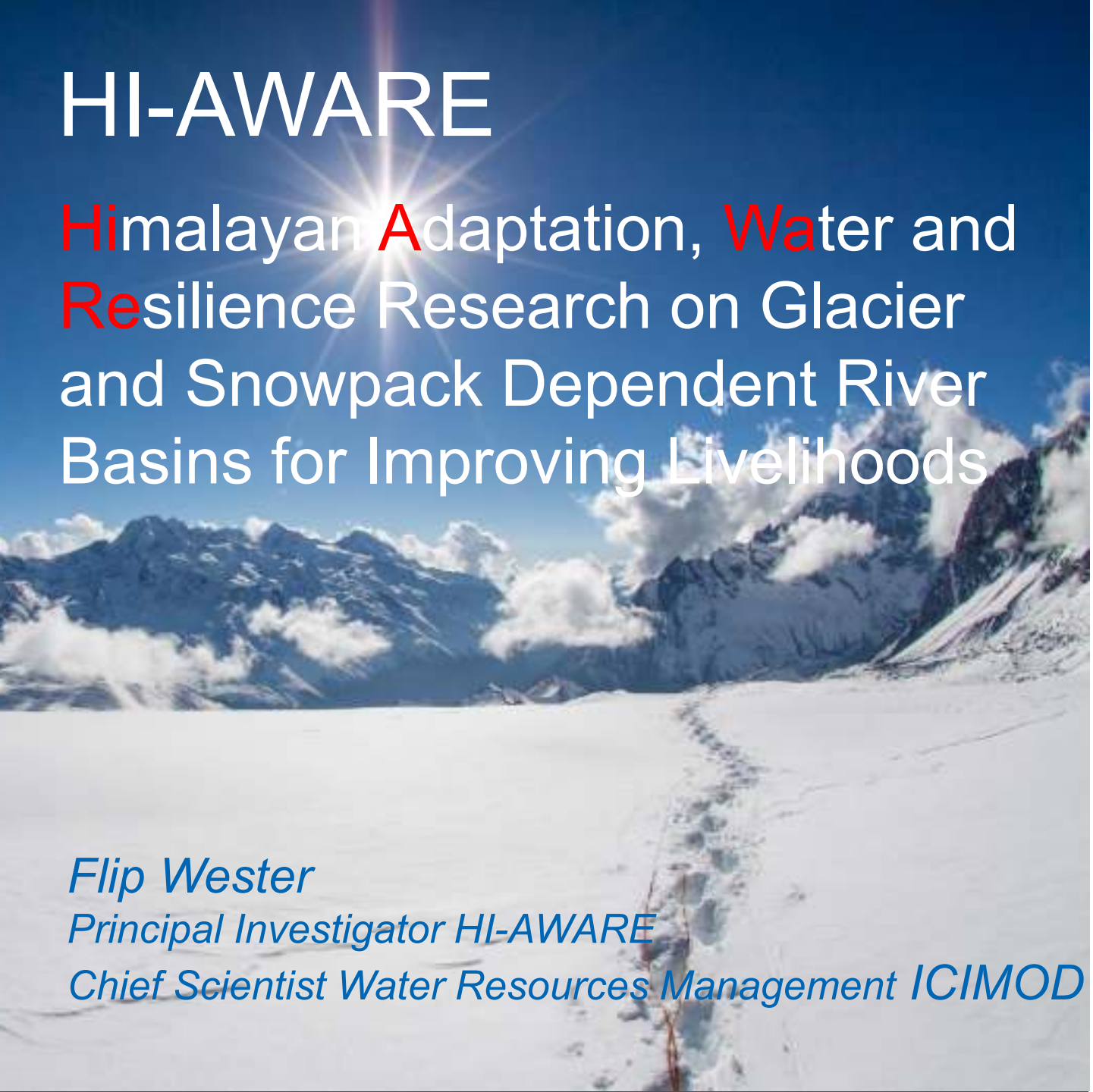
HI-AWARE

Himalayan Adaptation, Water and Resilience Research on Glacier and Snowpack Dependent River Basins for Improving Livelihoods



Flip Wester
Principal Investigator HI-AWARE
Chief Scientist Water Resources Management ICIMOD

Introduction to HI-AWARE

- HI-AWARE funded through CARIAA (IDRC / DFID)
- Proposal development March to Sept 2013
- 4 consortia funded, 2 in semi-arid regions, 1 in deltas, 1 in basins
- Glacier + Snowpack dependent river basins hotspot = HI-AWARE consortium members, FutureWater and partners in the region
- Inception Phase from April – Sept 2014, implementation to Sept 2018


12 HI-AWARE STUDY AREAS
IN 4 STUDY BASINS
Indus
Upper Ganga
Gandaki
Teesta
Hunza
Soan River Basin
Chaj Doab
Plains Upper Ganga Basin
Mandakini Watershed
Mid-Hills Upper Ganga Basin
Rasuwa, Gandaki Basin
Chitwan and West Champaran
Mid-Hills Gandaki Basin
Sikkim, Teesta Basin
Mid-Hills, Teesta Basin
Jalpaiguri District, India and Nilphamari District, Bangladesh

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Consortium Members

- Bangladesh Centre for Advanced Studies (BCAS)
- International Centre for Integrated Mountain Development (ICIMOD), based in Nepal
- Pakistan Agricultural Research Council (PARC)
- The Energy and Resources Institute (TERI), based in India
- Wageningen University and Research, based in the Netherlands

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Strategic Partners

- Centre for Ecology Development and Research (CEDAR)
- FutureWater
- LEAD – Pakistan
- Megh Pyne Abhiyan (MPA)
- Practical Action Nepal
- The Mountain Institute (TMI) India

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Universities

- Free University Amsterdam, the Netherlands
- Karakoram International University, Pakistan
- National University of Science and Technology (NUST), Pakistan
- Rajshahi University, Bangladesh
- Sikkim University, India
- TERI University, India
- Tribhuvan University, Nepal

Research Question

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How to develop timely adaptation measures and approaches

to respond to rising temperatures, seasonal shifts in glacier and snowmelt induced runoff, and increased frequency of extreme events

