



## Background

### CHALLENGES

- Regional knowledge gap on EO & GIT
- Emerging EO and GIT techniques
- Large capacity gap  
(shortfall of professionals and trained specialists)
- Lack of women participation
- Monitoring and evaluation
- Others  
(Communication, Customization)



### OPPORTUNITIES

- Collaboration with stakeholders
- Acquiring cutting-edge expert knowledge  
(Engaging SMEs)
- High demands of capacity development  
(systemic capacity building pathways )
- Women-focused capacity building programs
- Effective impact tracing  
(Short/long term)
- Interaction with diverse group  
(Understanding best practices)



Agriculture and food security



Land cover and land use change and ecosystems



Water resources and hydro-climatic disasters



Weather and climate



Air quality

## Major focus

- **Science and technology innovations/advances** to solve development challenges
- **Build capacity** of people and institutions to integrate EO science and technology
- **Foster strategic collaborations** across scales and sectors to achieve sustainable solutions

# Pathways to impact – continue innovative approach

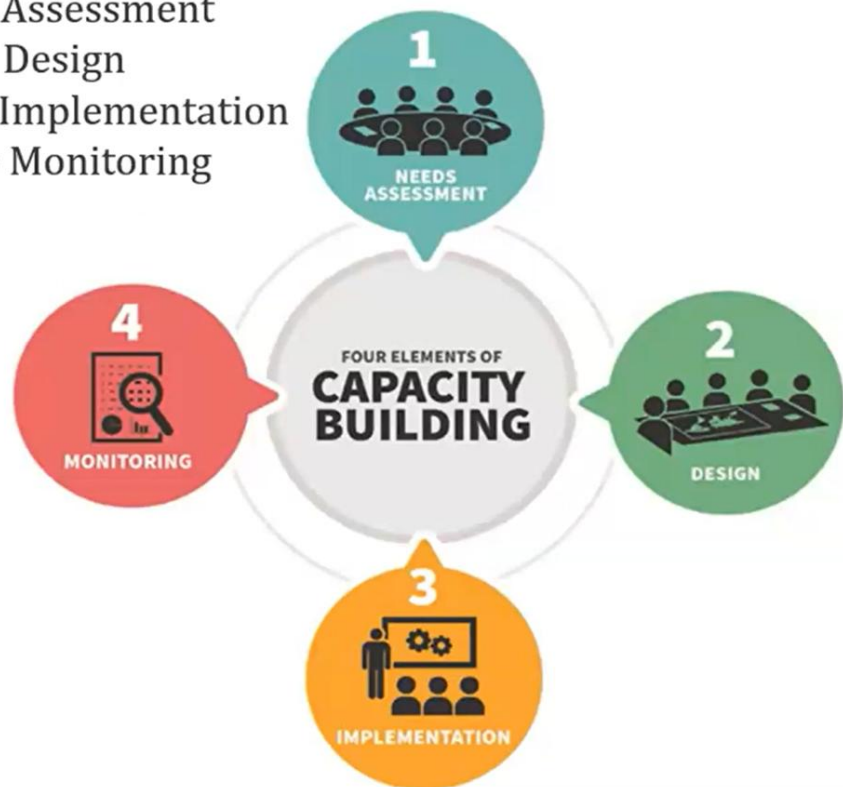
## Elements of Capacity building (CB)

A = Assessment

D = Design

I = Implementation

M = Monitoring



Thapa et al. (2019), *Frontiers*; Thapa R.B.T., Tripathi et al., (2021), *Book Chapter Springer Nature*



## The ADIM approach

### Assessment

Introduction of the basic framework  
Assessment of RS and GIT capacities in various services  
Identification of priorities and applications

### Design

Selection of subject matter experts (SMEs)  
Curriculum development  
Materials (manuals, resource books, hands-on exercises)

### Implementation

**Earth observation and geospatial information technology**



Spatio-temporal data  
Analysis and modeling  
Visualization

**Service area**



Agriculture and food security



Land cover and land use change and ecosystems



Water resources and hydro-climatic disasters



Weather and climate

**Trainings and workshops**



On-the-job training (OJT)  
Training of trainers (ToT)  
Standard training (ST)  
Exposure and learning (EL)

