

A satellite view of Earth from space, showing a curved horizon and a landscape of brown and tan terrain with scattered blue lakes. A white zigzag graphic is overlaid on the left side of the image.

ICIMOD

Birendra Bajracharya

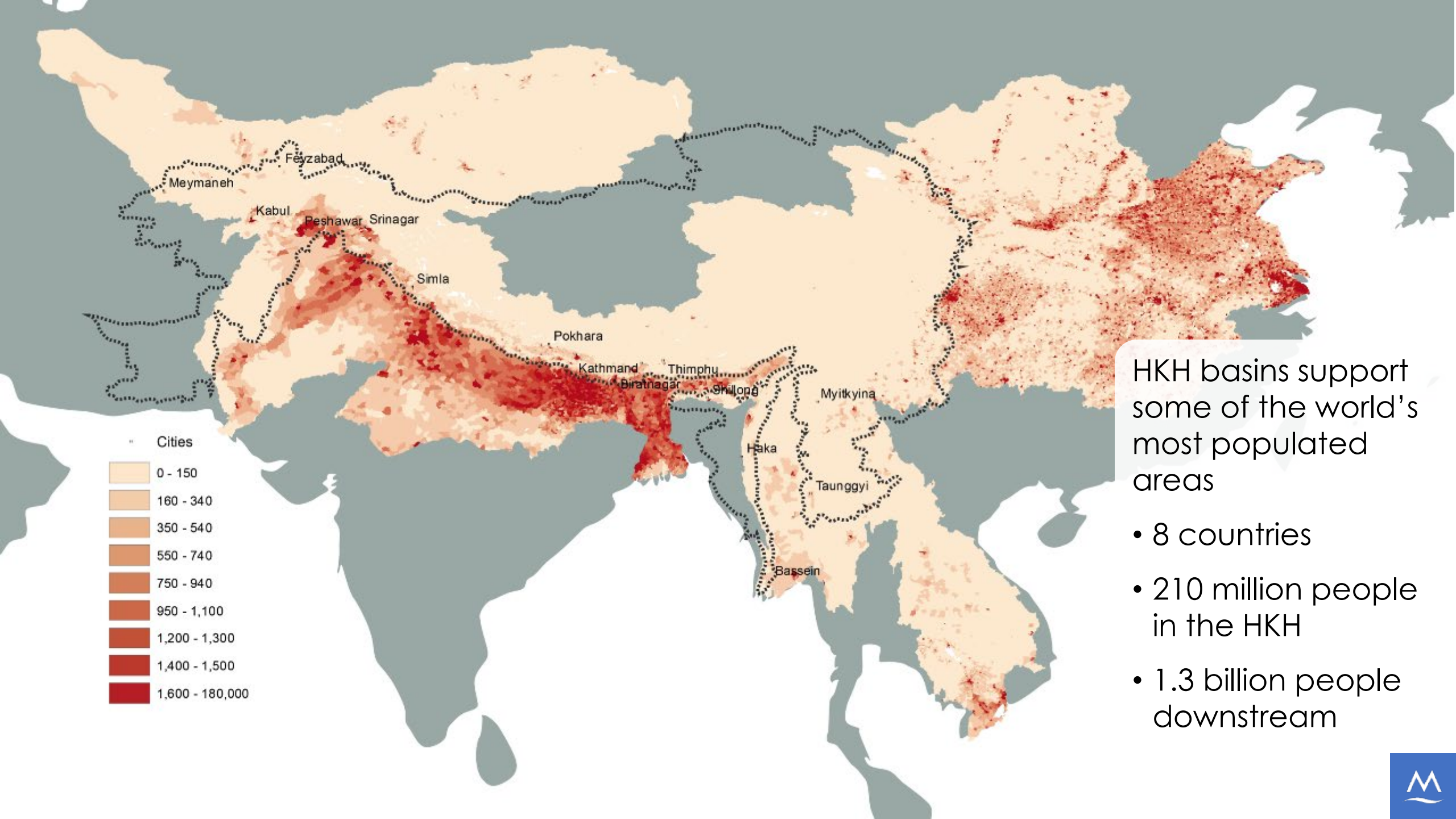
19 March 2022

**Earth observation
applications at ICIMOD**

International Centre for Integrated Mountain Development (ICIMOD)

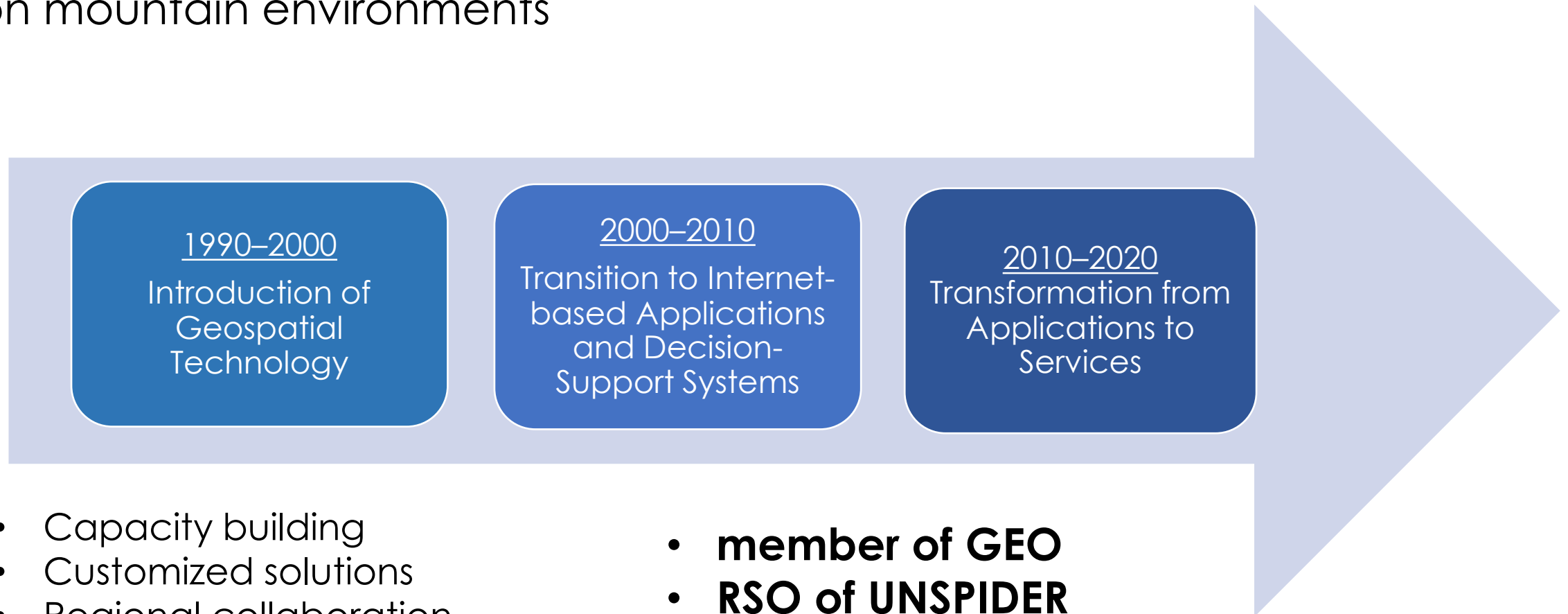
A regional mountain knowledge, learning, and enabling centre devoted to sustainable mountain development for mountains and people





EO Applications in the HKH

ICIMOD established Mountain Environment Regional Information System (MENRIS) in 1990 to promote the use of GIS and RS applications focusing on mountain environments



- Capacity building
- Customized solutions
- Regional collaboration

- **member of GEO**
- **RSO of UNSPIDER**

ICIMOD as a regional hub of SERVIR



Connecting space to village through innovative solutions using Earth observation and Geospatial technologies to address critical challenges, improve livelihoods and foster self-reliance in Asia, Africa, and the Americas.



Thematic Priorities



Agriculture and food security



LULC and Ecosystems



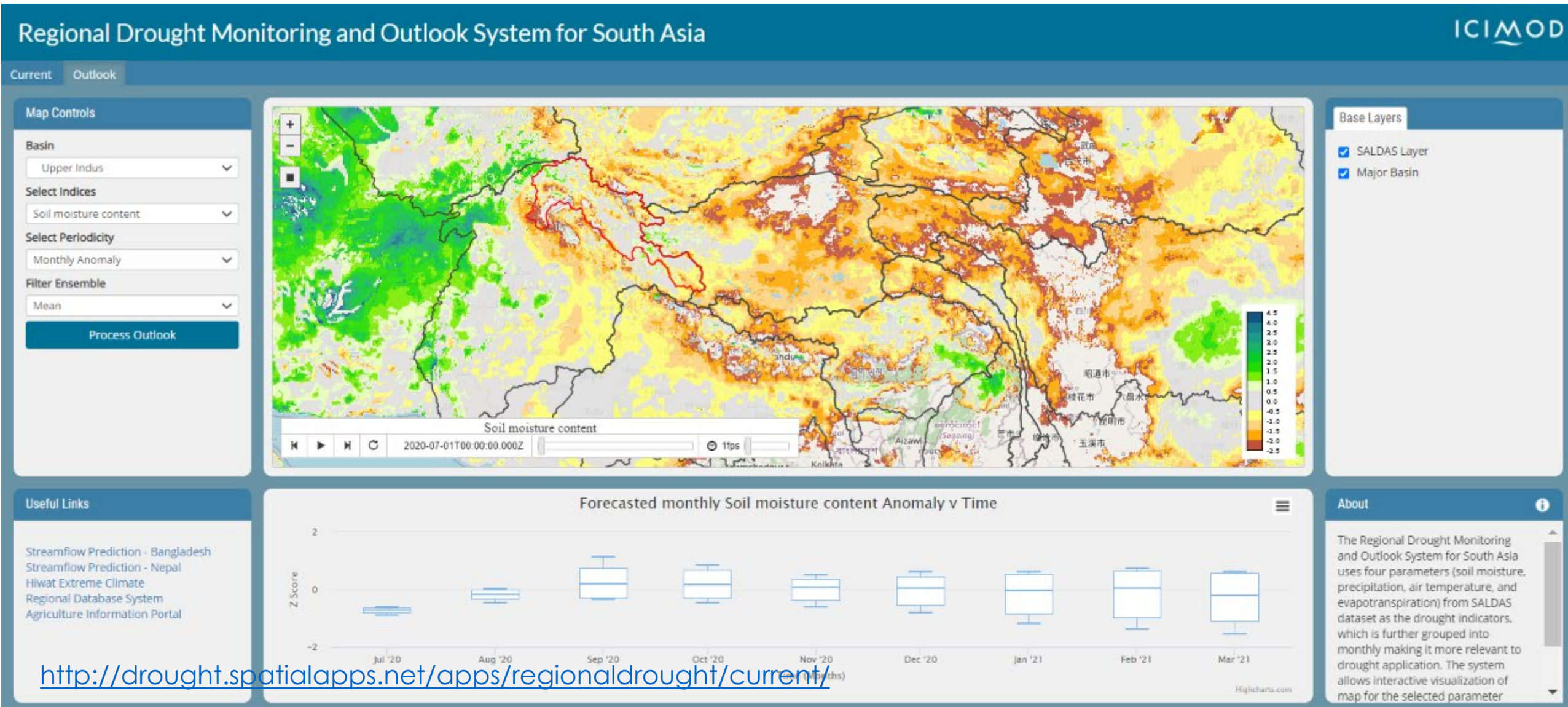
Water resources and hydro-climatic disasters



