From climate evidence to climate change adaptation: a local perspective

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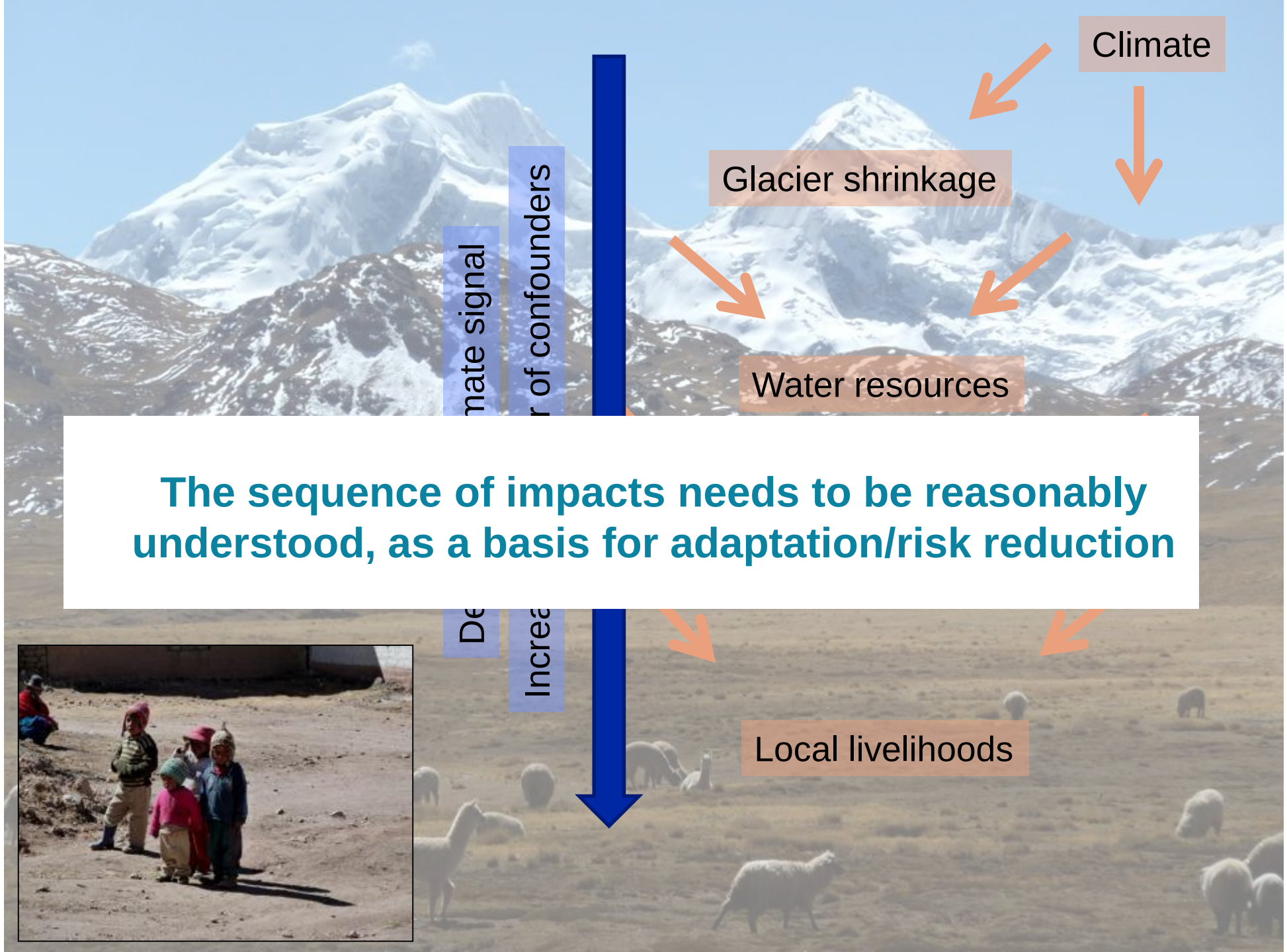
What is this presentation about

- Climate data and analysis
- Risk assessment in practice
- From climate risks to responses: adaptation
- Climate change adaptation: no-low regret, incremental or transformative?


Climate
Glacier shrinkage
Water resources
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Increa
Local livelihoods
The sequence of impacts needs to be reasonably understood, as a basis for adaptation/risk reduction

One of the Green Climate Fund investment criteria to support countries in needs of adaptation under “Needs of the recipients” is “*Intensity of exposure to climate risks and the degree of vulnerability including the exposure to slow onset events*” (GCF 2016, pg. 28)

For local farmers in the Peruvian Andes the transition from dry to wet season begins with a repeated drizzle gently moisturizing the soil and preparing it for seedling. Farmers have consistently reported delay or shortening in the onset of such drizzle which hamper their (traditional) cultivation plans.

