT?



Long timeframes³

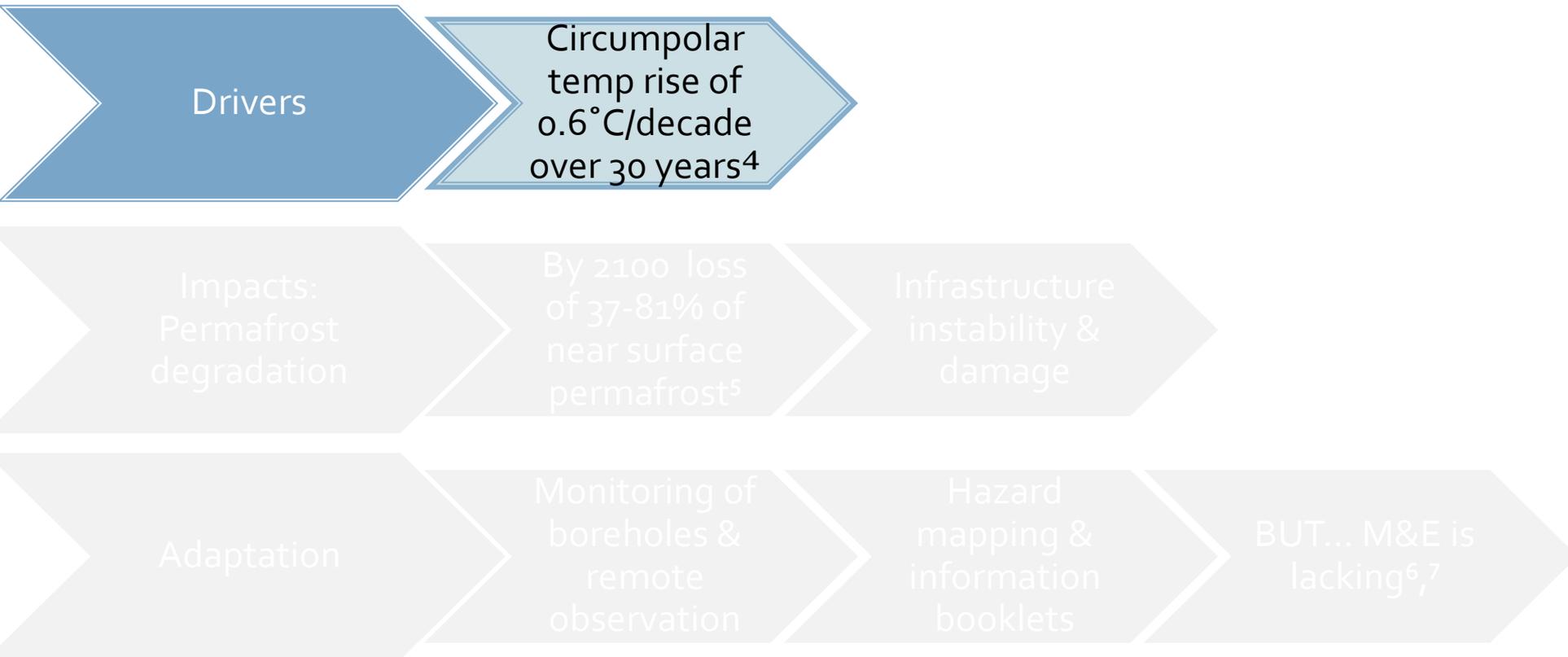


Shifting baselines and
context³

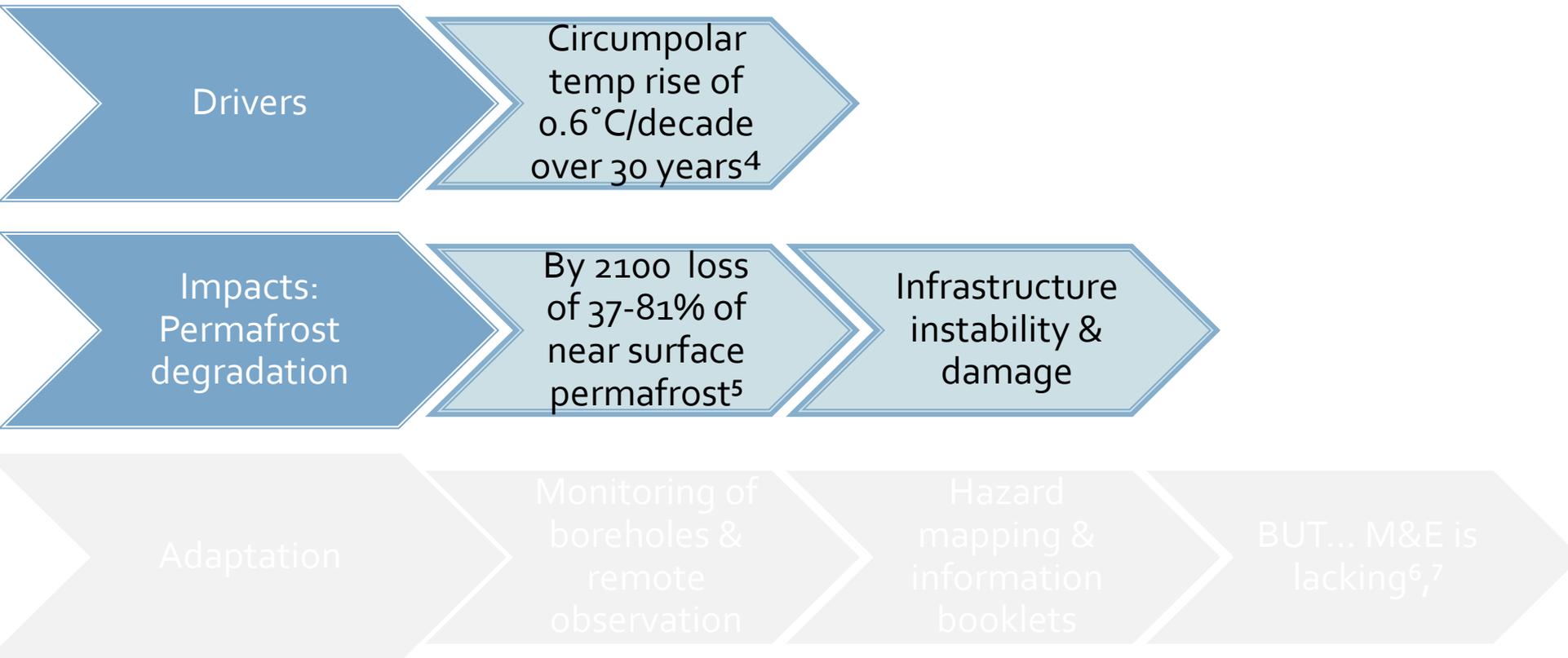


What is “good”
adaptation? ³

Research gap: Arctic adaptation is happening and M&E needs to catch up



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Research gap: Arctic adaptation is happening and M&E needs to catch up