**Capacity building**



Individual



Institutional

### Monitoring

Pre- and post-training assessment  
Feedback and reflection



# AO GEO

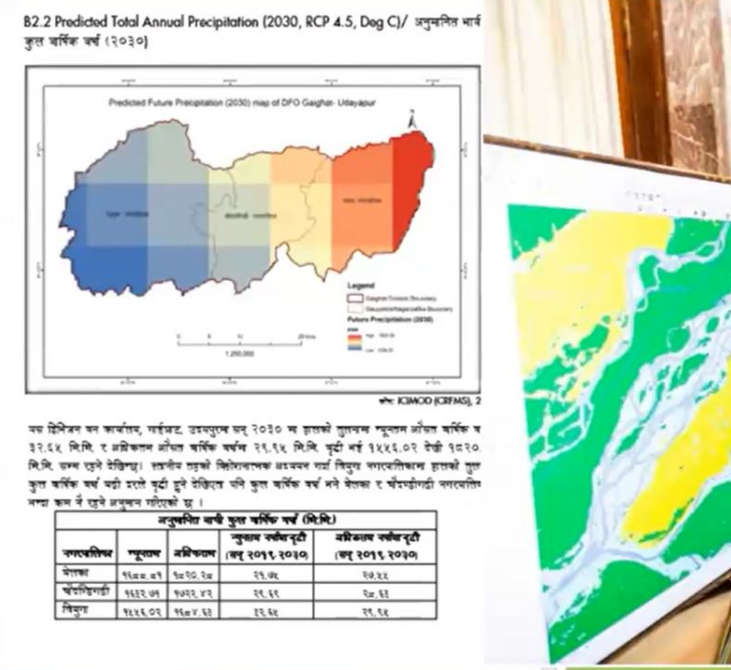
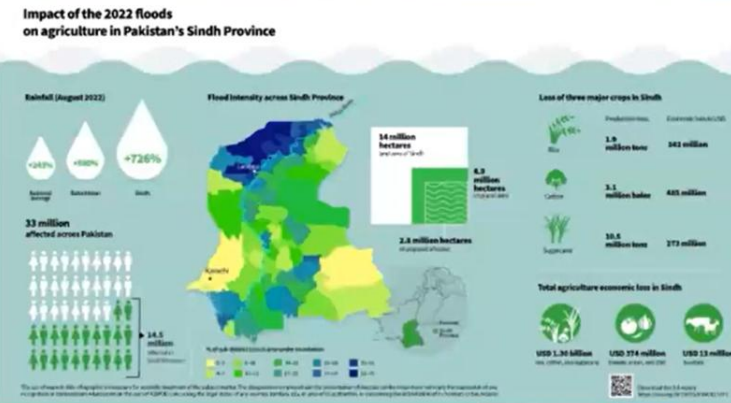


# Pathways to impact

## 1. Science and technology innovation

EO data for

- Land cover mapping and monitoring
- In season rice crop mapping
- Drought monitoring
- Flood inundation mapping
- Weather forecasting
- Flash flood prediction
- Forest fire monitoring
- Landslide monitoring
- Application and tools development
- and so on.....





## Pathways to impact

<https://servir.icimod.org/science-applications/>

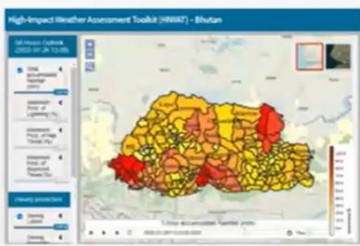
Science applications (functional)  
Users can filter by **thematic focus**  
or **Country**

**Filter By**

Thematic Focus  
- Any -

Country  
- Any -

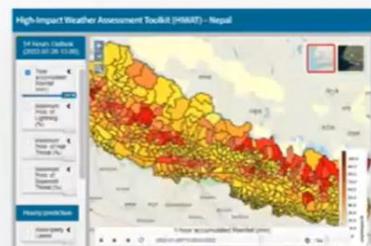
SEARCH



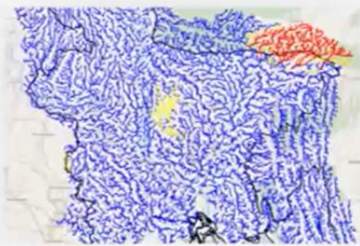
High-Impact Weather Assessment Toolkit (HIWAT) – Bhutan



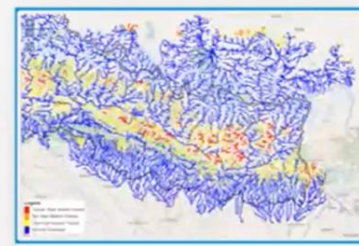
High-Impact Weather Assessment Toolkit (HIWAT) – Bangladesh



High-Impact Weather Assessment Toolkit (HIWAT) – Nepal



Flash Flood Prediction Tool – Bangladesh



Flash Flood Prediction Tool – Nepal



National Land Cover Monitoring System of Nepal

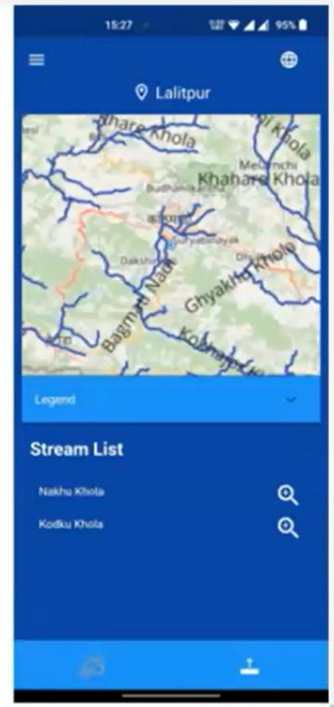


# Pathways to impact

Science applications (under development)

