Real-time monitoring and flood outlook for reduced flood risks in the Ganges Brahmaputra basin

Global Flood Partnership Conference

Guangzhou, CHINA

11-13 June 2019

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

International Centre for Integrated Mountain Development

Kathmandu, Nepal

ICIMOD

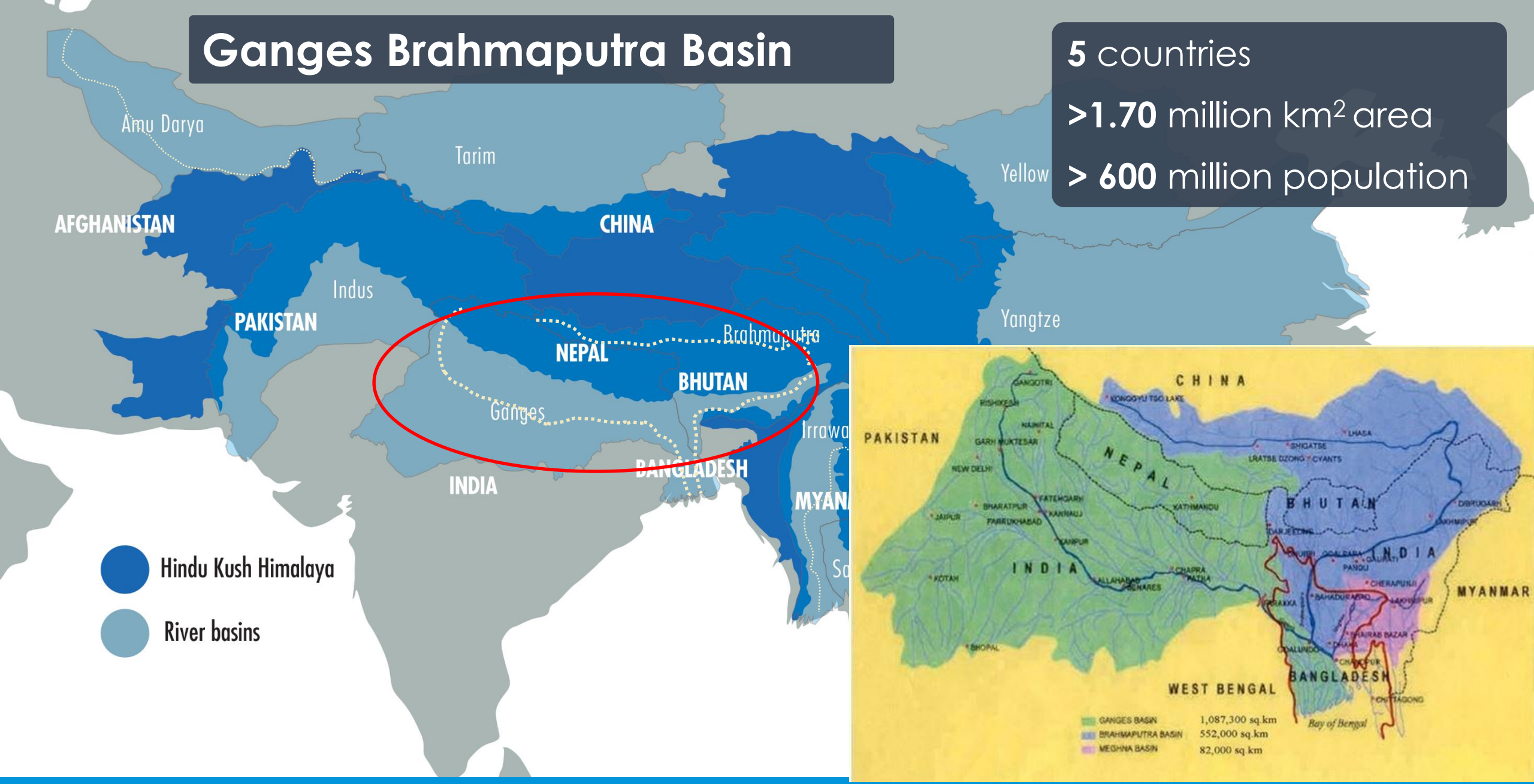