Drivers

Circumpolar
temp rise of
 $0.6^{\circ}\text{C}/\text{decade}$
over 30 years⁴

Impacts: Permafrost degradation

By 2100 loss
of 37-81% of
near surface
permafrost⁵

Infrastructure
instability &
damage

Adaptation

Monitoring of
boreholes &
remote
observation

Hazard
mapping &
information
booklets

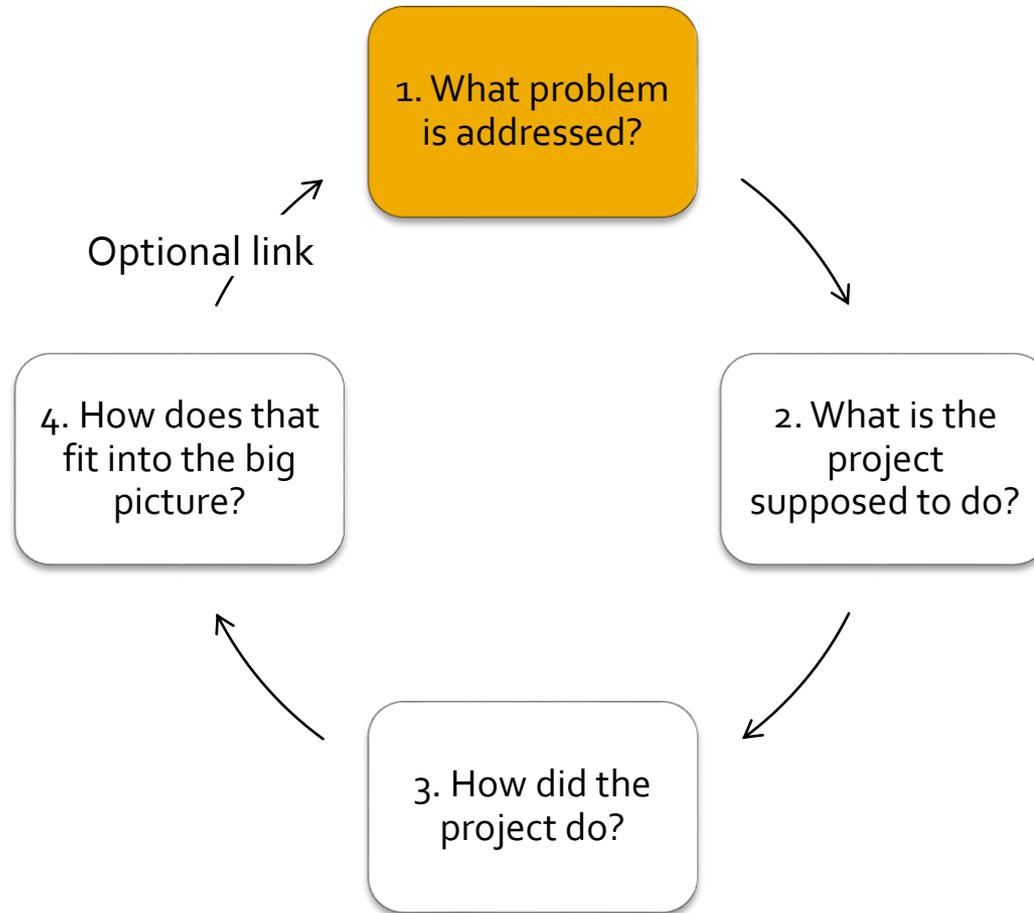
BUT... M&E is
lacking^{6,7}

Research gap: Arctic adaptation is happening and M&E needs to catch up

