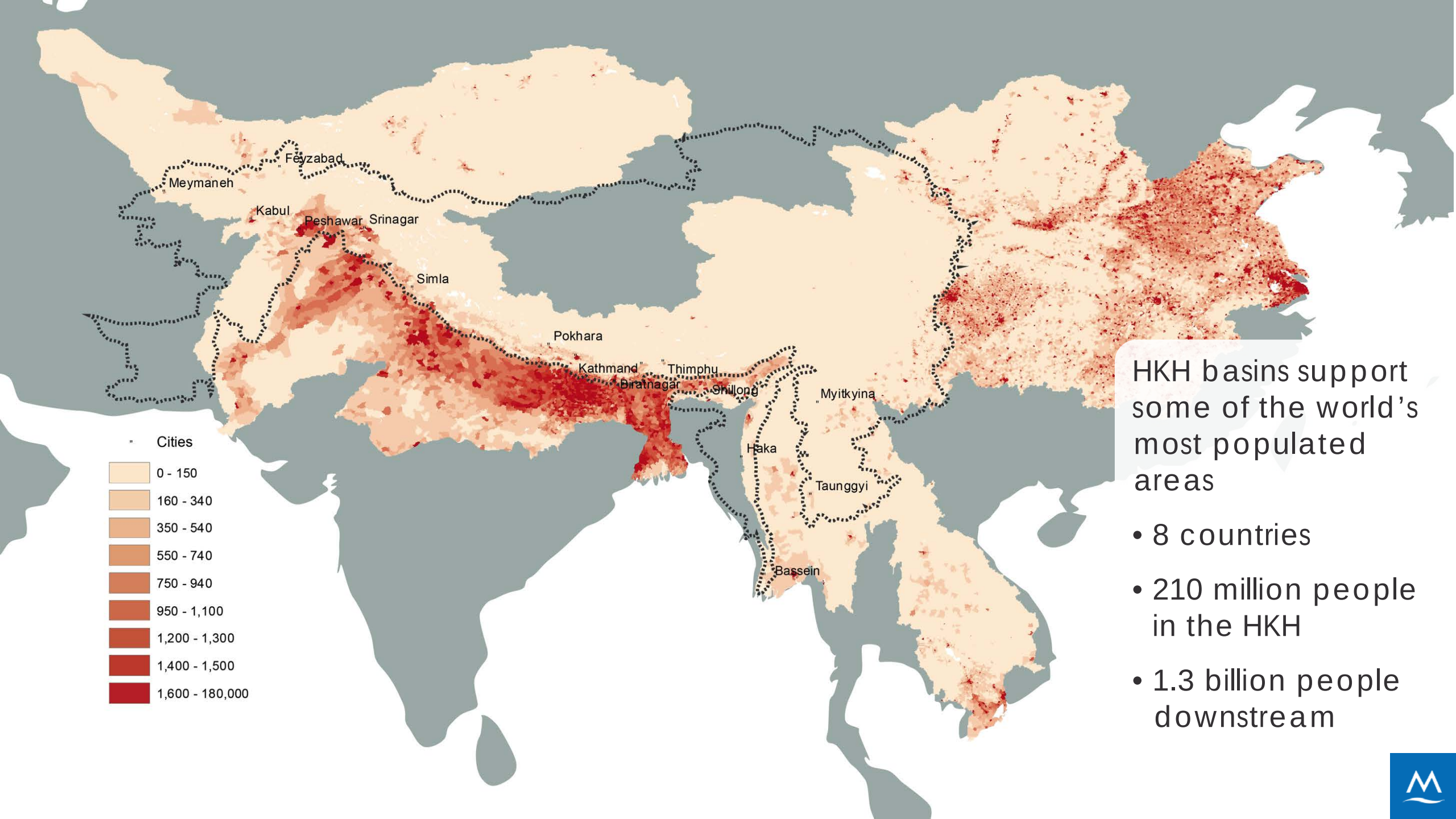
ICIMOD

Space Applications for Disaster Risk Reduction in the HKH Region

Birendra Bajracharya

The Hindu Kush Himalaya

Global asset for food, energy, water, and cultural and biological diversity



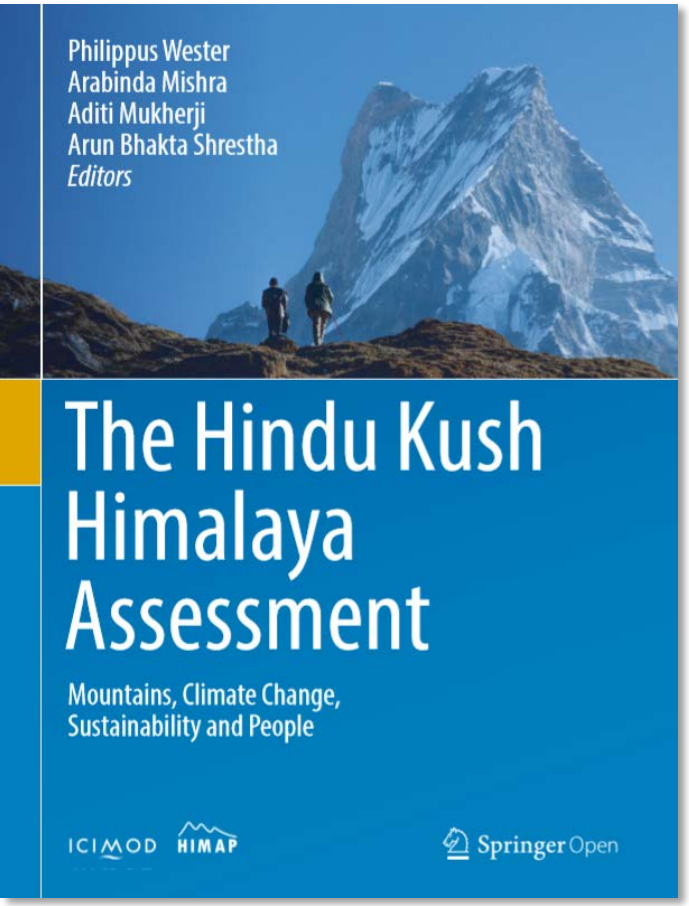
HKH basins support some of the world's most populated areas

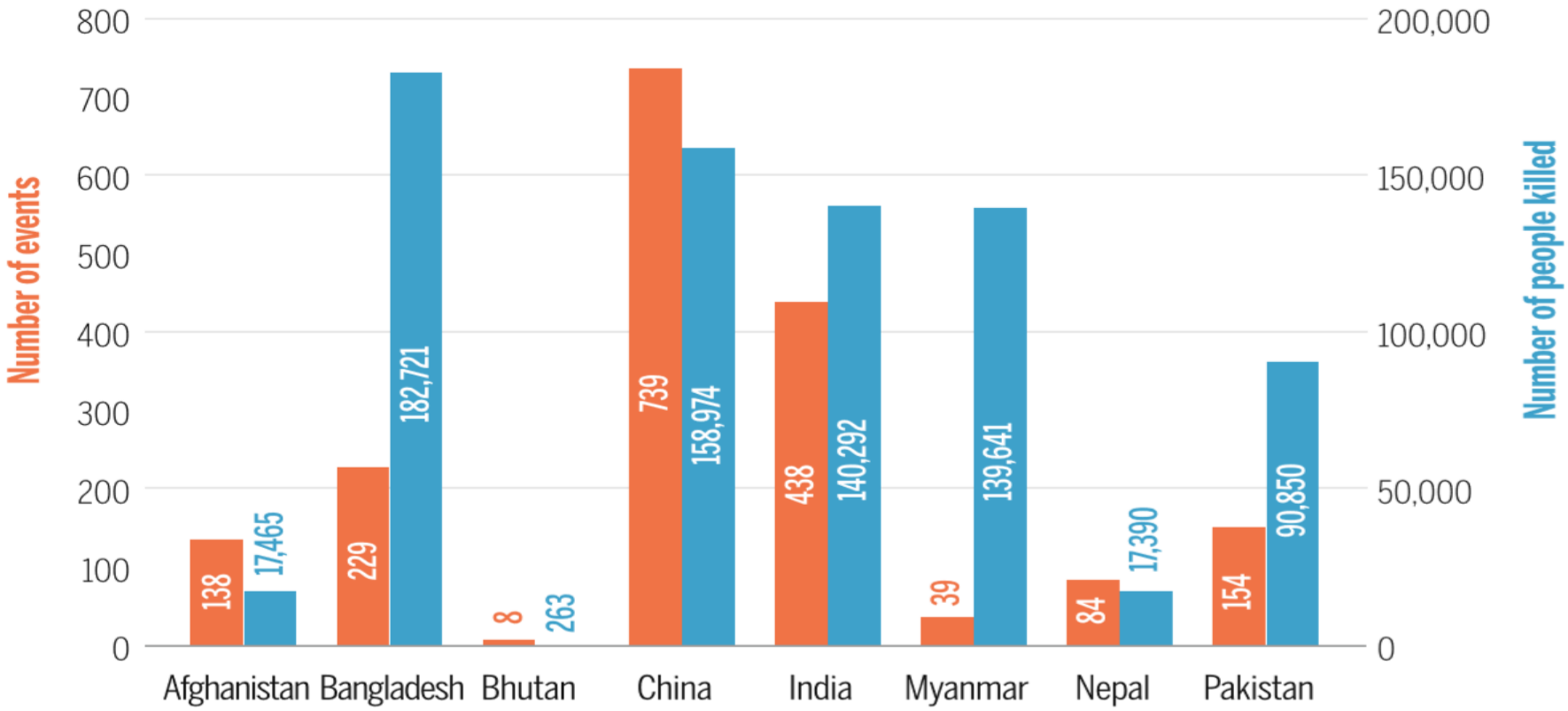
- 8 countries
- 210 million people in the HKH
- 1.3 billion people downstream