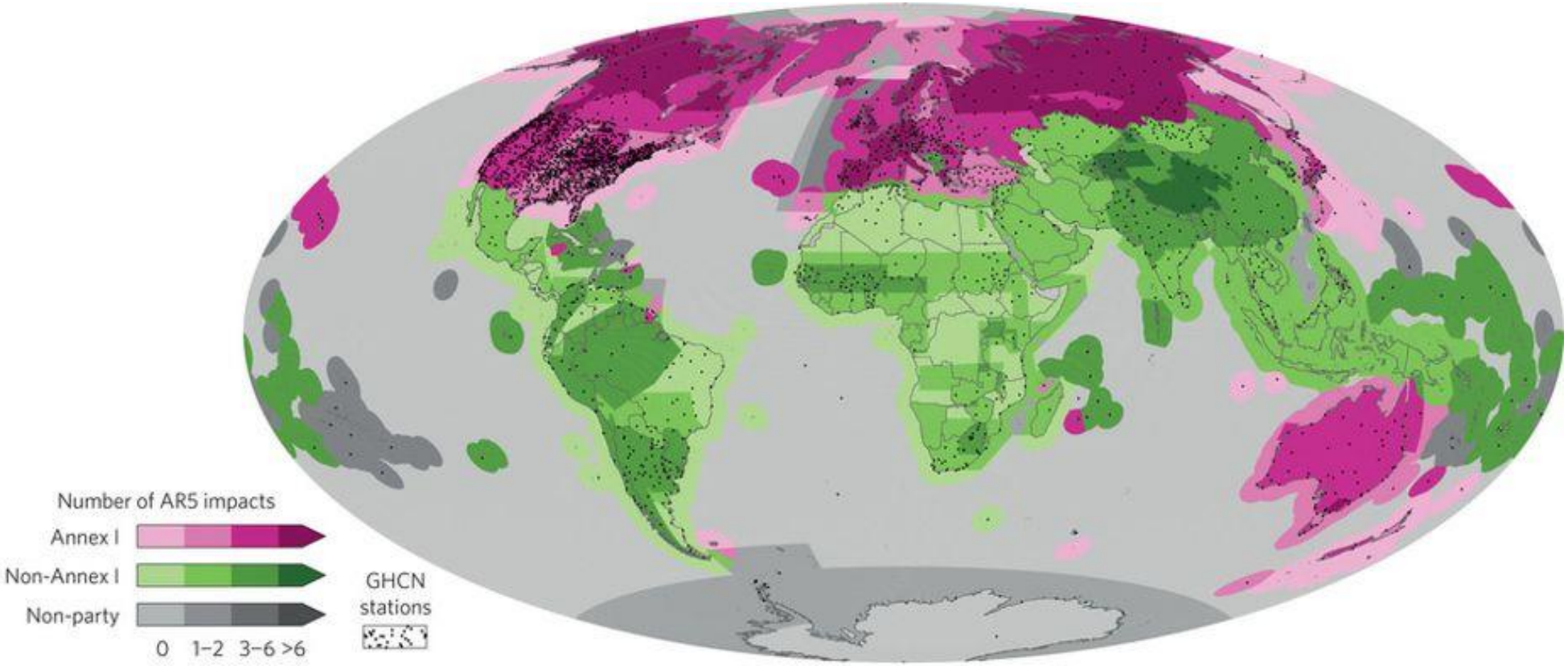
Would “farmer observations” be sufficient to advocate for international climate finance from the GCF?

(Orlowski & Huggel, 2017)

Climate data: our basis for evidence

In-situ observations	Satellite Observations	Re-analysis	Models	Local knowledge
✓ Longest time series where available ✓ Truly local conditions ✓ Great importance to understand local processes ✓ Needed to validate model data	✓ Large data coverage ✓ Cheap for the users	✓ Large data coverage ✓ Take advantage of dense network of stations ✓ Fill in observational gaps	✓ Allow understanding of processes ✓ Supplement missing information from observations ✓ Allow to look into the future	✓ Truly local ✓ Context specific
✗ Difficult to maintain ✗ Expensive ✗ Poor coverage where needed	✗ Short time records ✗ Coarse resolution (mostly regional)	✗ Short time records ✗ Coarse resolutions ✗ Problems with bias and errors	✗ Models are models ✗ Uncertainties ✗ Bias	✗ Only available where people live ✗ Highly subjective ✗ Highly contextual