FOR MOUNTAINS AND PEOPLE

Ganges Brahmaputra Basin

5 countries

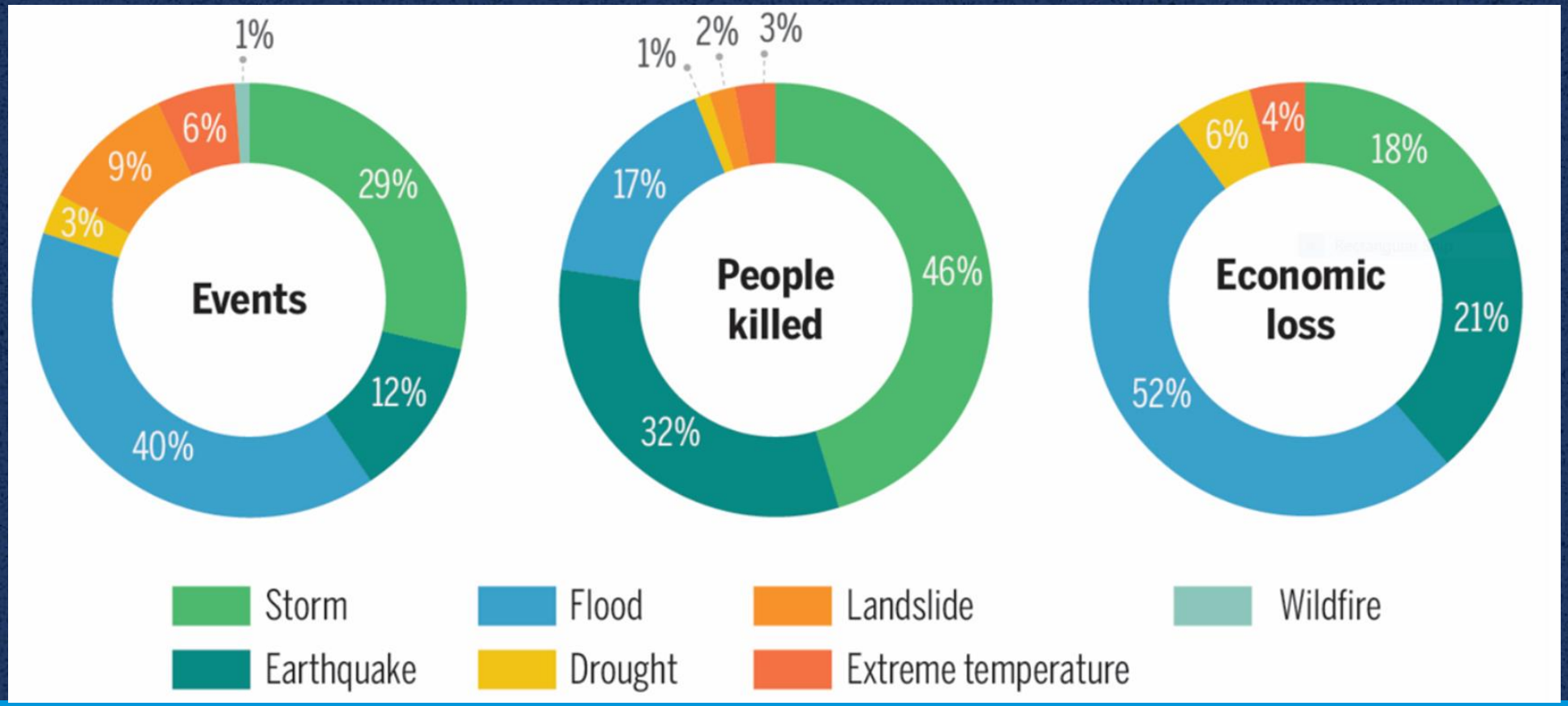
>1.70 million km² area

> 600 million population



Hindu Kush Himalayan region is prone to disasters

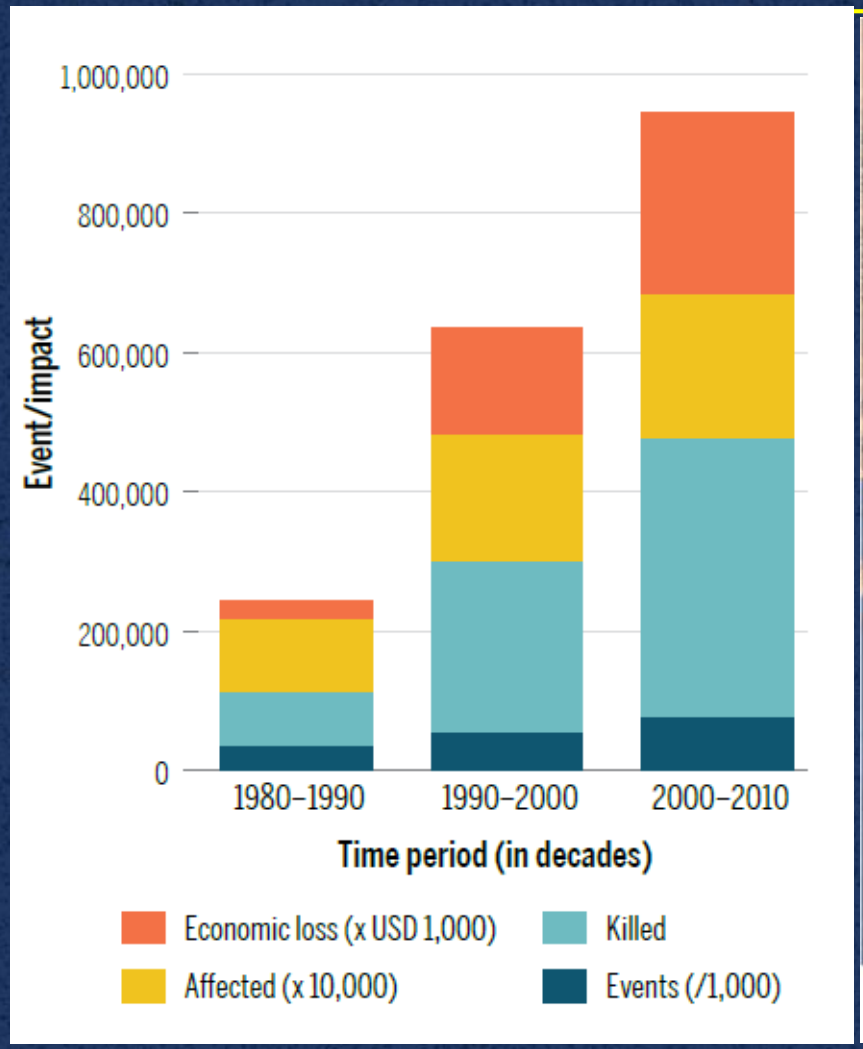
More than 1 billion people are at risk of exposure to increasing frequency and intensity of natural hazards