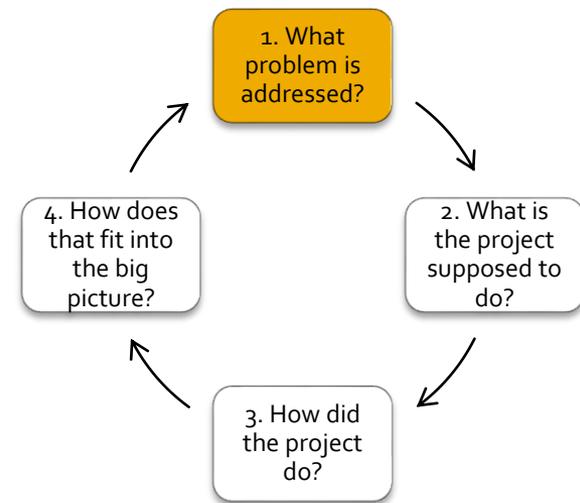
Aim

Create an evaluation framework for climate change adaptation in a permafrost environment: A pilot study using the 'Terrain Analysis in Nunavut' project in Arviat, Canada.

Method: A community based adaptation evaluation framework



Method: Baseline literature review



How?

Previous literature & Stakeholder interviews

Why?

To determine if the project had added anything new

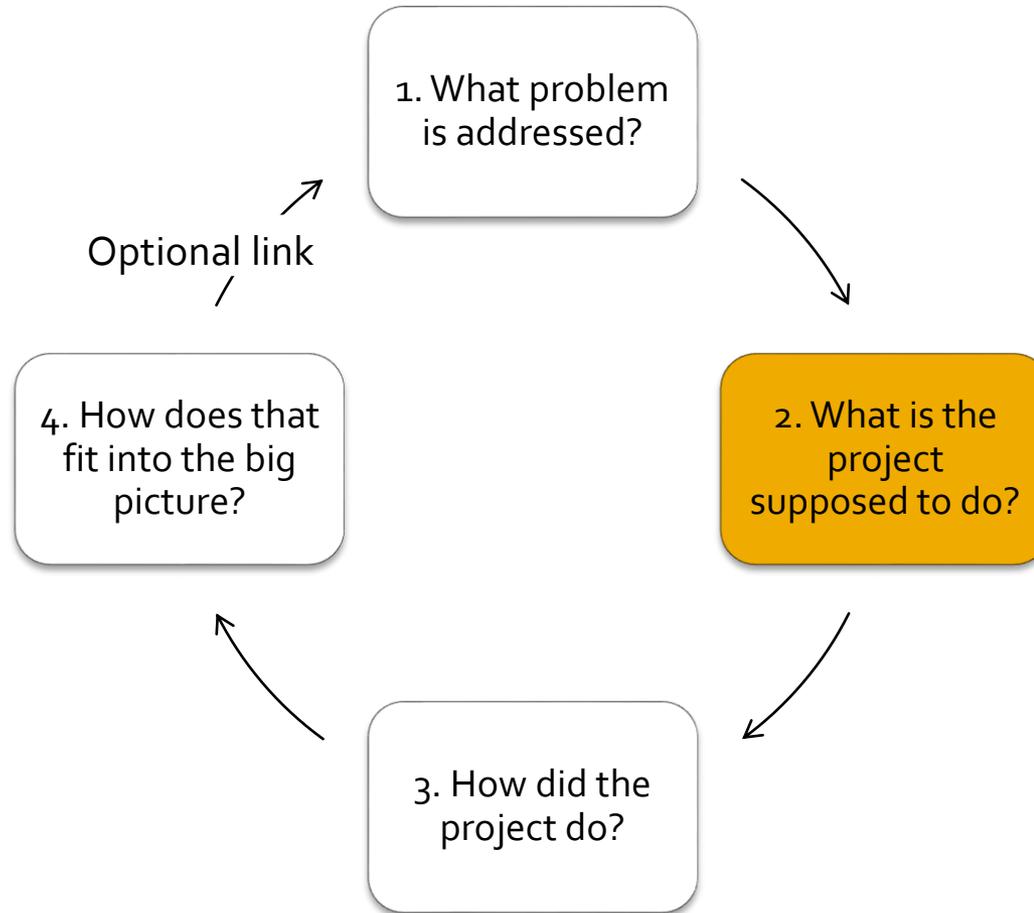
E.g. results:

Limited permafrost monitoring in the region

Desk studies from the 90's

Data not at appropriate scale for community decisions

Method: A community based adaptation evaluation framework



Method: Logic model⁸

Activities

- The specific tasks to be undertaken

Outputs

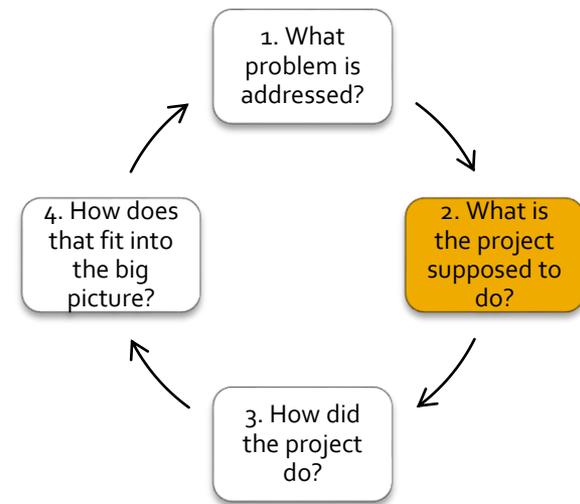
- The tangible products produced

Outcomes

- What the project is expected to achieve

Impact

- The macro-level objectives which the project contributes to



Method: Logic model⁸

Activities

- The specific tasks to be undertaken

Outputs

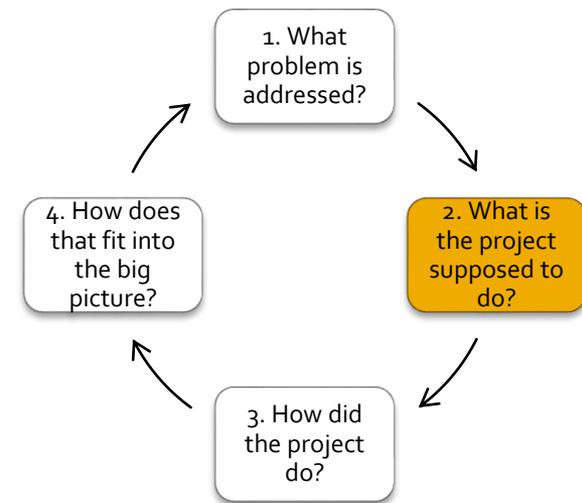
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How?

Review project proposals

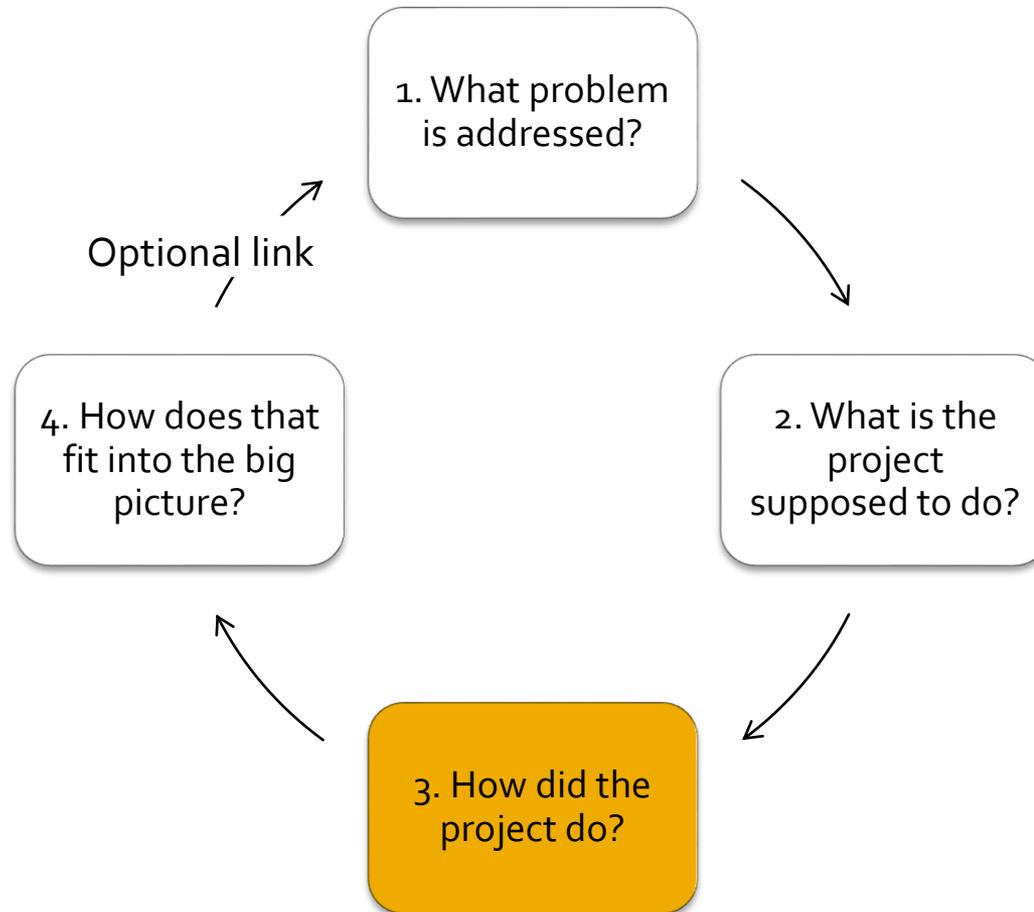
Why?