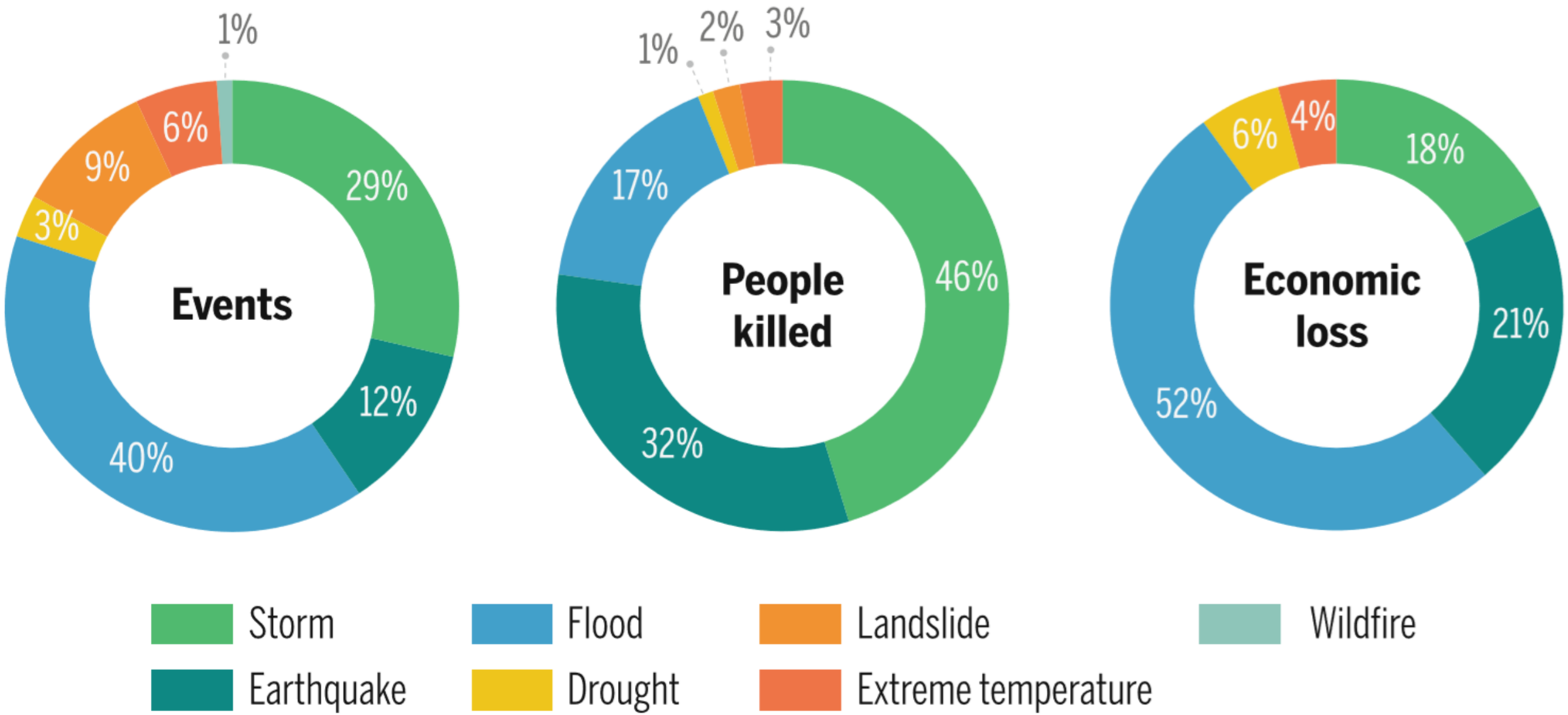
International Centre for Integrated Mountain Development (ICIMOD)

A regional mountain knowledge, learning, and enabling centre devoted to sustainable mountain development for mountains and people

HKH – hotspot of natural disasters







Proportional impact of different types of disaster in HKH countries between 1980 and 2015 (Source EM-DAT: The Emergency Events Database—Université catholique de Louvain (UCL)—CRED, D. Guha-Sapir—www.emdat.be, Brussels, Belgium)

Space applications for DRR

- Disaster early warning systems which are considered to be the most effective DRR strategy, are very limited or non-existent. Earth observation combined with modeling and geospatial technology provide opportunities to fill these gaps.
- The *Sendai Framework for Disaster Risk Reduction* explicitly references to the need of satellite Earth observation for improving disaster risk management and reduction by providing timely risk information relevant to the full cycle of disaster management (mitigation, preparedness, warning, response and recovery).
- The countries of the HKH need to cooperate more extensively and effectively by sharing data, information, and scientific and indigenous knowledge, and by fostering transboundary disaster risk reduction practices *(HIMAP/ ICIMOD)*.

- connects space to village by helping developing countries use satellite data to address critical challenges
- develops innovative solutions to improve livelihoods and foster self-reliance in Asia, Africa, and the Americas.

SERVIR

USAID NASA adpc CIAT ICIMOD RCMRD

Priority areas

Agriculture & food security

Weather & climate services

Land use land cover & ecosystem services

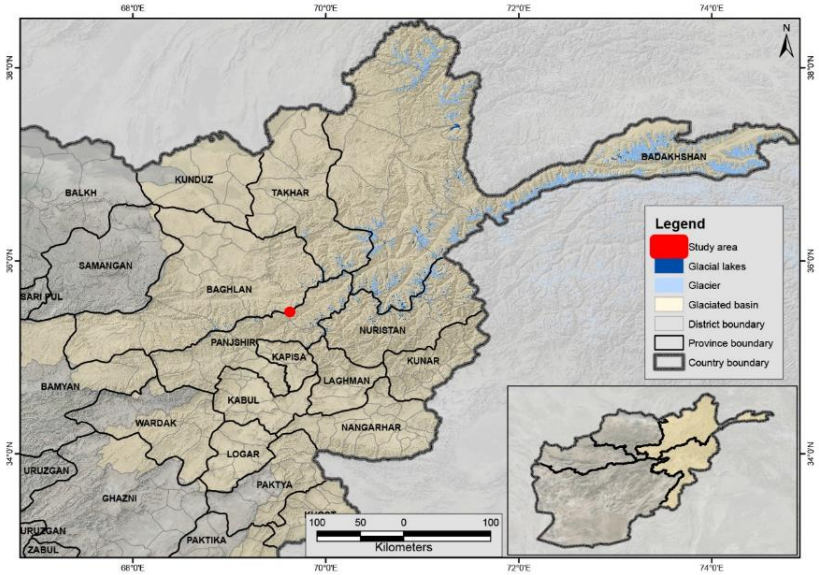
Water & related disasters

- Improve access to data, tools, model and online mapping and visualization
- Strengthen capacity of regional stakeholders
- Create user-tailored decision support tools and information services
- Foster regional cooperation and build international partnerships