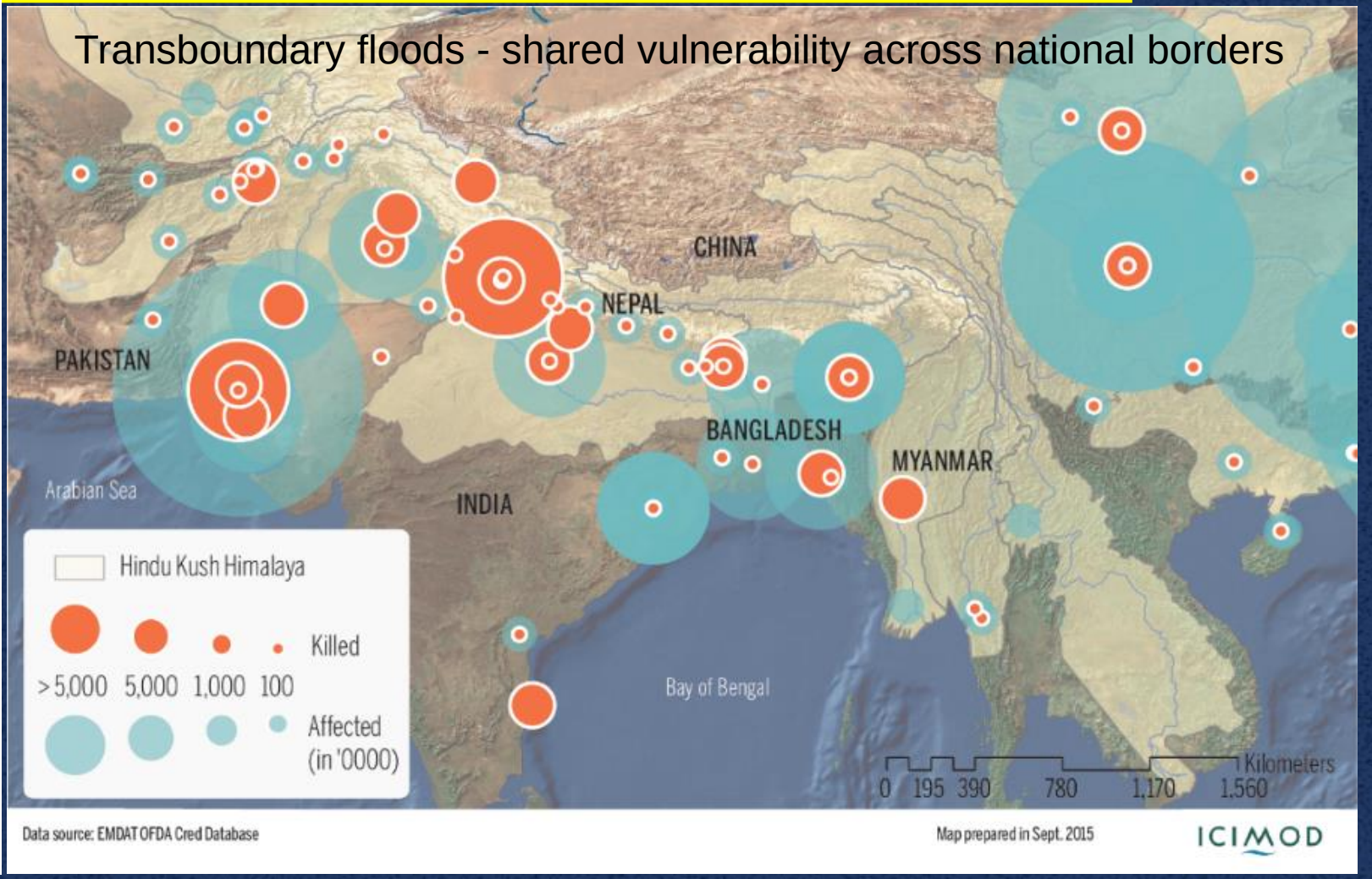


Source: EM-DAT – The OFDA/CRED International Disaster Database

ICIMOD

The economic and human impacts of natural disasters are increasing





Source: Vaidya etal., 2019 (HIMAP report)