To define success

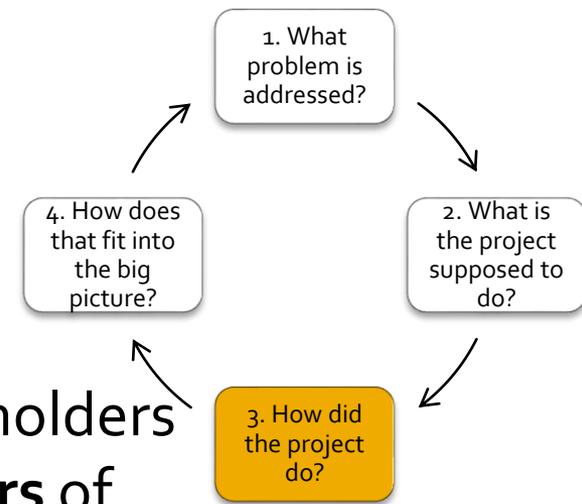
To identify key assumptions

⁸Adapted from AUSAID, 2005.

Method: A community based adaptation evaluation framework



Methods: Interviews



N=19 semi-structured interviews with key stakeholders
Interviewees were divided into **creators** and **users** of the project

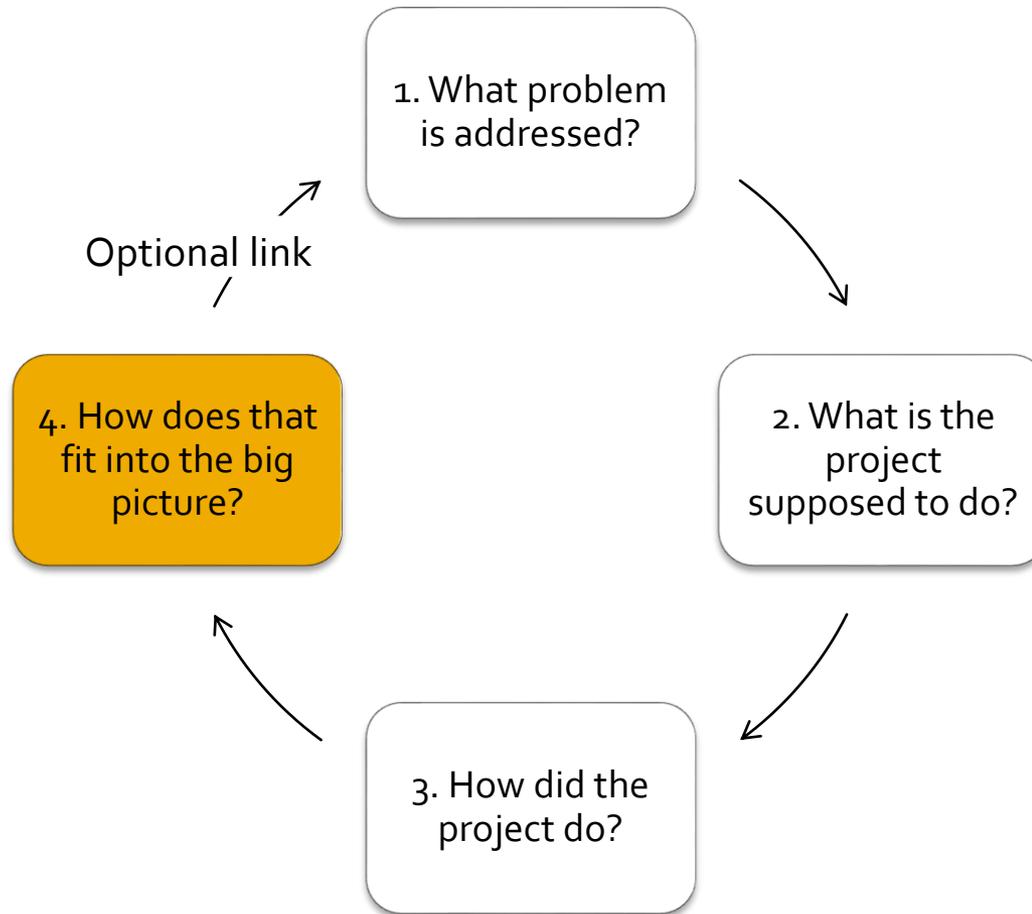
E.g. questions:

What data was available for this area prior to this project?

How do you plan to use the maps?

Feedback	Positive	Negative	Recommendations
Creators	Considered the local context	Lack of communication between project stakeholders	Include more oral and/or engaging activities
Users	Increased knowledge sharing	Local knowledge contradicts data	Don't build near water

