Climate services in the HKH region for informed decision making

Mandira Singh Shrestha
21 June 2022
Key Issues in the HKH region

- Multi-hazard environment
- Upstream-downstream linkages
- Climate change and variability
- Connectivity and physical access
- Governance
Hindu Kush Himalayan region is prone to disasters

More than 1 billion people are at risk of exposure to increasing frequency and intensity of natural hazards

Source: WMO, 2021
Disasters in the HKH (1980-2020)

Source: EMDAT CRED Database
Challenges

Increase in intensity and frequency of disasters

Inadequate climate observing network

Lack of sharing of data and information

Inadequate and varying capacity

Limited tailored climate services that is actionable and gender responsive.
What is climate service?

Science-based information and forecasts that empower decision-makers at different levels to anticipate and manage climate related shocks and avail opportunities.

- Generate
- Curate
- Disseminate in various product (packaged information) output
- Policy/Plans
- Operational

Past, present and future climate data and information
Climate services: Spatial and temporal scale

**Spatial Scale**
- **Local**
  - Historical variability and changes in extreme events, Climate Normal
  - Weather forecasts
- **Regional/National**
  - Weather statistics, anomalies
  - Weather outlooks
  - Long range probabilistic weather forecast
- **Continental/Global**
  - ENSO conditions
  - Climate projections
  - Future trends

**Temporal Scale**
- Historical
- Daily
- Weekly
- Decadal
- Monthly
- Seasonal
- Annual
- Projected
Global framework for climate services

five pillars of GFCS to support more robust adaptation planning and policy decisions increasing resilience to climate change
Climate risk sensitive growth sectors

Agriculture: Climate change is detrimental to agriculture systems.

Tourism

Water and energy

Health

Disasters – floods, droughts, forest fire, extreme temperatures/heat waves, air pollution

Results in loss of productivity, infrastructure, property and lives.
Climate Services Initiative

**Impact:** Improved livelihood and enhanced resilience of mountain communities as a result of reduced risks and vulnerabilities with the use of climate information services.

**Outcome:** Improved capacities of mandated institutions and understanding of end users in making best use of climate information services for decision making and long-term resilience building.

**Change pathways:**
- Build partnerships and user interface
- Co-develop services
- Strengthen capacity
Needs and priorities in the HKH (ARRCC)

To bridge the gap between climate information providers and users

• Strengthen capacity in the use of advanced tools in forecasting and data assimilation: impact-based forecasting, seasonal outlooks and climate projections

• Build Institutional capacities in the access and use of Climate change projections

• Co-develop and tailor climate information to the needs of specific users for societal benefits

• Awareness, enhancing capacity, communication and dissemination of climate information to various types of users (language, sociocultural norms and mode)
Prepare CORDEX data sets in areas of interest and compare them with reference (APHRODITE) data sets

Visualize spatial and temporal variation in climate change projections

Spatial and temporal climate change analysis using CORDEX datasets
Climate indices are important metrics that assist in the analysis of regional and global datasets for e.g. extremes in meteorological events.

Assessment of sectoral impacts (e.g., Agriculture, Health, Energy, Water Resources and Hydrology)

Expert Team on Sector-specific Climate Indices (ET-SCI core and non-core) adopted by the World Meteorological Organization (WMO)