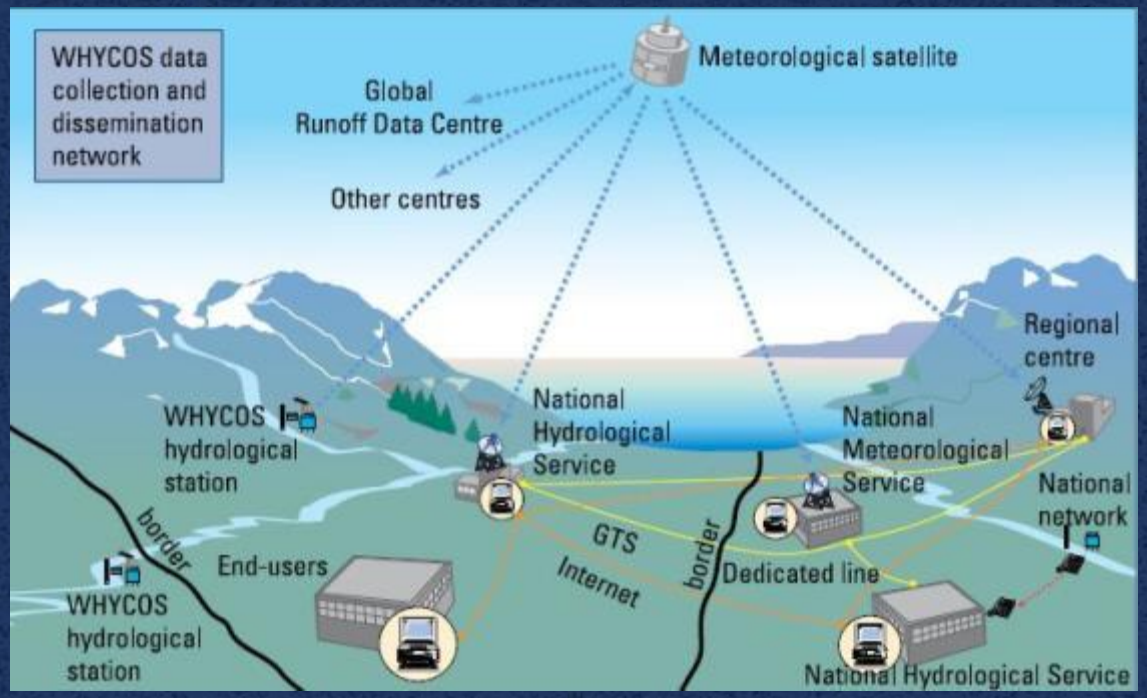
ICIMOD

Lessons learned from past disasters

- Data gaps
- Capacities vary across institutions
- End-to-end information systems
- Proper infrastructure planning
- Communication of flood early warning
- Opportunities for transboundary cooperation

HKH-HYCOS: Setting up monitoring stations and establishment of real-time flood information systems

‘Making Information Travel Faster Than Flood Waters’



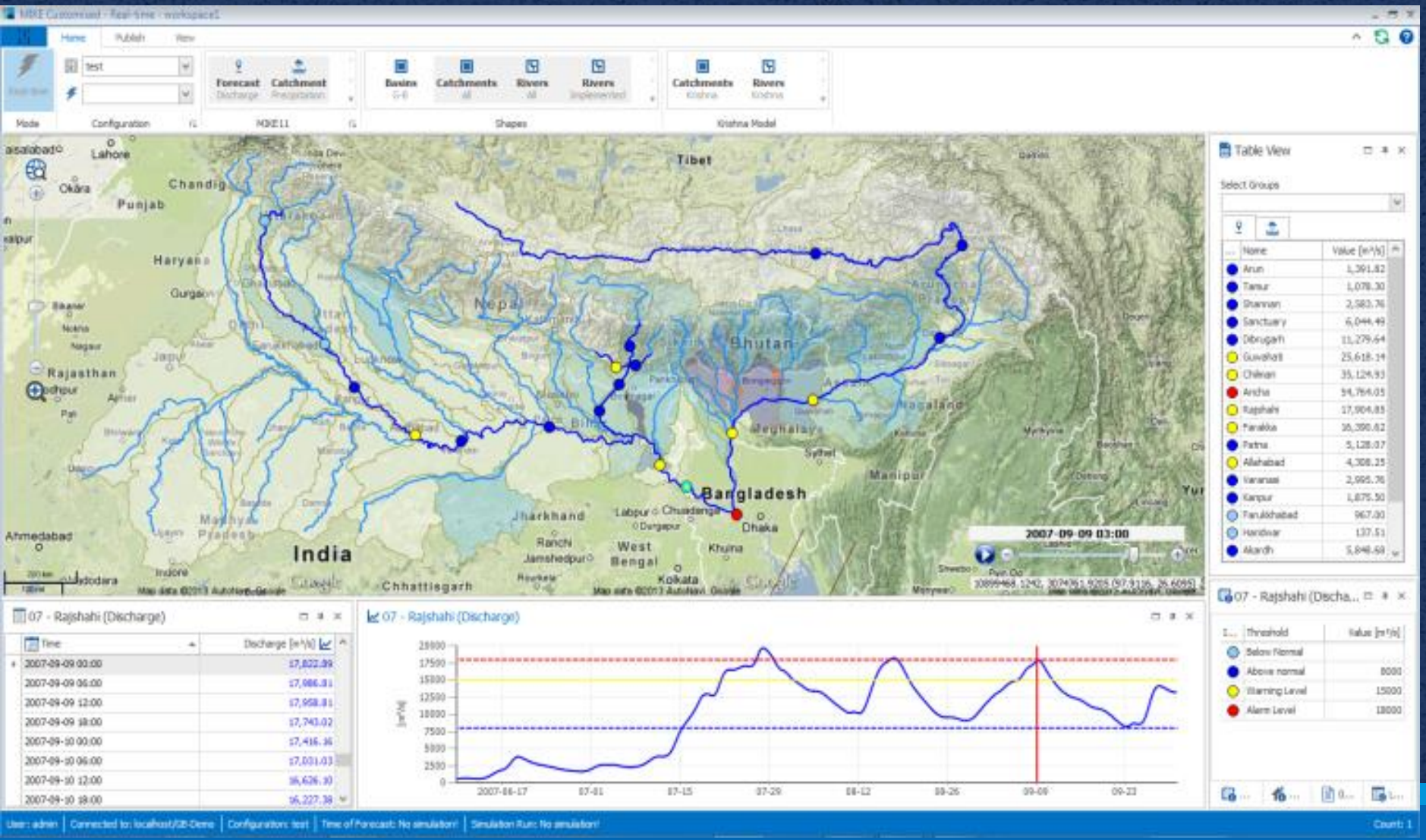
HYCOS is a vehicle for technology transfer, training, and capacity building

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

Modernization of observation network and real-time data transmission

- 38 hydrometeorological stations upgraded in four countries: Real-time transmission of data (Bangladesh, Bhutan, Nepal, Pakistan)
- Access to > 300 Global Telecommunication Stations of WMO
- Use of latest technology for data collection and transmission (GPRS/GSM)

