Adaptation action and research in glaciated mountain systems: Are they enough to meet the challenge of climate change?

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Workshop 1.1.D: Climate change in Mountain regions: Bringing together methodologies and knowledge systems

International Mountain Conference
Innsbruck, Austria
9 September, 2019

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Institute for Resources, Environment and Sustainability
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Context and Rationale

This study developed a typology for the challenge of climate change in glaciated mountain systems and used formal systematic review methods to critically evaluate existing adaptation actions and research in light of this framework

Challenge of Climate Change

The ‘challenge of climate change’ has three interwoven components

Challenge 1 ⟷ Challenge 2 ⟷ Challenge 3

What is at Stake

If adaptation action and research do not attend to these interlinked issues, the challenge of climate change will go unmet, with implications for progress on the Paris Agreement's 'Global Goal on Adaptation' and several SDGs

Results

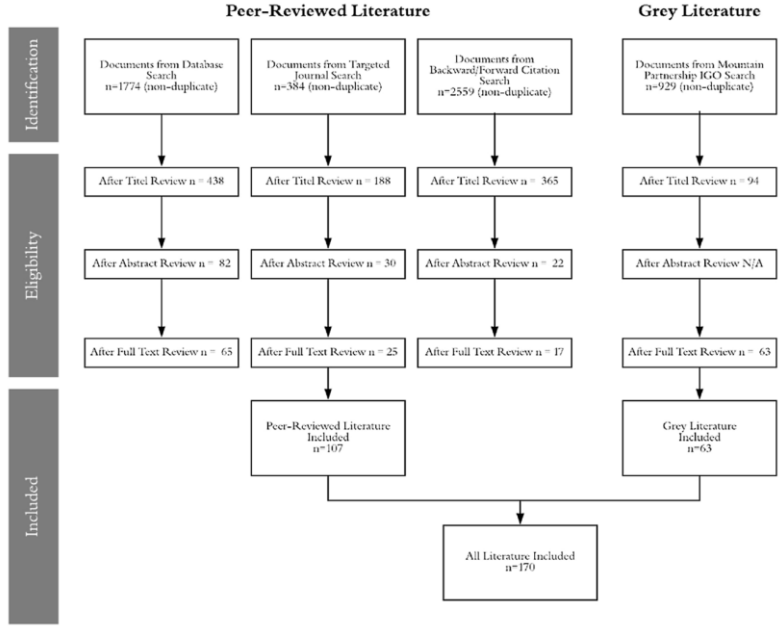

Fig. 1. Document identification, eligibility, and inclusion progression. Adapted from PRISMA Flow Diagram.

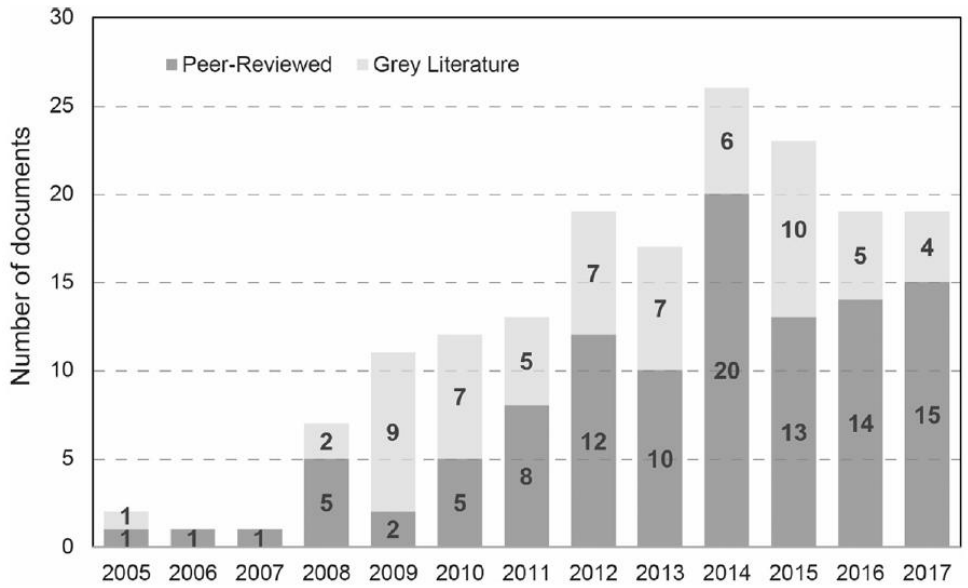

Fig. 2. Peer-reviewed and grey literature by publication year.