---

<table>
<thead>
<tr>
<th>Short name</th>
<th>Long name</th>
<th>Definition</th>
<th>Plain language description</th>
<th>Units</th>
<th>Time scale</th>
<th>Sector(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FD</td>
<td>Frost Days</td>
<td>Number of days when TN &lt; 0 °C</td>
<td>Days when minimum temperature is below 0°C</td>
<td>days</td>
<td>Mon/Ann</td>
<td>H, AFS</td>
</tr>
<tr>
<td>TNlt2</td>
<td>TN below 2°C</td>
<td>Number of days when TN &lt; 2 °C</td>
<td>Days when minimum temperature is below 2°C</td>
<td>days</td>
<td>Mon/Ann</td>
<td>AFS</td>
</tr>
<tr>
<td>TNltm2</td>
<td>TN below -2°C</td>
<td>Number of days when TN &lt; -2 °C</td>
<td>Days when minimum temperature is below -2°C</td>
<td>days</td>
<td>Mon/Ann</td>
<td>AFS</td>
</tr>
<tr>
<td>TNltm20</td>
<td>TN below -20°C</td>
<td>Number of days when TN &lt; -20 °C</td>
<td>Days when minimum temperature is below -20°C</td>
<td>days</td>
<td>Mon/Ann</td>
<td>H, AFS</td>
</tr>
<tr>
<td>ID</td>
<td>Ice Days</td>
<td>Number of days when TX &lt; 0 °C</td>
<td>Days when maximum temperature is below 0°C</td>
<td>days</td>
<td>Mon/Ann</td>
<td>H, AFS</td>
</tr>
<tr>
<td>SU</td>
<td>Summer days</td>
<td>Number of days when TX &gt; 25 °C</td>
<td>Days when maximum temperature exceeds 25°C</td>
<td>days</td>
<td>Mon/Ann</td>
<td>H</td>
</tr>
<tr>
<td>TR</td>
<td>Tropical nights</td>
<td>Number of days when TN &gt; 20 °C</td>
<td>Days when minimum temperature exceeds 20°C</td>
<td>days</td>
<td>Mon/Ann</td>
<td>H, AFS</td>
</tr>
<tr>
<td>GSL</td>
<td>Growing Season Length</td>
<td>Annual number of days between the first occurrence of 6 consecutive days with TM &gt; 5 °C and the first occurrence of 6 consecutive days with TM &lt; 5 °C</td>
<td>Length of time in which plants can grow</td>
<td>days</td>
<td>Ann</td>
<td>AFS</td>
</tr>
<tr>
<td>TXX</td>
<td>Max TX</td>
<td>Warmest daily TX</td>
<td>Hottest day</td>
<td>°C</td>
<td>Mon/Ann</td>
<td>AFS</td>
</tr>
<tr>
<td>TNN</td>
<td>Min TN</td>
<td>Coldest daily TN</td>
<td>Coldest night</td>
<td>°C</td>
<td>Mon/Ann</td>
<td>AFS</td>
</tr>
<tr>
<td>WSDI</td>
<td>Warm spell duration indicator</td>
<td>Annual number of days contributing to events where 6 or more</td>
<td>Number of days contributing to a warm period (where</td>
<td></td>
<td></td>
<td>H, AFS, WRH</td>
</tr>
</tbody>
</table>
Rx1day - precipitation maximum.dat Yearly
Institutional capacity building: climate projections

Stakeholder consultation and need identification
- Identification of the needs and priorities through regional and national consultations held in 2019
- Online survey for training need identification

International and regional partnerships
- UK’s Met Office, World Climate Research Programme (WRCP), IITM-Pune

Dedicated institutional capacity building approach
- Partnership from the beginning (shared vision and commitments)
- National hydro-meteorological agencies on board (Afghanistan, Nepal, Bangladesh, Pakistan)
- Series of capacity building activities planned for 2020-2022
- Development of software’s and tools
- **Co-generating knowledge** to develop national climate change projections and sectoral implications
Institutional capacity building approach

01. Service area selection
   Climate change projections

02. Partner identification
   Key institutions
   Jan 2019

03. Capacity need assessment
   Survey Dec 2019

04. Online Regional Training
   CORDEX access
   Oct 2020

05. Training in first quarter 2021
   Data analysis and applications

06. Training in Dec 2021: Bangladesh

07. Training in Jun 2021: Nepal

08. Training in March 2022
    Bangladesh

09. Regional training in June 2022:
    Nepal

010. Services used for decision making
    Capacity in place
Objective: The training aims to build knowledge and skills for analysing climate indices using CORDEX regional climate model simulations

<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAY 1 21 June</td>
<td>Pres-assessment survey, installation of softwares, Introduction of participants, Concepts of climate change indices by IITM and reflection and review of the earlier trainings</td>
</tr>
<tr>
<td>DAY 2 22 June</td>
<td>Introduction to climate data indices tool and data extraction, Presentations on bias correction by SMHI and Met Office</td>
</tr>
<tr>
<td>DAY 3 23 June</td>
<td>Climate indices calculation for selected models, Climate indices analysis</td>
</tr>
<tr>
<td>DAY 4 24 June</td>
<td>Uncertainty analysis, Group work on areas of interest and presentations</td>
</tr>
</tbody>
</table>
Expected outcomes

- Selection of representative models for their defined area of interest.
- Extract CORDEX datasets for their areas of interest and analyse them separately.
- Spatial and temporal visualization of climate indices over their defined area of interest.
- Interpret the uncertainty of the selected model results.
Thank you

Let’s protect the pulse.