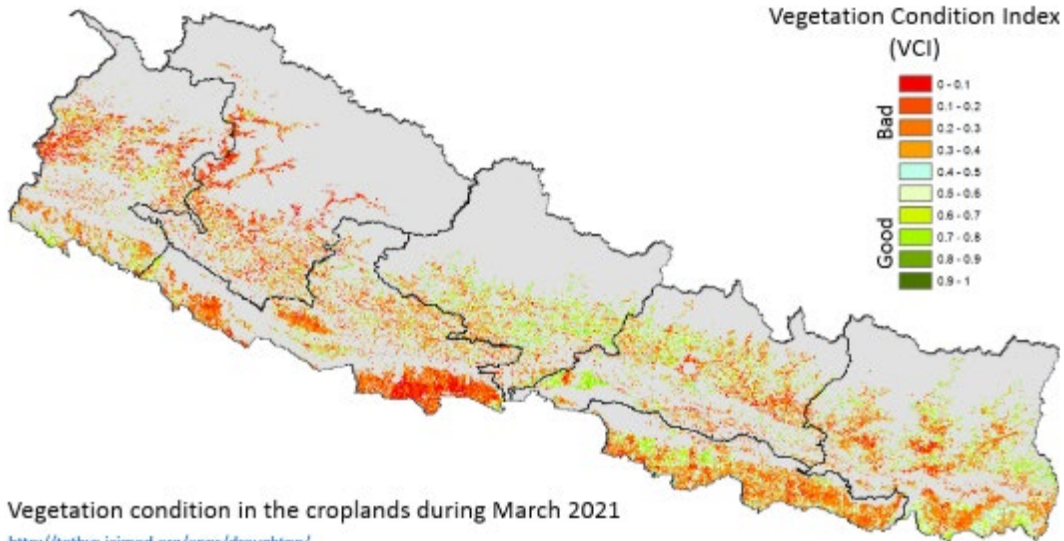
Weather and climate

Agriculture and Food Security

- Drought Monitoring and Outlook



Drought monitoring and early warning



Vegetation condition in the croplands during March 2021
<http://tethys.icimod.org/apps/droughtnpl/>

Drought response plan for the livestock sector – 2021

General Directorate of Livestock and Animal Health, Ministry of Agriculture, Irrigation and Livestock, Afghanistan

Declaration of national drought emergency
 Presidential office;
 Rangelands Directorate used for farmer aid assistance planning

National agricultural drought watch - Bangladesh

Current Seasonal Outlook

Map Controls: Bangladesh, Districts, Upazila, Thana, Union, Village

Map: Interactive map of Bangladesh showing drought watch data.

Key Indicators:

- Rainfall:** Bar chart showing monthly rainfall (mm) from April to June 2021. Values are generally below the 100mm threshold.
- Accumulated Rainfall:** Line graph showing cumulative rainfall over time.
- Soil Moisture:** Line graph showing soil moisture percentage over time.
- Temperature:** Line graph showing maximum and minimum temperature anomalies.
- Evapotranspiration:** Line graph showing maximum and minimum evapotranspiration anomalies.

National agricultural drought watch - Nepal

Current Seasonal Outlook

Map Controls: Nepal, Province, District, Municipality, Village

Map: Interactive map of Nepal showing drought watch data.

Key Indicators:

- Forecasted monthly Rainfall Flux Anomaly v Time:** Box plot showing rainfall anomalies from April to June 2021.
- Forecasted monthly Soil moisture content Anomaly v Time:** Box plot showing soil moisture anomalies.
- Forecasted monthly Total evapotranspiration Anomaly v Time:** Box plot showing evapotranspiration anomalies.
- Forecasted monthly Air temperature Anomaly v Time:** Box plot showing temperature anomalies.

In-season crop area mapping

- Crop area mapping of rice area in Terai region completed with MoALD
- GeoFairy mobile app for field data
- Methodology development for yield estimation



Rice area in Terai districts of Nepal

Wheat mapping in Afghanistan

Wheat Mapping Application for Afghanistan

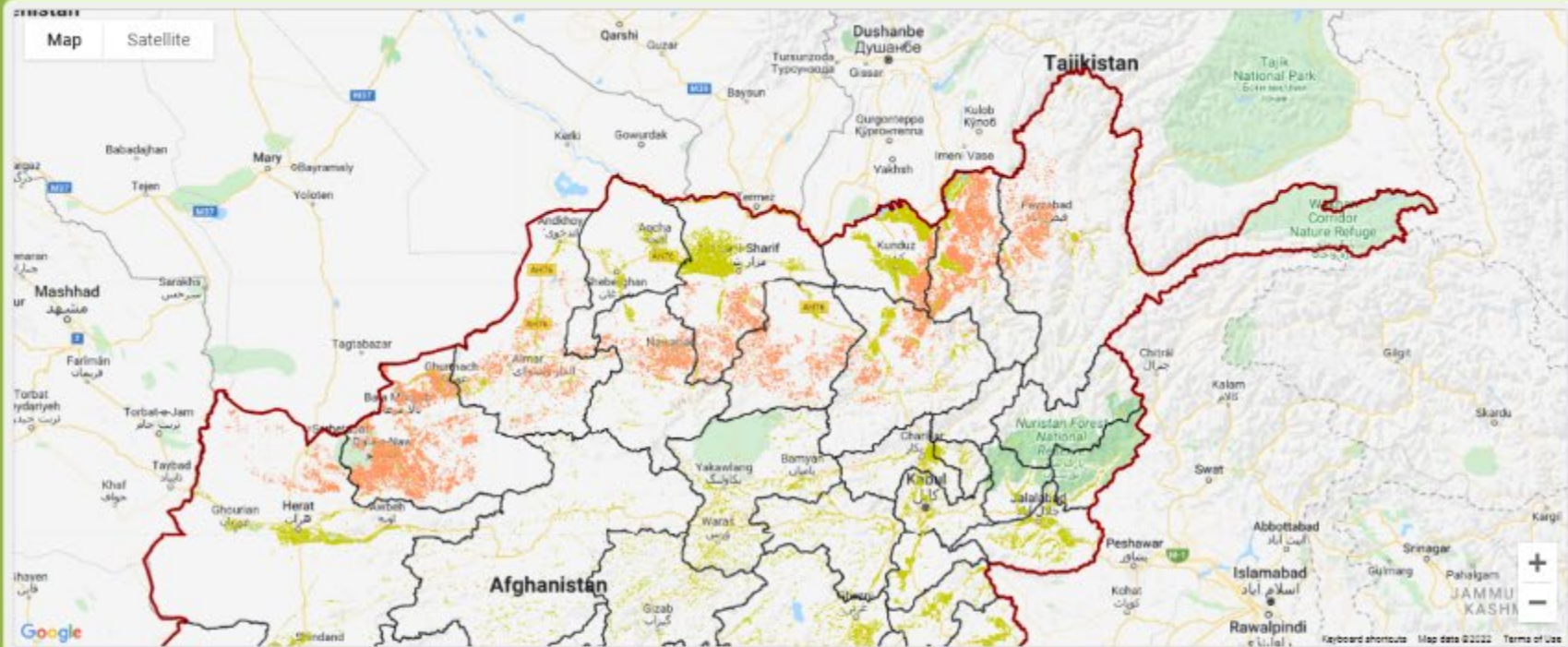


Wheat Statistics

Afghanistan

Province

Badkhashan



Layer

Country Outline

Province

Wheat Sown Area 2017 (Irrigated)

Wheat Sown Area 2017 (Rainfed)

Related Links

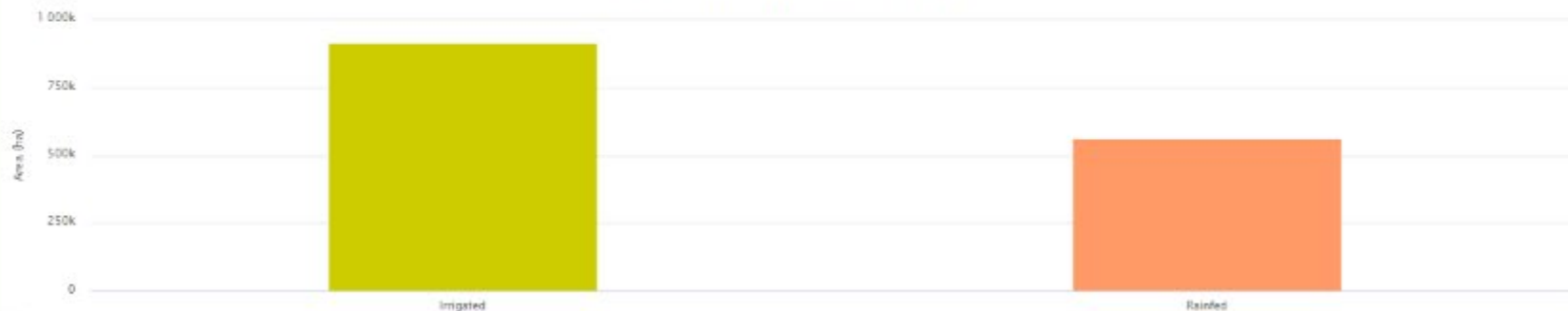
Data

[Wheat Sown Area in Afghanistan 2017](#)

Information Sheet

[Estimation of Wheat Growing Areas in Afghanistan](#)

Wheat Sown Area in Afghanistan (2017)



About

The application provides a visualization of data generated by a study on the "Estimation of Wheat Growing Areas in Afghanistan" carried out by the International Centre for Integrated Mountain Development and partners under its SERVIR Hindu Kush Himalaya (SERVIR-HKH) initiative.

[View More...](#)

Land cover monitoring system

Regional Land Cover Monitoring System

ICIMOD

Parameters

Hindu Kush Himalaya region

Ecoregion

Eastern Himalayan Alpine Me...

