Coastal communities in the Circumpolar North and the need for sustainable climate adaptation approaches

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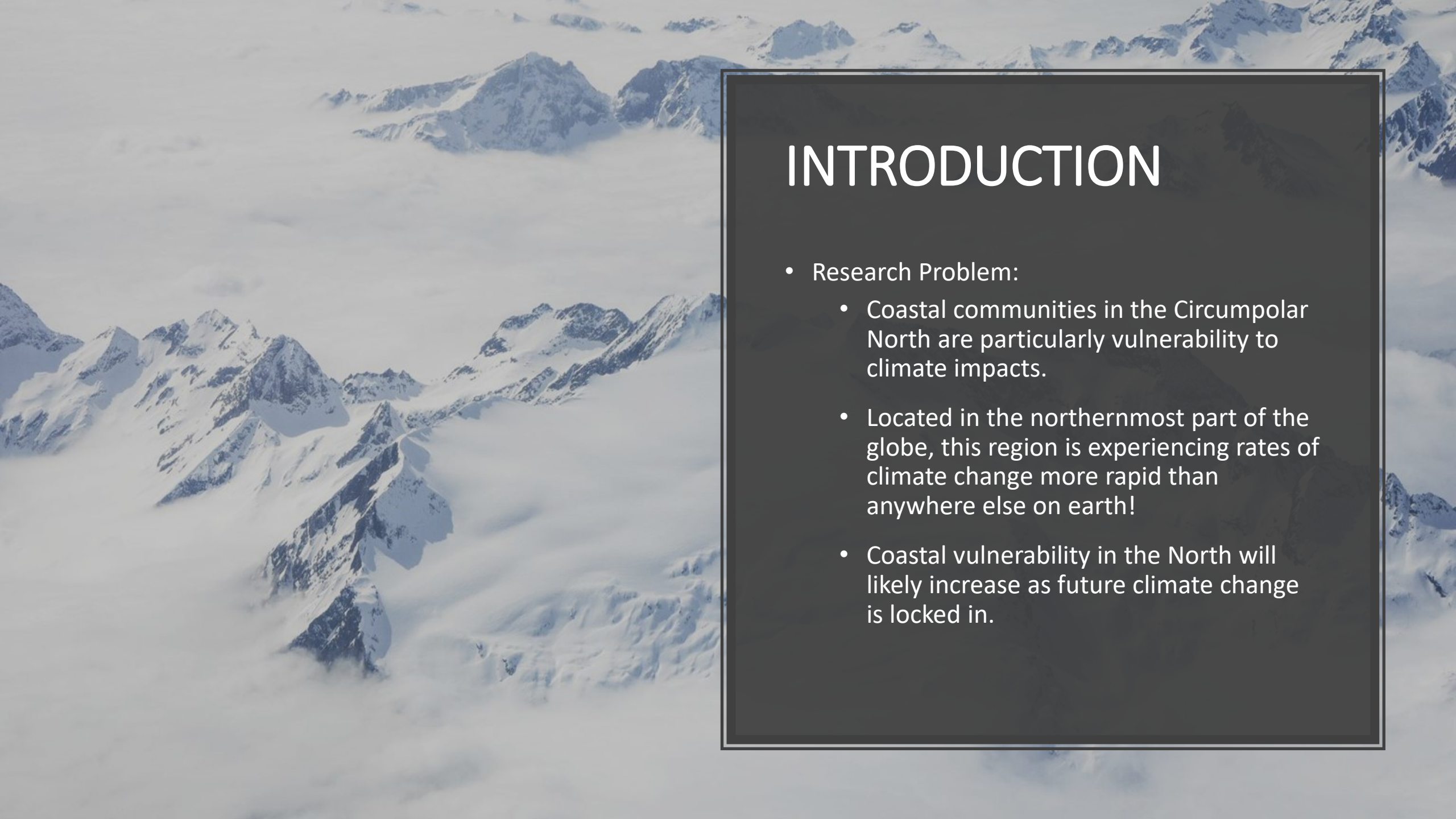
UArctic Thematic Networks: Graduate Seminar on Climate Change Impacts and Responses in the Arctic

OUTLINE

- Introduction
- Context: Communities in the Circumpolar North
- Taking Action: Overview of Adaptation Approaches
- Adaptation Approaches in the Circumpolar North
- Opportunities for Interventions
- Conclusion



INTRODUCTION

- Research Problem:
  - Coastal communities in the Circumpolar North are particularly vulnerability to climate impacts.
  - Located in the northernmost part of the globe, this region is experiencing rates of climate change more rapid than anywhere else on earth!
  - Coastal vulnerability in the North will likely increase as future climate change is locked in.