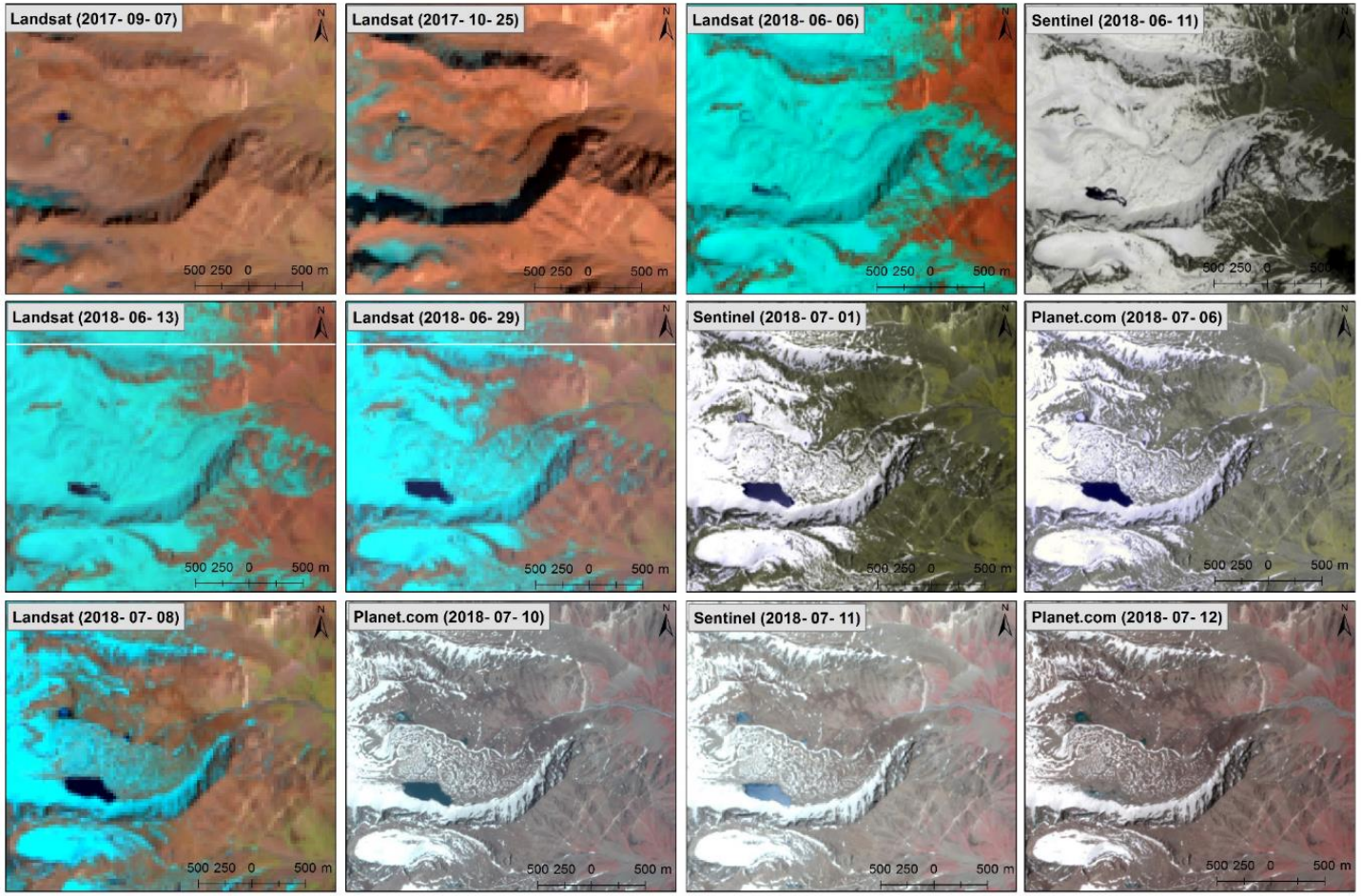
Disaster related applications

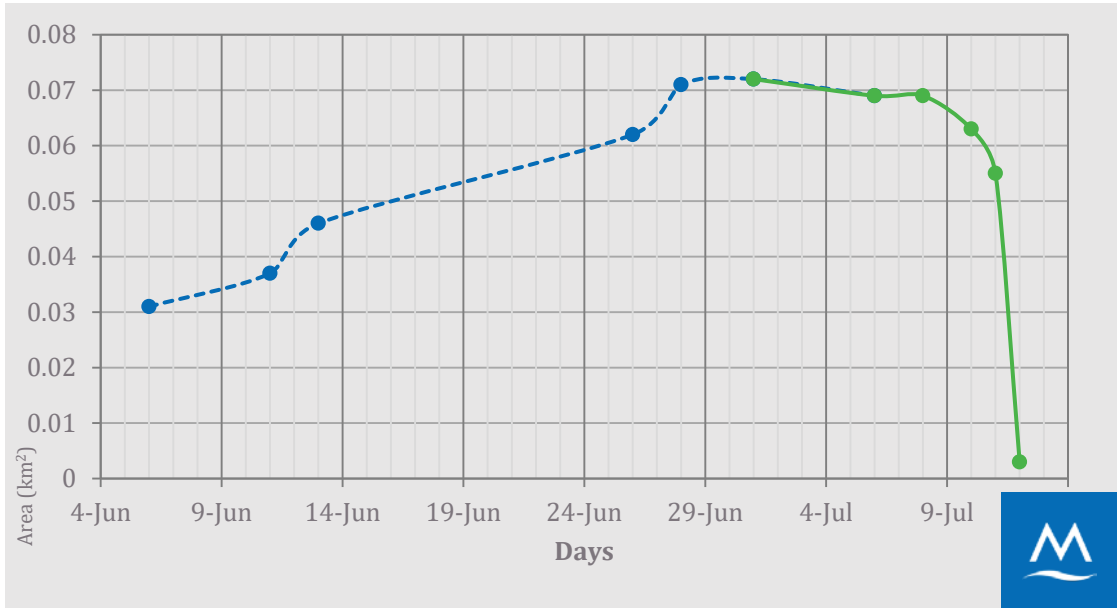
- Information analysis and damage assessment
- Improving flood forecasting and early warning
- High impact weather assessment
- Drought monitoring and early warning
- Information management, visualization and dissemination

Panjshir flood in Afghanistan
(12 July 2018)



Panjshir flood in Afghanistan: understanding the cause





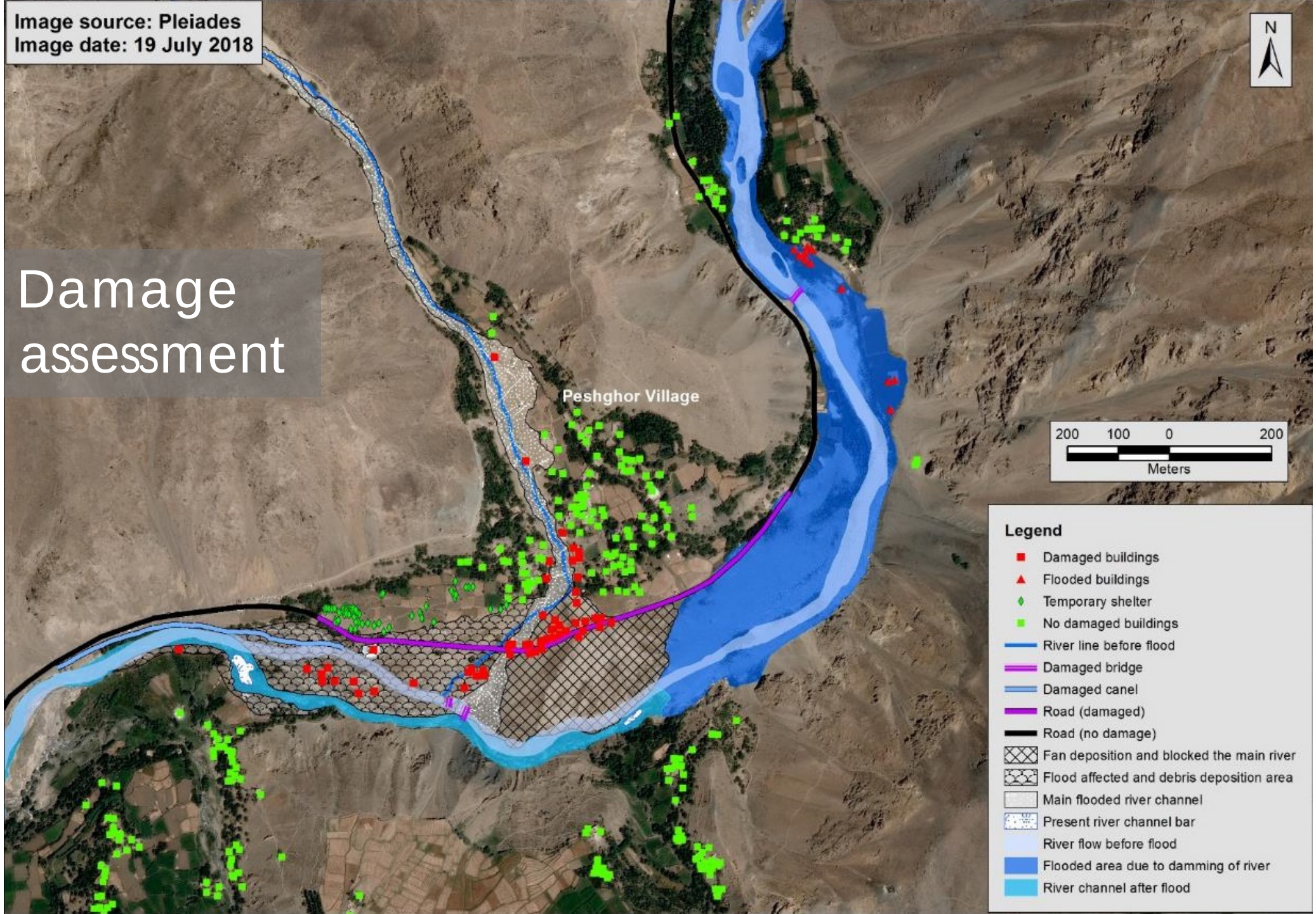
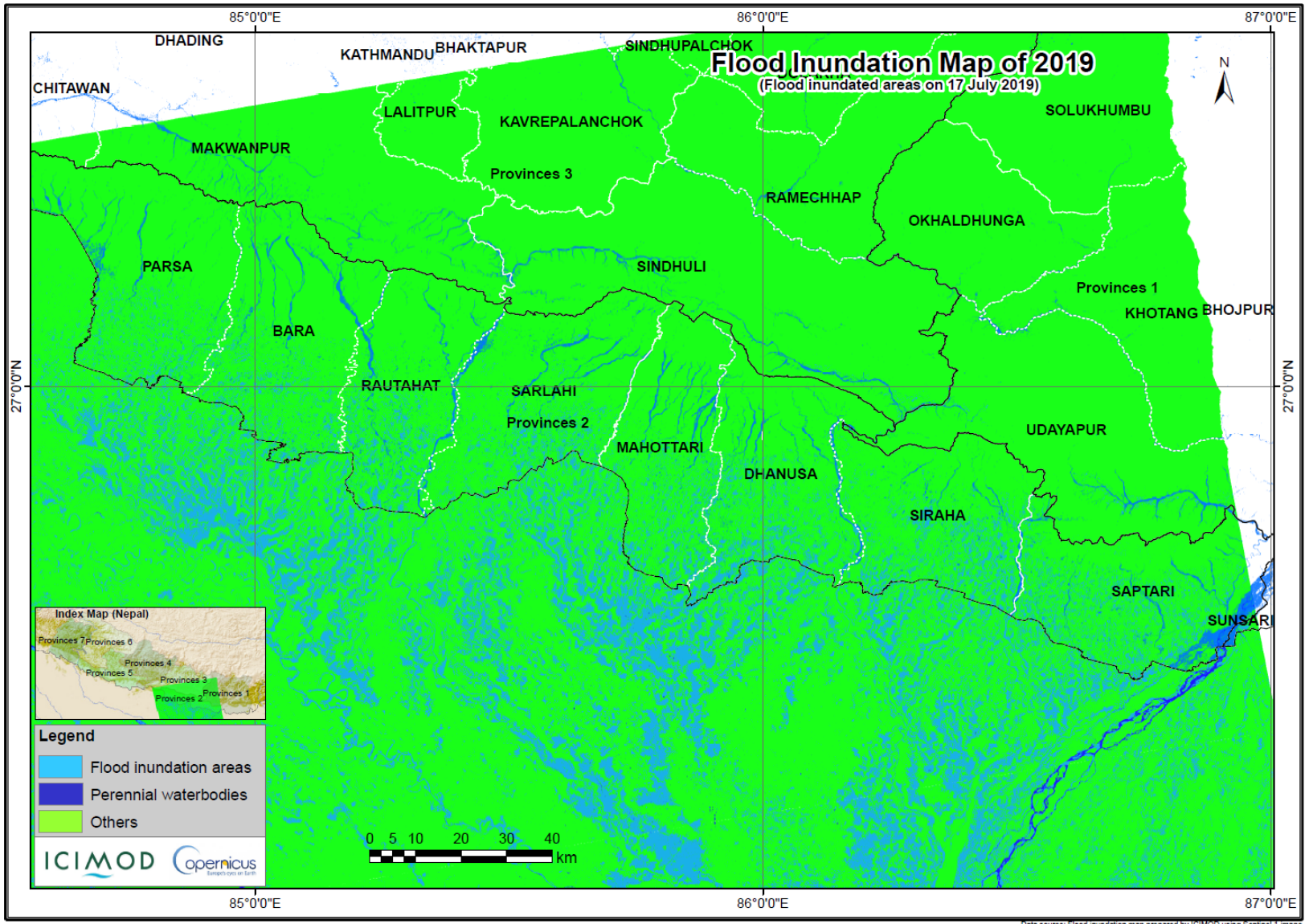