Method: A community based adaptation evaluation framework



Method: Adaptation Readiness Framework⁹

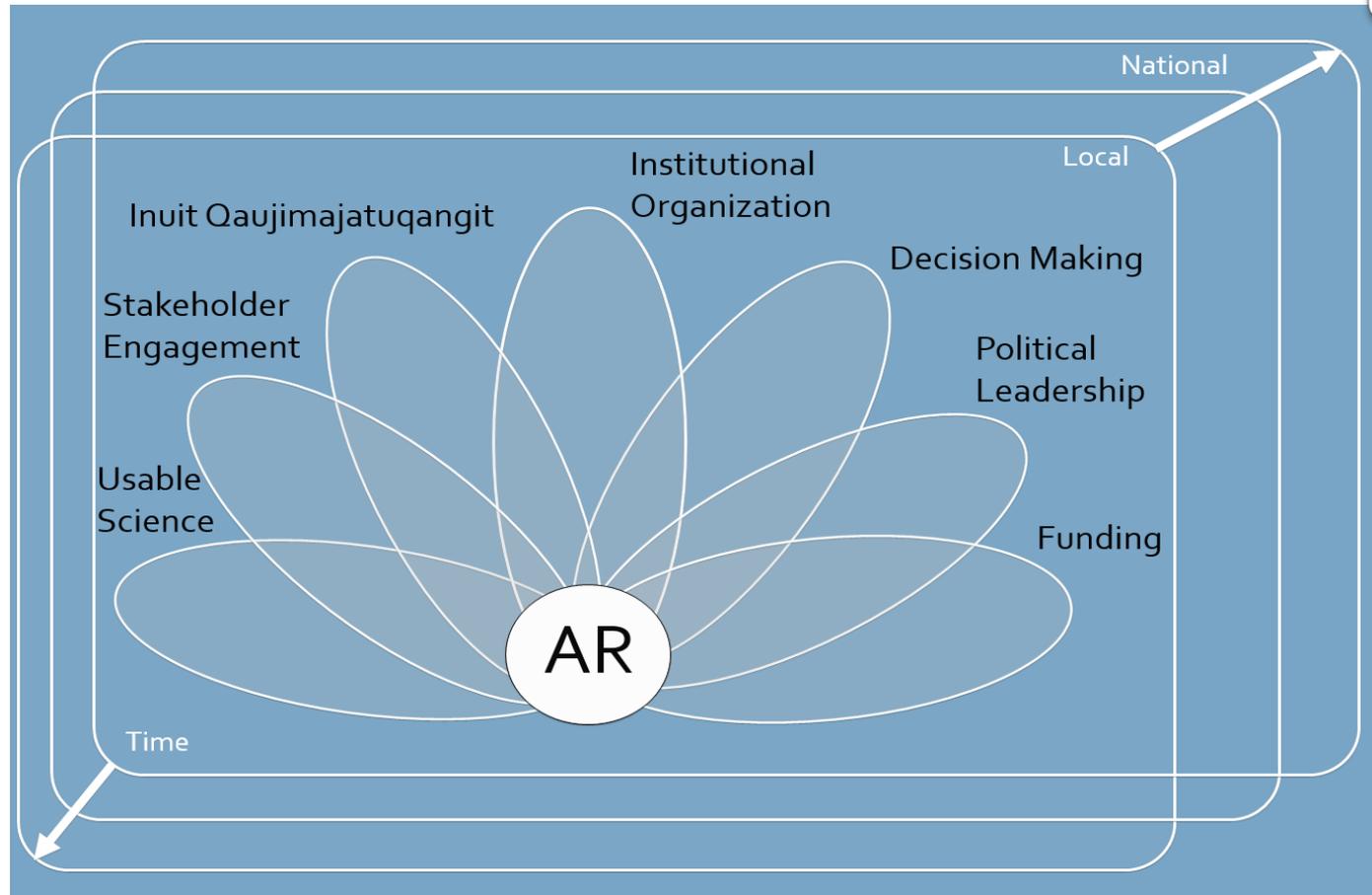
The overarching factors critical for adaptation to occur⁹

1. What problem is addressed?

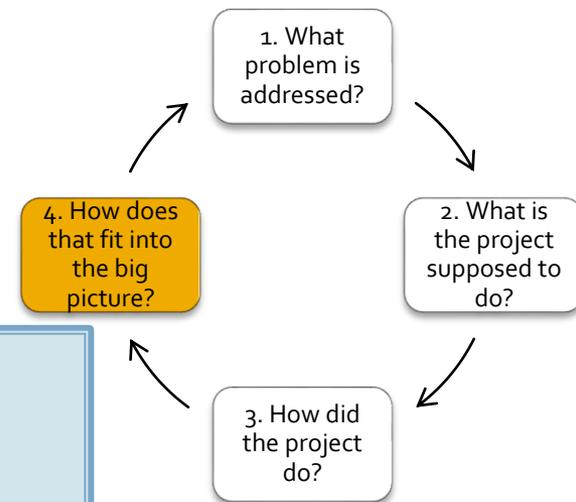
2. What is the project supposed to do?

3. How did the project do?

4. How does that fit into the big picture?



Method: Readiness ratings⁹



How? 8 readiness factors
16 indicators (2 per factor)
Scoring (0-2)

Why? To consider if an enabling environment for adaptation exists

INSTITUTIONAL ORGANIZATION

Reduces ad hoc adaptation and allows effective climate adaptation planning

INDICATORS

- Presence of boundary organisations working on climate change adaptation¹²
- Stakeholders were involved in the decision making process¹²

RATING (SCORE)

Yes (2)
Somewhat (1)
No (0)

⁹Adapted from Ford & King, 2015

Findings: How does this add to understanding of Arctic adaptation?