Climate data: our basis for evidence

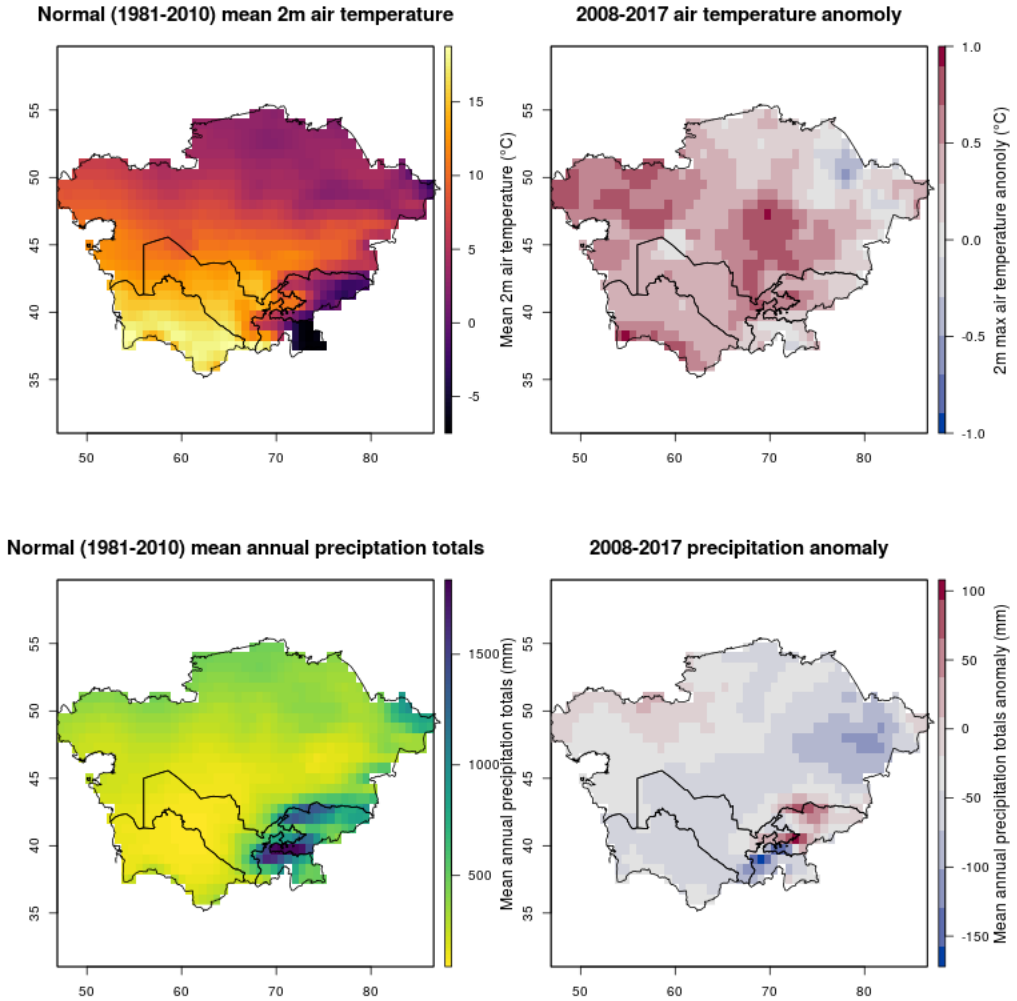


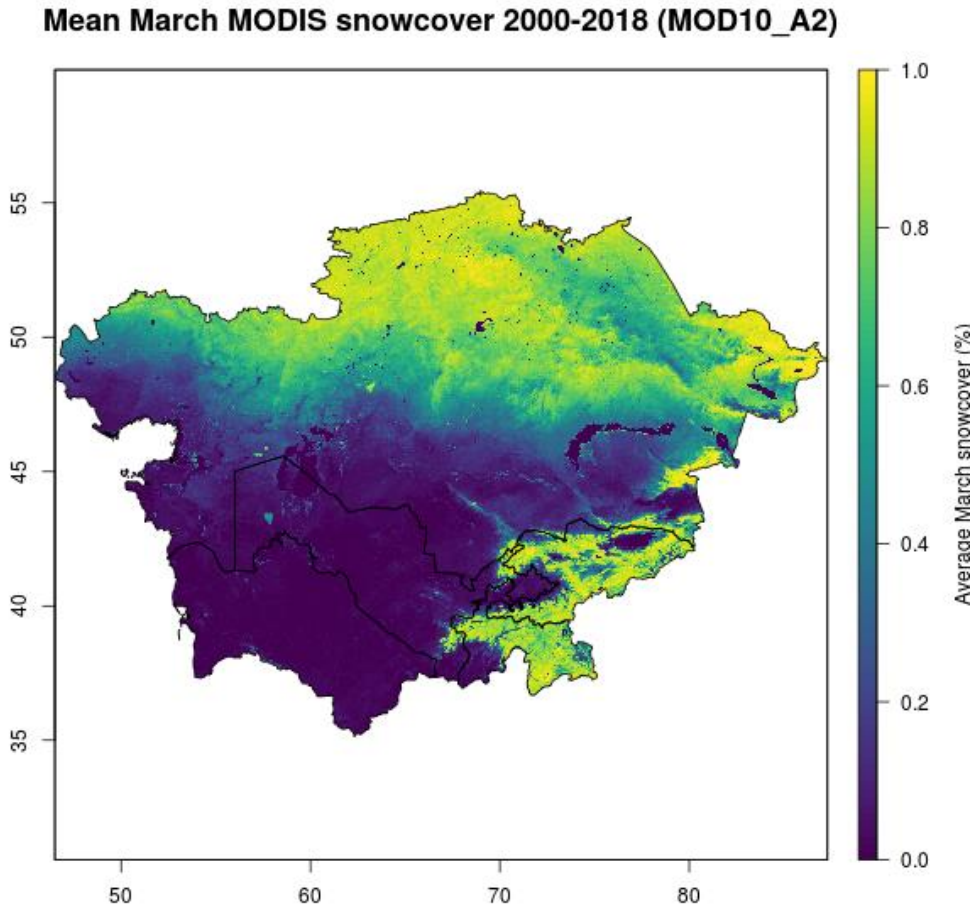
Global Historical Climatology Network (GHCN) stations

Huggel et al. (2016)

Climate data: our basis for evidence

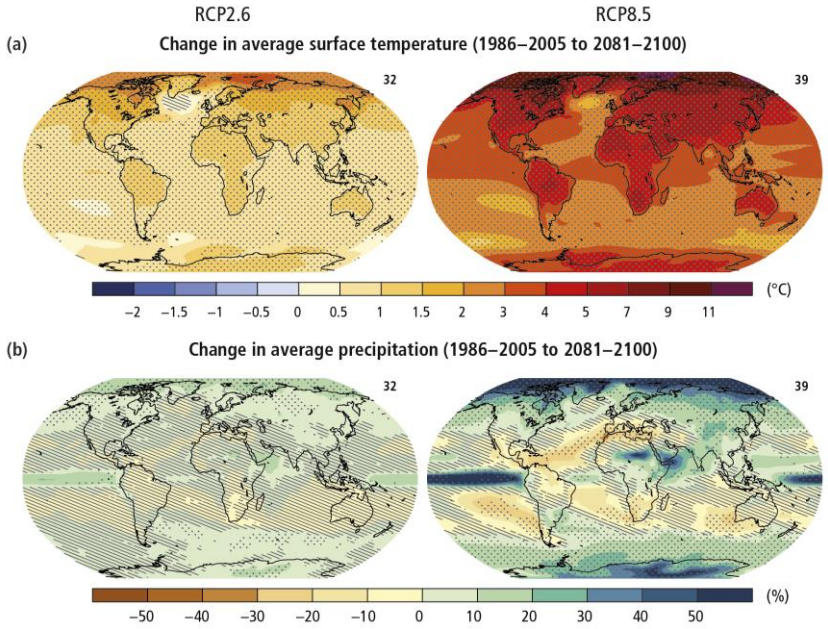
ERA- Interim Reanalysis Data



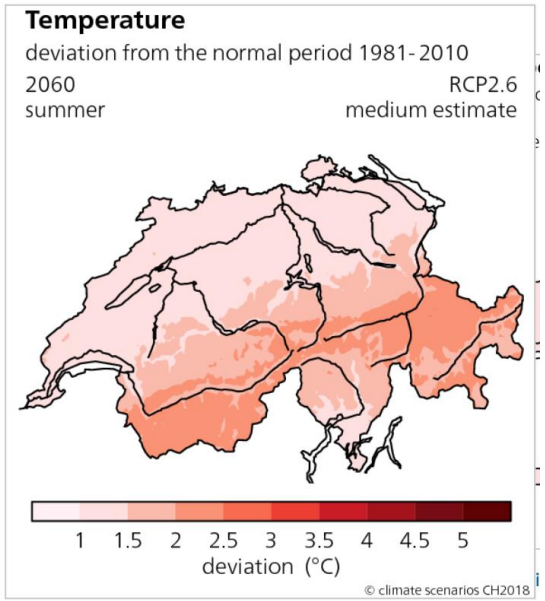


Muccione & Fiddes (in prep)