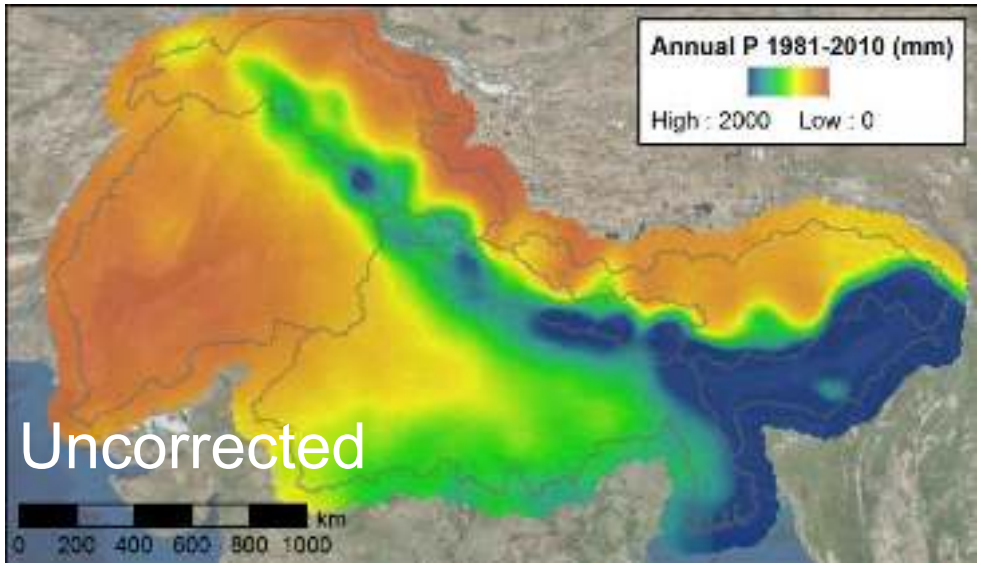
in the HKH mountains and floodplains

in order to improve the resilience of livelihoods of the poor and vulnerable women, men and children in the region?

Achievements to Date

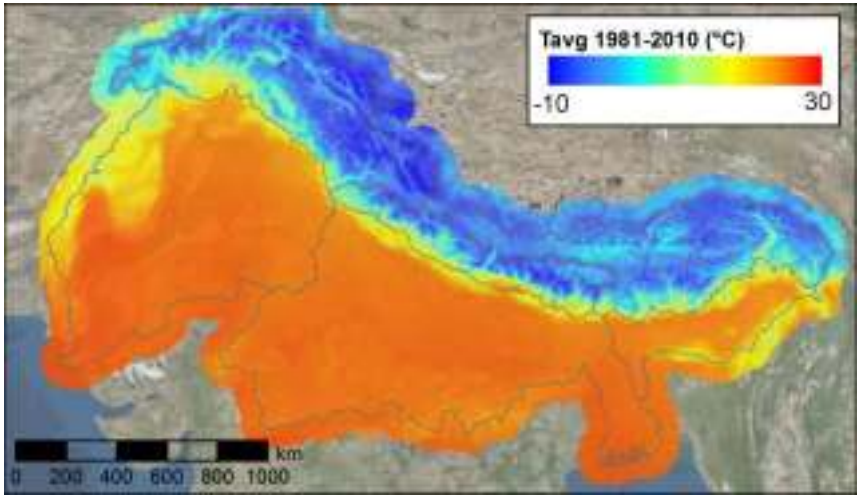
- Situational Analysis in 12 Study Areas
- External KMC Strategy
- Data Management Policy
- 6 fully supported PhDs (3 women, 3 men)
- 4 partially supported PhDs
- 2 PhD thesis completed
- 16 MSc students (8 women, 8 men)
- 9 journal articles
- 1 Working Paper (9 in pipeline)
- 25 stakeholder engagement events
- 32 blogs
- RiU Strategy
- Use of Touchtables in RiU

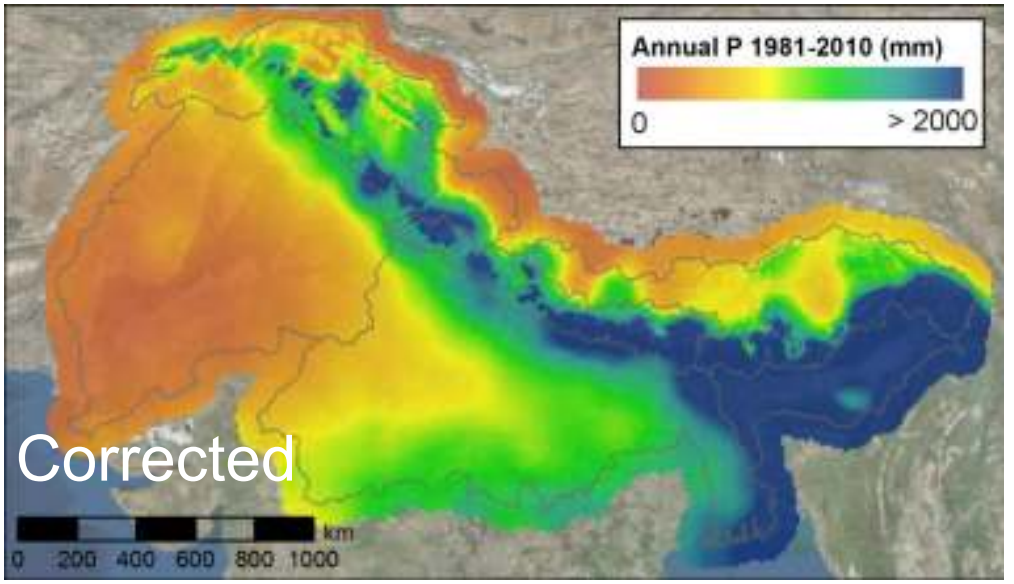
High-resolution historical climate dataset



Dataset properties

- 1981-2010, daily P, Tavg, Tmax, Tmin, ETref
- 5x5 km for upstream IGB
- 10x10 km for total IGB