The application of the evaluation framework

- Facilitates adaptive learning through in-depth stakeholder feedback
- Allows for longitudinal evaluations
- Readiness ratings identify key linkages and barriers to help improve adaptation in a northern context

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Appendix

- A. What is being evaluated: Information about Arviat and the TAN project
- B. Logic model for TAN project
- C. Interview results
- D. Readiness indicator: Institutional organisation
- E. Readiness indicator: Public Support
- F. Readiness indicator: Usable Science
- G. Readiness indicator: Funding
- H. Readiness indicator: Stakeholder Engagement
- I. Readiness indicator: Leadership
- J. Readiness indicator: IQ
- K. Readiness indicator: Decision Making

A. What is being evaluated?

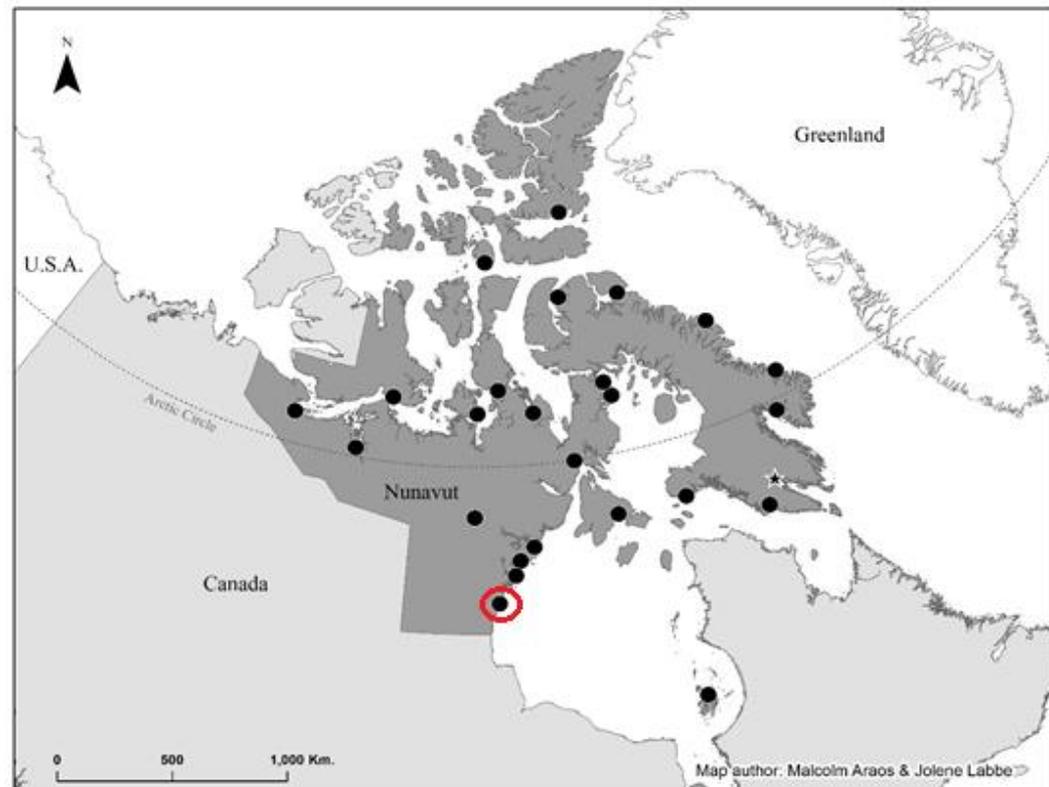
TERRAIN ANALYSIS IN NUNAVUT

- A 4 year project, lead by GofN - Community Government Services
- Across 7 communities

Aim: To identify ground which is susceptible to CC impacts using radar satellite data

For use by decision makers, in planning development ⁷

ARVIAT, NUNAVUT



A. What is being evaluated?

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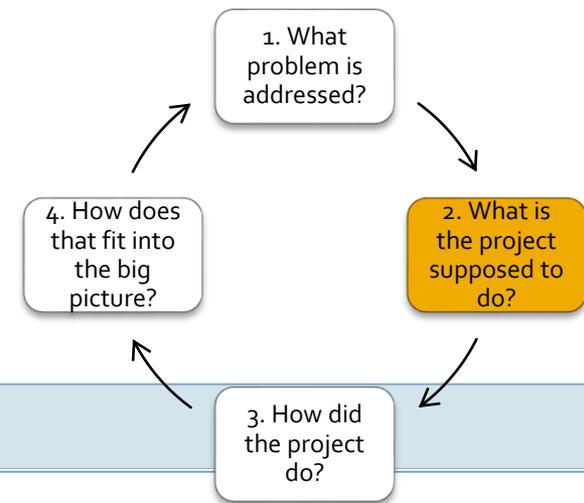
ARVIAT, NUNAVUT

Population: 2,308 people in 2011 (est. 3,747 by 2036) ⁸

Why is this project happening here?