Climate data: our basis for evidence

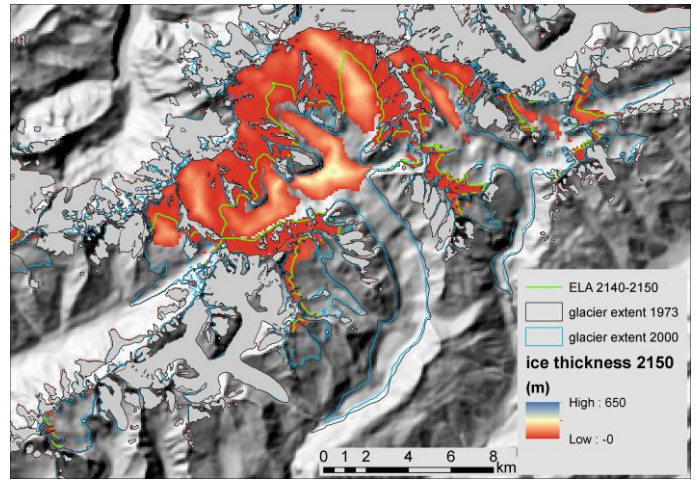


GCM → Global T and Precipitation (approx. 300 km resolution)

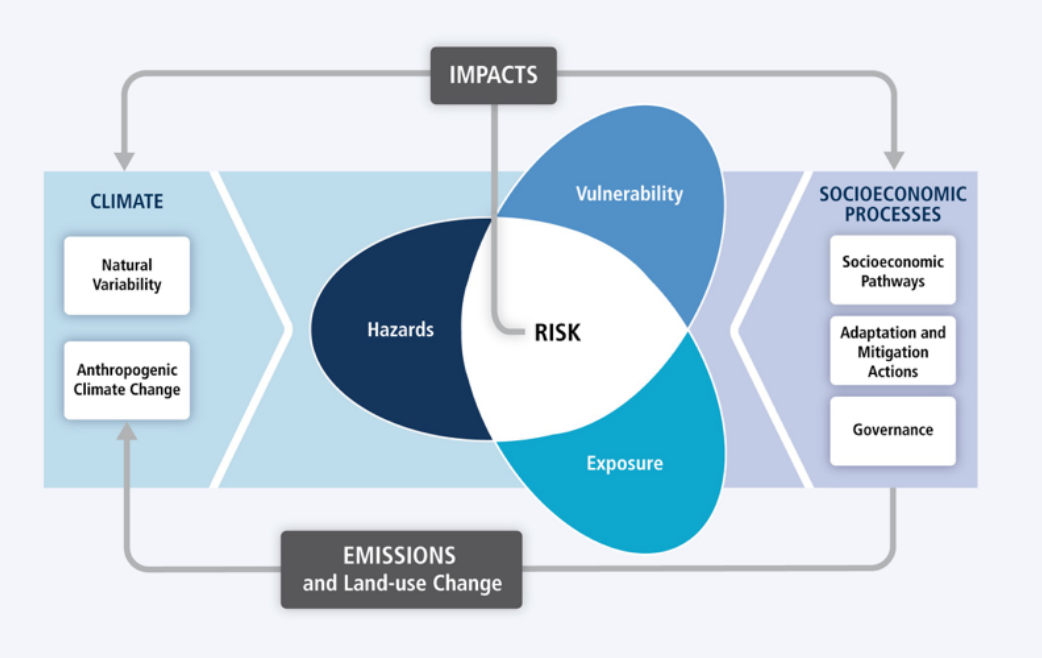


Regional model → down to few kilometers

Impact model → from km to m



The IPCC Approach to Climate Risk Assessment



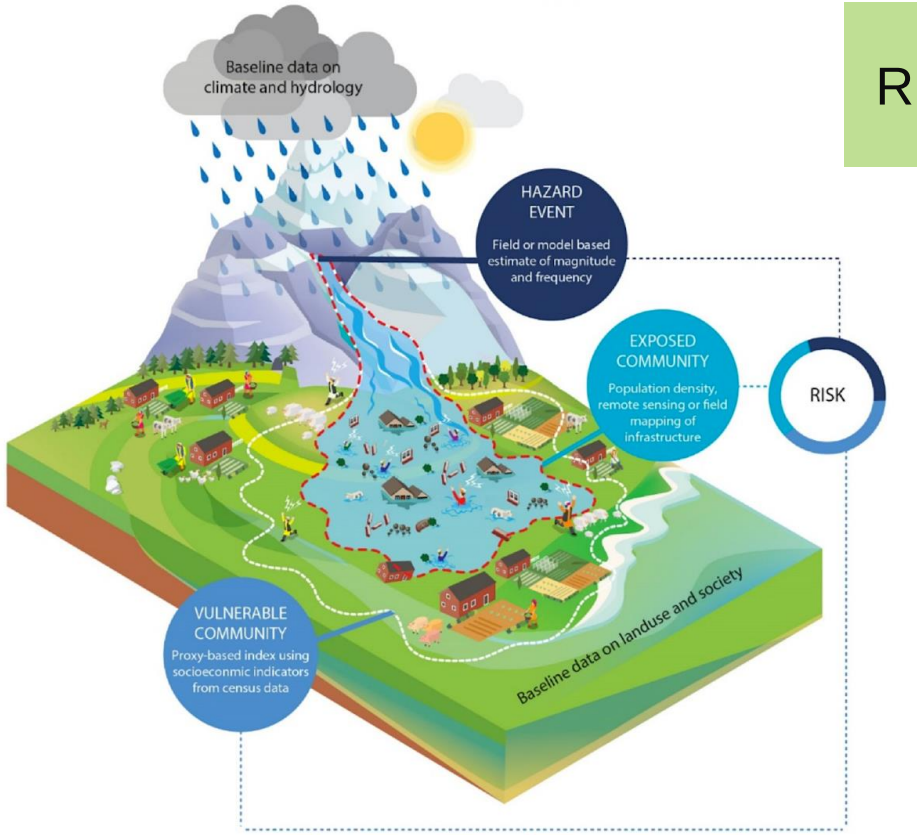
IPCC (2012, 2014)

Risk is defined as the potential for consequences where something of **value** is at stake and where the outcome is **uncertain**, recognizing the **diversity** of values. Risk is often represented as probability of occurrence of hazardous events or trends multiplied by the impacts if these events or trends occur. Risk results from the interaction of **vulnerability, exposure, and hazards**.