Flood outlook development: set up for real time flood outlook

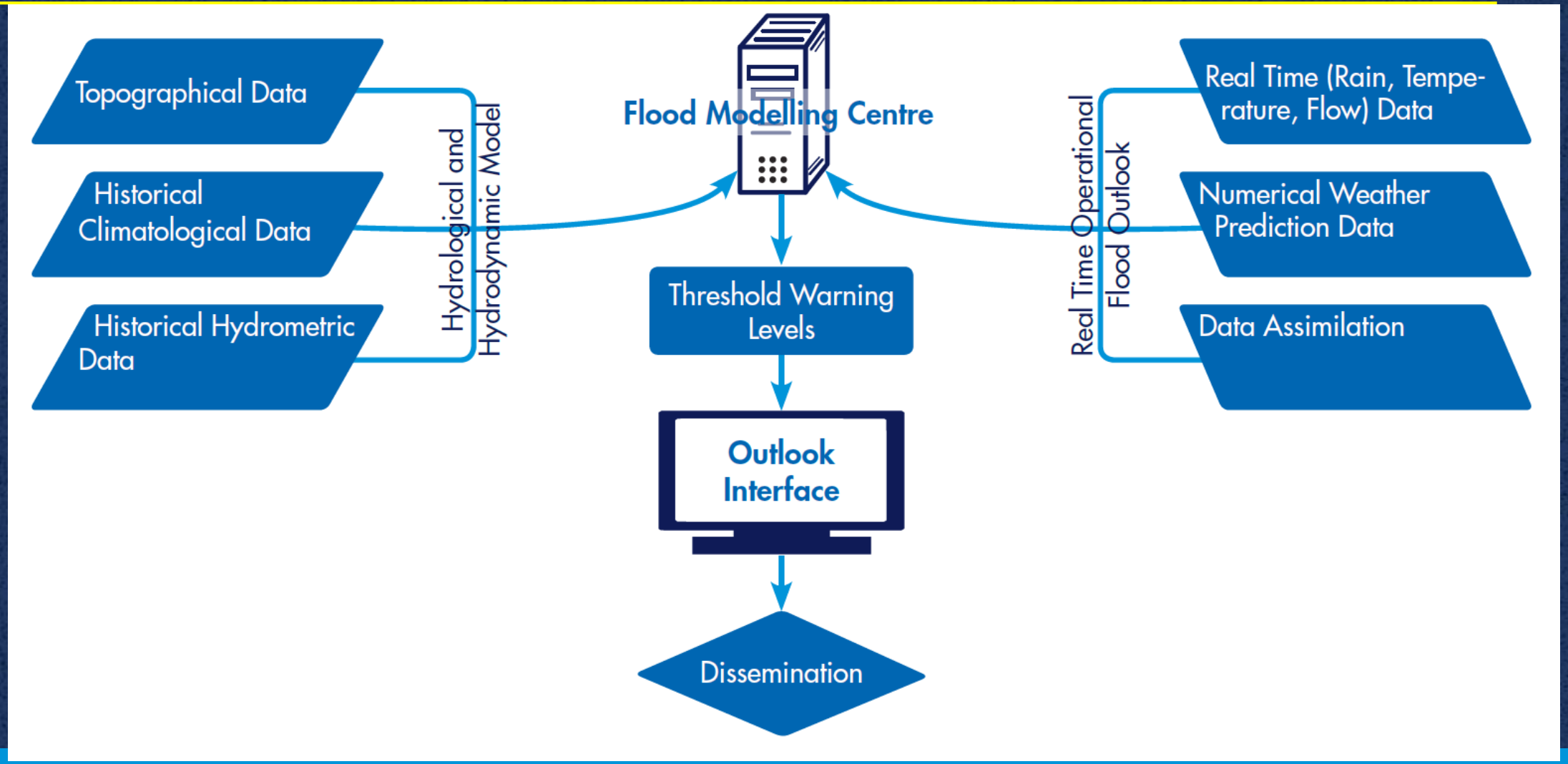


Developed a flood outlook system for the Ganges- Brahmaputra basin utilizing freely available data and weather forecasts

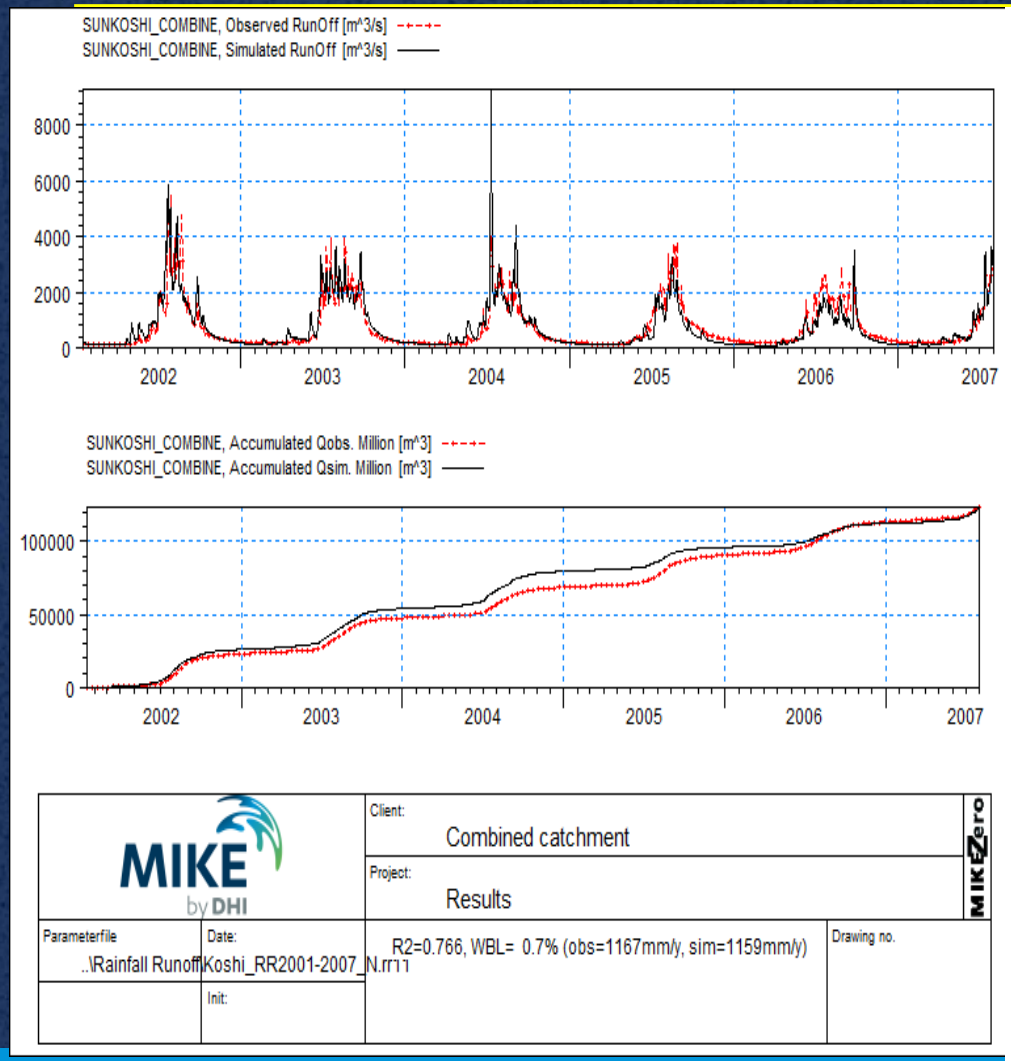
Mathematical model describing the **precipitation-runoff process** in the catchments and **hydrodynamic flood routing** along the river system.