High demand for new housing and has seen rapid recent development ⁹

B. Logic model



Activities

The specific tasks to be undertaken

- Acquire RADARSAT-2 images
- Identify and monitor changes and field visits for validation

Outputs

The tangible products produced

- A map and report of suitability for future development

Outcomes

What the project is expected to achieve

- Transfer of knowledge to communities.
- Integrated into community development plans (20 year timeframe).

Impact

The macro-level objectives which the project contributes to

- Reduce the costs, damages and losses associated with the failure of foundations of buildings and infrastructure in Nunavut.

C. Interview results

Creator comments (+) (N=102)

Considered local context (n=16)

Aided in building relationships (n=16)

Increased results dissemination (n=11)

Creator comments (-) (N=63)

Lack of communication between project stakeholders (n=17)

Limited data access (n=6)

Timeliness of information (n=5)

Creator comments (REC)* (N=46)

Include more oral/engaging activities (n=6)

*Only one recommendation included

User comments (+) (N=116)

Increased knowledge sharing (n=22)

Local agreement with map (n=22)

Aids decision making (n=18)

User comments (-) (N=80)

Local knowledge contradicts data (n=13)

Limited data access (n=8)

Unclear ranking system on maps (n=5)

User comments (REC) (N=45)

Don't build near water (n=5)

Consider local quality of life (n=4)

Clarification of ranking system on maps (n=4)

D. Readiness indicators: Institutional organisation

Readiness factor	Indicator	Example	Rating
Institutional Organisation	Presence of boundary organisations working on climate change adaptation ¹²	The bringing in of DoE-CCS to work with project leader and coordinate outreach.	Yes
	Stakeholders were involved in the decision making process ¹²	Climate change engagement in Arviat brought together end-users with map creators to discuss results and next steps.	Yes

¹²Ford & King, 2015; ¹³Ford et al., 2013

E. Readiness indicators: Public support

Readiness factor	Indicator	Example	Rating
Public support	There is a public perception of the importance of climate change adaptation ¹²	40-50 people attended the public event held, interviewees acknowledged changes happening in Arviat and discussed adaptation.	Yes
	Public understanding of climate change and impacts	Unpredictability of weather and changing migration patterns discussed by interviewees. Some misconceptions about the link between impacts and climate change.	Some what

F. Readiness indicators: Usable science

Readiness factor	Indicator	Example	Rating
Usable science	Quality, timeliness and pertinence ¹³	<p><i>Quality (score 2)</i>, literature review showed the project is using appropriate technology and in-situ data to validate results. <i>Timeliness (score 1)</i> CGS felt project outputs would be ready for incorporation in official community plan. Some felt it was too late for current development occurring in unsuitable zones. <i>Pertinence (score 1)</i>, the project provided new knowledge but the suitability categories were critiqued.</p>	Somewhat
	Meaningful consultation with end-users	3vG consulted with CGS (end-user). However, the Hamlet weren't consulted during project creation and did not have significant input prior to community engagement.	Somewhat

G. Readiness indicators: Funding

Readiness factor	Indicator	Example	Rating
Funding	Dedicated funding streams or budgets available within departments for climate change adaptation work ¹²	Organisations interviewed currently found money for adaptation from other budgets (e.g. Halloween indoor activities held by Arviat). DoE-CCS budget is for admin and daily operations rather than funding of adaptation projects.	No
	Climate change adaptation funding is being accessed and utilised	CGS were able to access AANDC funds, Arviat Wellness centre also accessed funds from national level. Laval and Memorial's work was funded nationally through Arctic Net.	Yes

H. Readiness indicators: Stakeholder engagement

Readiness factor	Indicator	Example	Rating
Stakeholder engagement	Relevant stakeholders have been engaged	Interviewees agreed that key stakeholders were present during the outreach.	Yes
	Stakeholders understood how this project would be utilised in their day to day role	'In Vivo' coding of "not my job" identified a lack of understanding about who was responsible for utilizing the project information.	No

I. Readiness indicators: Leadership

Readiness factor	Indicator	Example	Rating
Leadership	Organisations or departments are mandated to include climate change in their work (own)	Most organisations did not have climate change policies. Exceptions to this were DoE-CCS, CGS (through CIP) and Nunavut Housing Corp (building standards).	Somewhat
	Statements of importance and need for adaptation by leaders ¹²	CGS; felt it would be irresponsible to not include climate change. Hamlet felt there was too much uncertainty in impacts and Arviat currently had greater needs than adaptation (e.g. housing crisis)	Somewhat

J. Readiness indicators: Inuit Qaujimatujatugangit (IQ)

Readiness factor	Indicator	Example	Rating
Inuit Qaujimatujatugangit (IQ)	IQ was collected during the project (own)	Discussions with elders occurred and local knowledge was sought out through field visits, Arctic Net work and community engagement	Yes
	IQ is integrated into project results (own)	No evidence of this happening currently. Interviewees discussed the difficulty in incorporating IQ	No

K. Readiness indicators: Decision making

Readiness factor	Indicator	Example	Rating
Decision making	Access to key project information for decision makers	CGS and the Hamlet had access to maps but not all potential users had access to the map or knew where to find the information.	Somewhat
	Climate change adaptation is considered and accounted for in decisions made	Other priorities were given more consideration than climate change in development decisions	No