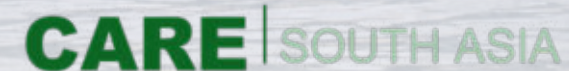


# PLANNING WORKSHOP ON Impact-Based Forecasting and Climate Services

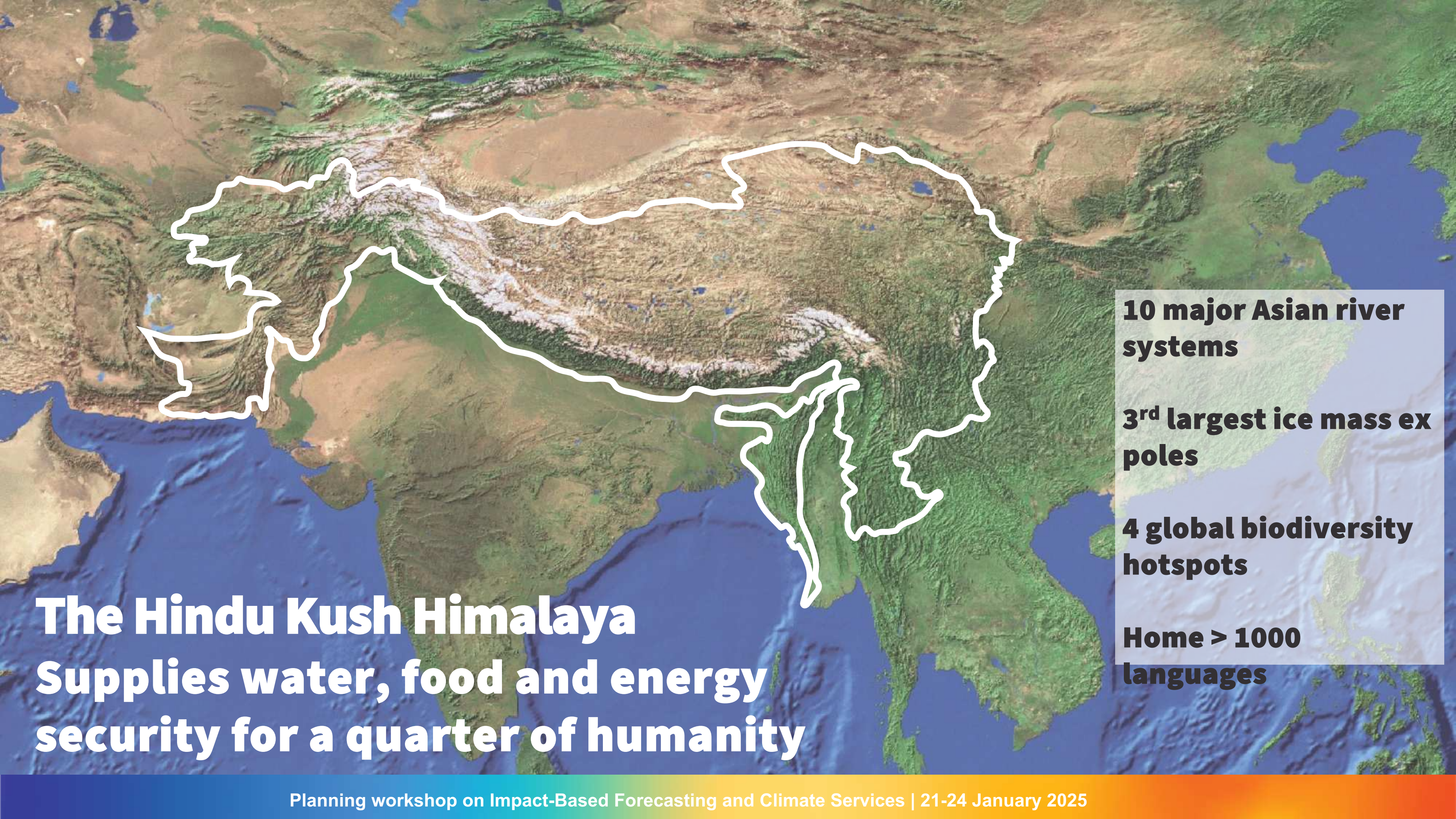
21–24 January 2025 | Bangkok, Thailand

ICIMOD's experience in Early Warning and Impact Based  
Forecasting

Birendra Bajracharya, Manish Shrestha / ICIMOD







**The Hindu Kush Himalaya  
Supplies water, food and energy  
security for a quarter of humanity**

- 10 major Asian river systems**
- 3<sup>rd</sup> largest ice mass ex poles**
- 4 global biodiversity hotspots**
- Home > 1000 languages**