Biodiversity hotspot

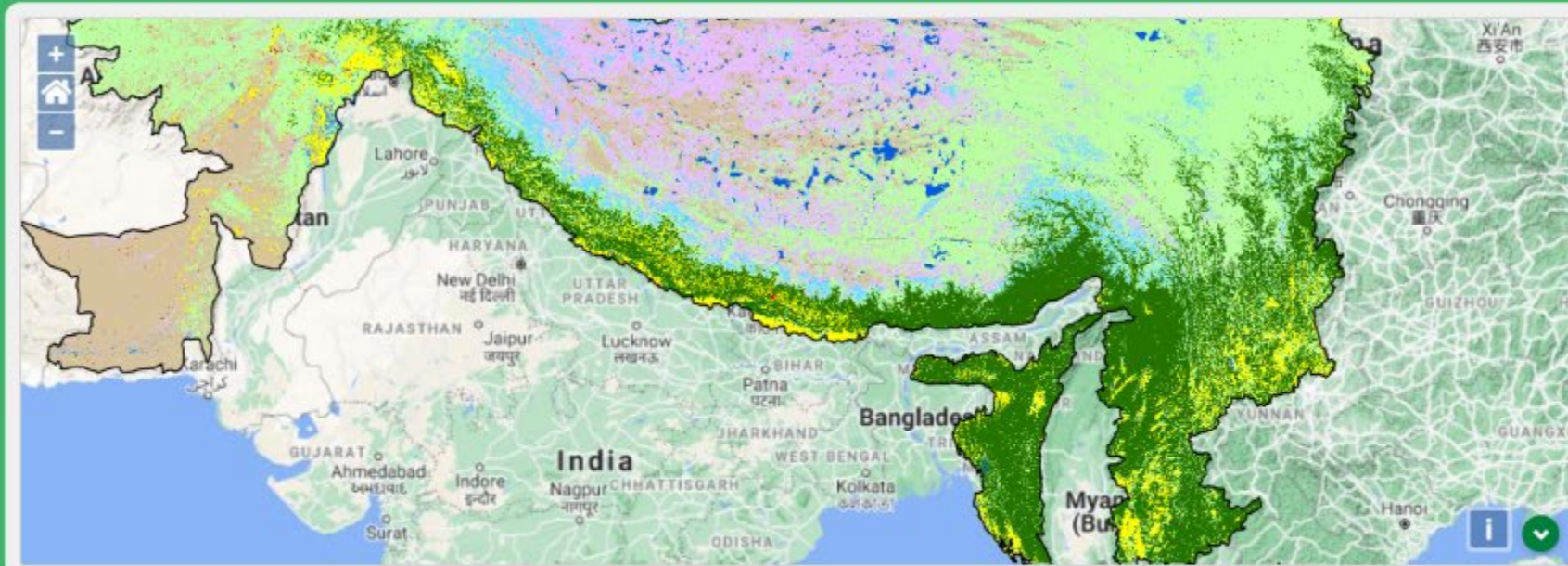
Himalaya

Draw polygon

Year

2018

Show trend



Layers

HKH boundary

Ecoregion

Biodiversity hotspot

Land cover

- Forest
- Grassland
- Cropland
- Bare soil
- Bare rock
- Built-up
- Snow and glacier
- Water body
- Riverbed

Useful links

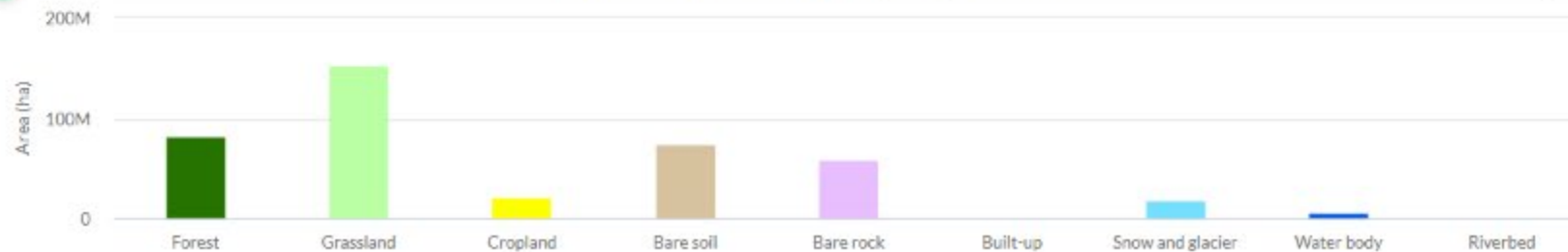
Data

[Land cover of HKH region](#)

Application guide

[RLCMS user guide](#)

Land cover of Hindu Kush Himalaya region in 2018



About

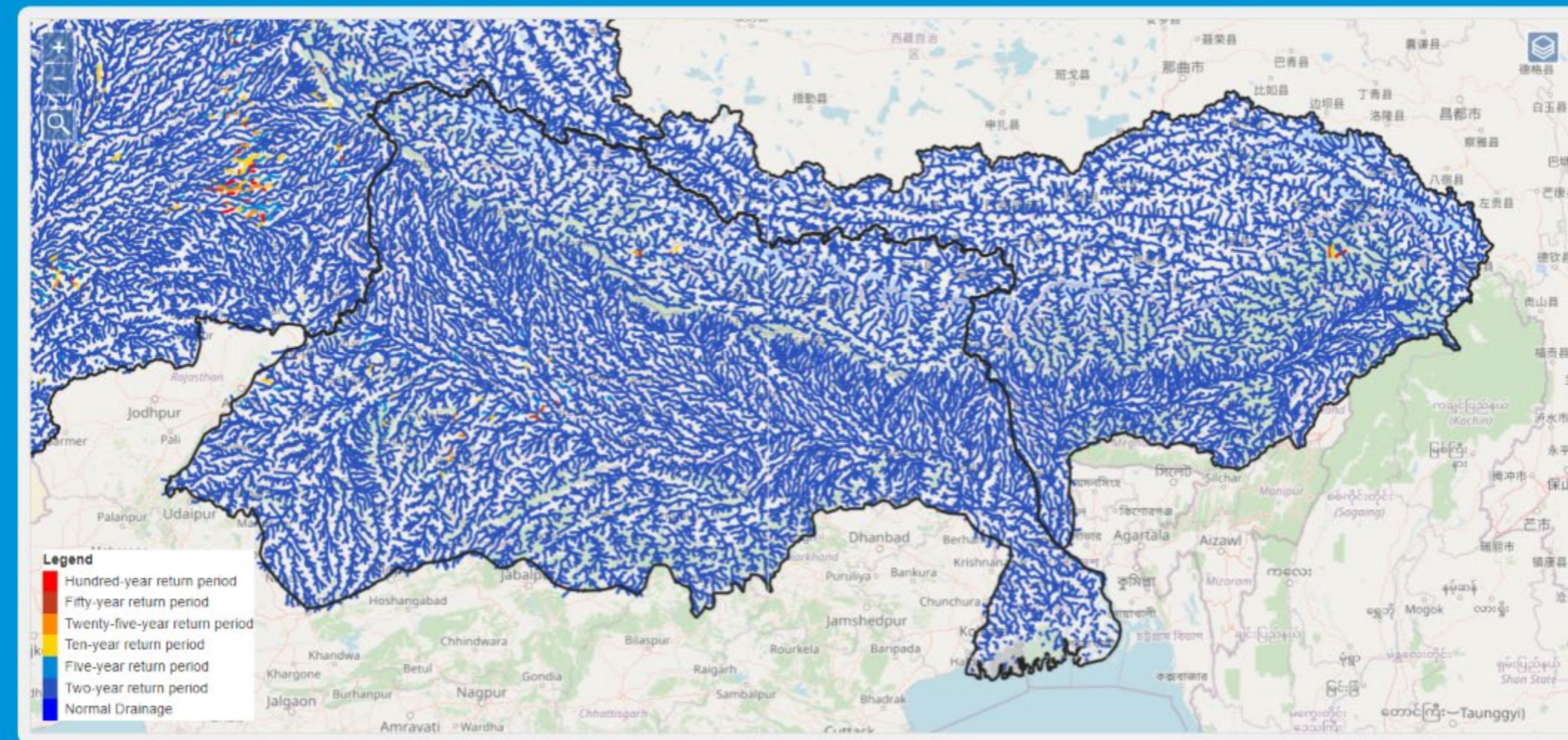
The web-based application provides easy access to the harmonized land cover database for the entire HKH region over 2000–2018.

[View More...](#)

Improving flood forecasting and early warning

Streamflow Prediction Tool - HKH river basins

ICIMOD



Layers

- Amu Darya
- Brahmaputra
- Ganges
- Indus

About Streamflow Prediction Tool **i**

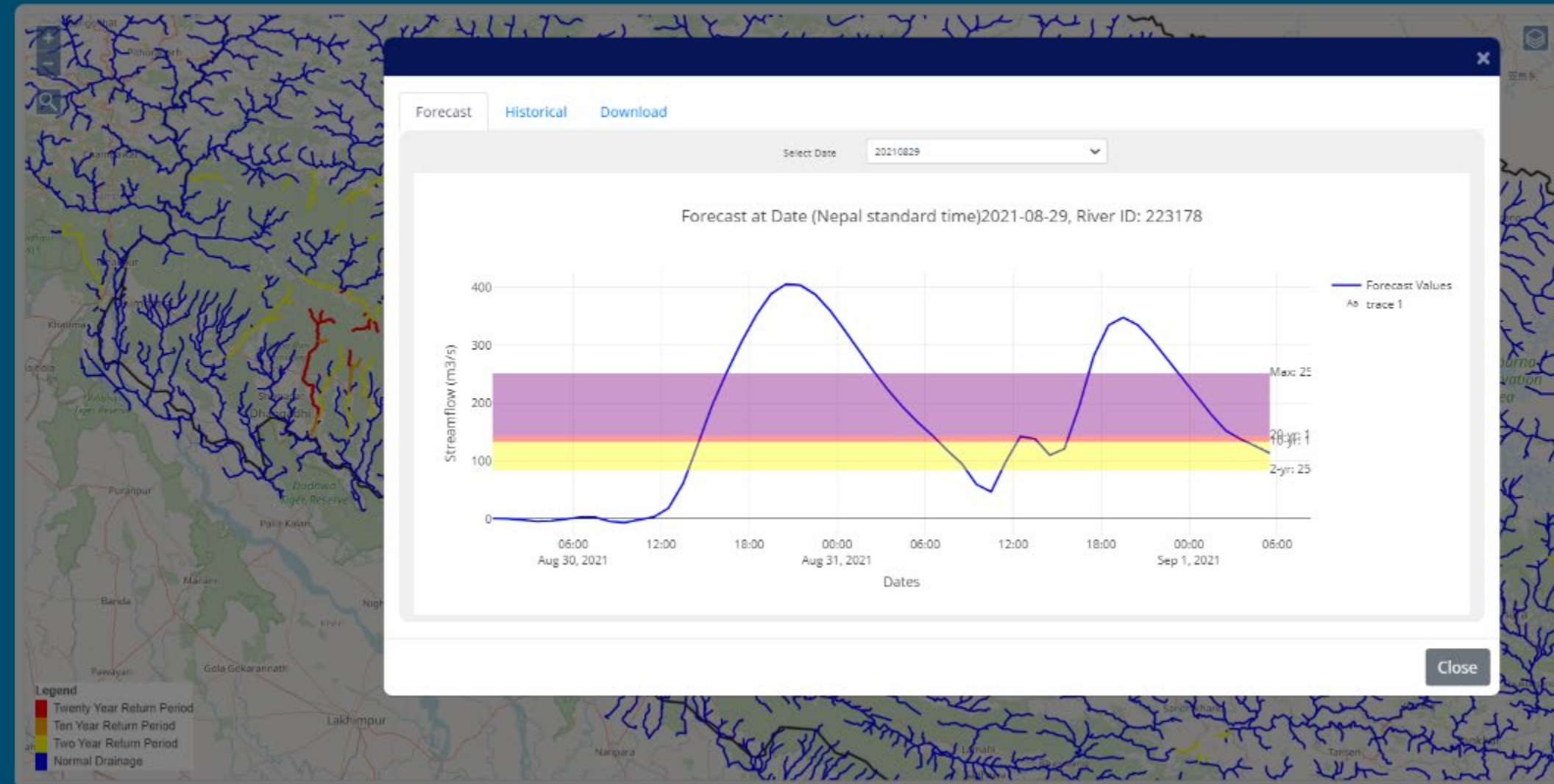
Description:

The Streamflow Prediction Tool for the HKH river basins provides 10-day streamflow forecasts for major rivers within the Amu Darya, Brahmaputra, Ganges and Indus basins in the Hindu