Hazard

Risk = (Probability x Intensity) x Exposure x Vulnerability

Climate Risk Assessment, Kullu District, Himachal Pradesh, Northern India



Hazard

Risk = (Probability x Intensity) x Exposure x Vulnerability

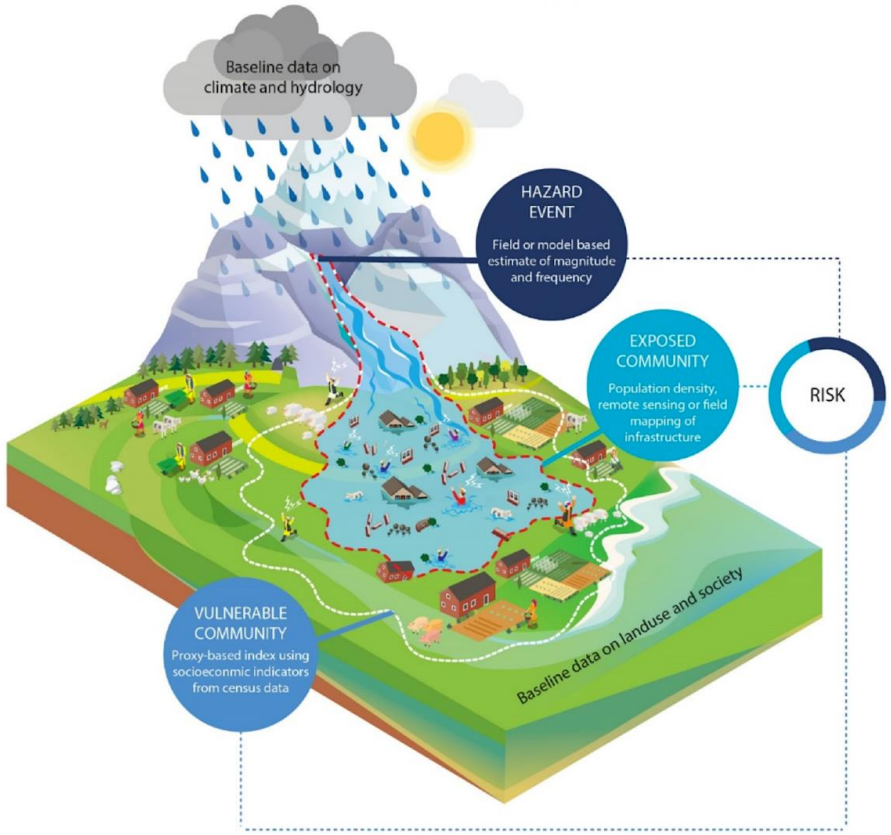
1) Hazard = Flood (Monsoon + Glacial lakes)

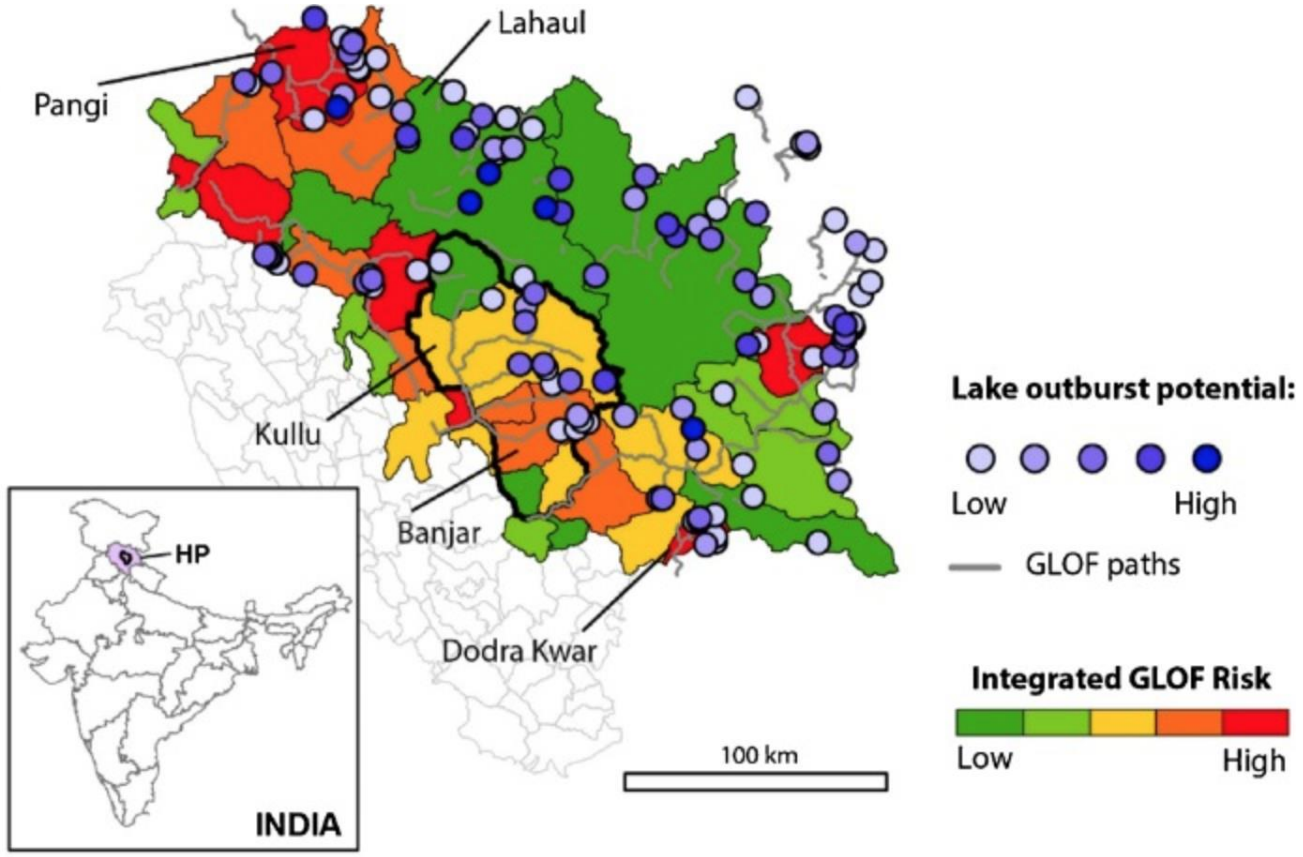
2) Exposure = population density and Googlemap imagery to map exposed elements (close to river banks)