# International Centre for Integrated Mountain Development

**A greener, more inclusive and climate resilient Hindu Kush Himalaya**



## Strategic Groups

**Reducing Climate and Environment Risks**

**Shaping Green Mountain Economies and Landscapes**

**Enabling Regional and Global Mechanisms for Sustainable Mountain Development**



# ICIMOD's Experience in EWS

**Community based flood early warning system (CBFEWS)**

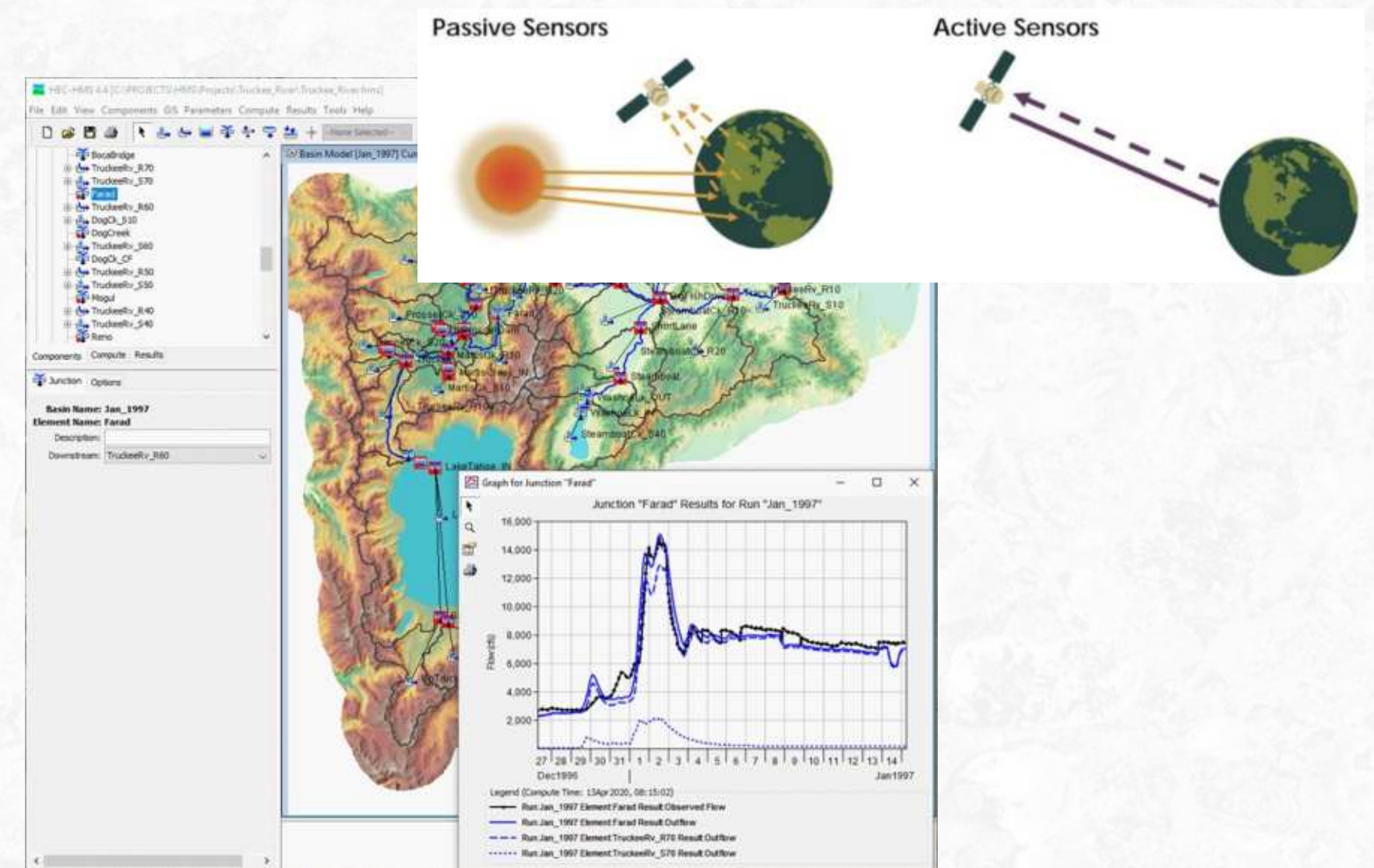
**US/DS community linkages**

**Highly accurate**

**Modeling based**

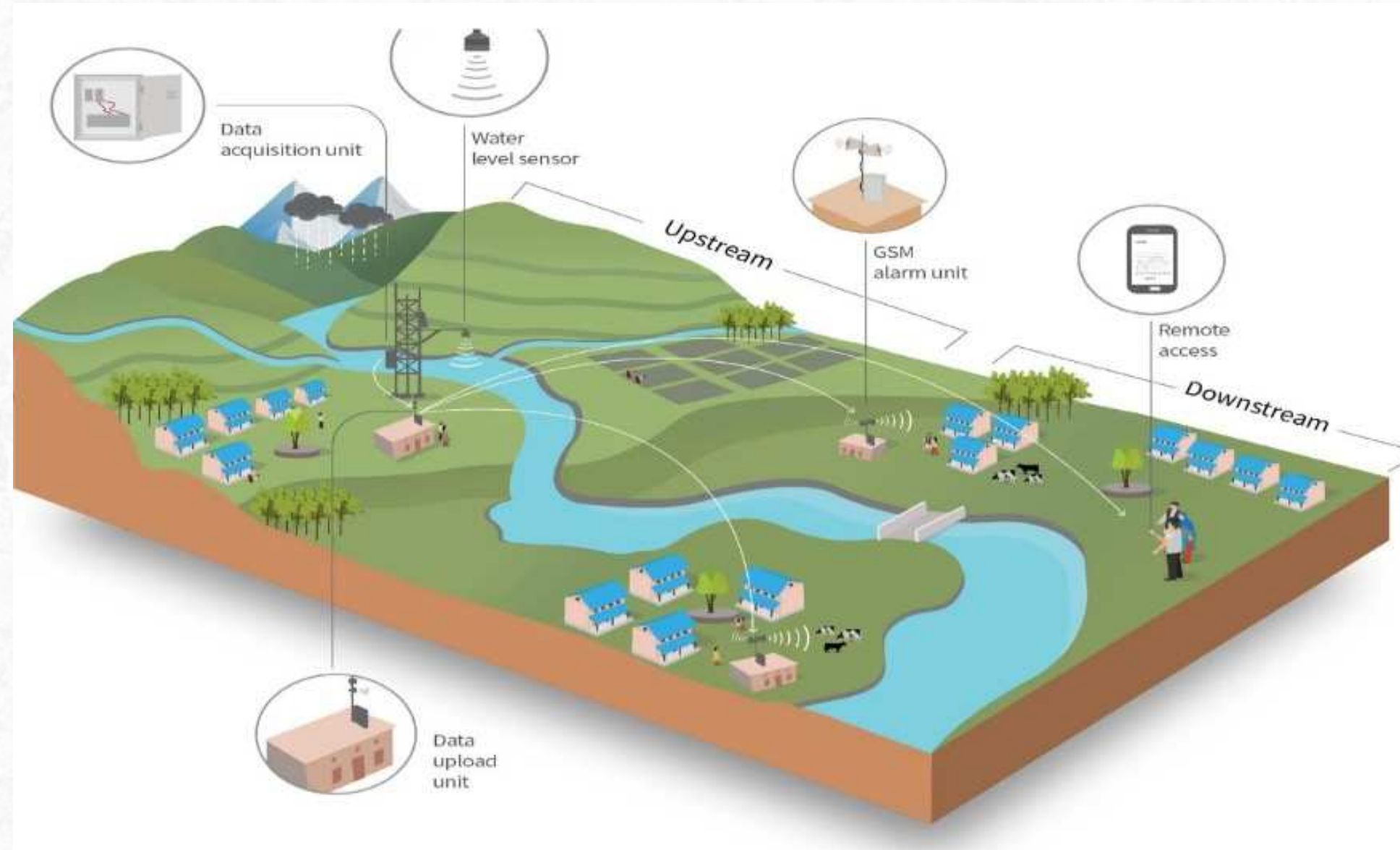
**Hydrological model, earth observation, RS and ML**