Climate modeling

Future scenarios (2010-2100)

- Daily, P, Tavg, Tmax, Tmin, ETref
  - Entire IGB at 10x10 km resolution
  - Upstream IGB at 5x5 km resolution
- 2 RCPs x 4 GCMs = 8 scenarios, covering broad range of projected changes in climate
- RCP4.5: temp increase of 1.7 to 3.5 ^{o}C (2071 to 2100 vs 1971 to 2000)
- RCP8.5: temp increase of 3.6 to 6.3 ^{o}C (2071 to 2100 vs 1971 to 2000)

Climate modeling

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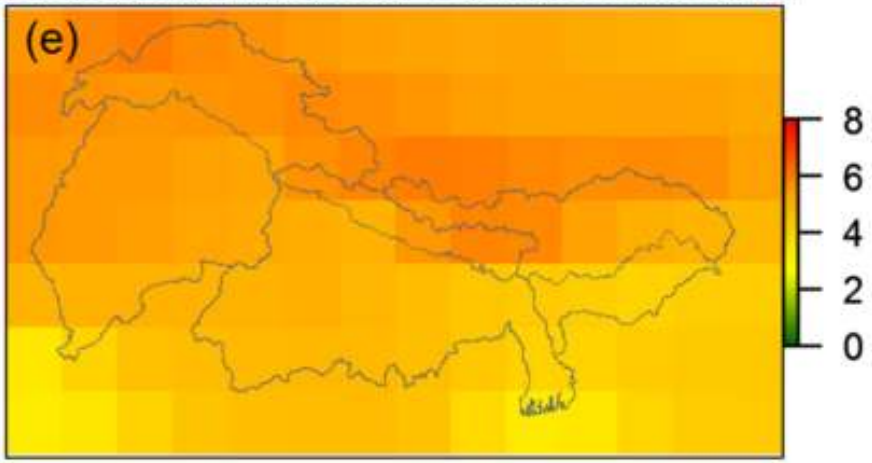
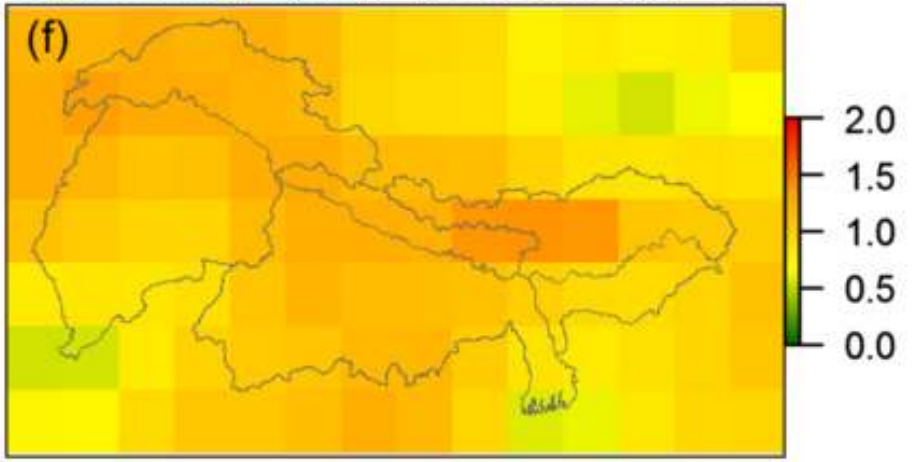
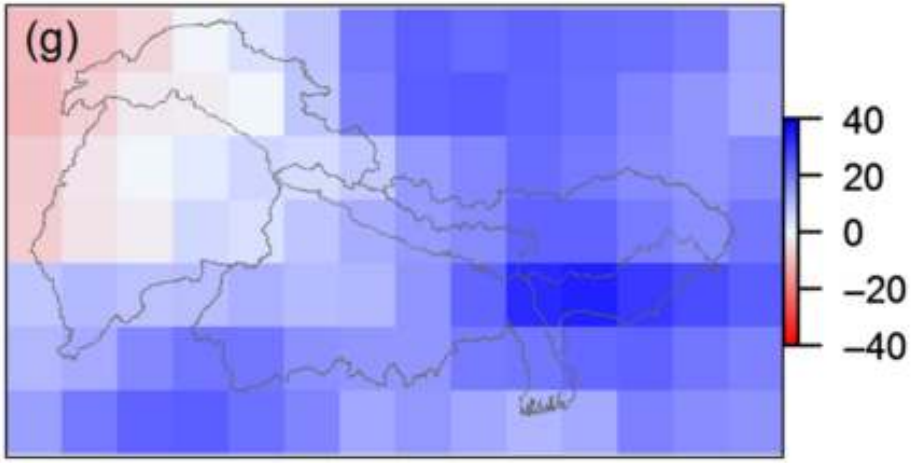
RCP8.5 Mean ΔT (°C) 2071–2100 versus 1971–2000



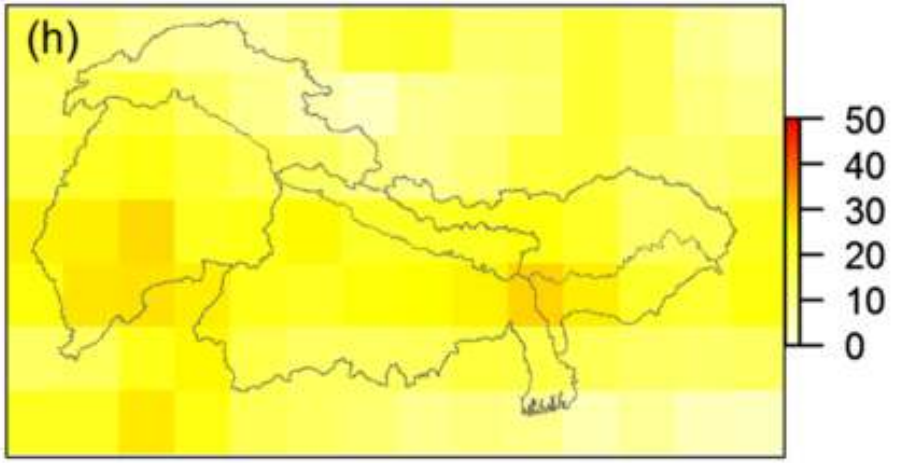
RCP8.5 SD ΔT (°C) 2071–2100 versus 1971–2000