## RiceMapEngine

### HiWAT weather mobile app



RiceMapEngine Phenology Explorer Rice Mapping

Crop Mask (GEE asset) projects/testee-319020/a

Image Date Range  
Start Date: 06/01/2019  
End Date: 11/01/2019

Classification Details  
Training Ratio: 0.7  
Model: Random Forest  
numberOfTrees: 200  
variablesPerSplit: Leave blank to use def  
minLeafPopulation: 1  
bagFraction: 0.5  
maxNodes: Leave blank to use def  
seed: 0

[6/29/2022, 3:26:26 PM] Rice area: 21610.648 ha  
Confusion matrix

	0	1
0	37	6
1	5	31

Overall Accuracy: 0.8607594936708861  
Kappa: 0.719948436996455

Samples (count: 294) Upload Download  
Class field: Land\_cover  
Class value: Rice

- 1 - Rice
- 2 - Vegetables
- 3 - Sesame
- 4 - Settlements
- 5 - Rice
- 6 - Other fruits
- 7 - Barren land
- 8 - Vegetables
- 9 - Rice
- 10 - Rice
- 11 - Vegetables
- 12 - Water
- 13 - Rice
- 14 - Rice
- 15 - Barren land
- 16 - Rice
- 17 - Other fruits
- 18 - Street/vegetable



# Pathways to impact



## 2. Capacity Building (till May 2023 )

Total 189 participants

Title	Thematic area	Training Type	Total
Forest carbon stock measurement using Earth observation data	LULC&E	OJT	2
Forest carbon assessment using EO and GIT	LULC&E	ST	41
In-season Crop Mapping and Damage Assessment using Open-access EO data	AFS	ST	24
In-season Crop Mapping and Damage Assessment using Open-access EO data	AFS	ST	30
Use of SERVIR-HKH science applications for disaster preparedness in Nepal	AFS	ST	30
Enhancing disaster preparedness in Nepal's Bagmati Province	AFS	ST	22
Forest fire information system management in Nepal	LULC&E	ST	24
Forest monitoring and carbon Mapping	LULC&E	ST	16



# Pathways to impact (Institutional capacity)



**Disaster preparedness in Nepal, Nepal Red Cross Society**  
For provincial and local governments to improve and localise flood early warning systems



**In-season Crop Mapping, DAE, Bangladesh**





# Pathways to impact

- Focus on youth and women
- Closing gender gap in STEM



Empowering women in geospatial information technology – 2023 edition

Date	13 Jun 2023 to 16 Jun 2023
Venue	Zoom
Contact Persons	<a href="mailto:servirhkh@icimod.org">servirhkh@icimod.org</a>
Type	Training
Programmes	SERVIR-HKH



## Empowering women in geospatial information technology – 2023 edition

Attendance is free! Apply by 26 May 2023

For more information, please visit: [hkh.pub/WoGIT23](http://hkh.pub/WoGIT23)  
Dates: 13–16 June 2023  
Platform: Zoom





# Pathways to impact



Global network, partnerships and policy influence





# Pathways to impact

## 3. Strategic collaborations

Localization of early warning system

### Partnership with

- Practical Action – EWS strategies for Karnali and Far West provinces; customization of HIWAT and Streamflow applications
- Red Cross (Danish, Finnish and Nepal) for adoption at municipal levels
- APF Disaster Training Centre for adoption in regular curriculum
- Local level awareness with FFWC, Bangladesh



बृष्टि हते पाए, बन्या नय

सुदूरपश्चिम प्रदेशको एकटा गाउँपालिकामा बाढको समयमा बाढबाट सुरक्षित रहन सकिने गरी प्रशिक्षण कार्यक्रम सम्पन्न भएको छ।

प्रदेश सरकारको अग्रगण्य योजनाअनुसार अन्तर्गतको कार्यक्रम अन्तर्गतमा प्रशिक्षण कार्यक्रम सम्पन्न भएको छ।

प्रशिक्षण कार्यक्रममा प्रशिक्षकहरूले बाढको समयमा बाढबाट सुरक्षित रहन सकिने गरी प्रशिक्षण कार्यक्रम सम्पन्न भएको छ।

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# Pathways to impact

## Adoption by national partner

Bangladesh Meteorological Department (BMD) launched HIWAT at their campus on 29 March 2022



# NLCMS formally launched as national system for Nepal



- Partnership between SERVIR hubs (Mekong) and global network (USFS, UMD, FAO) to bring state of the art methods and technologies
- Co-development with national partners (including contributions in field work)
- Adoption by national government
- Contribution to all national reporting requirements





## Conclusions

- Simple approach to cater the needs in the region.
- Promotes GESI, adopts frontier technology, engages SMEs and provides sustainable solutions, focuses on partners' priorities.
- The OJT and ToT type of capacity building activities play a very important role in institutional capacity building.
- The standard training type of activities are powerful in building individual capacity and improving the GESI balance in the technical professional workforce.
- The exposure learning visit brings young people together and provides a competitive environment of learning wherein they gain and share knowledge among themselves and others.
- Large number of unique organizations and communities worldwide were benefitted in past.
- Our efforts in region help promoting the Himalayan GEO activities (AOGEO Tasks), on capacity building on utilization of EO data.