**Lead time and larger area**





# Community Based Flood Early Warning System (CBFEWS)



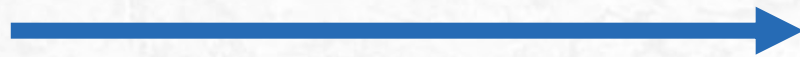
**Three components:**  
**Water level sensor unit at the riverbank upstream**  
**Data upload unit at a caretaker's house**  
**GSM alarm unit downstream for the communities.**

- **The lead time - ranges from 30 minutes to a few hours**



# Five Element of CBFEWS

**Understand about the risk caused by hazards and vulnerability.**



Risk Knowledge

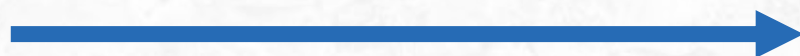


Monitoring & Warning Service

**Observe water level continually and warn key stakeholders during flood conditions**



**Ability of a community to resist or hold to and recover from the effects of hazard**

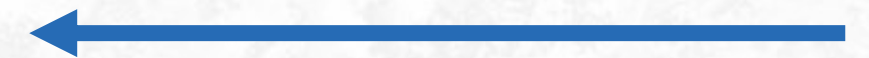


Response Capabilities



Dissemination & Communication

**Share flood information to vulnerable communities and concerned stakeholders**



**Sustainability mechanism**



**Mechanism to ensure that CBFEWS continues to operate beyond project support**



# Climate Services (ARRCC project)

- **A functional mechanism for generating agro-met advisory developed (Agriculture Knowledge Centre Chitwan)**
- **Institutional capacity built in access and use of Climate Projections (CORDEX Climate data) in Nepal and Bangladesh**



कृषि ज्ञान केन्द्र, चितवनद्वारा जारी

## कृषि-मौसम सल्लाह बुलेटिन

वर्ष १ अंक १

वैद्यताको अवधि: १ फागुन देखि ५ फागुन, २०७८

### मौसम:

यस साताको आइतबार, सोमबार र मंगलबार आंशिक बदली तथा बुधबार र विहवार आंशिक देखि सामान्य बदली रहनेछ । अधिकतम तापक्रम हल्का बढ्ने र न्यूनतम तापक्रममा उल्लेखनीय परिवर्तन नहुने सम्भावना रहेको छ ।

### केरा:

सिगाटोगा रोग व्यवस्थापनका लागि रोगी पातहरू काटी बर्बादभन्दा केही पर खाडलमा गाडी नष्ट गर्नुहोस् । रोगको प्रकोप सामान्य भएमा कार्वेन्डाजिम २.५ ग्राम प्रति लिटर पानीमा र यदि रोगको प्रकोप अत्याधिक छ भने प्रोपिकोनाजोल २.५ इ सी (टिल्ट वा डिल्ट) १ एम एल प्रति लिटर पानीमा स्टिकर सहित मिसाएर पात भिज्नेगरी छर्कनुहोस् ।