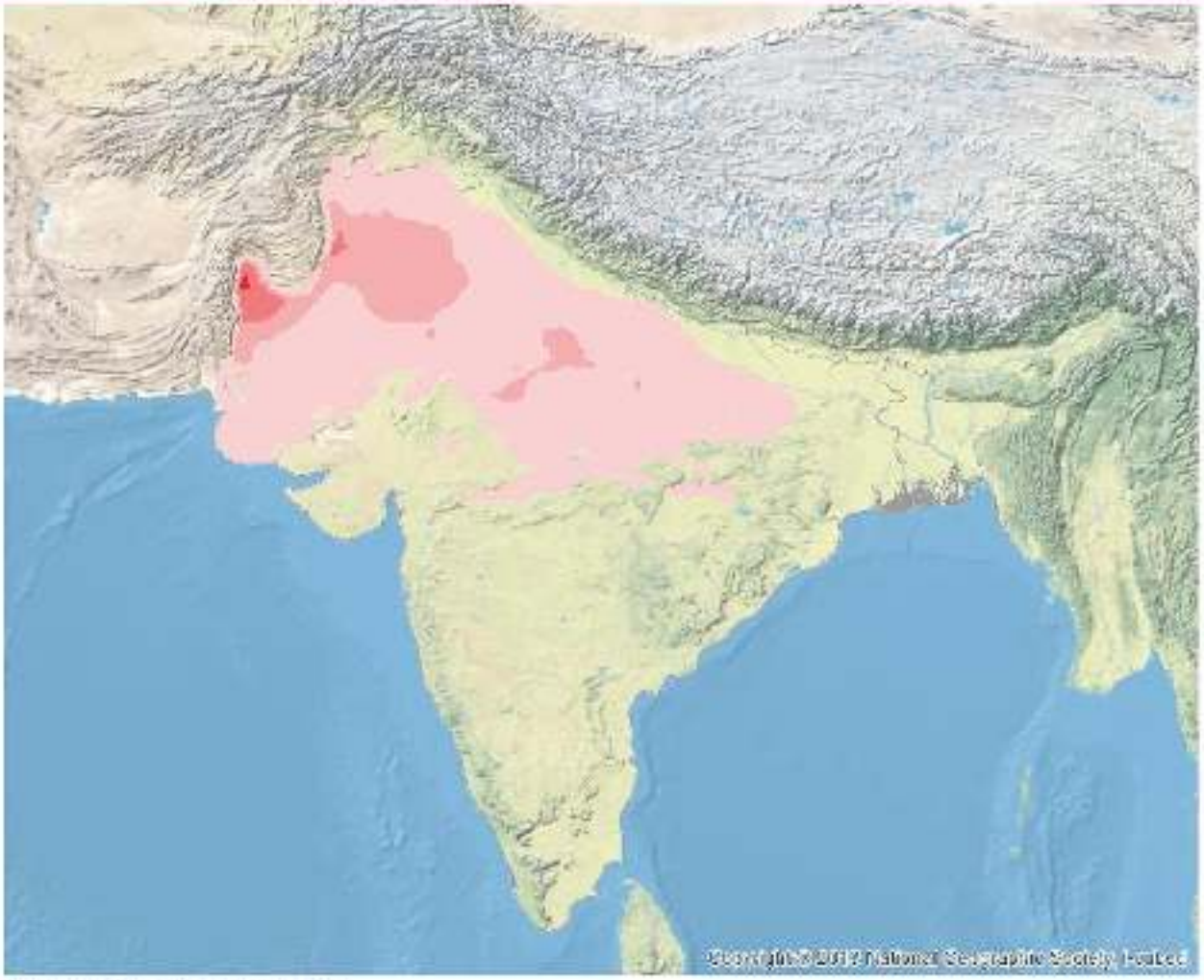
RCP8.5 Mean ΔP(%) 2071–2100 versus 1971–2000