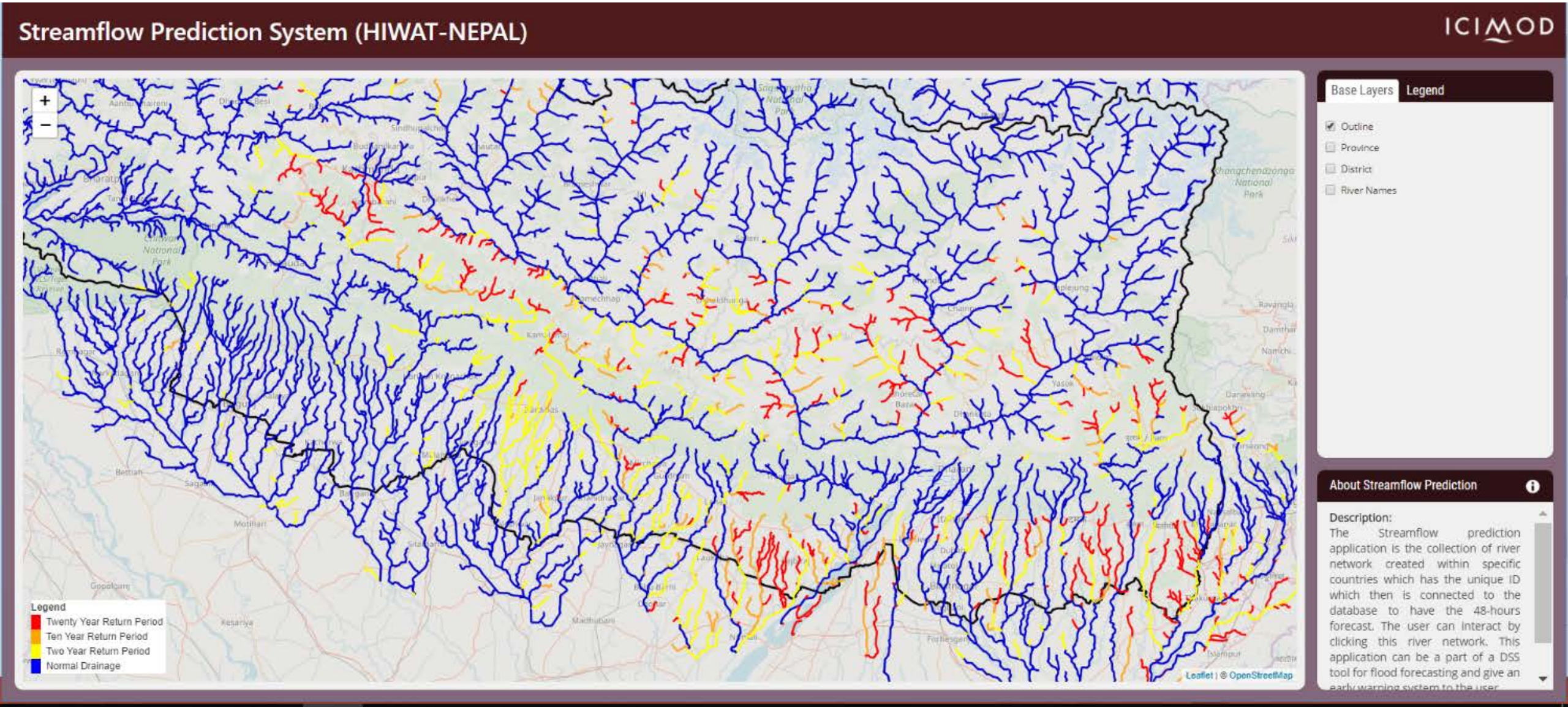
Image source: Pleiades
Image date: 19 July 2018
Damage assessment
Peshghor Village
N
200 100 0 200
Meters
Legend
Damaged buildings
Flooded buildings
Temporary shelter
No damaged buildings
River line before flood
Damaged bridge
Damaged canel
Road (damaged)
Road (no damage)
Fan deposition and blocked the main river
Flood affected and debris deposition area
Main flooded river channel
Present river channel bar
River flow before flood
Flooded area due to damming of river
River channel after flood

Flood inundation mapping (Nepal and Bangladesh)

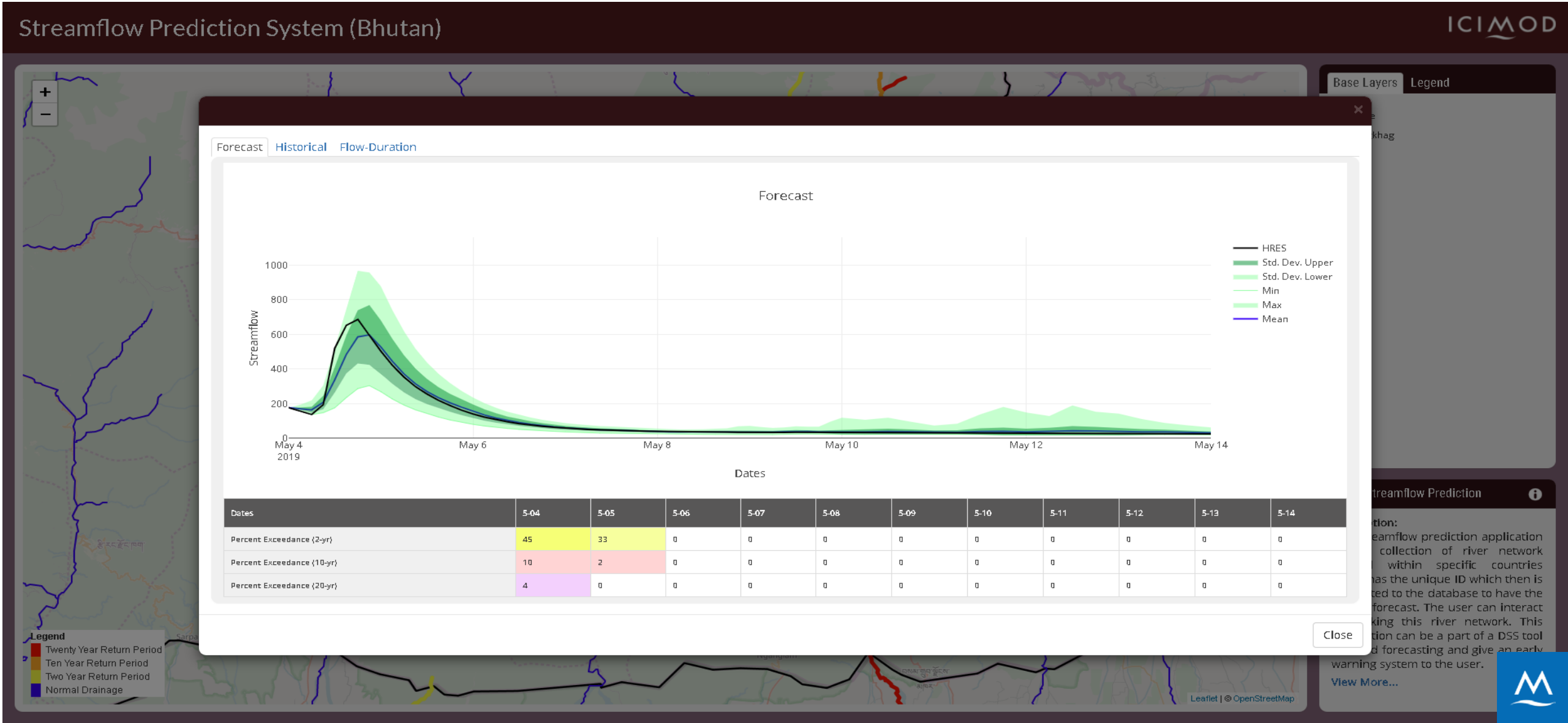


- Use of SAR data during cloudy season
- Regularly updated as soon as new images are available
- Web based platform for interactive visualization of inundated area