### भेडे खुर्सानी:

डडुवा रोग व्यवस्थापनका लागि रोगी भागहरू काटी नष्ट गर्नुहोस् । रोगको प्रकोप सामान्य भएमा म्यान्कोजेव ६.४% र मेटाल्याग्जिल ४% भएको विषादि २ ग्राम र प्रकोप ज्यादा भएमा साइमोवजानिल ८% र मेन्कोजेव ६.४% को मिश्रण ०.५ एम एल अथवा डाइमेटोमोर्फ ५.०%WP १ ग्राम प्रति लिटर पानीमा स्टिकर समेत मिसाएर छर्कनुहोस् ।

### धान:

चैते धानका लागि चैते ५, हर्दिनाथ १, हर्दिनाथ ३ लगायतका सिफारिस जातहरू मध्ये उपलब्ध जातको बीउ १.५ केजी प्रति कठ्ठा वा हर्दिनाथ हाइब्रिड १ गाघा केजी प्रति कठ्ठाका दरले बीउ राख्नुहोस् । ब्याड बनाउँदा १ मीटर चौडाई र आवश्यकता अनुसारको लम्बाई बनाउनुहोस् । ब्याडमा विउ छर्नु अगाडी करीव ४८ घण्टा भिजाइएको बीउलाई कार्वेन्डाजिम ५.० WP वा क्याप्टान ७.० WP ३ ग्राम प्रति केजी विउका दरले राम्ररी मिसाइ छर्नुहोस् ।