RCP8.5 SD ΔP (%) 2071–2100 versus 1971–2000



Floods | Drought | Heat | Food | Energy | Housing | Health



Background

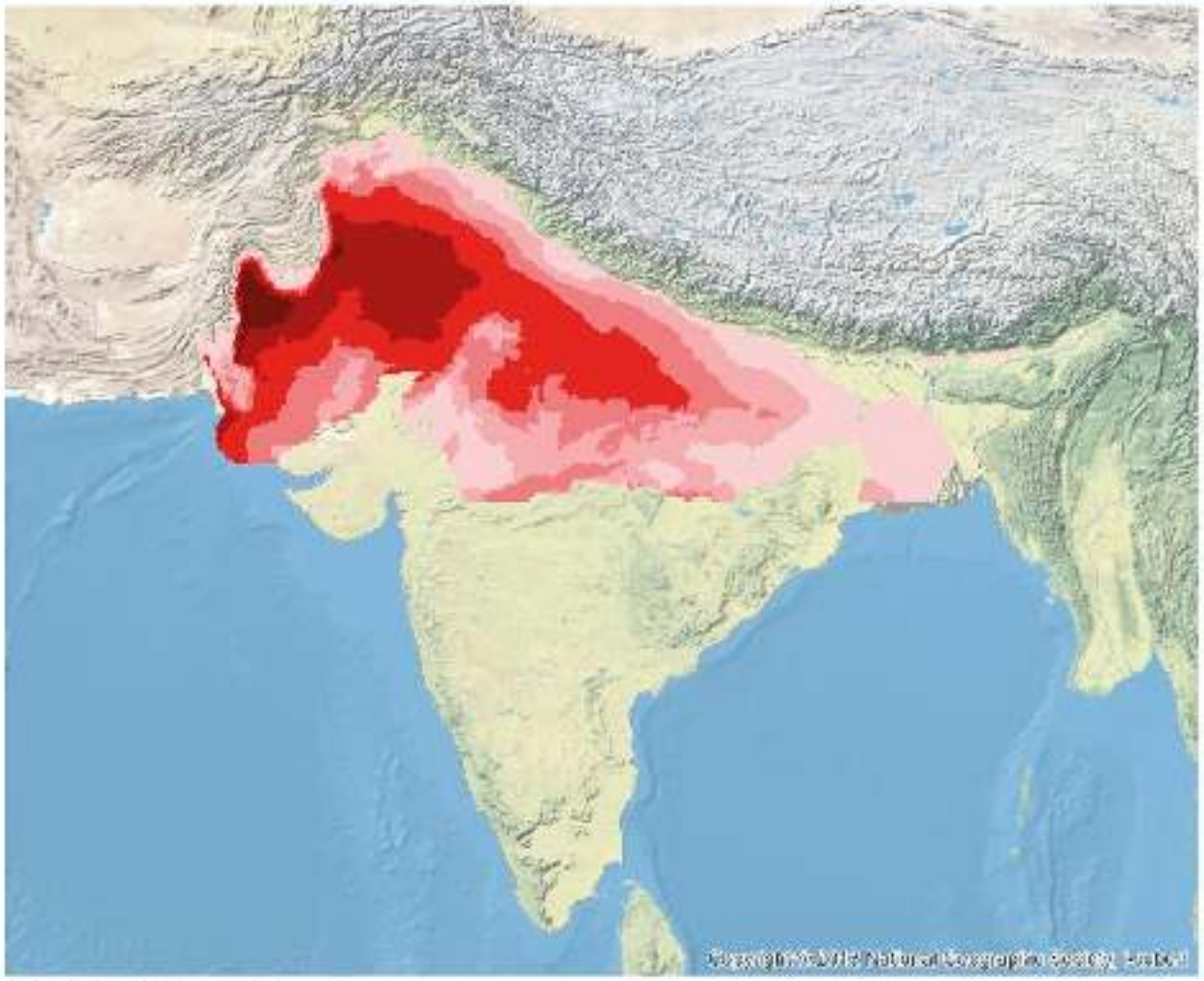
Background map

Country borders

Number of days with minimum temperature > 30 °C

Current climate | RCP 4.5 2050 | RCP 8.5 2050

Number of days with maximum temperature > 45 °C



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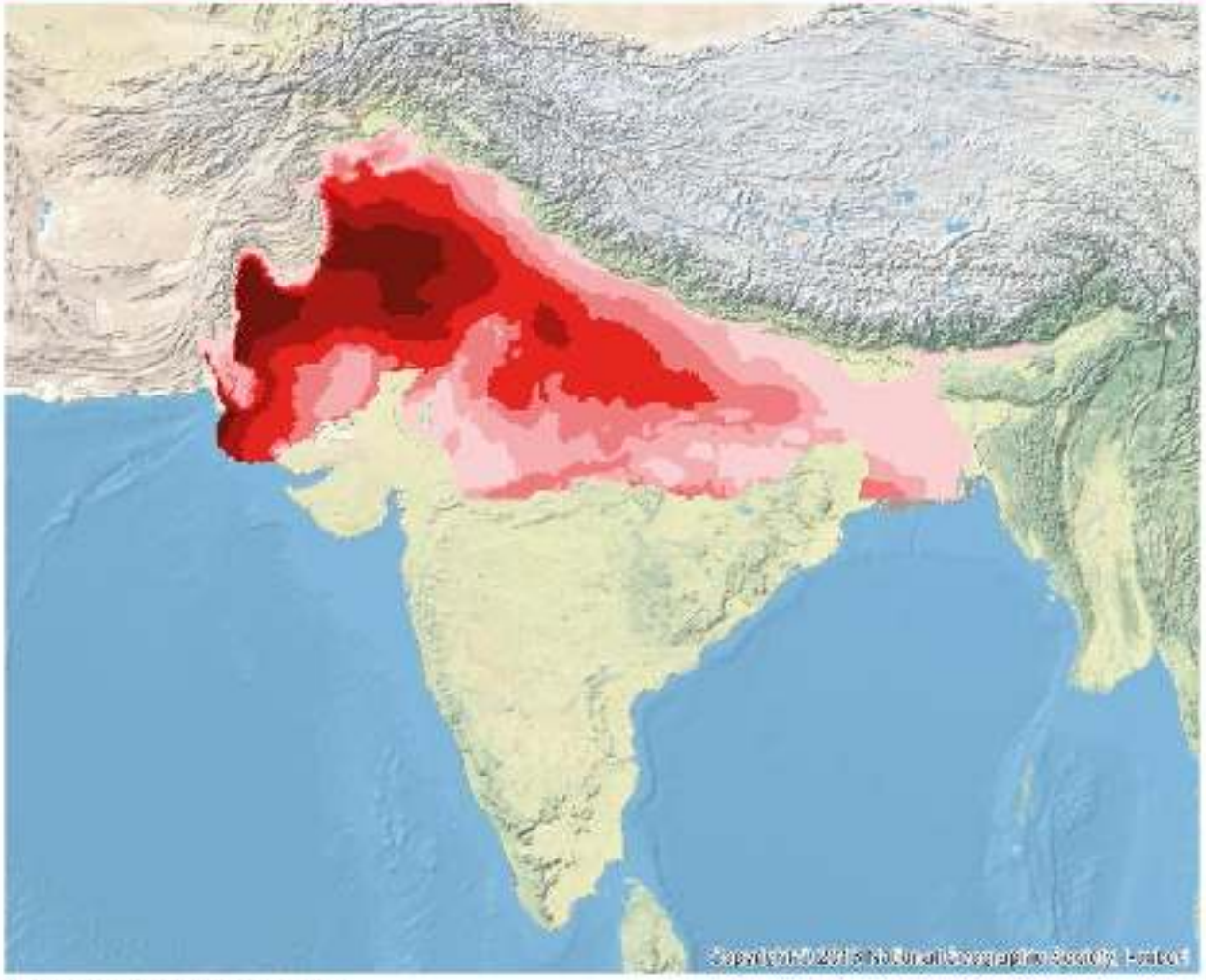


