Regional flood information system in the Hindu Kush Himalayas

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Mandira Singh Shrestha (mandira.shrestha@icimod.org)

International Centre for Integrated Mountain Development

Kathmandu, Nepal
Presentation outline

- About ICIMOD
- Distribution of disasters in the Hindu Kush Himalayan (HKH) region
- Flood disasters in the HKH region
- HKH HYCOS
  - Key achievements
  - Challenges and opportunities
  - Lessons learnt
  - User Phase
- Summary
ICIMOD

Member countries

- Afghanistan
- Bangladesh
- Bhutan
- China
- India
- Myanmar
- Nepal
- Pakistan

Mission
Enable sustainable and resilient mountain development for improved and equitable livelihoods through knowledge and regional cooperation.

Vision
ICIMOD’s Vision is that the men, women, and children of the Hindu Kush Himalayas enjoy improved wellbeing in a healthy mountain environment;
How does ICIMOD work?

- Bridge science with policies and practice and provides a regional platform where policy makers, experts, planners, and practitioners can exchange ideas and perspectives towards the achievement of sustainable mountain development

- Facilitates knowledge exchange across the region

- Tailor international knowledge to the region’s needs

- Brings regional issues to the global stage

- Partnership with regional and international agencies.
Himalayan region: Source of 10 major river systems – the “water tower” of Asia

Himalayan glaciers are sources of freshwater reserves which provide headwaters for major river systems in Asia.

Sustains ecosystems and lives and livelihoods of about 1.3 billion people.
The Himalayas are prone to disasters
On average, annually more than 24,000 people are killed and 160 million affected due to natural disasters in the region.

The region has had an average of 60 disaster events each year.
One-third of these disasters are floods

Globally, 10% of all floods are transboundary, but they cause over 30% of all flood causalities and displace close to 60% of all those displaced by floods (Bakker 2006)

Transboundary floods - shared vulnerability across national borders
Increasing frequency and magnitude

Economic losses from weather- and climate-related disasters have increased, but with large spatial and interannual variability (IPCC, 2012)
Key issues

- There is a diversity of technical, scientific, and institutional capacity.
- Sharing knowledge, experiences and know-how.
- There is limited exchange of real-time data especially across national boundaries - increase lead time.
- Application of state of the art tools and technologies can provide timely and reliable flood forecasting and EWS systems to save lives.
Innovation in technologies for end to end flood early warning system

- **Advancement in technology**: real-time data through sensors.

- **Data transmission** through CDMA, GPRS/GSM, and satellite iridium.

- **Space based technology using earth observations** are increasing the lead time, filling data gaps and risk mapping.
Global WHYCOS framework

- To improve the basic observation activities,
- To strengthen the international cooperation and
- To promote free exchange of data in the field of hydrometeorology.
HKH-HYCOS: Setting up monitoring stations and establishment of real-time flood information systems

‘Making Information Travel Faster Than Flood Waters’

Establishment of a Regional Flood Information System in the HKH-Region - Timely exchange of flood data and information through an accessible and user friendly platform

HYCOS is a vehicle for technology transfer, training, and capacity building
Overall objective: to minimise the loss of lives and property by reducing flood vulnerability in the HKH region

Five distinct components:
Framework for cooperation
Regional flood observation network
Regional flood information system
Training and public awareness
Planning of a full-scale regional project

<table>
<thead>
<tr>
<th>Project Duration</th>
<th>5 years (Dec 2009 – Dec 2015)</th>
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<tbody>
<tr>
<td>Partners</td>
<td>Hydro-meteorological services of six participating countries - Bangladesh, Bhutan, China, India, Nepal, and Pakistan</td>
</tr>
<tr>
<td>Facilitating Agency</td>
<td>ICIMOD and World Meteorological Organization</td>
</tr>
<tr>
<td>Funding</td>
<td>Government of Finland</td>
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</tbody>
</table>
Phased implementation

Preparatory Phase
Feasibility study and infrastructure testing
(2001-2005)

Implementation Phase
HKH-HYCOS implementation
(2009-2015)

User Phase
User perspective with implementation of end to end flood information system
(Duration 5 years)
Upgraded observation network

- 38 hydrometeorological stations upgraded in four countries (Bangladesh, Bhutan, Nepal, Pakistan)
- Access to > 300 Global Telecommunication Stations of WMO
Real-time hydrometeorological stations

- Use of latest technology for data collection
- Transmission (mobile phone using CDMA/ GSM, satellite communication)
- Establishment of regional and national flood information systems
Value of real time data:
Regional flood outlook
3 days flood outlook at Bahadurabad, Bangladesh

- Provides discharge outlooks at selected locations
- Warning indicated at various levels
Real time monitoring during disaster

Sun Koshi landslide disaster, August 2014
Landslide dam forming a lake holding about 7 million m$^3$ of water

- Real-time water level data at Pachuwarhat, Sun Koshi 37 km downstream of the landslide
- River locked about 12 hours as indicated in the figure above
Challenges and opportunities

Technical challenges

- Station operation and maintenance
  - Spare parts
  - Vandalism in some stations
  - Sim card recharge

- Database management
  - Quality control
  - Harmonization of data, interoperability and compatibility

Limited capacity

- Limited capacity and human resources
- Technical infrastructure and capacity for forecasting and early warning highly variable in the region
- Better integration of science-based climate information and prediction into planning, policy and practices, especially through improved end-user interfaces.
Opportunities for cooperation

- Better understanding and analysis of the extreme events
- Opportunity for regional cooperation and collaboration in data sharing and timely warning
- Joint capacity building and trainings and strengthening institutional capacities
- Mutual learning, knowledge sharing and dissemination through regional platforms for enhanced disaster resilience
- Promoting partnerships and international collaboration in disaster risk reduction.
Lessons learnt

- Flood forecasting and warning needs to be integrated with the disaster risk management activities for an effective end to end flood early warning system
  - Efforts need to be made for risk communication, awareness and better preparedness
- Institutional mechanisms for provision of flood warning to communities need to be strengthened
- Limited networks in the region – need further strengthening and sharing
- Utility of data and information for developing flood outlook demonstrated the value of real-time data
- Cross learning visits for example to the Mekong region provided an opportunity to learn and share experiences
- Capacity building and training enhanced cooperation and partnerships
- Regional cooperation is a long term process which requires building trust and confidence between and amongst countries
What is there in the User phase?

- Strengthening of end user interface as a means for adapting to changing climate
- Utility of data and information
- Education, capacity building and training
- Strengthening national flood forecasting capabilities
  - Flood forecasting models and tools
  - Flood outlooks at national and regional levels
- Observation networks
  - State of the art technologies for expansion
  - Discharge measurements
- Strengthening international and regional cooperation
Summary

- There is a need for an end to end flood forecasting system where information is translated down to the communities and timely action taken.
- Need to improve data collection, transmission and modelling capabilities for timely forecasts.
- Need for capacity building and training.
- Need for further research, sound scientific basis and state of the art technology.
- Need to better understand the needs of end users and provide services to match their needs for prevention of disasters.
- The next phase focus is on “Users” for which funding is being sought: letters of support from countries.
- Regional and international partnerships: there is a continued need for regional cooperation and collaboration across borders and transboundary sharing of information to minimize adverse impacts of disasters.
Thank you