3) Vulnerability = census data capturing main susceptibility and adaptive capacity

Allen et al. (2018)

Climate Risk Assessment, Kullu District, Himachal Pradesh, Northern India





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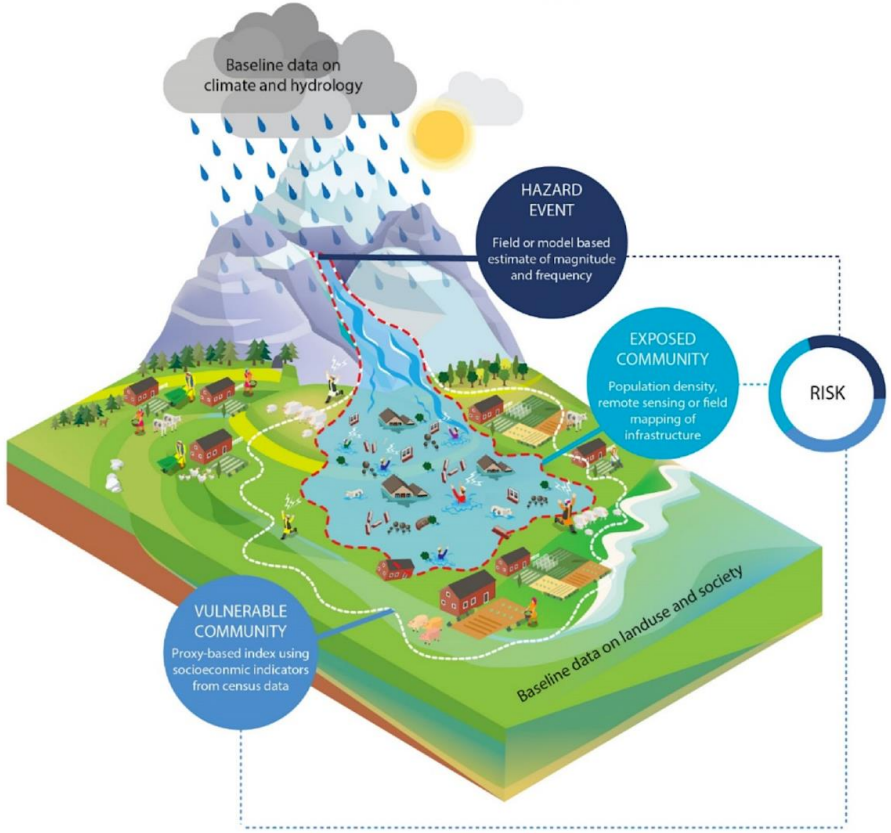
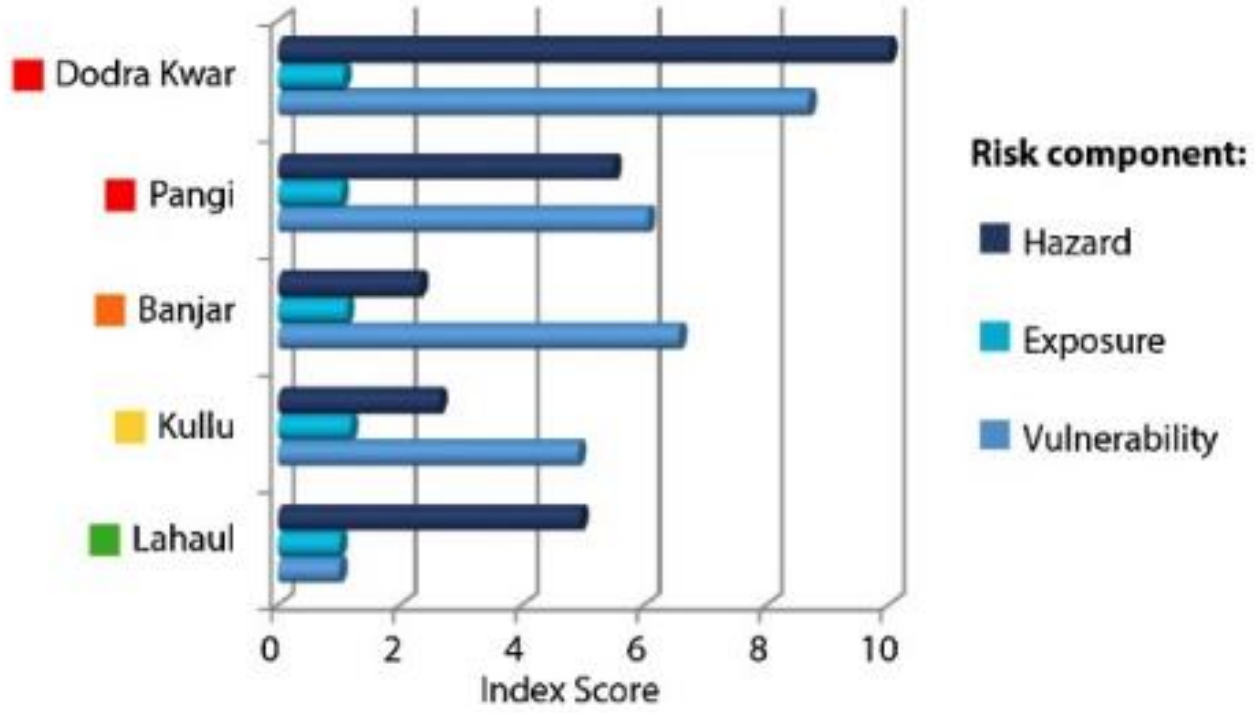
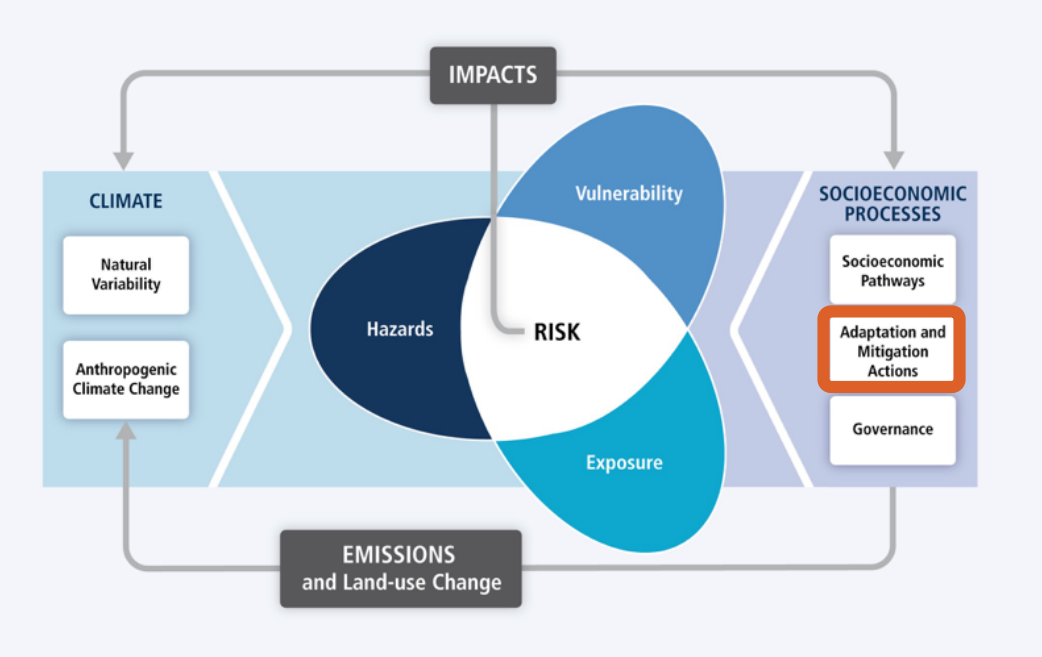