Number of days with minimum temperature > 30 °C

< 1	10 - 20	30 - 45	> 60
1 - 10	20 - 30	45 - 60	

Background

Background map

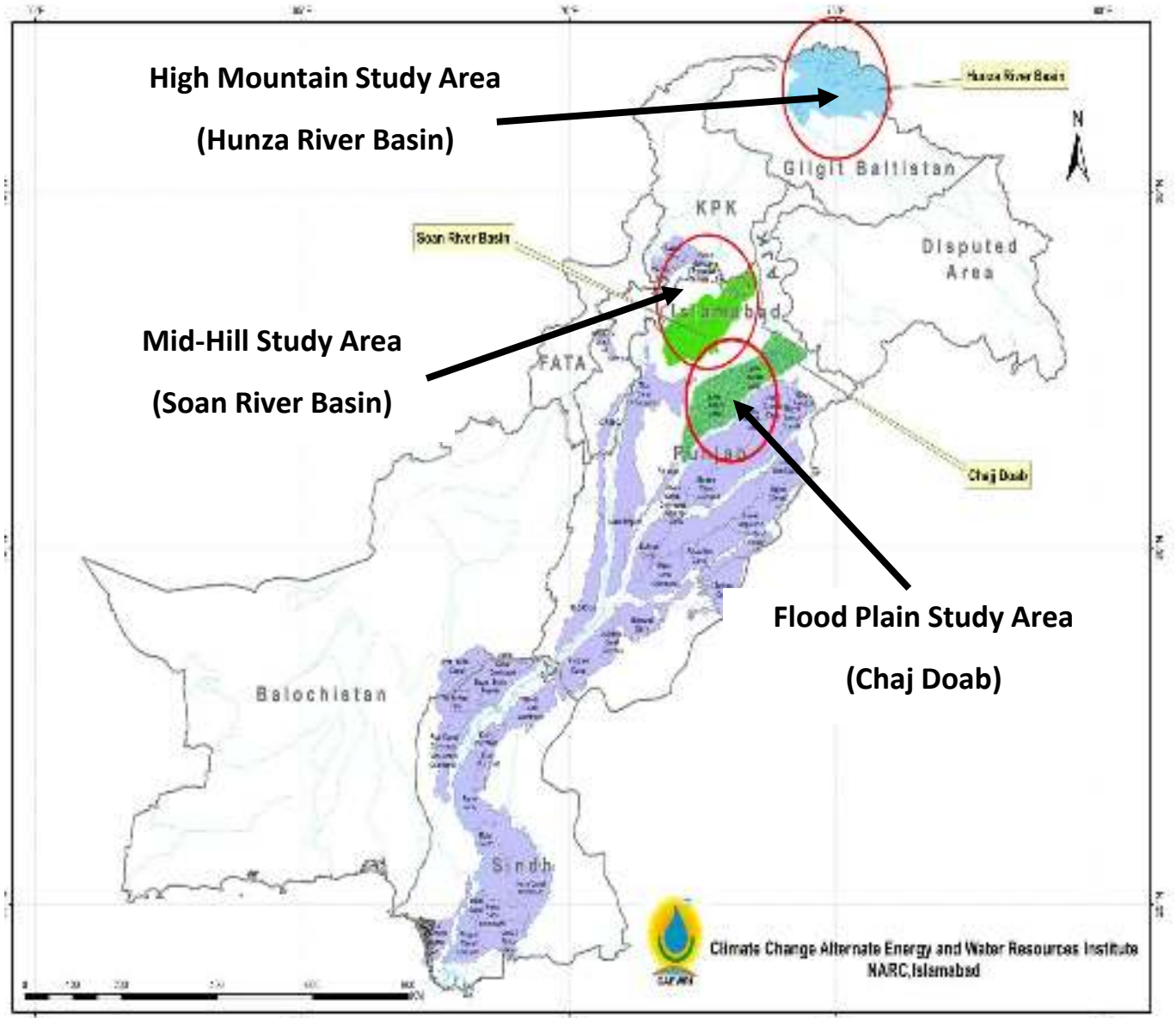
Country borders

Number of days with minimum temperature > 30 °C

Current climate | RCP 4.5 2050 | RCP 8.5 2050

Number of days with maximum temperature > 45 °C

Study Areas in Pakistan



Hunza Basin Study Sites

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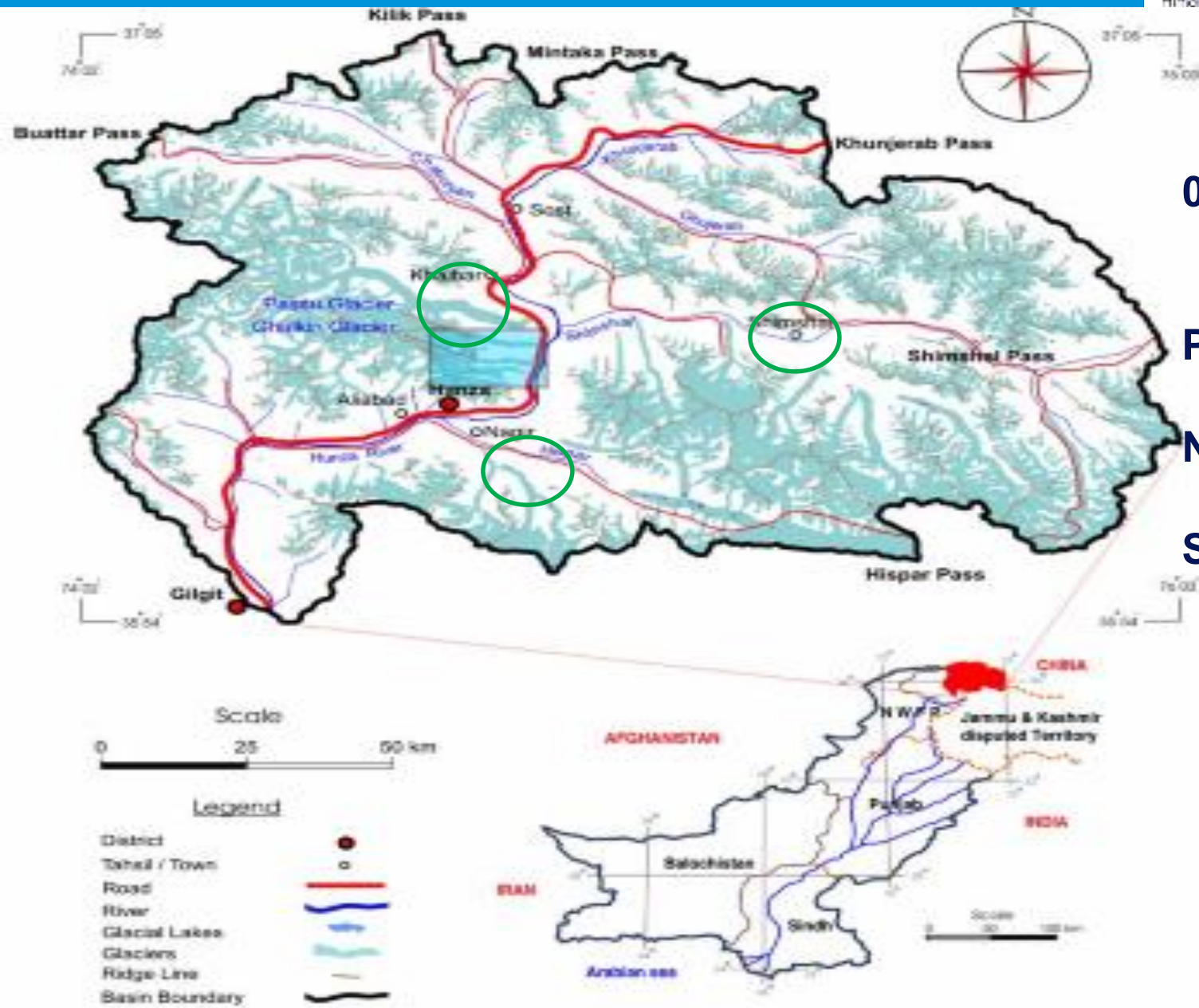