Improving flood forecasting and early warning

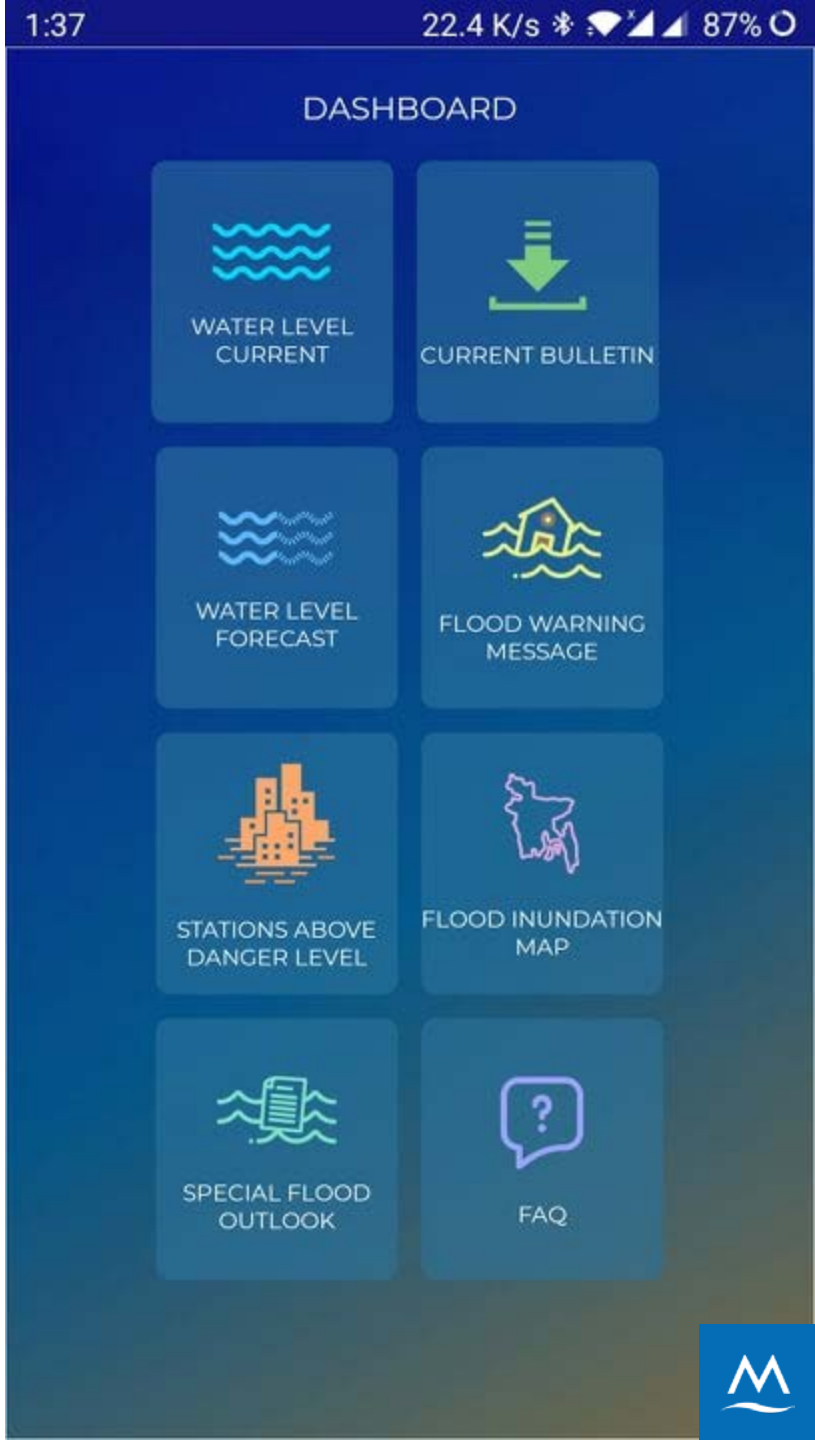


Improving flood forecasting and early warning



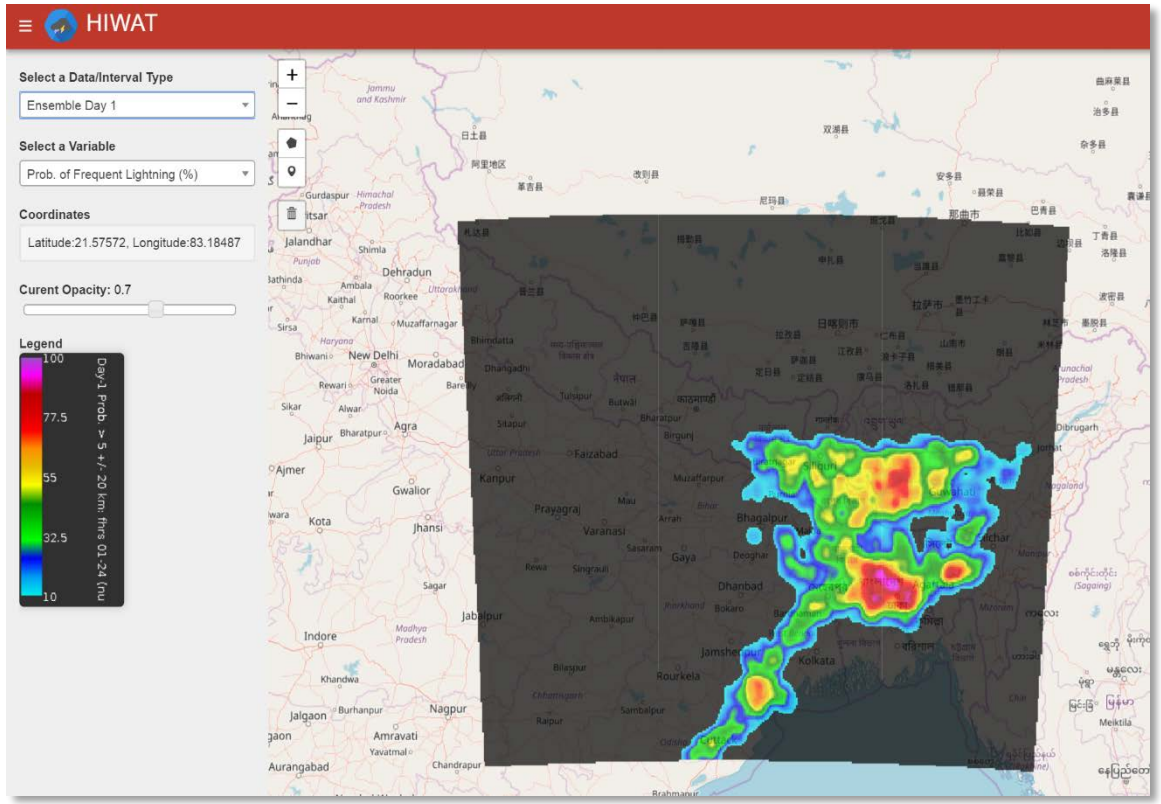
Dissemination of information

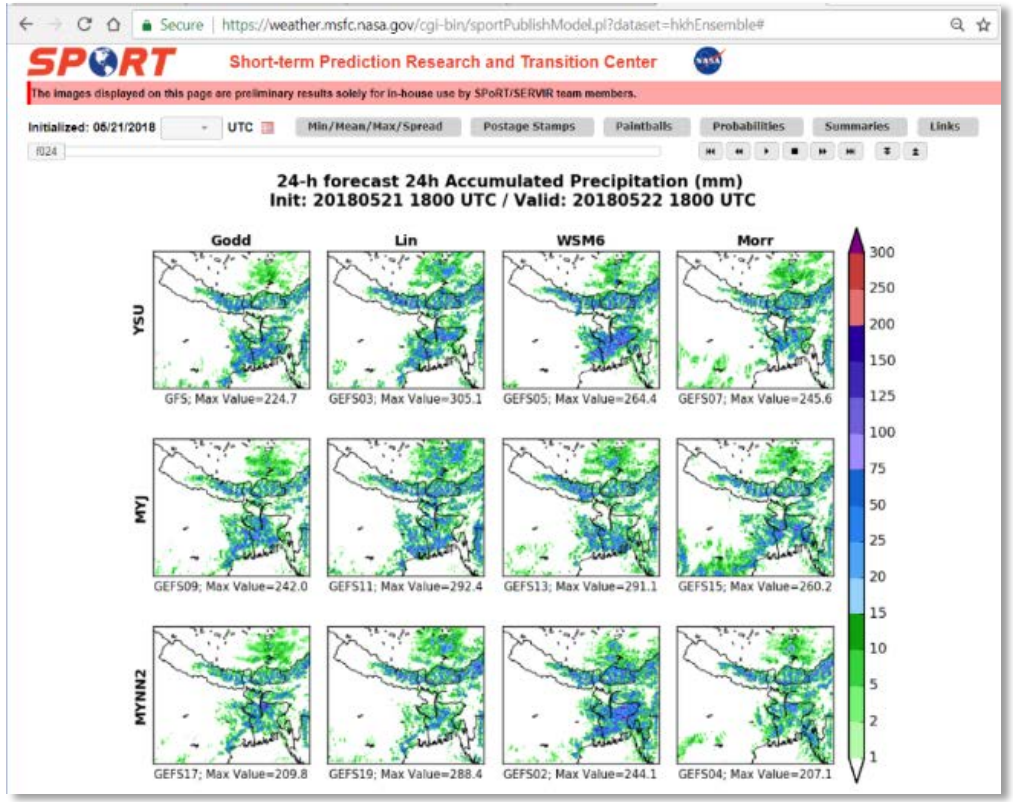
- Hydroviewer application developed on Tethys portal to visualize forecast for South Asia using ECMWF
- A mobile app was developed for disseminating Flood early warning in Bangladesh
- a hydrostatistics toolset developed by BYU for supporting the validation