Allen et al. (2018)

From climate risk assessment to climate change adaptation



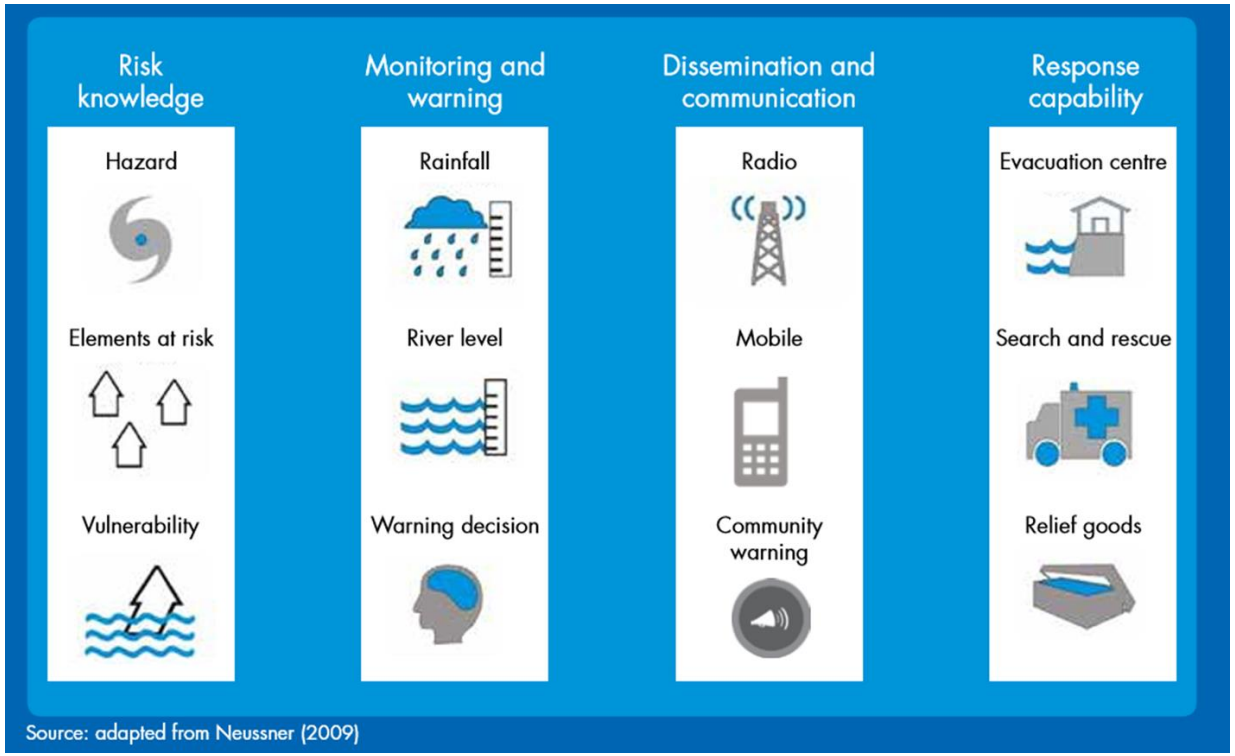
"In human systems, the process of **adjustment** to actual or expected climate and its effects, in order to **moderate harm** or **exploit beneficial opportunities**.." (IPCC (2012, 2014))

Types of Adaptation

- Low or no regrets: benefits even without climate change and low cost
- Incremental (or pathways): a set of small incremental steps to meet community expectations in face of impacts from changes (also flexible)
- Transformative: actions resulting in significant changes in terms of goals and expectations, (temporarily) disrupting established values, benefits, etc…