### जारी गर्ने

कृषि ज्ञान केन्द्र, चितवन

कृषि विकास निर्देशनालय

कृषि तथा पशुपन्छी विकास मन्त्रालय

बागमती प्रदेश

सम्पर्क नम्बर: ०५६-५२०११५ इमेल: akcchitwan@gmail.com



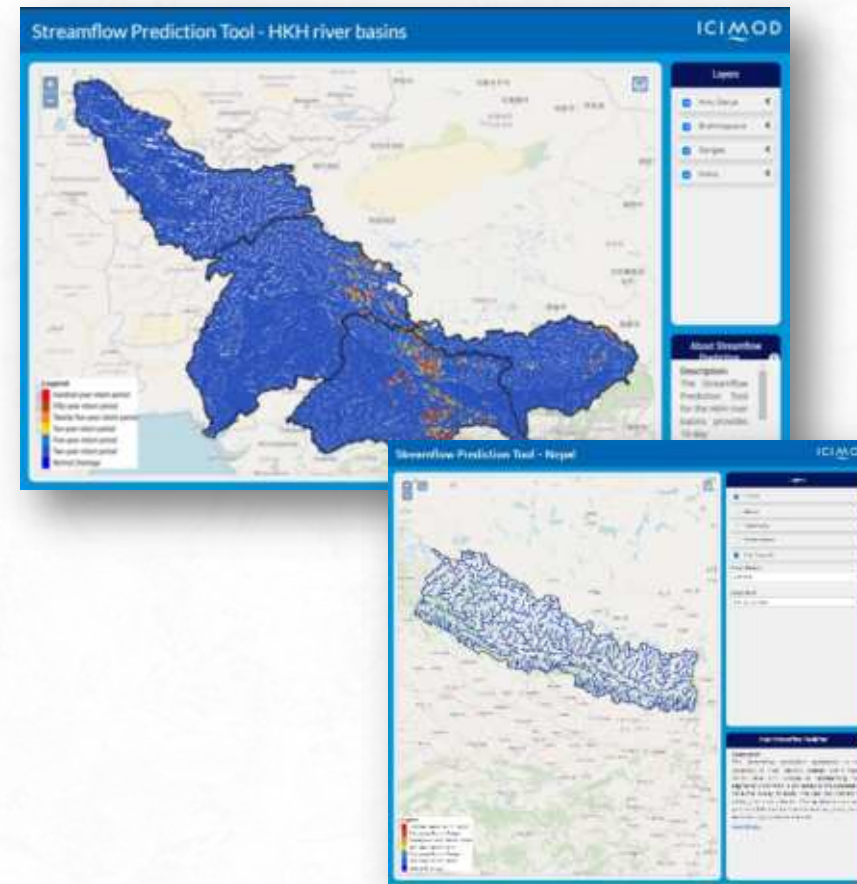
# SERVIR-HKH

## Flood management services

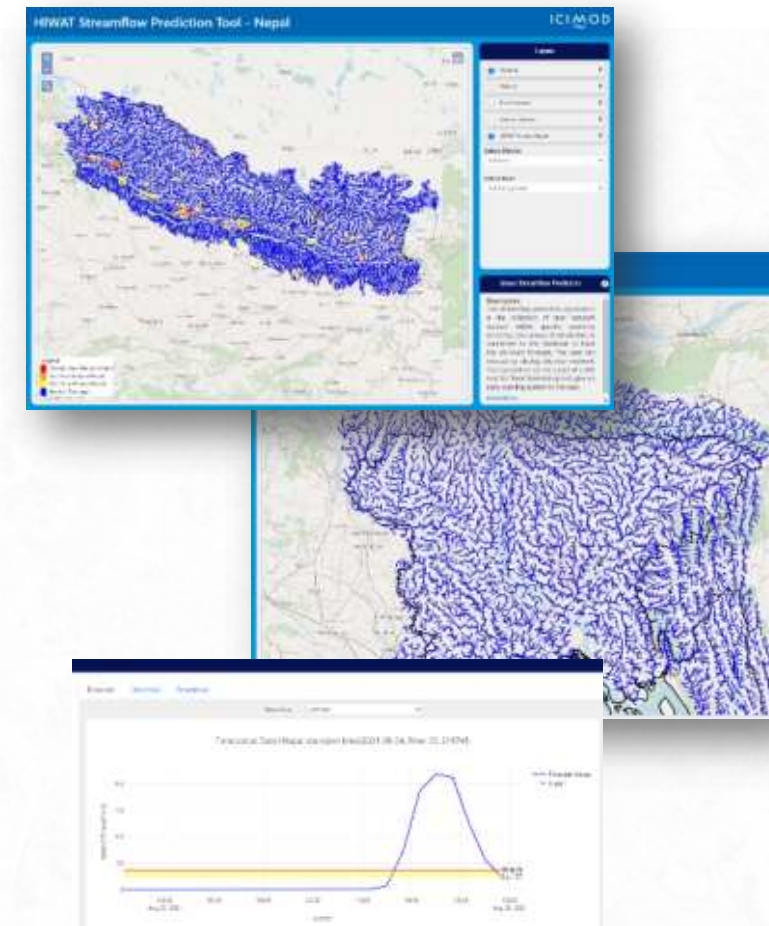
### HIWAT



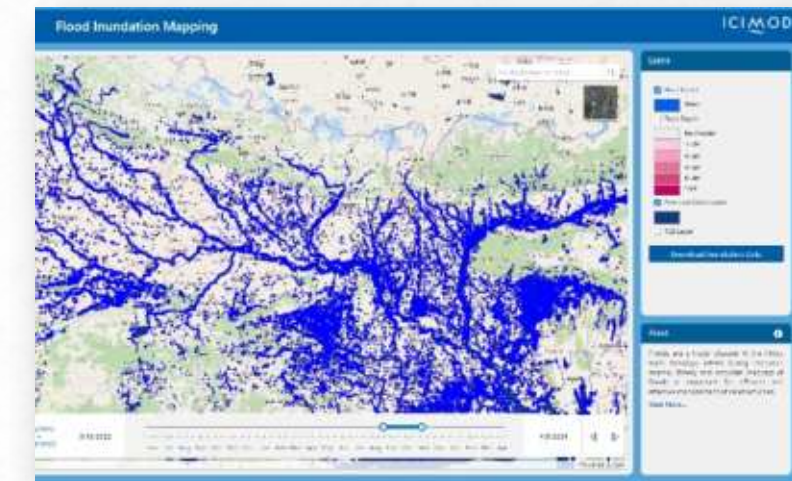
### Streamflow Prediction Tool



### Flash Flood Prediction Tool



### Flood Inundation Mapping



- **Weather forecast – 2 days**