Improving flood forecasting and early warning

HIWAT Streamflow Prediction Tool - Nepal

ICIMOD



Layers

- Outline
- District
- River Names
- Station Names
- HIWAT Rivers Nepal

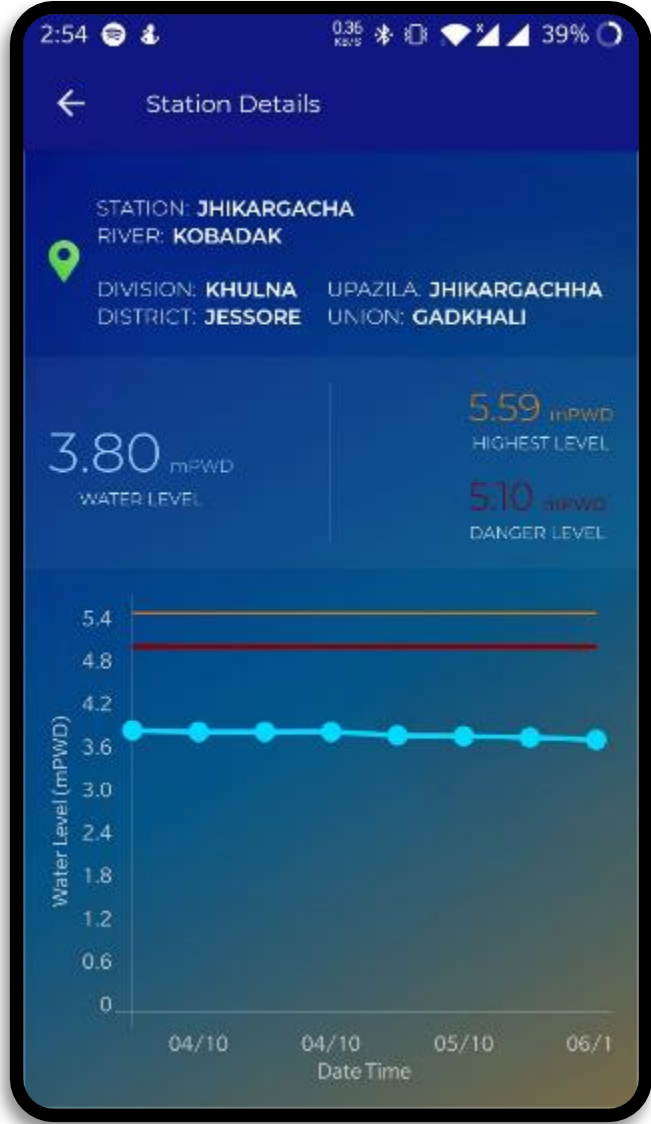
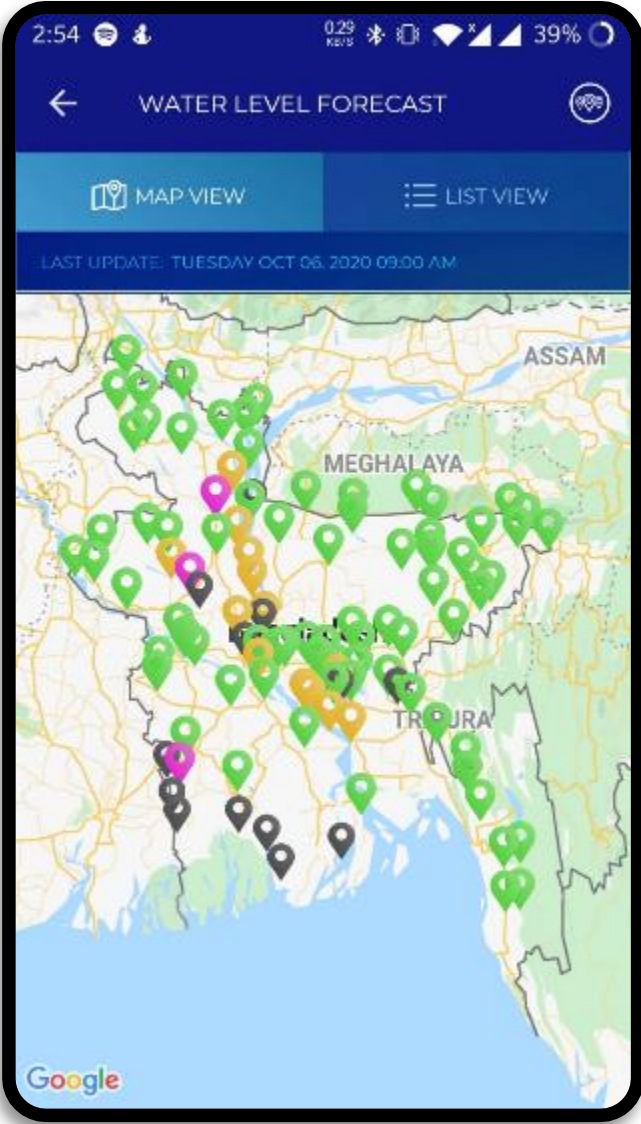
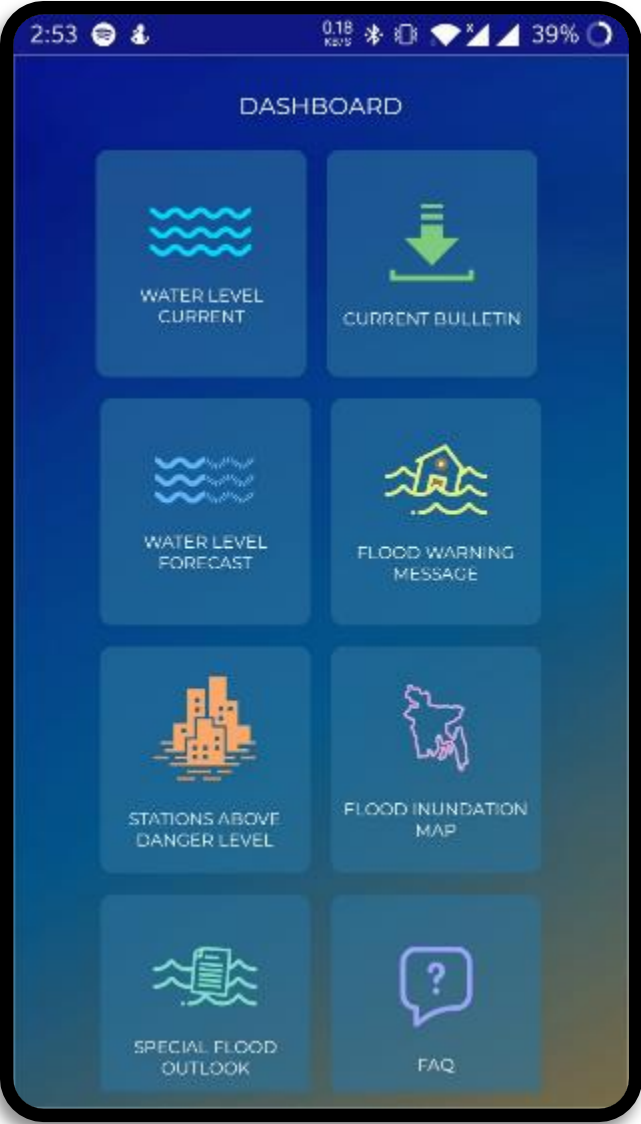
Select District: Achham

Select River: Achhariya Nala

About Streamflow Prediction

Description:
The Streamflow prediction application is the collection of river network created within specific countries which has the unique ID which then is connected to the database to have the 48-hours forecast. The user can interact by clicking this river network. This application can be a part of a DSS tool for flood forecasting and give an early warning system to the user.