High Impact Weather Assessment Tool (HIWAT)

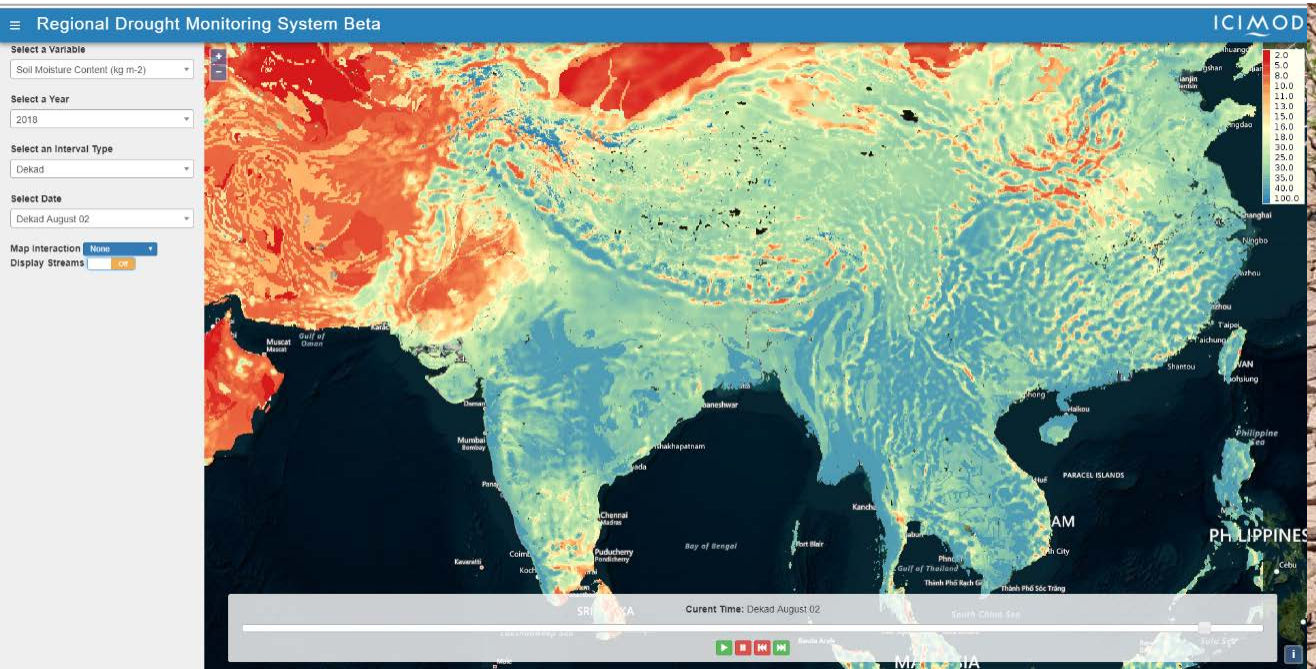
- HIWAT system implemented on the NASA Socrates system and was run during the extreme weather season of 2018
- Visualization application on Tethys platform developed for disseminating the forecast





Drought monitoring and early warning

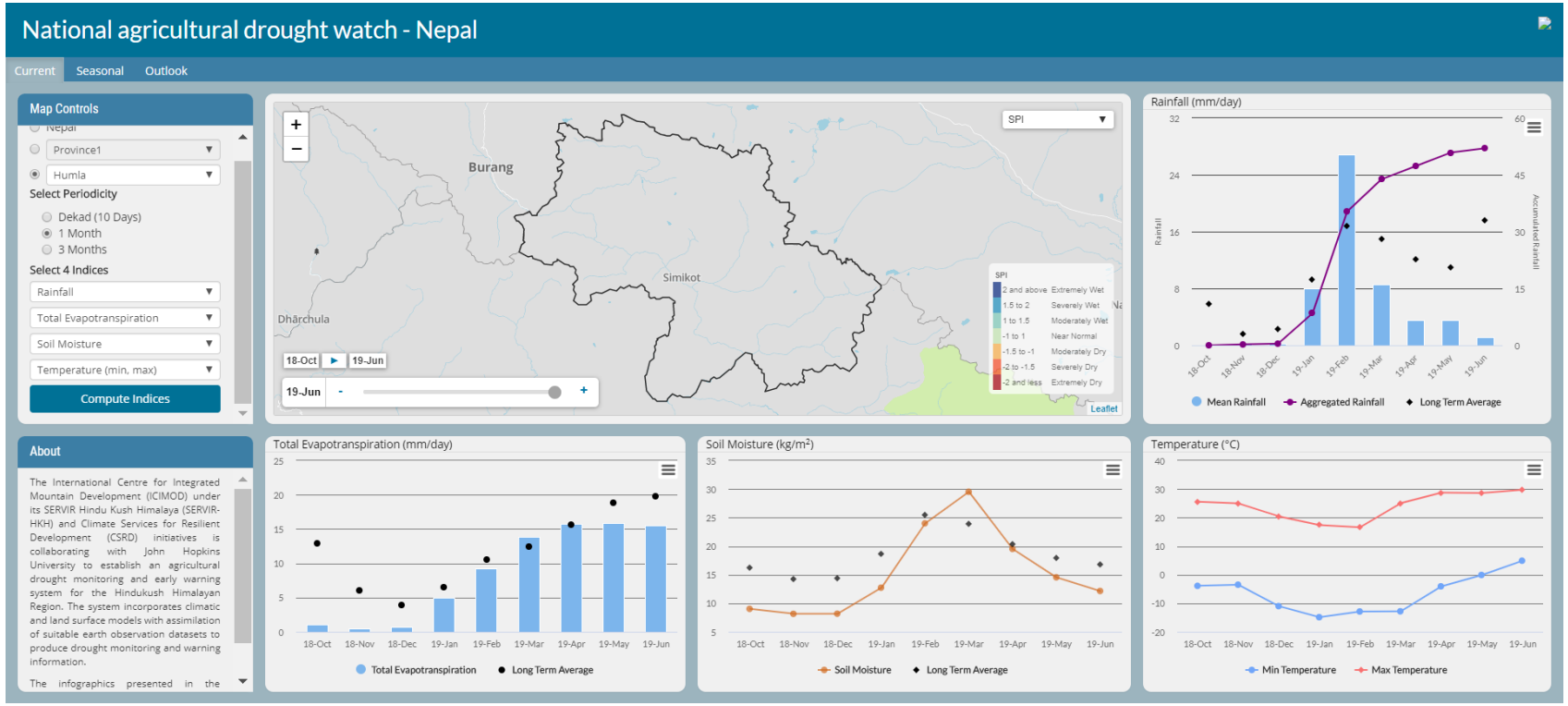
- Regional/ national level application
- Historical data for 18 years (ability to explore historical time series)
- Forecast 3 to six months (aggregated data by ten days, monthly, quarterly)
- Map interaction by point, polygon, custom shape by KML (National)