INTRODUCTION

- Research Problem:
  - Adaptation strategies are intended to moderate or avoid harm associated with climate impacts.
  - Although the urgency of adaptation is gaining salience among government decision-makers, adaptation planning is still in its infancy.
  - Adaptation approaches are often reactionary and fragmented in practice, and in northern coastal communities, lack diversity.

CONTEXT

Where is the Arctic and how do we define the Circumpolar North?

- The Circumpolar North: the polar region located approximately 66.5◦ North of the equator.
- Definitions of the North can vary substantially and include descriptions based on:
  - temperatures
  - the Arctic tree line
  - permafrost zones
  - political and cultural surroundings

CONTEXT

Communities in the Circumpolar North in a changing climate

- Experiencing unprecedented increases in temperature.
- Sensitivity to environmental change is acute.
- Climate stressors pose a significant threat to assets, infrastructure, and human health and safety.

EROSION IN SHISHMAREF, ALASKA

https://seagrant.uaf.edu/topics/environmental-hazards-alaskas-coasts/flooding-erosion/

CONTEXT

Communities in the Circumpolar North in a changing climate

- These communities are often:
  - remotely located
  - sparsely populated
  - subject to a limited tax base
  - heavily dependent on marine resources

TAKING ACTION

	Definition and classification	Examples	Benefits	Drawbacks
Structural	• Hard adaptation typology • An infrastructural change or improvement that is intended to increase a community's resilience to climate impacts (Wenger, 2015)	▪ shoreline armoring ▪ levees ▪ sea walls ▪ drainage channels ▪ dams ▪ dykes ▪ elevated infrastructure (stilts) ▪ heat insulators	• Commonly used and well understood • Quick to install • Associated with a visible sense of security	• Associated with rigidity • Capital intensive • Costly to maintain • Contribute to environmental degradation
Non-Structural	• Soft adaptation typology • Measures that focus on human behavior and aim to permit the continued use of vulnerable areas by managing climate risks primarily through planning, including the regulation of land use and development (Harman et al., 2015)	▪ planned relocation or retreat ▪ altered land use and building controls ▪ elevated floor requirements ▪ increased setbacks ▪ emergency management ▪ insurance	• Greater flexibility in responding to climate threats • More cost effective than structural adaptations	• Social barriers challenge implementation • Subject to institutional and political constraints
Ecosystem-Based	• Soft adaptation typology • Protective strategies that leverage the adaptive opportunities associated with ecosystem services (Wilson & Forsyth, 2018; Jones et al., 2012)	▪ beach nourishment ▪ sand dune restoration ▪ wetland preservation ▪ rain gardens	• Unobtrusive in nature • Potential to enhance ecosystem health • Additional recreation and aesthetic opportunities	• Limited understanding of how to value ecosystem services in monetary metrics

STRUCTURAL ADAPTATIONS

https://informedinfrastructure.com/21946/first-salish-sea-wide-shoreline-armoring-study-shows-cumulative-effects-on-ecosystem/

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NON-STRUCTURAL ADAPTATIONS

Is this a sufficient setback from the coast?