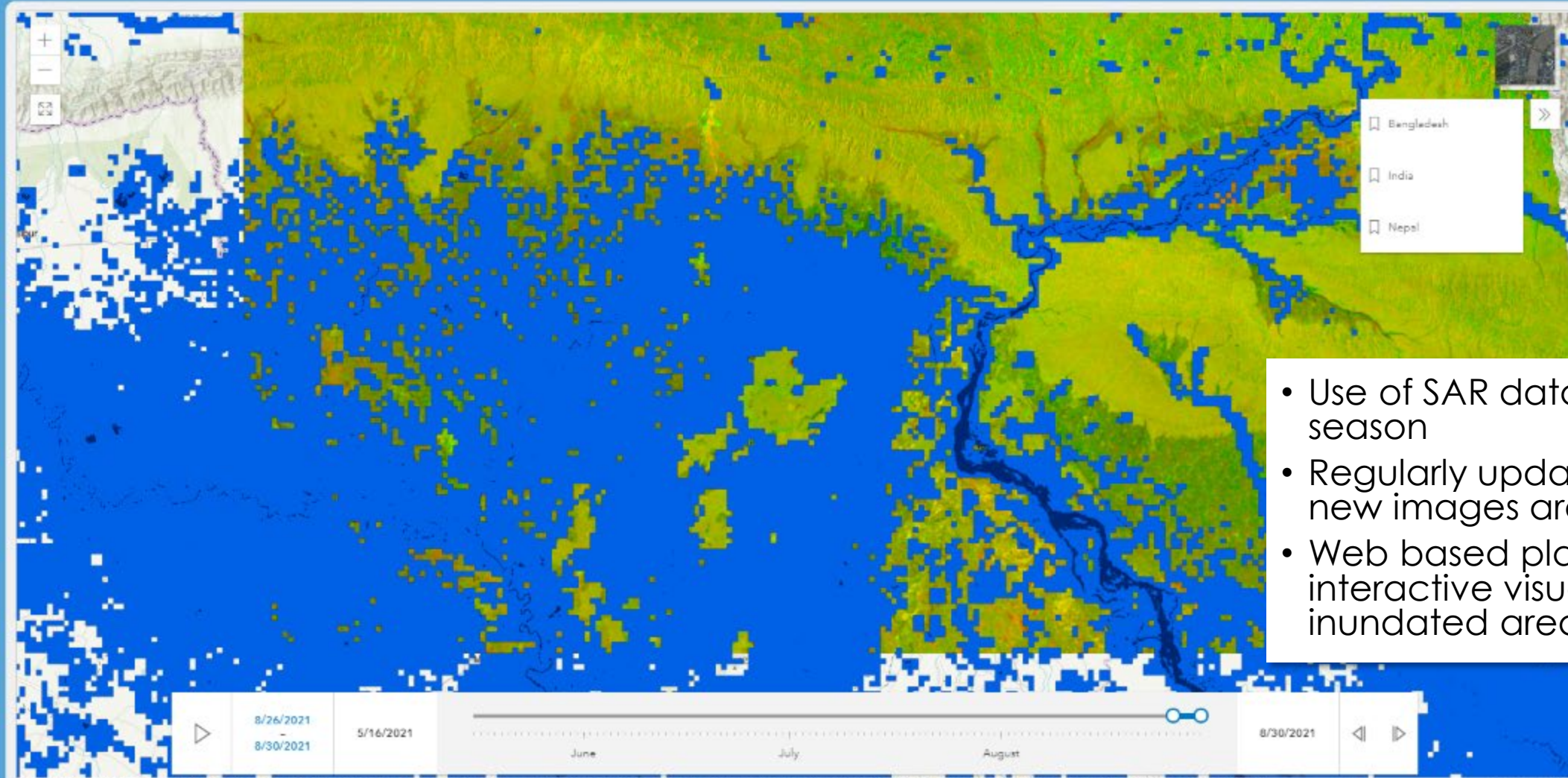
Mobile app for flood early warning



Flood inundation monitoring

Flood Inundation 2021

ICIMOD



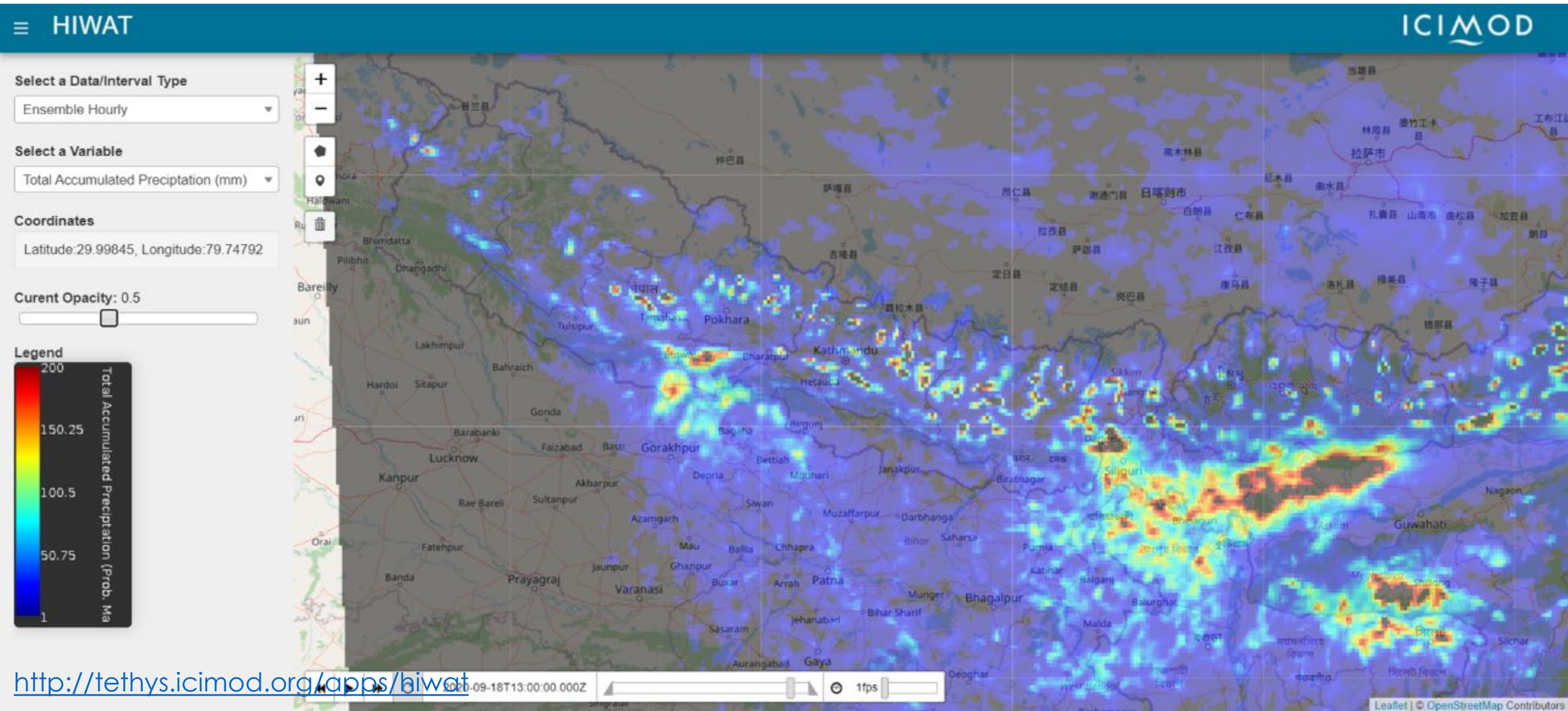
Layers

- Flood Extent
- Perennial Waterbodies
- RGB Layer

- 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

Weather and climate

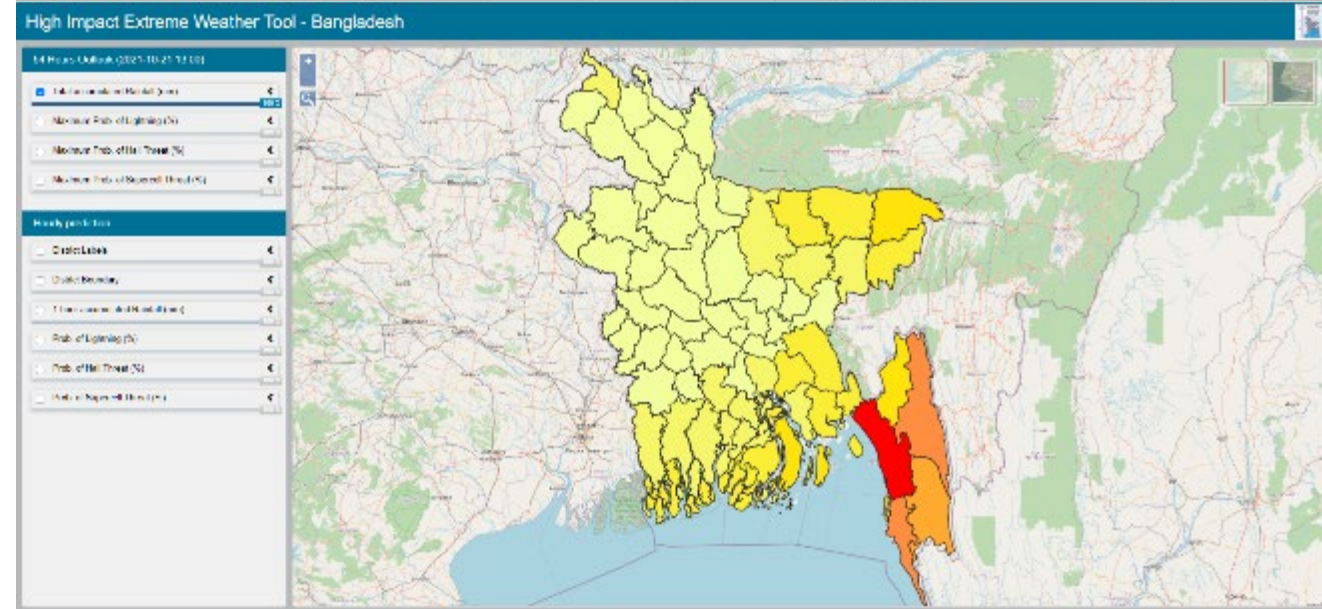
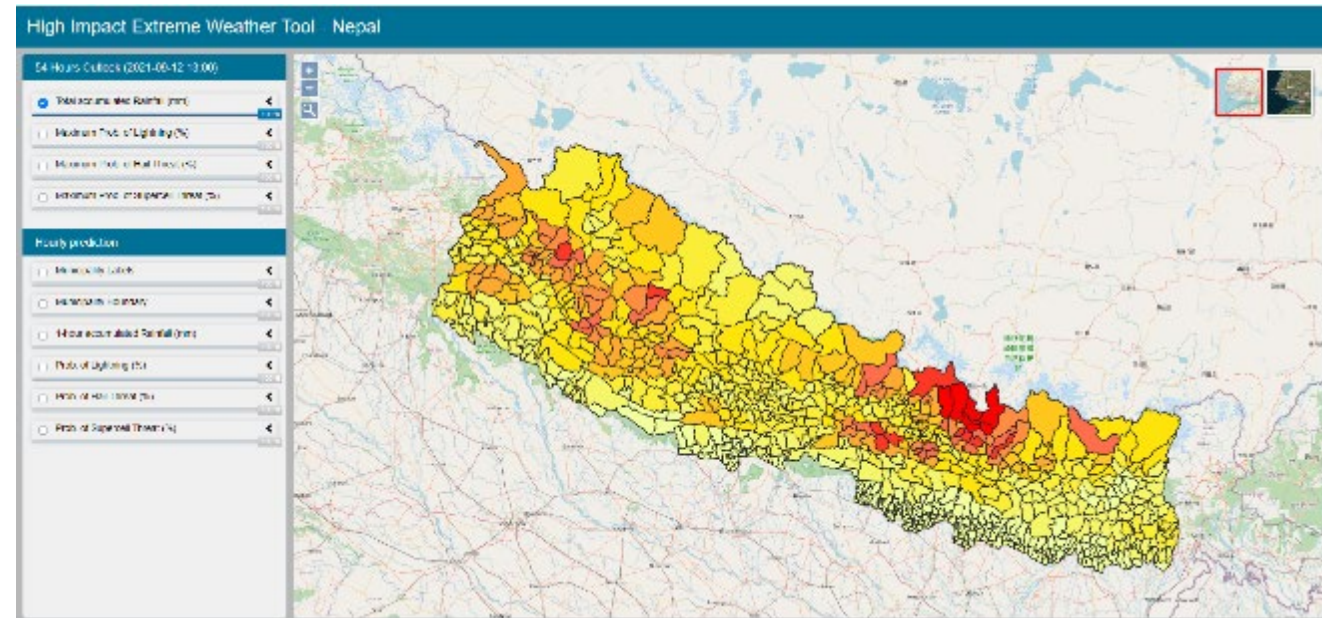
- High Impact Weather Assessment Tool (HIWAT)