170 documents reviewed

Results

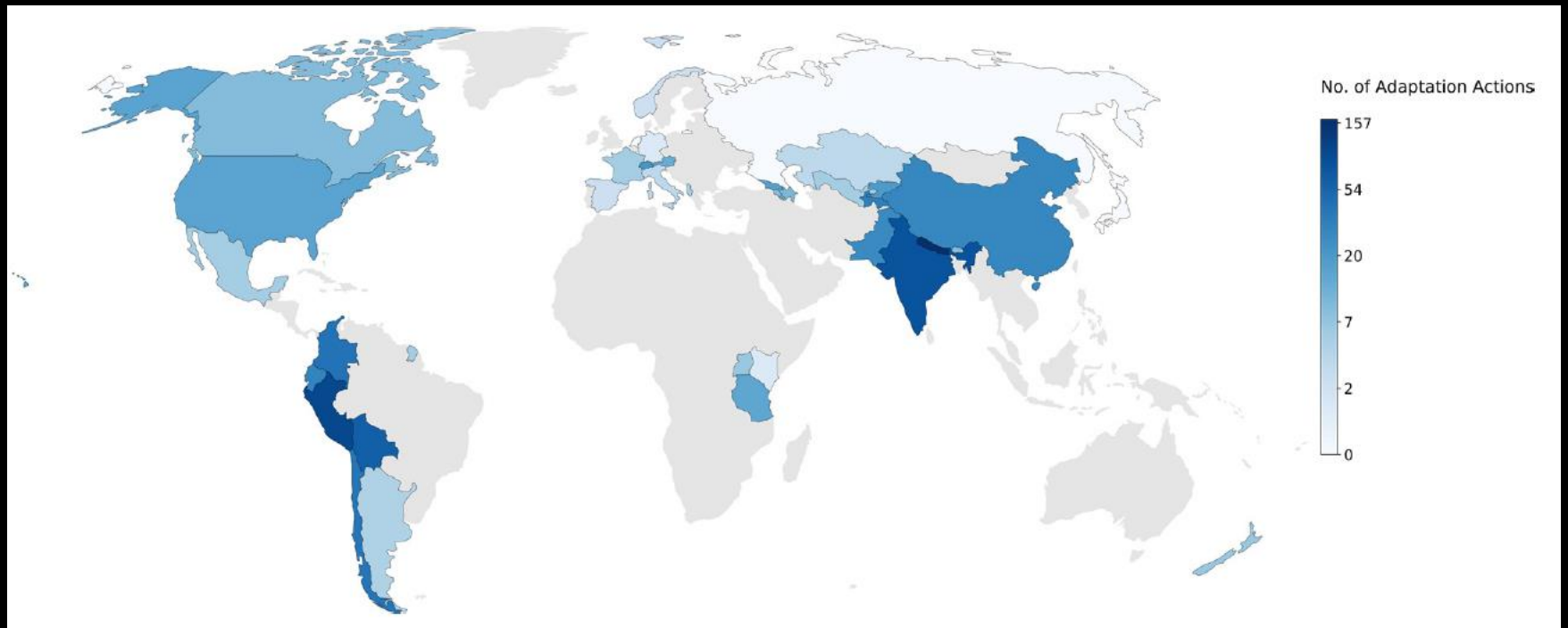

Fig. 3. Discrete adaptations per country.

690 discrete adaptation initiatives documented

Results – Challenge 1

The climatic drivers motivating adaptations are generally consistent with *observed* climate-related changes in glaciated mountain systems. However:

- Predominance of informal adaptations suggests that many of adaptations are not underpinned by robust scientific information about *trajectories* of climate change

- The expected magnitude of future changes raises serious concerns about the long-term viability of adaptations documented in this study

Results – Challenge 2

The human dimensions of climate change featured in many documented adaptations. However:

- Limited engagement with the needs of women, indigenous peoples, and other vulnerable groups
- Few documents considered the role of adaptations in reinforcing, rearranging, or altering dominant social structures

Results – Challenge 3

The adaptations reviewed showed little evidence of explicit engagement with socio-ecological dynamics in the context of climate change adaptation

- The implications of adaptation were only discussed in 1/3 of documented adaptations
- Only 13 documents noting any consequences relevant to mountain ecosystems

Results – Knowledge Integration?