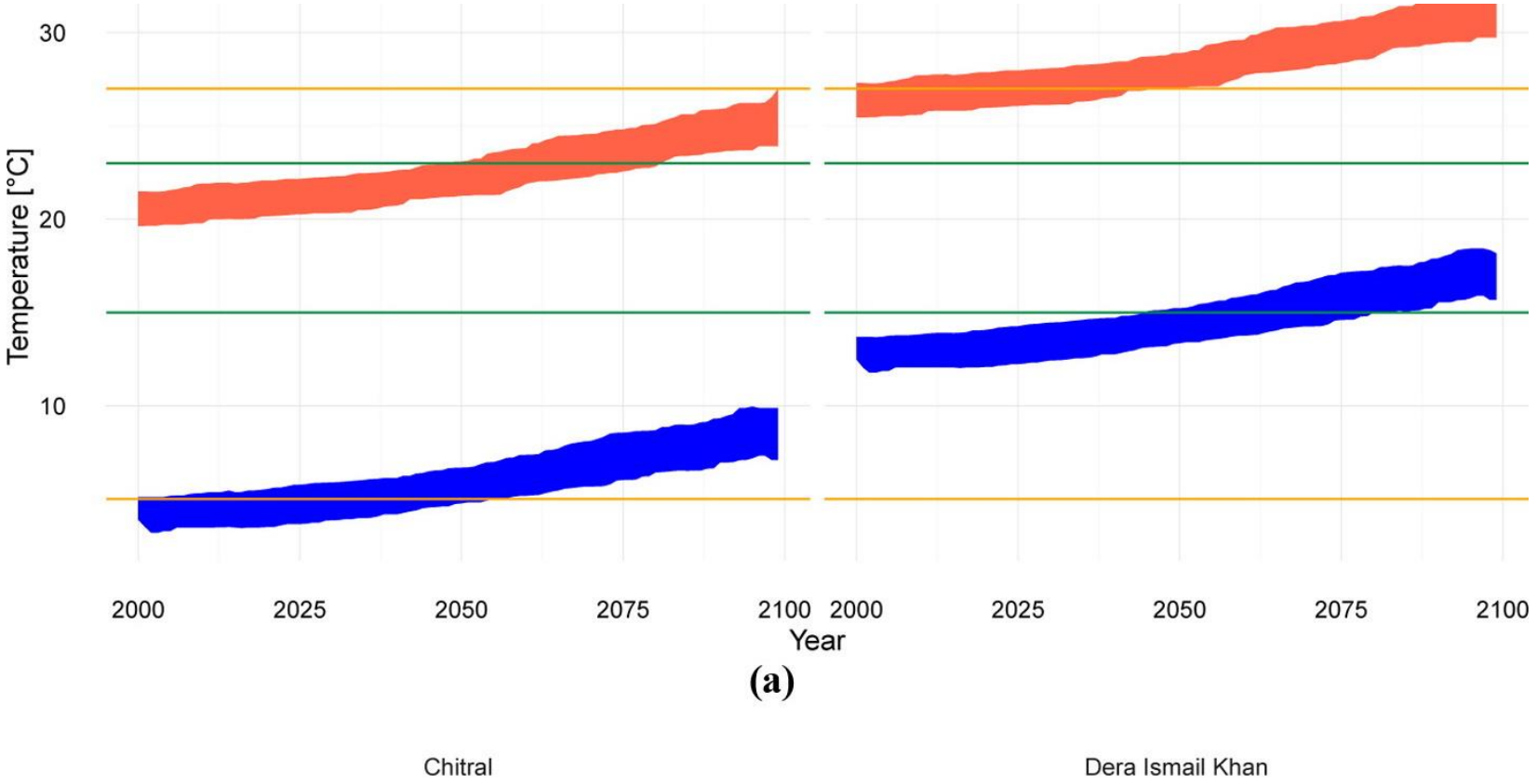
Example 1: Low or no regrets – Early Warning Systems

Following the risk assessment in the Kullu District, intensive consultations were undertaken with local stakeholders to design appropriate adaptation solutions (taking into account local socio economic and political realities). It was opted for an integrated monsoon flood and GLOF monitoring as well as an Early Warning System.



Example 2: Adaptation pathways – Climate corridors

Climate corridors focus on the specific climatic conditions that many human activities require, e.g. crop cultivation necessitates temperature, radiation and precipitation to be within a specific interval.



Orlowski et al. (2017)

Climate corridors for wheat cultivation compared with the current and future temperature of the coldest (blue) and warmest (red) months during the growing season in two districts in Pakistan.

Synthesis from examples

Locally focused and evidence based approaches

Approches guided by exchange and interaction with local actors

Planning with uncertainties in mind

Can be cost effective

But, adaptation pathway offers a perspective on when and if a specific measure can no longer be sustained (new pathway needed) and it is more aware of the limits of adaptation

The curious case of Lake 513

The curious case of Lake 513

The curious case of Lake 513

The international consortium overseeing the installation of the EWS handed over the technology to the provincial authority in 2015.
The head of the local disaster management office could monitor the system, but the local government lacked funding for maintenance and appropriate training.
There has been tension on water management between upstream communities and the downstream city dwellers.
The pressing issue for the upstream farmers is the lack of adequate water resources for irrigation. For the city the major concern is protection against flood, debris flow and landslide hazards.

As of now….the installation has not been replaced.

Lessons learnt

What local evidence are needed for successful climate change adaptation?

- *Adaptation strategies need to be underpinned by robust science (to support claims for climate finance)*
- *But evidence from multiple independent sources (including local knowledge) are preferred (triangulation)*
- *Finally, only those adaptation strategies which are strongly supported by the local population will be successful (to enable appropriate adaptation actions)*

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Would “farmer observations” be sufficient to advocate for international climate finance from the GCF?

Needed, but not sufficient!!

(Orlowski & Huggel, 2017)

Thank you!

SOS Survey: *https://goo.gl/forms/uft2u3nInEnMTIsH3*