- **Rainfall, temp, lighting etc.**
- **12 ensemble**
- **Prakop Alert-Mobile app**

- **10 days lead time**
- **ECMWF rainfall and runoff**
- **52 ensemble**

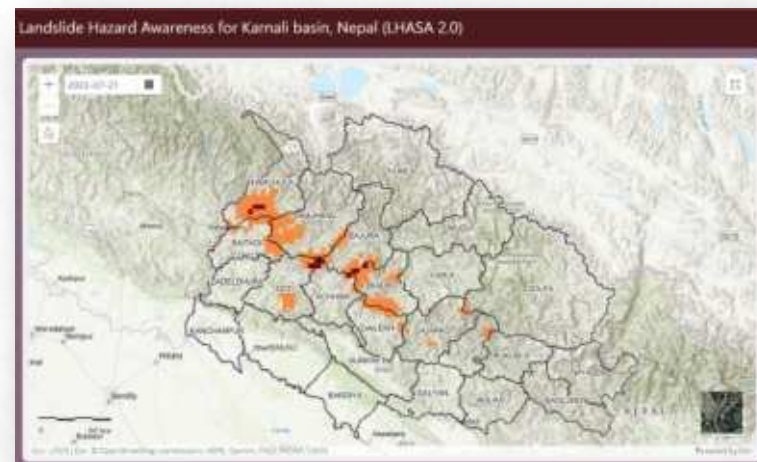
- **2 days lead time**
- **HIWAT rainfall**
- **Localized flood**

- **Flooded and non flooded area**
- **SAR data- penetrate cloud**
- **Machine Learning algorithm**