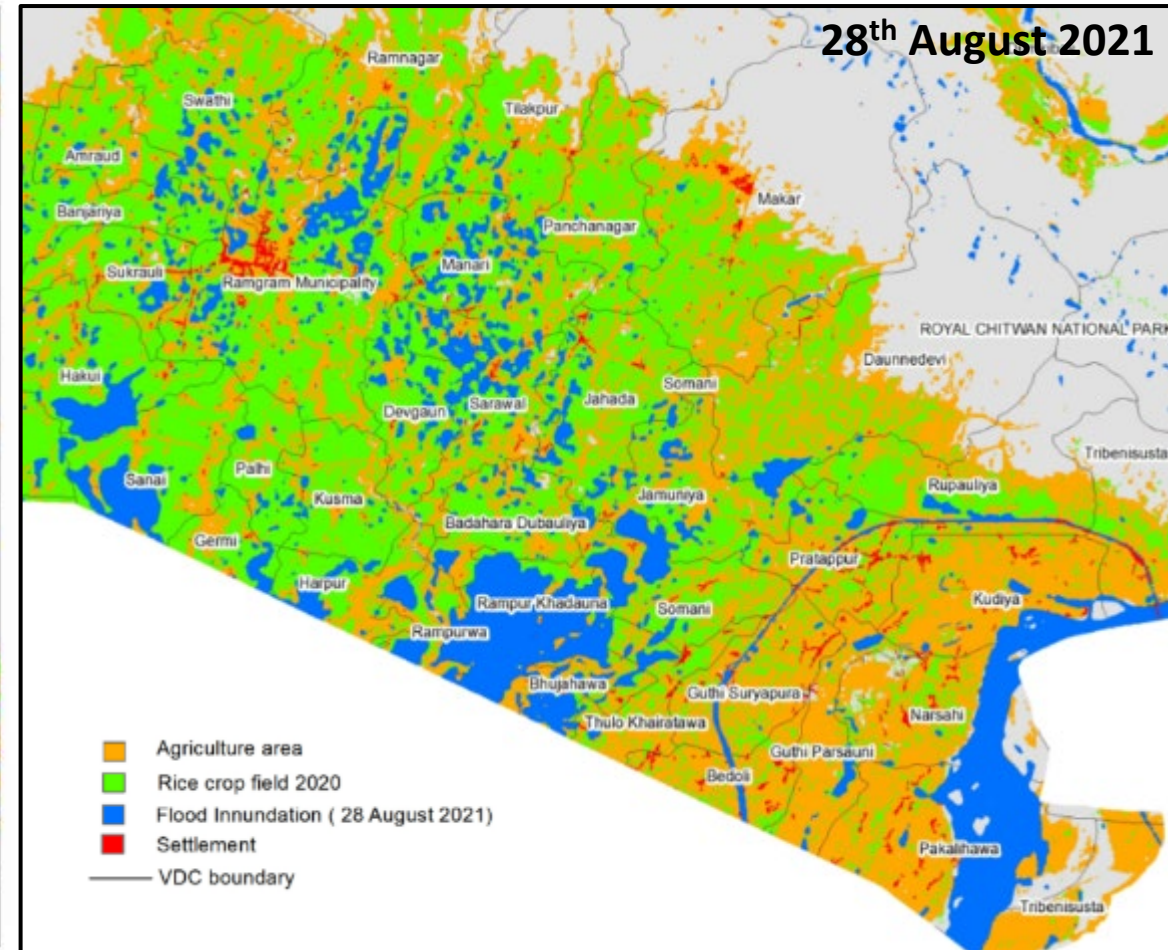
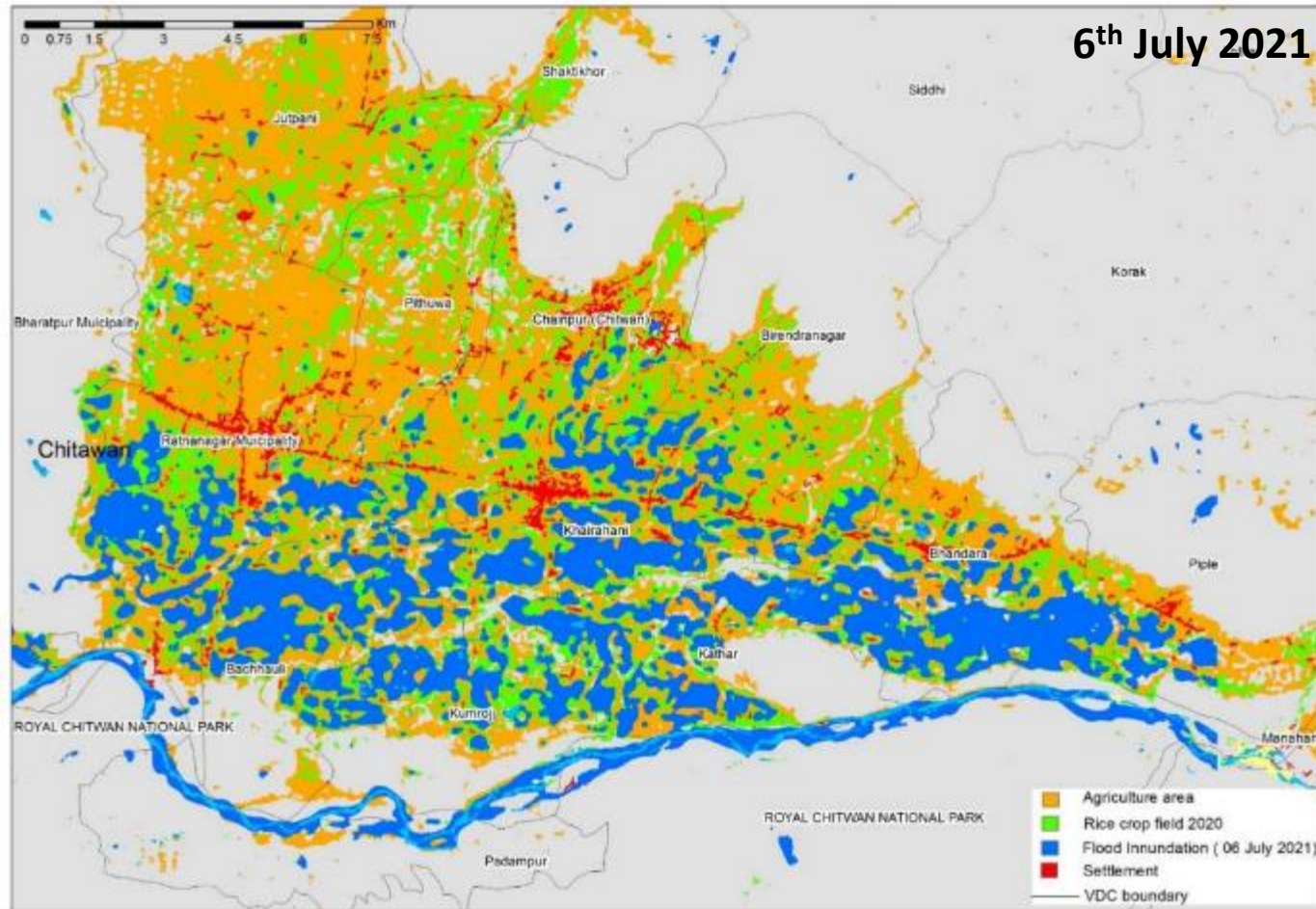
Visualization for local use

Prediction for next 54 hours

- Rainfall
- Lightening
- Hail
- Wind
- Supercell storms



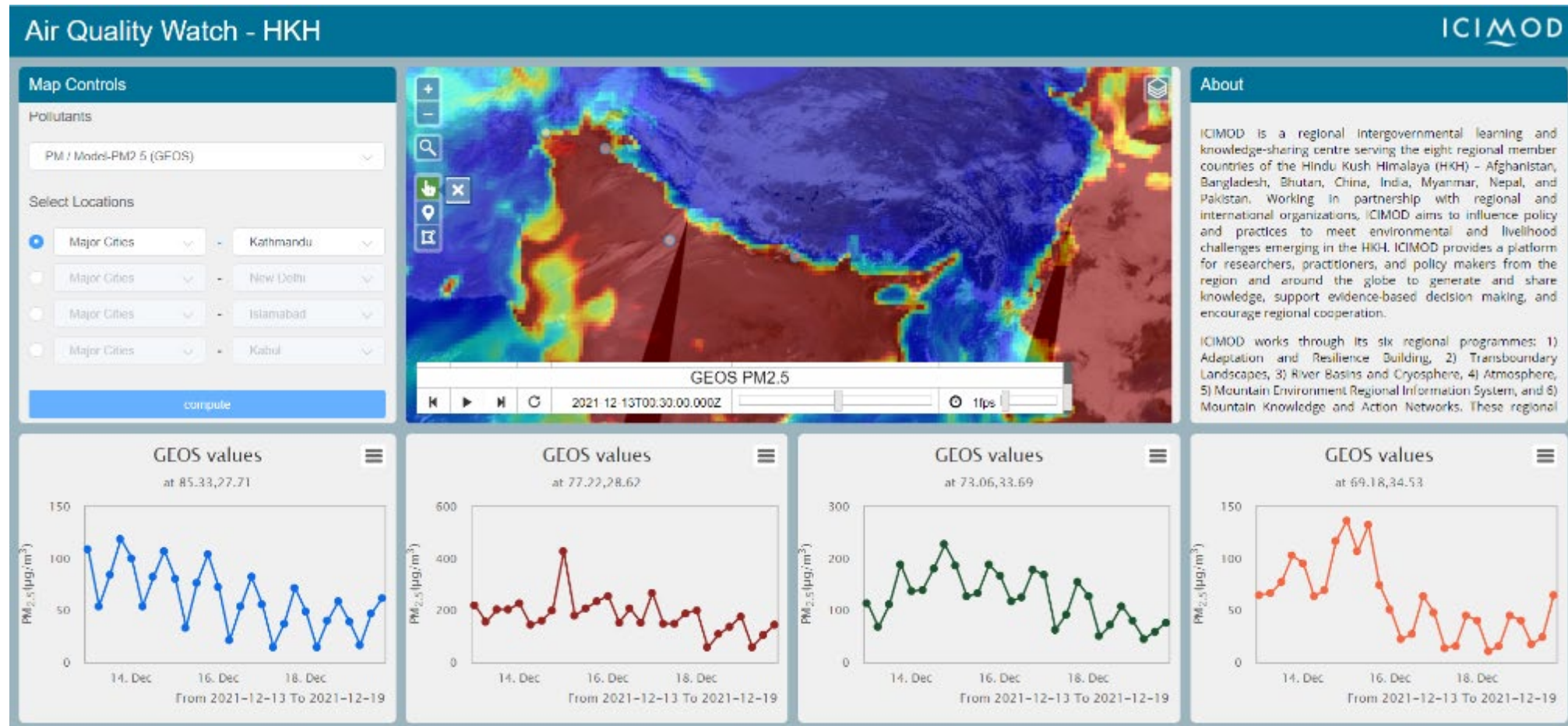
Rapid response mapping for flood inundation in croplands



Air quality monitoring and management

- Innovative air quality products using models, satellite data, and monitoring stations for dust, AOD and trace gases

<http://smog.icimod.org/apps/airquality/> (Hosted in ICIMOD)



Forest fire monitoring system



नेपाल सरकार
वन तथा वातावरण मन्त्रालय
वन तथा भू-संरक्षण विभाग

वन डढेलो पहिचान तथा अनुगमन प्रणाली

Login

English

वन डढेलो

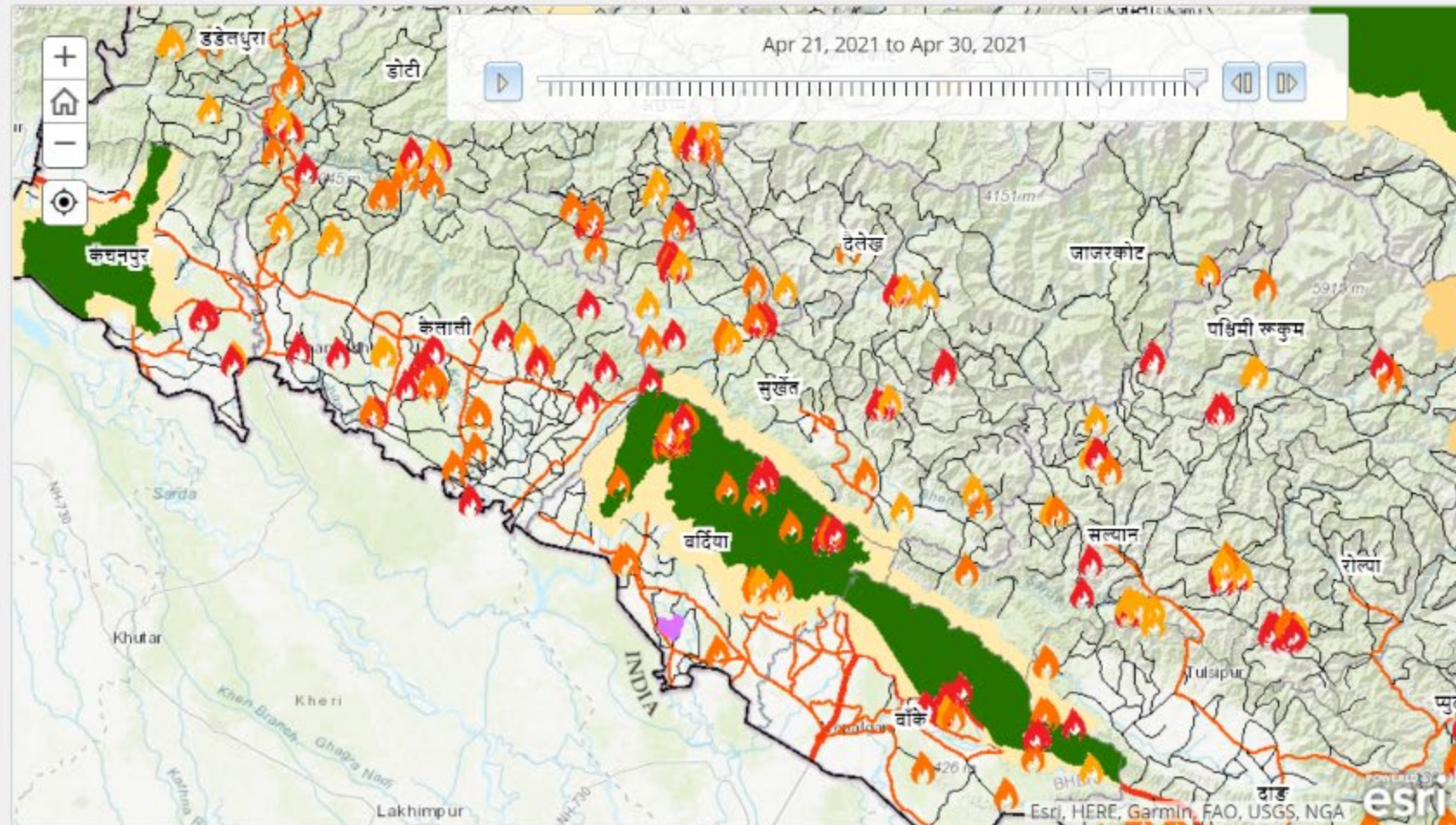
- नेपाल
- प्रदेश
- प्रदेश-१
- जिल्ला
- अछाम
- संरक्षित क्षेत्र
- संपूर्ण संरक्षण क्षेत्र
- सुरु मिति: 3/1/2021
- अन्त्य मिति: 4/30/2021