Drought monitoring and early warning for improving agro-met advisory

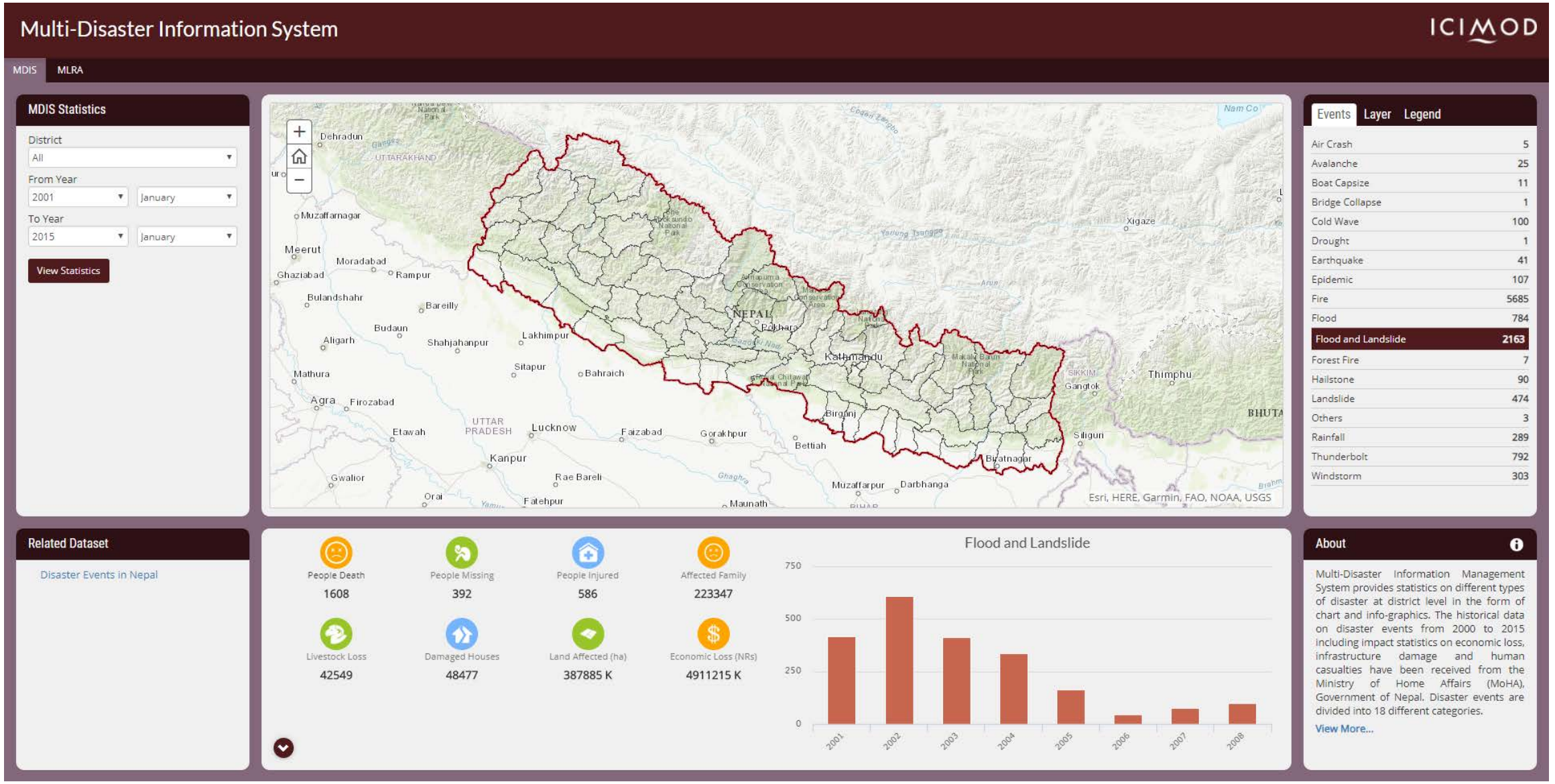
- Information on current and future drought conditions for better advisory process
- Contextualization of drought indicators to the cropping patterns increase the ability to provide meaningful advisory
- Partners' capacity enhanced to understand biases and calibrate products

http://geoapps.icimod.org/nepalDrought/

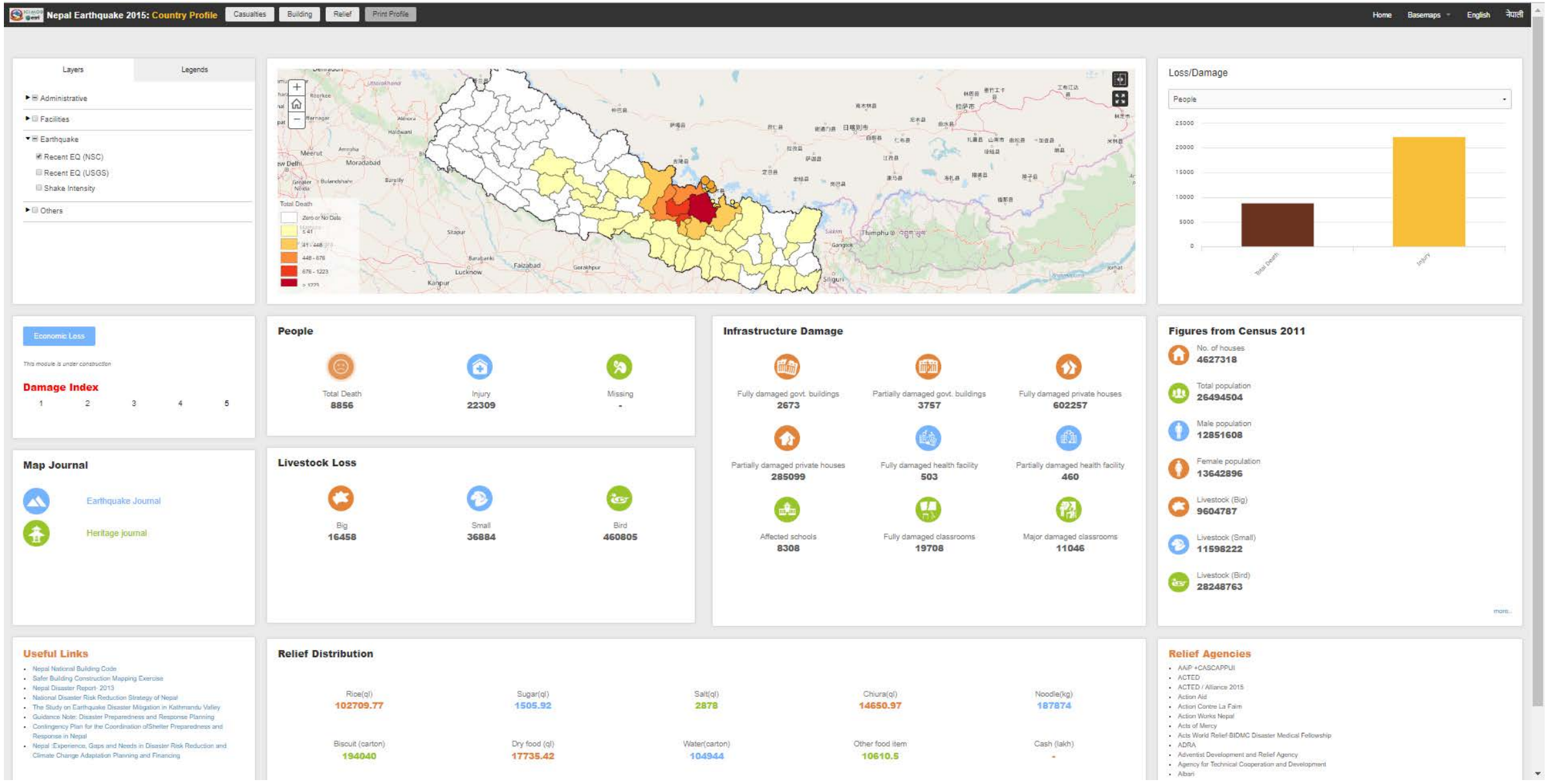


Information management, visualization and dissemination

Disaster Information Management System



NDRRP (Nepal Earthquake)