- Our results suggest that substantive knowledge integration is still limited and therefore that adaptation actions and research are not yet meeting the challenges of climate change in glaciated mountain systems

Global Environmental Change 54 (2019) 19–30

Contents lists available at ScienceDirect

Global Environmental Change

journal homepage: www.elsevier.com/locate/gloenvcha

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Project funding

Bourses d'études supérieures du Canada
Vanier
Canada Graduate Scholarships

SSHRC CRSH
Social Sciences and Humanities Research Council of Canada
Conseil de recherches en sciences humaines du Canada

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Agency for Development and Cooperation SDC

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CONCLUSION AND RECOMMENDATIONS: Despite some encouraging results, adaptation actions and research are not yet meeting the challenges of climate change in glaciated mountain systems.

Challenge 1 Recommendation: To ensure that adaptations are commensurate with trajectories of climate change, our results suggest that efforts should be made to increase engagement with available scientific information in the development of adaptation actions. At the same time, adaptation planners should continue to seek out and integrate observations from stakeholders whose familiarity with local environments can complement scientific assessments climatic changes.

Challenge 2 *Recommendation* : Our results suggest a need for more resolute engagement with the broader political economy of adaptation in adaptation planning, including through increased attention to the causes and consequences of differential vulnerability as well as the potential of transformative adaptations in reducing the exposure-sensitivity and increasing adaptive capacity. Progress in these areas is predicated on inclusive, open-minded, and fair adaptation planning processes.

Challenge 3 *Recommendation* : Our results suggest that––to avoid maladaptation and devise sustainable adaptations––there is a need for more explicit engagement with how human adaptations influence and are influenced by high mountain socio-ecological dynamics. Developing a reasonable understanding of such entangled dynamics will require the integration of insights from scientific studies and local knowledge holders.

Table 1
Recommendations for adaptation action and research.

Challenge 1: Scientific dimensions of climate change	
Action	• Increase the integration of scientific information in adaptation planning processes
	• Complement scientific assessments with observations from mountain residents familiar with local environments
	• Acknowledge that detailed information about climate-related changes is important but not sufficient for effective adaptations
Research	• Strive for deeper engagement with nuanced, scale-appropriate assessments of current and projected climatic changes
	• Clarify information needs for colleagues in the natural sciences
	• Foster knowledge sharing between adaptation researchers and other stakeholders with knowledge about climate-related changes
Challenge 2: Human dimensions of climate change	
Action	• Recognize the broader political economy of adaptation when planning adaptations
	• Aim to address the causes and consequences of differential vulnerability, including through transformative adaptations
	• Ensure that adaptation planning processes are inclusive, open-minded, and fair
Research	• Increase its engagement with the human dimensions of climate change
	• Aim to move away from environmentally deterministic narratives about vulnerability and adaptation through place-based assessments that involve mountain populations
	• Expand repertoire of theoretical, analytical, and methodological tools used in adaptation assessments
Challenge 3: Socio-ecological dimensions of climate change	
Action	• Encourage adaptation planning processes that consider how human adaptations influence and are influenced by socio-ecological dynamics
	• Utilize understanding of socio-ecological dynamics to avoid maladaptation and to devise more sustainable adaptations
	• Draw on complementarities between local knowledge and scientific studies when characterizing system dynamics
Research	• Explicitly evaluate how human adaptations influence and are influenced by socio-ecological dynamics
	• Expanded engagement with concepts and methods from socio-ecological resilience literature
	• Explore diverse scenario and systems modelling approaches
General recommendations	
Action	• Address remaining geographical gaps in adaptation action
	• Cultivate participatory, forward looking adaptation planning processes
	• Strengthen engagement with the sustainable mountain development paradigm
	• Increase monitoring and evaluation efforts
Research	• Address large geographical gaps in adaptation research
	• Embrace transdisciplinary research approaches
	• Strengthen engagement with the sustainable mountain development paradigm
	• Support monitoring and evaluation efforts