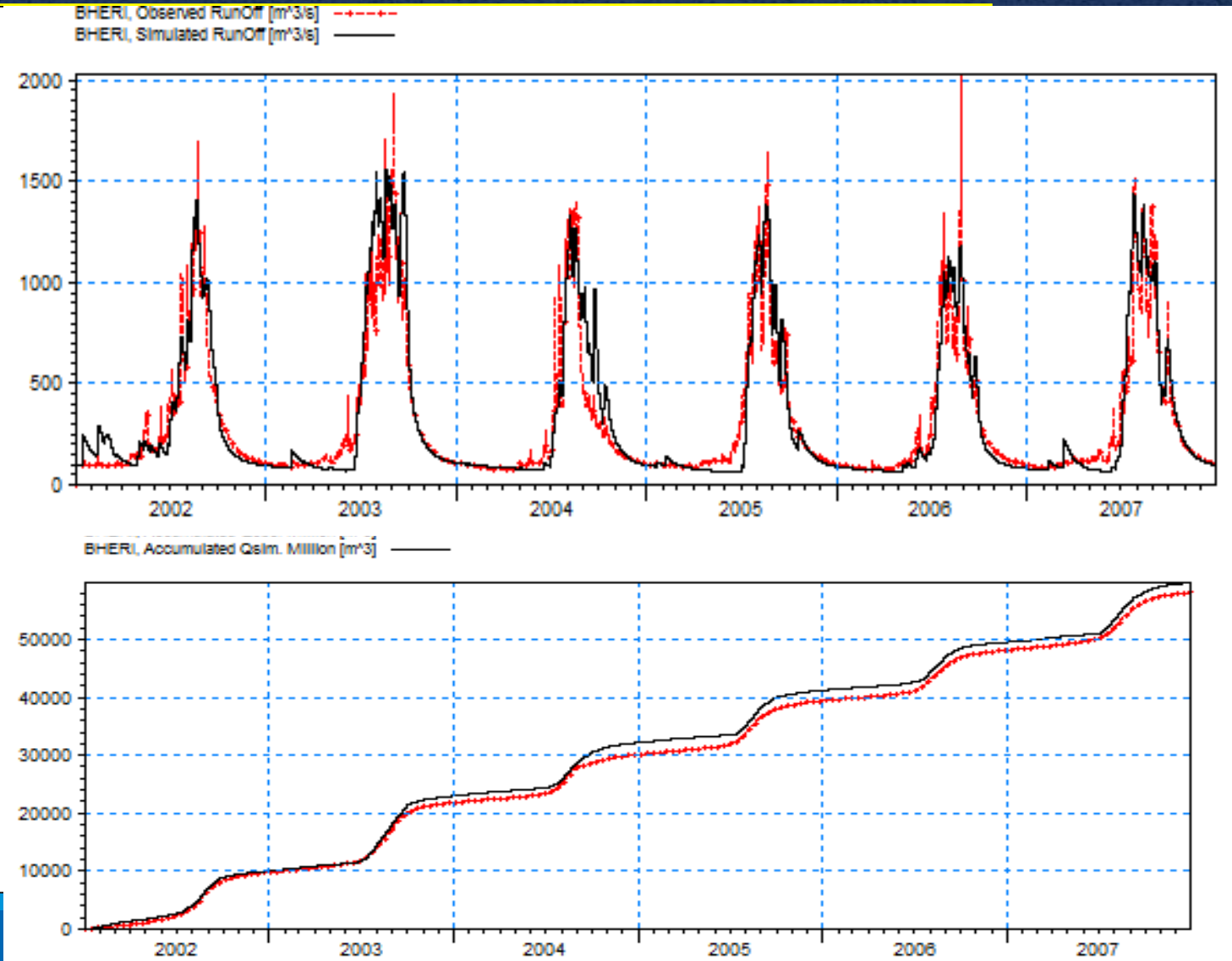
ICIMOD

Schematic structure of the flood outlook system

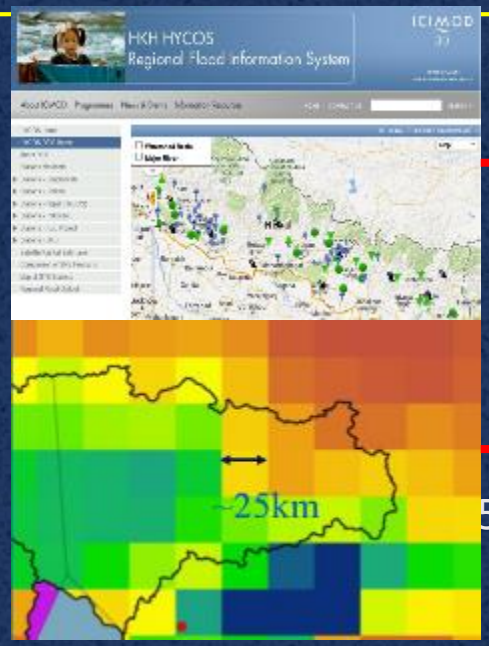


Calibration of rainfall-runoff (NAM) model

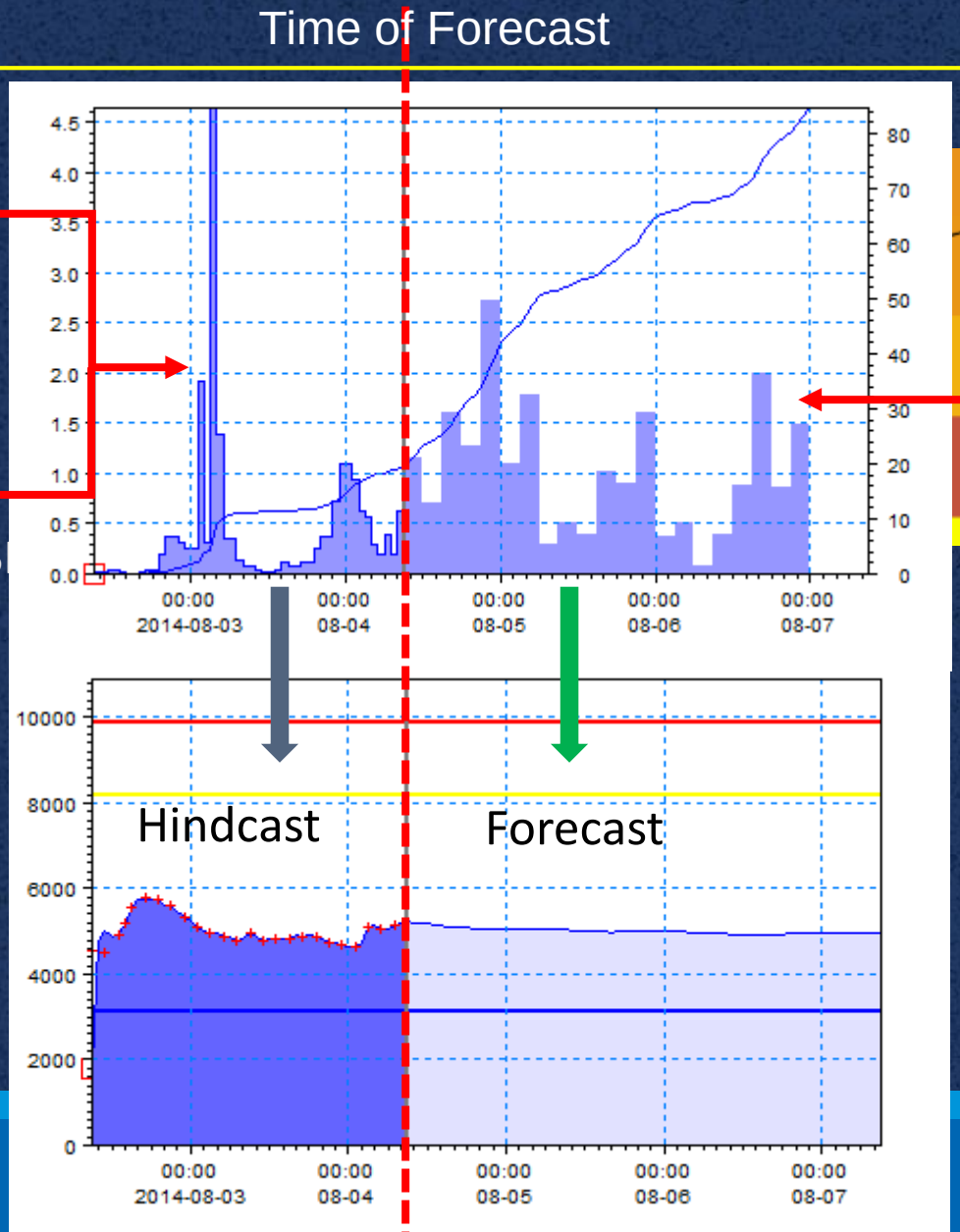


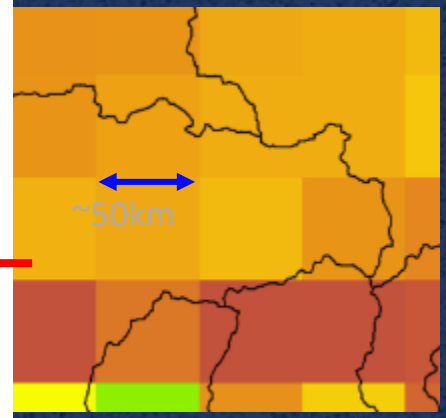


System of flow forecast



Hindcast
(Observed RT data, TRMM (RT), NASA



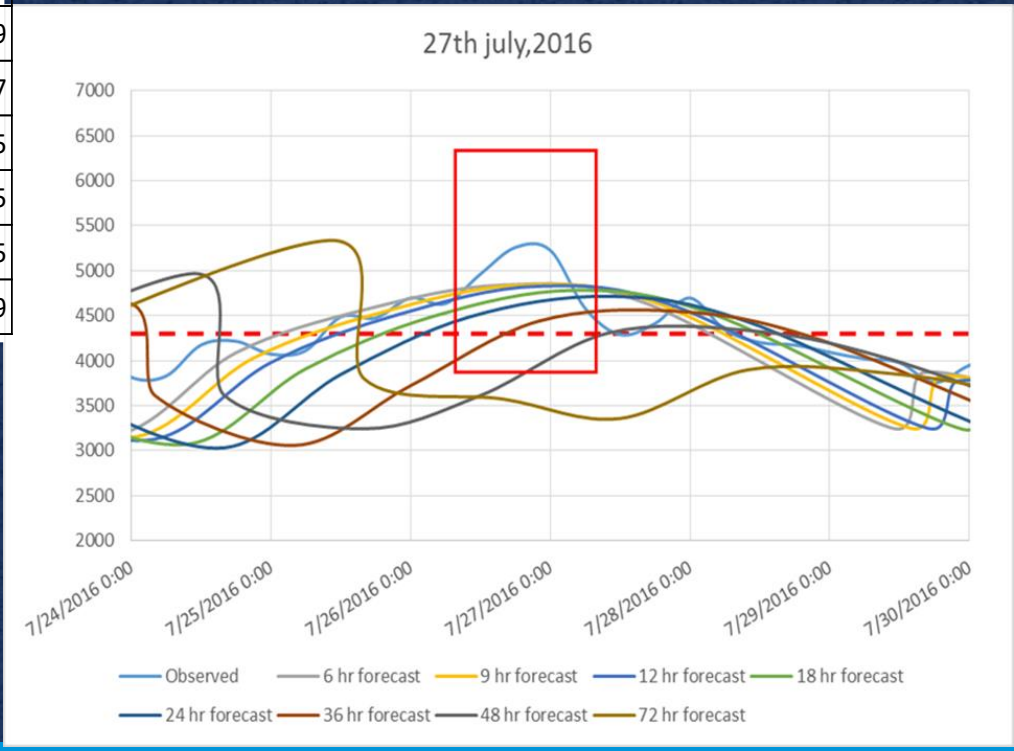


Quantitative Precipitation/ Temp Forecast (GFS, NOAA)

ICIMOD

Evaluation of the forecast

Event Forecast						Skills score		
forecast	Hit	Miss	Near miss	False alarm	Close false alarm	POD	FAR	CSI
6 hr forecast	28.00	11.00	0.00	0.00	0.00	0.72	0	0.72
9 hr forecast	28.00	11.00	0.00	0.00	0.00	0.72	0	0.72