03 sites:

Passu-Gulkin

Nagar Valley

Shimshall Valley

Hunza Basin action research and demonstration

- Improved water management & agronomic practices (tunnel farming, organic farming)
- Solar pump irrigation introduction

Nagar Valley

- Microhydel

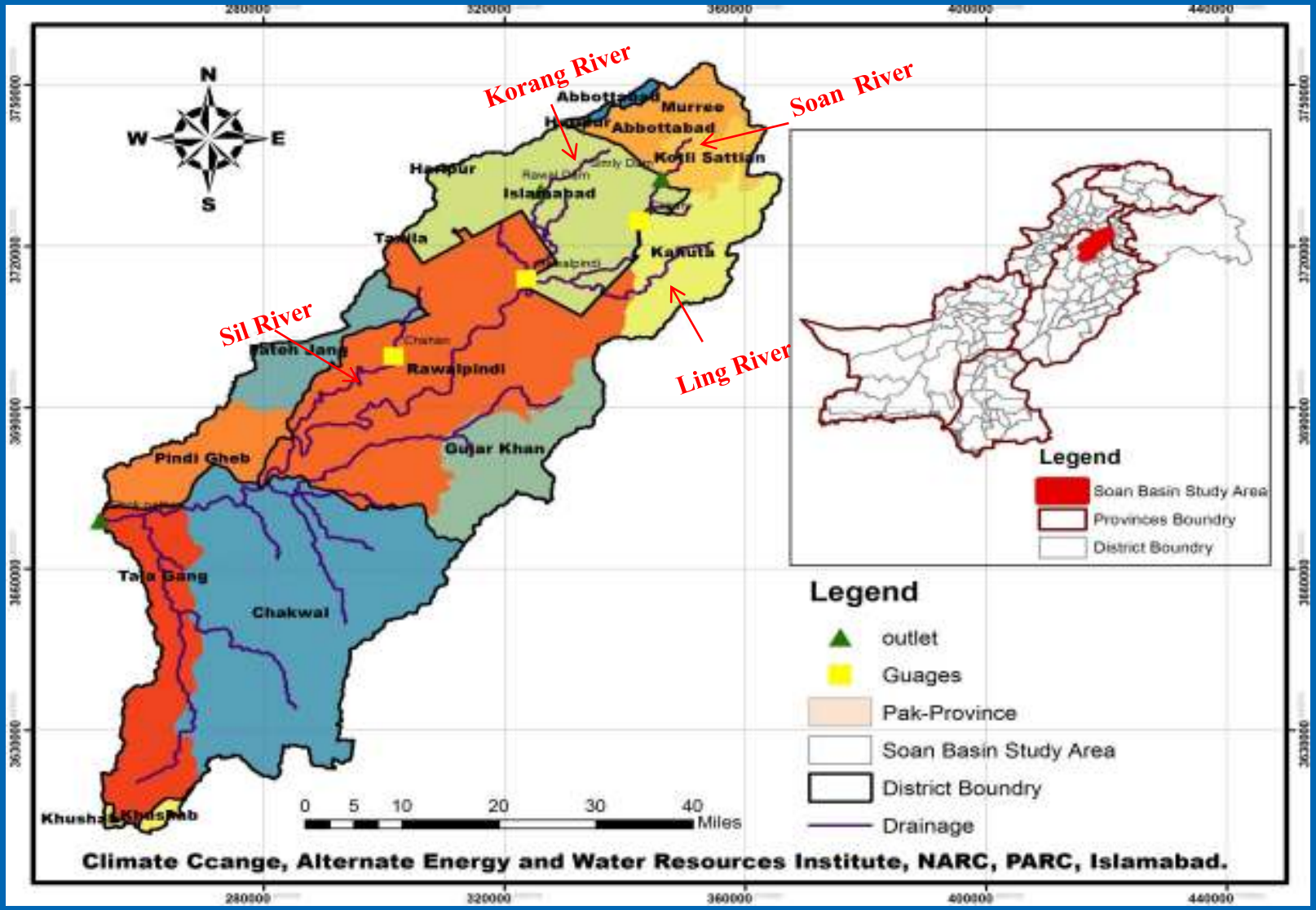
Passu-Gulkin

- Processing and value addition (solar drying, packaging etc.)
- Rehabilitation of traditional irrigation system