नक्सामा देखाउनुस्

टेबलमा देखाउनुस्

डढेलो तथ्याङ्क (मोडिस) ४३२

जिल्ला	संख्या
अछाम	१७
अर्घाखाँची	१३
बाग्लुङ	२
बैतडी	५



तह सङ्केत आधार नक्सा

- देश रेखांकन
- प्रदेश
- जिल्ला
- जिल्लाको नाम
- गाउँपालिका/नगरपालिका
- डिभिजन
- सब-डिभिजन
- वडा
- विमानस्थल
- बस्ती
- सडक
- संरक्षित क्षेत्र
- संरक्षित क्षेत्रको नाम
- वन डढेलो (मोडिस)

हाम्रो बारे

यो सूचना प्रणाली वन तथा भू-संरक्षण विभाग (DoFSC), वन तथा वातावरण मन्त्रालय (MoFE), नेपाल सरकार र अन्तर्राष्ट्रिय एकीकृत पर्वतीय विकास केन्द्र (ICIMOD) काठमाडौं द्वारा संयुक्त रूपमा विकास गरिएको हो।

यो प्रविधिले नेपालभर विगतमा भएका तथा तत्काल आगलागीका घटनाहरूको

Glacier mapping of the HKH region

Status of Glaciers in the HKH Region

HKH Afghanistan Bhutan

Glacier Statistics

Major Basin

All Major Basin

Basin

Select Basin

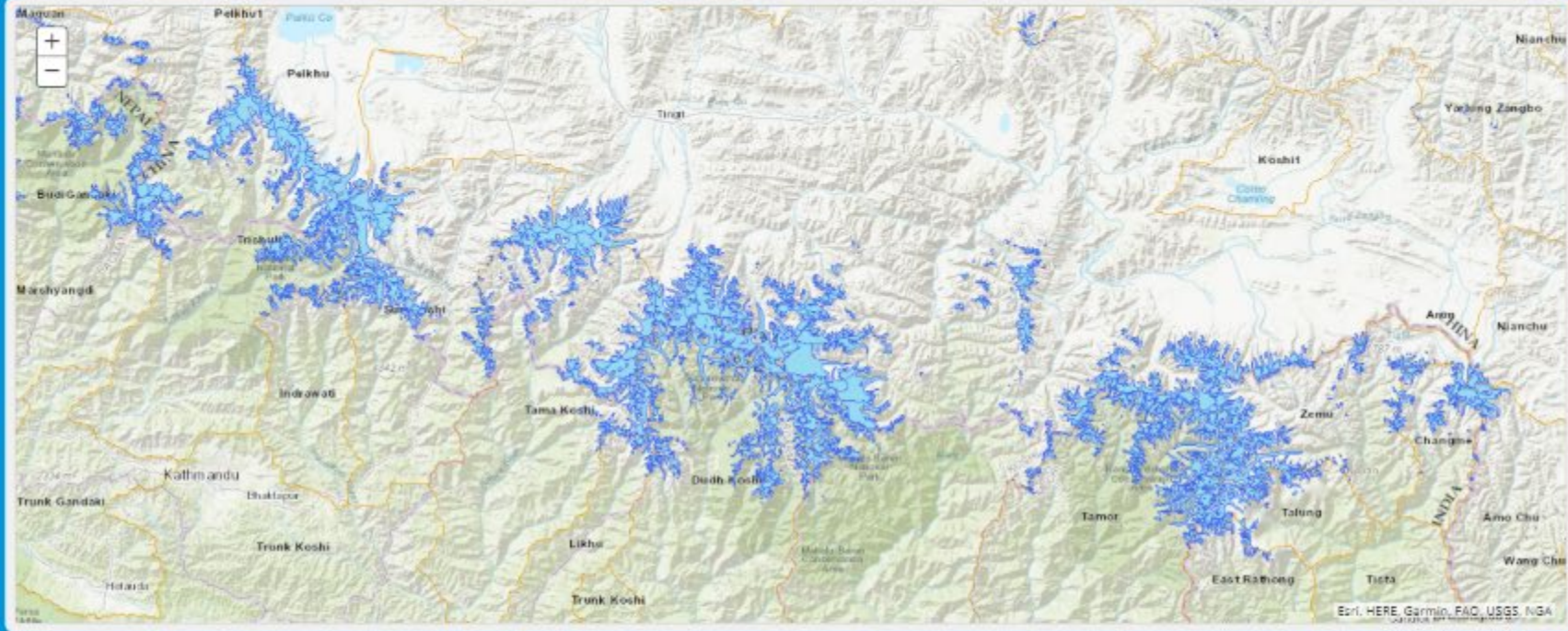
Cut Off

Elevation: 5000 m.

Slope: 40

Aspect: 5

[View Statistics](#)

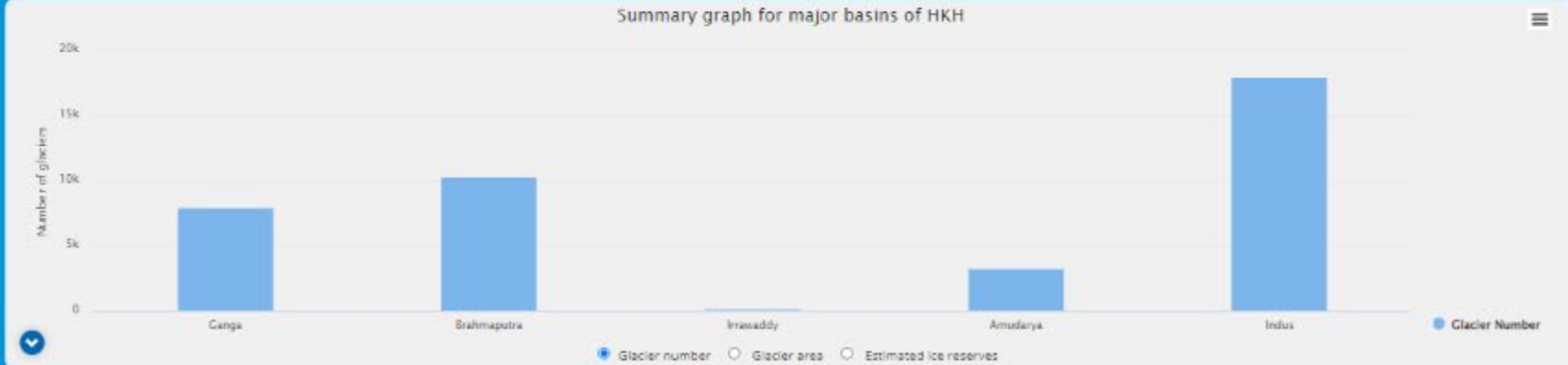


Layer Legend

- HKH boundary
- Major-basin
- Basin
- Sub-basin
- Glaciers

Related Dataset

- Glacier of Amudarya
- Glacier of Brahmaputra
- Glacier of Ganges
- Glacier of Indus
- Glacier of Irrawaddy



About

The comprehensive baseline information on the glaciers of the entire HKH region have been organized by major basins and sub-basins. The application showcases glacier data of HKH region as interactive maps.

[View More...](#)

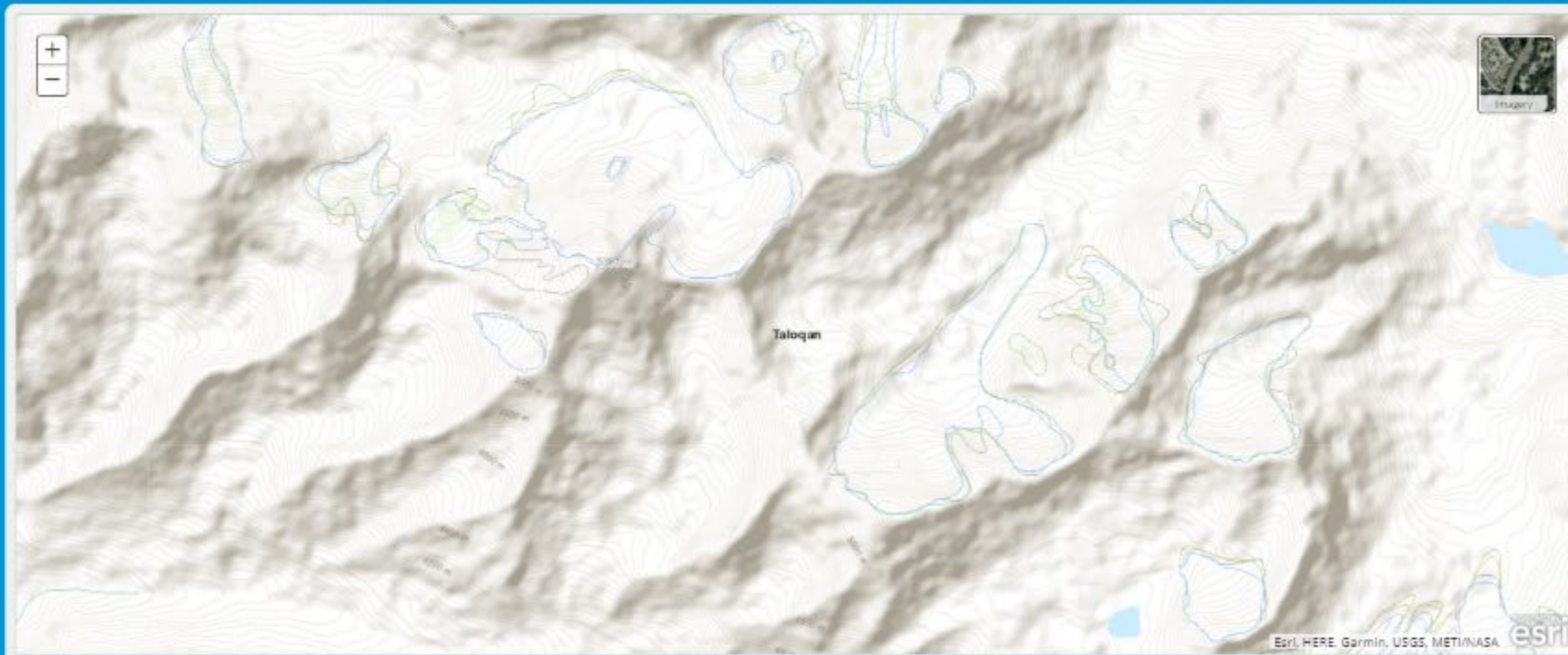
Glacier and glacial lake dynamics

Glacial Lakes in Afghanistan



Glacial lake statistics

- Afghanistan
- Select basin
- Kabul Indus
- Select sub-basin
- Ghorband
- [View statistics](#)