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ADAPTATION APPROACHES IN THE CIRCUMPOLAR NORTH

- Small Northern coastal communities tend to rely on hard-armouring protection measures.
- Structural adaptations are:
  - quick to install and associated with a visible and perceived security
  - deteriorating.
- The effectiveness of structural approaches has been heavily debated

https://en.wikipedia.org/wiki/Shishmaref,_Alaska

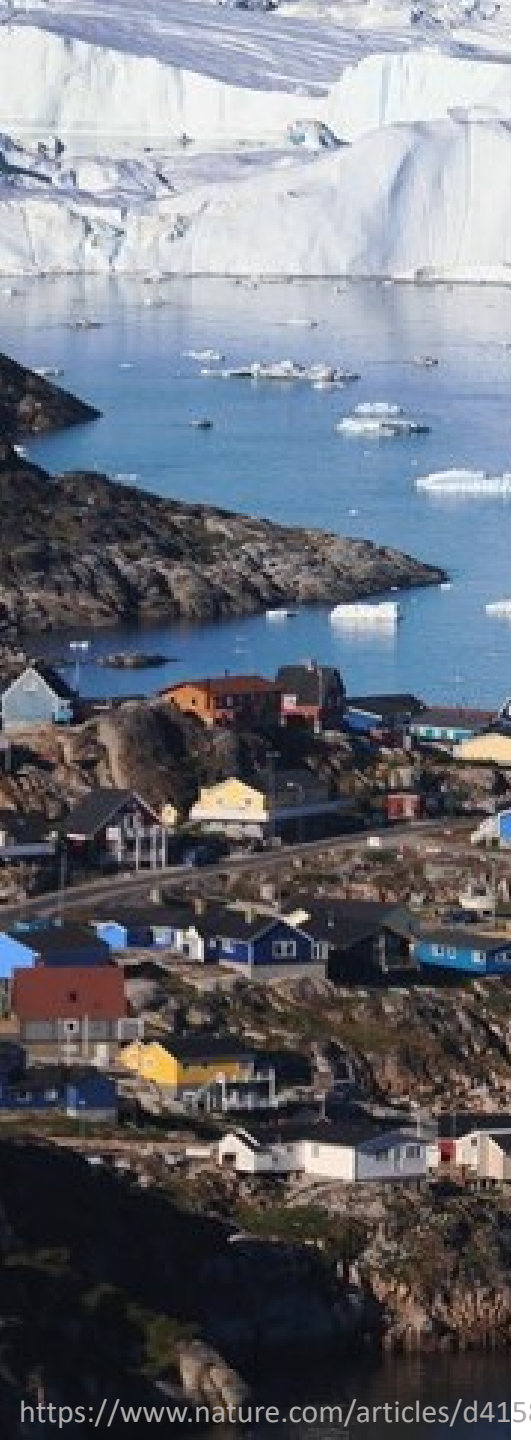
ADAPTATION APPROACHES IN THE CIRCUMPOLAR NORTH

- The conception and use of non-structural adaptations is lagging in small Northern communities as a result of several constraints:
  - Institutional
  - Political
  - Capacity
- Many small northern communities have relocated buildings and infrastructure highly susceptible to climate hazards.

https://www.nytimes.com/2016/08/20/us/shishmaref-alaska-elocate-vote-climate-change.html

ADAPTATION APPROACHES IN THE CIRCUMPOLAR NORTH

- Ecosystem-based adaptations are not a common approach to addressing vulnerability in Northern communities.
- Unforgiving climate and sensitivity of ecosystems in the Arctic decreases the ability to utilize a range of ecosystem services to reduce vulnerabilities



https://www.nature.com/articles/d41586-018-03036-4

OPPORTUNITIES FOR INTERVENTION

- It is recommended that existing structures be used in combination with soft adaptations to reduce costs and create a more robust response to climate stressors.

OPPORTUNITIES FOR INTERVENTION

- It is recommended that managed retreat not be overlooked.
- The relocation of residents and assets out of hazard-prone areas presents significant opportunities for risk reduction.

https://performingindigeneityblog.wordpress.com/2016/02/16/inuit-relocations/

OPPORTUNITIES FOR INTERVENTION

- It is recommended that various forms of education programing be utilized to foster awareness and facilitate buy-in for adaptation (Ford et al., 2018).
  - local decision-makers attending workshops/conferences on climate vulnerabilities and adaptation
  - collaborating with climate experts
  - participating in research networks such as those organized through UArctic

CONCLUSION

- To enhance resilience, small northern coastal communities should adopt a diversified portfolio of adaptations that incorporate more sustainable non-structural and ecosystem-based (or soft) adaptation approaches.

THANK YOU

Citations Listed

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