Shimshal Valley

- *Hydrological Monitoring of one glacier in Shimshal valley*

Soan Basin Study sites



Major Issues of Mid Hills

- Degraded watersheds
- Loss of runoff water
- Under utilization of harvested water
- Lacking innovations for livelihood
- Conventional energy scarcity
  - Low adaptation capacity:
    - Knowledge and technology gaps
    - Resource constraints
    - Lack of awareness
  - Land use changes (haphazard urbanization)
- Lack of data and information sharing

Soan Basin action research and demonstration

- Pilot Farm at Chakri for improving water management through solar innovations (solar water pumping, portable solar irrigation systems, integration of solar pumping with existing HEIS)
- Perennial water management for farm productivity enhancement (portable solar & small hydel irrigation systems)
- Water harvesting & kitchen gardening
- Nurseries development
- High value agriculture tunnels for off season vegetables
- Awareness, training and learning site

Pico hydel Power Generator

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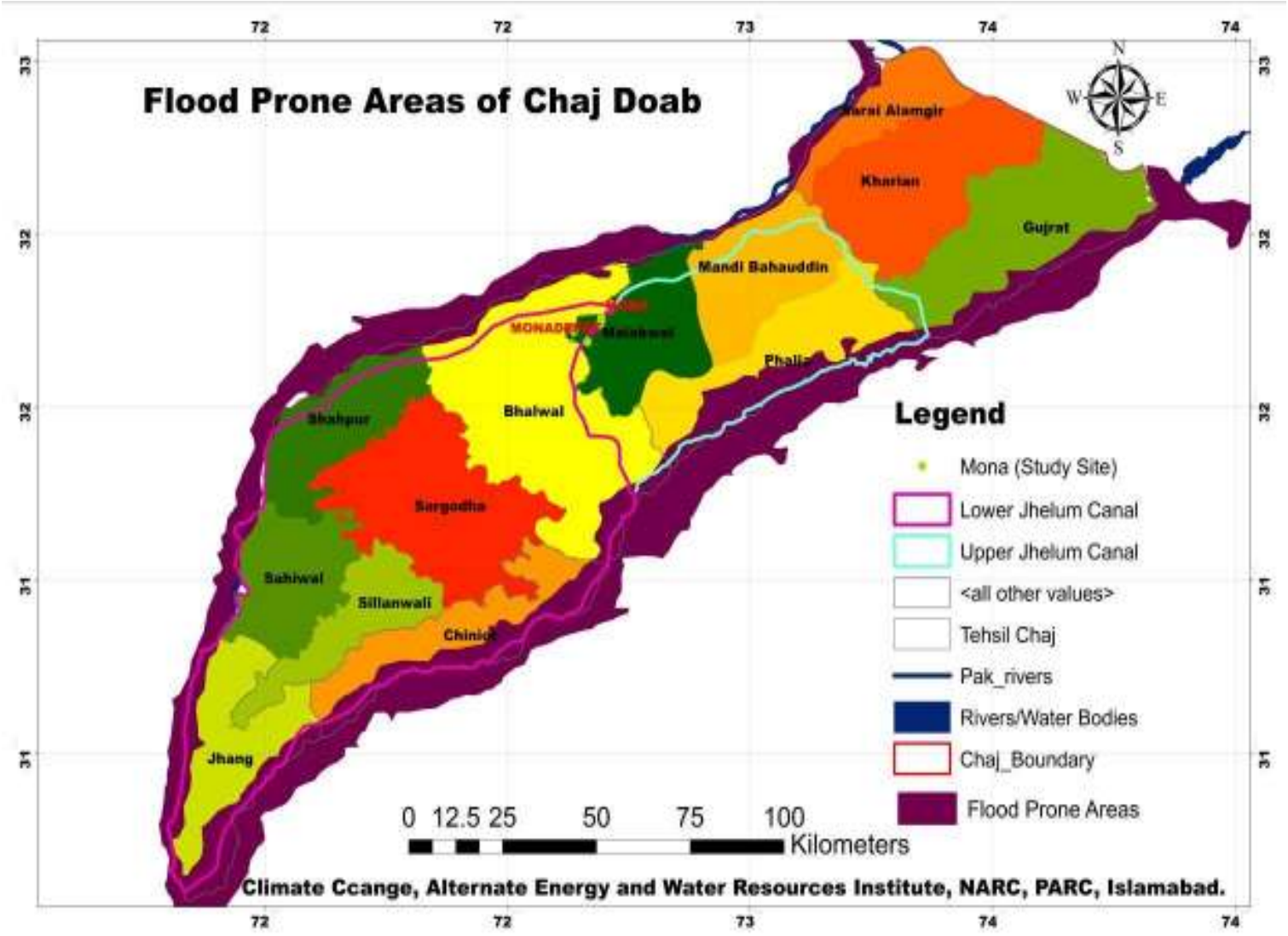
The total head of falling water is nearly 1.5 meter a water wheel turbine runs at 3000 rpm and then supplied to DC generator.

Utilization package is being designed including:

- Drip
- Micro-sprinkler
- Street lighting

Chaj Doab Area



Major Issues of Plains

- Frequent floods
- Rising temperatures and heat leading to reduced agricultural productivity
- Reduction in river flows availability due to CC and upper riparian abstractions
- Increased stress between upper and lower riparian regions in relation to sharing of water resources
- Low land and water productivity
- Waterlogging and salinity
- Convectional irrigation & farming practices
  - Low adaptation capacity:
    - Knowledge and technology gaps
    - Resource constraints
    - Lack of awareness

Thank you

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CARIAA
Collaborative Adaptation Research Initiative in Africa and Asia

Supported by the UK's Department for International Development (DFID) and Canada's International Development Research Centre (IDRC)

IDRC | CRDI
International Development Research Centre
Centre de recherches pour le développement international

Canada

UKaid
from the British people