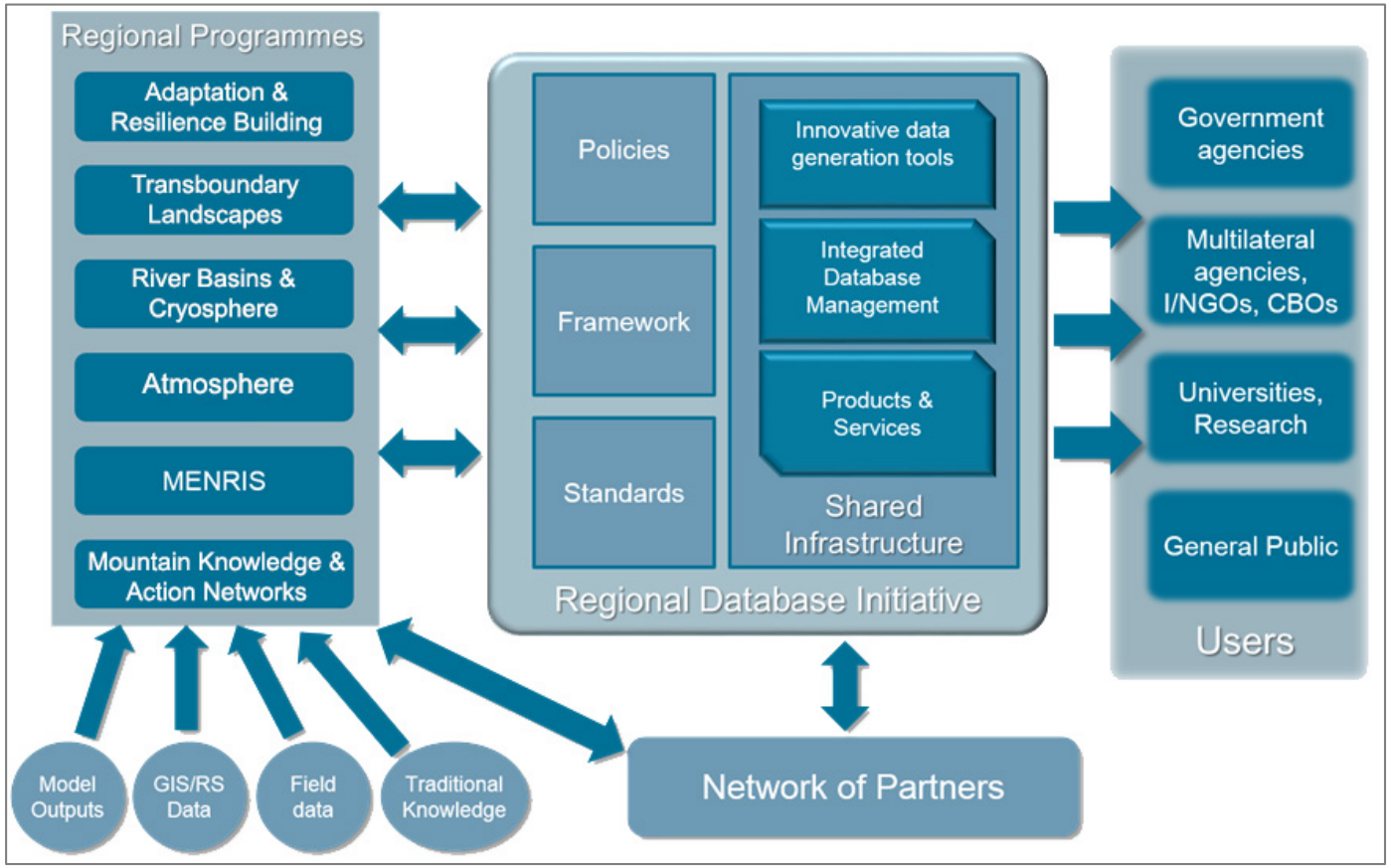
Capacity building efforts

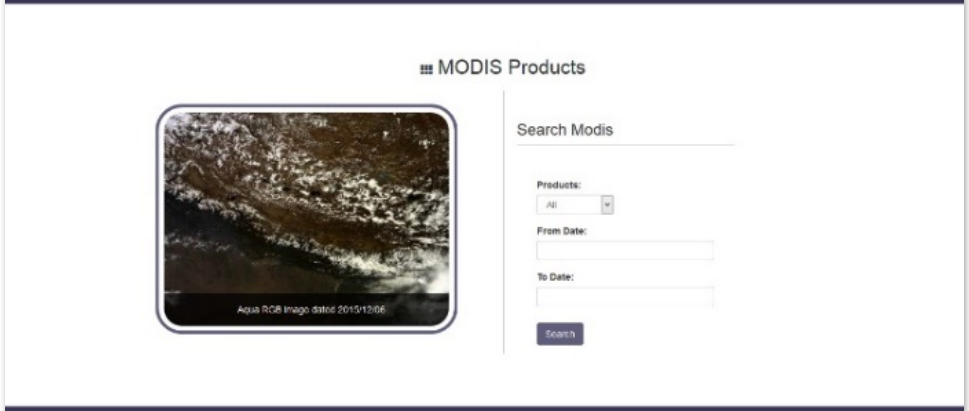
- Courses designed on specific applications/ services
- Different types of trainings
  - Structured Training
  - On the Job Training
  - Training of Trainers
  - Policy dialogs

Women in GIT

University partnership

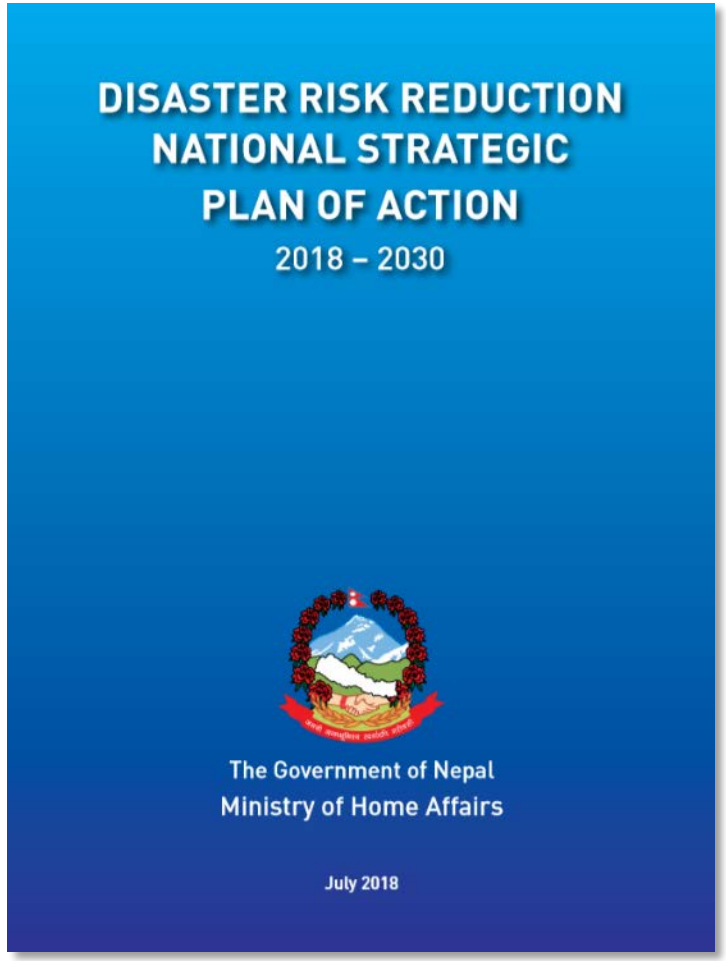
Promoting data sharing: Regional database system

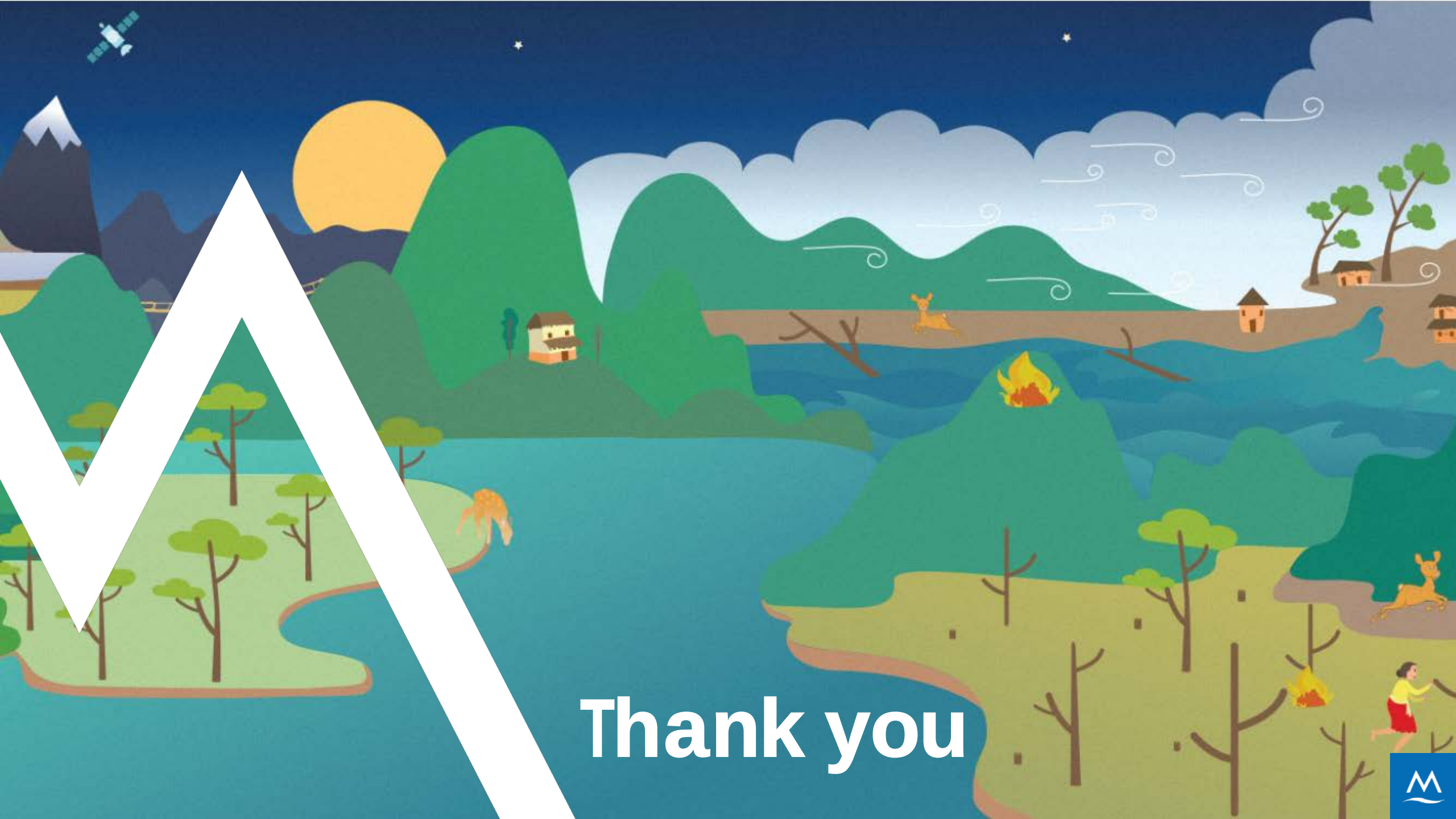




Conclusion

- positive developments in government policies for use of space information and technologies on DRR
- quick access to satellite data, their analysis, and information dissemination during disasters are major challenges
- lack of capacity and institutional mechanisms are major gaps
- use of data from regional satellites still limited
- increased regional cooperation on access to data, information, and scientific collaboration is urgent to address the needs of DRR




Thank you