12 hr forecast	27.00	12.00	0.00	0.00	0.00	0.69	0	0.69
18 hr forecast	26.00	13.00	0.00	0.00	0.00	0.67	0	0.67
24 hr forecast	22.00	15.00	2.00	0.00	0.00	0.65	0	0.65
36 hr forecast	20.00	17.00	1.00	1.00	0.00	0.57	0.05	0.55
48 hr forecast	20.00	16.00	1.00	2.00	0.00	0.58	0.09	0.55
72 hr forecast	14.00	22.00	1.00	2.00	0.00	0.42	0.13	0.39



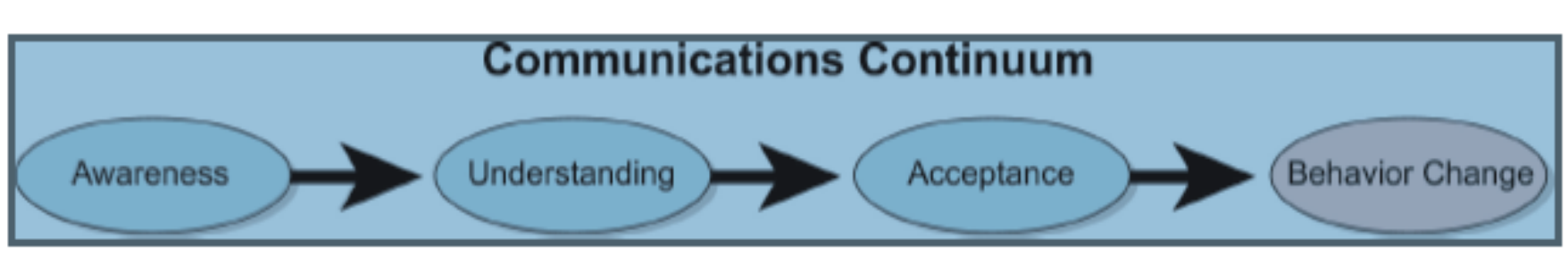
ICIMOD

What makes a good Early Warning System?

- Advanced forecasting and warning technology
- Good governance and functional institutions
- Last link to the communities and people at risk
- Combination of both top-down and participatory communication methods

A complete chain with the last mile connectivity

Timely warning, understandable formats, awareness, capacity building at local levels



Opportunities

- Establishing an *End to end flood forecasting system – people centered early warning system* to vulnerable communities
- Using new technology and advanced scientific knowledge for monitoring, assessing, forecasting and communicating information
- Strengthening Institutional capacity on flood risk management and end user interface
- Improving transboundary coordination and collaborative efforts
- Improved regional dialogue and cooperation for Flood risk management within the framework of IFM

Thank you

ICIMOD