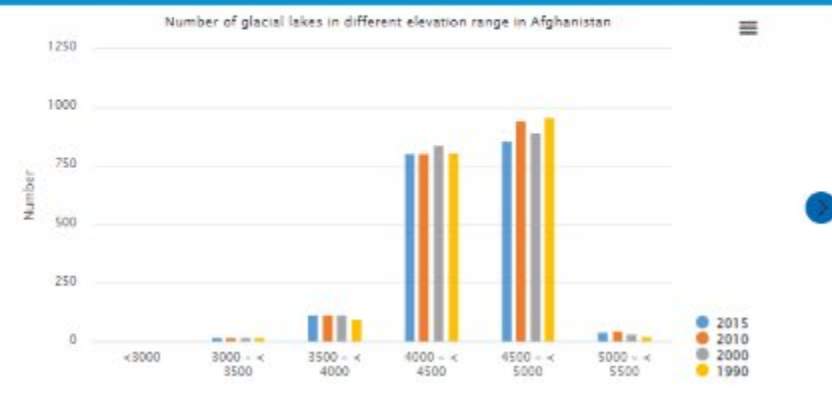
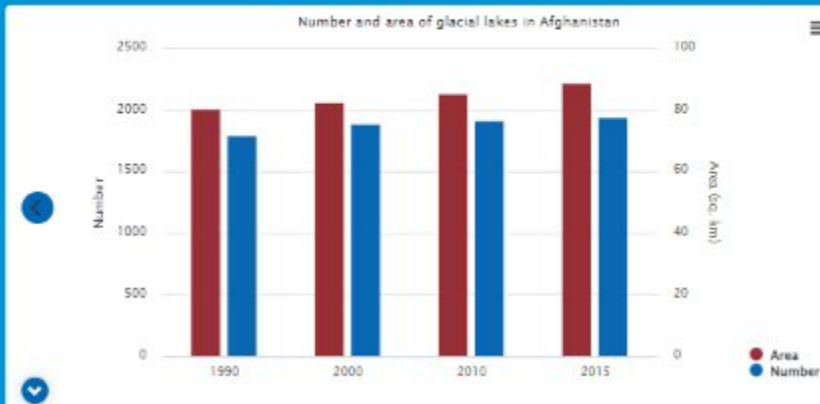


Layer Legend

- Country outline
- Basin
- Sub-basin
- Glacial lakes 2015
- Glacial lakes 2010
- Glacial lakes 2000
- Glacial lakes 1990
- Glaciers 2015
- Glaciers 2010
- Glaciers 2000
- Glaciers 1990

Related datasets

- [Glacial lakes in the Hindu Kush Himalaya](#)
- [Glacial lakes in the Koshi, Gandaki, and Karnali river basins of Nepal, the Tibet autonomous region of China, and India](#)
- [Potentially dangerous glacial lakes in the Koshi, Gandaki, and Karnali river basins of Nepal, the Tibet autonomous region of China, and India](#)



About

The National Water Affairs Regulation Authority (NWARA) and ICIMOD worked together to develop information on glaciers and glacial lakes in Afghanistan through ICIMOD's SERVIR Hindu Kush Himalaya (SERVIR-HKH) Initiative. Afghanistan's glacier dataset (1990-2015) was released in 2018. The General Directorate of Water Resources of NWARA and ICIMOD then prepared datasets on glacial lakes in Afghanistan (1990-2015). This is a first-of-its-kind dataset on the distribution of glacial lakes in Afghanistan and observed changes since the 1990s that covers the whole of Afghanistan using consistent data sources and methods. ICIMOD developed the Glacial Lakes in Afghanistan application that provides an interactive visualization of the database on glacial lakes online. The interactive maps for glacial lakes were prepared for 1990, 2000, 2010, and 2015 using a uniform data set and methodology, which provide a scientific basis for understanding the changes taking

Capacity building

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



Training for REDD IC, April 2021



Training for Armed Police Force, 31 Aug 2021

Capacity building



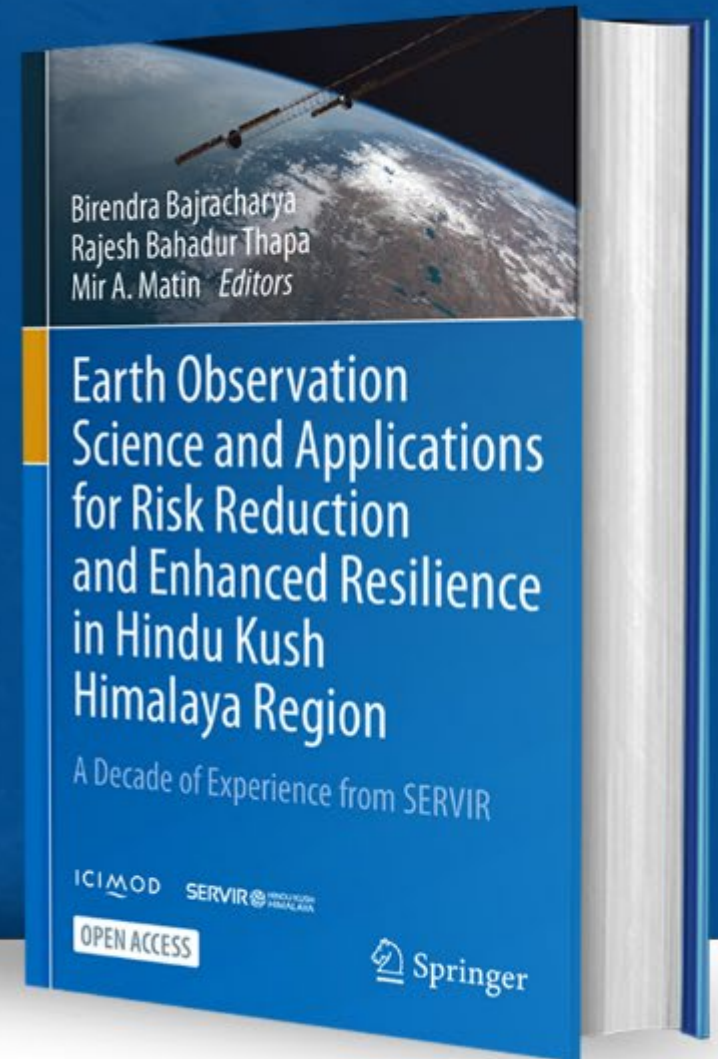
Participants in different work environments during the training



Knowledge products

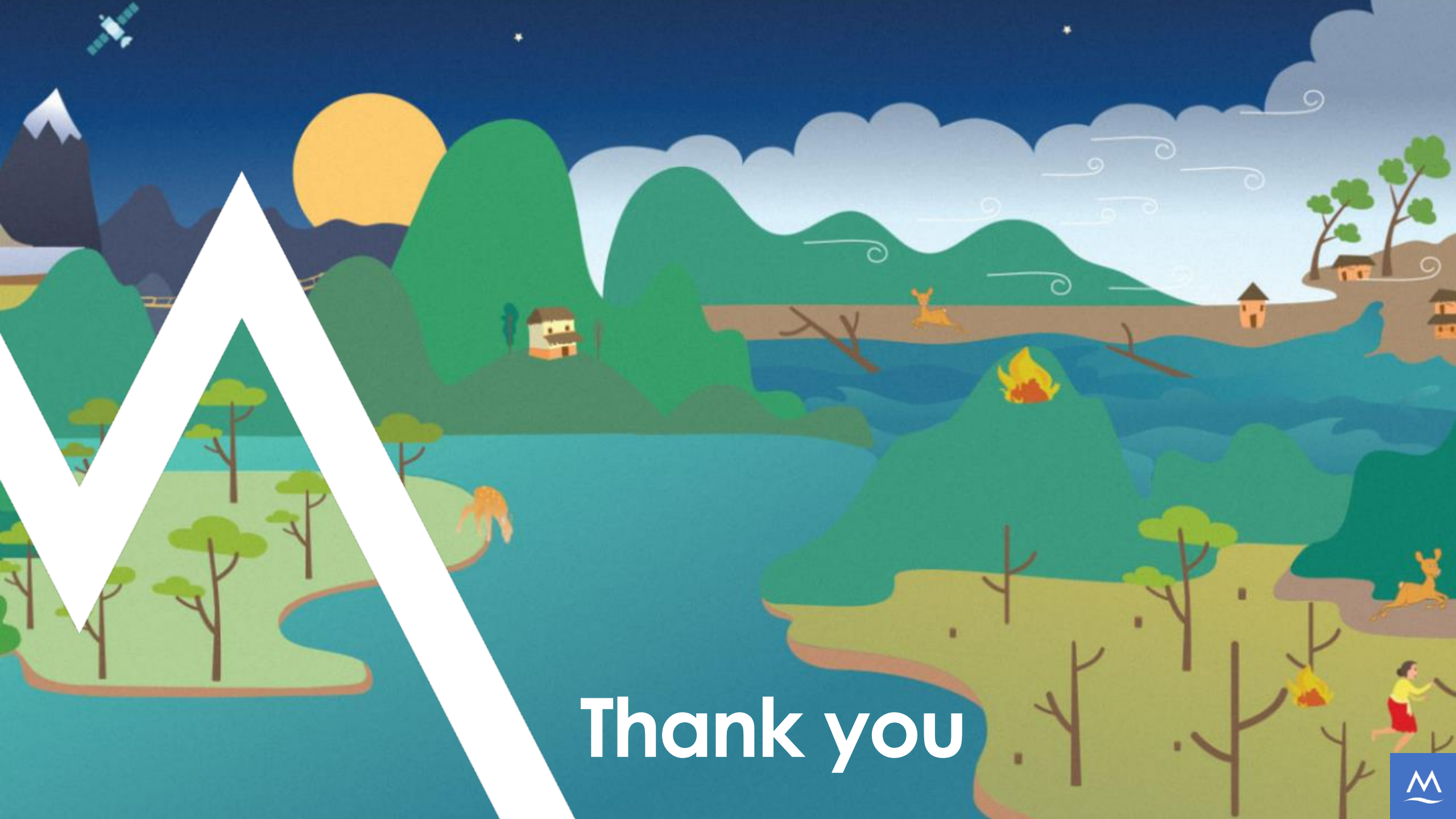
Earth Observation Science and Applications for Risk Reduction and Enhanced Resilience in Hindu Kush Himalaya Region

A Decade of Experience from SERVIR



Conclusion

- Opportunities for applications of EO in the HKH region are highly influenced by global trends and priorities set of nations
- Unprecedented growth on EO applications for environmental monitoring and climate change due to temporal and geographic coverage of satellites and advancements in computing facilities
- Satellite data are becoming easily accessible (e.g. Landsat, Sentinel)
- Platforms like Group on Earth Observation (GEO) are promoting space applications for societal benefits and monitoring SDG indicators
- More countries in the region are initiating space applications and growing opportunities for collaboration on transboundary issues, technology exchange, and capacity building



Thank you