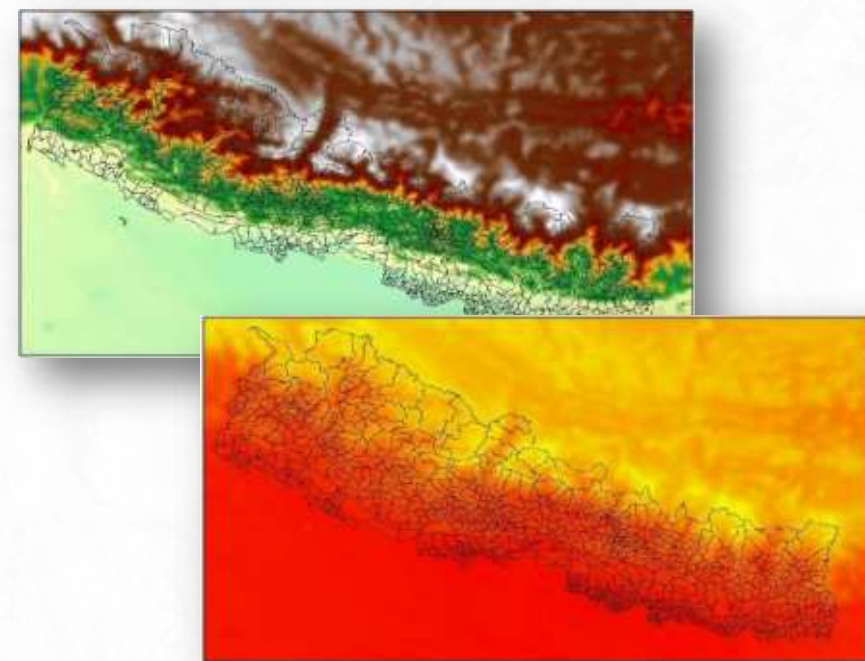
# Other EWS under development

## Landslide detection and forecasting tools



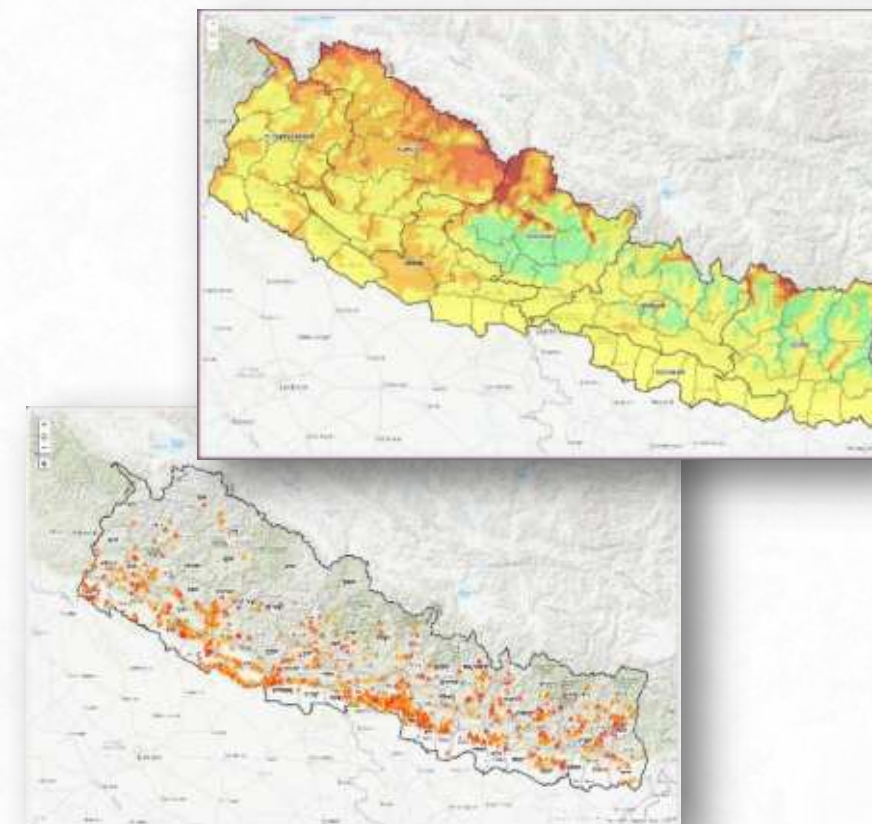
- **Landslide forecast – 2 days**
- **Rainfall trigger**
- **Machine Learning algorithm**

## Heat/Cold wave forecasting



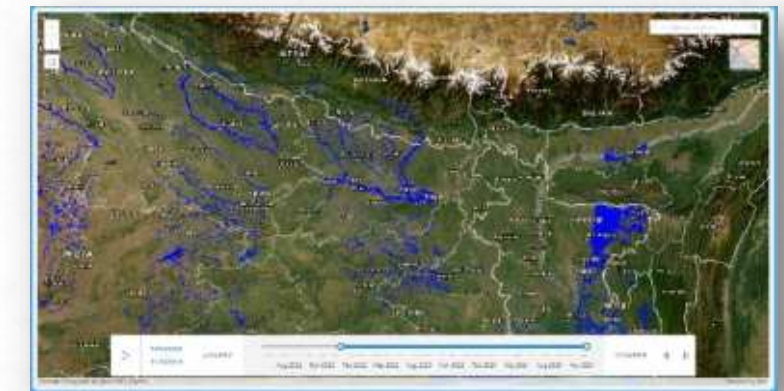
- **Heat/cold days**
- **2 days lead time**
- **HIWAT rainfall**

## Forest fire monitoring and outlook



- **2 days lead time**
- **Available in English and Nepali**
- **Localized flood**

## Flood Inundation forecasting



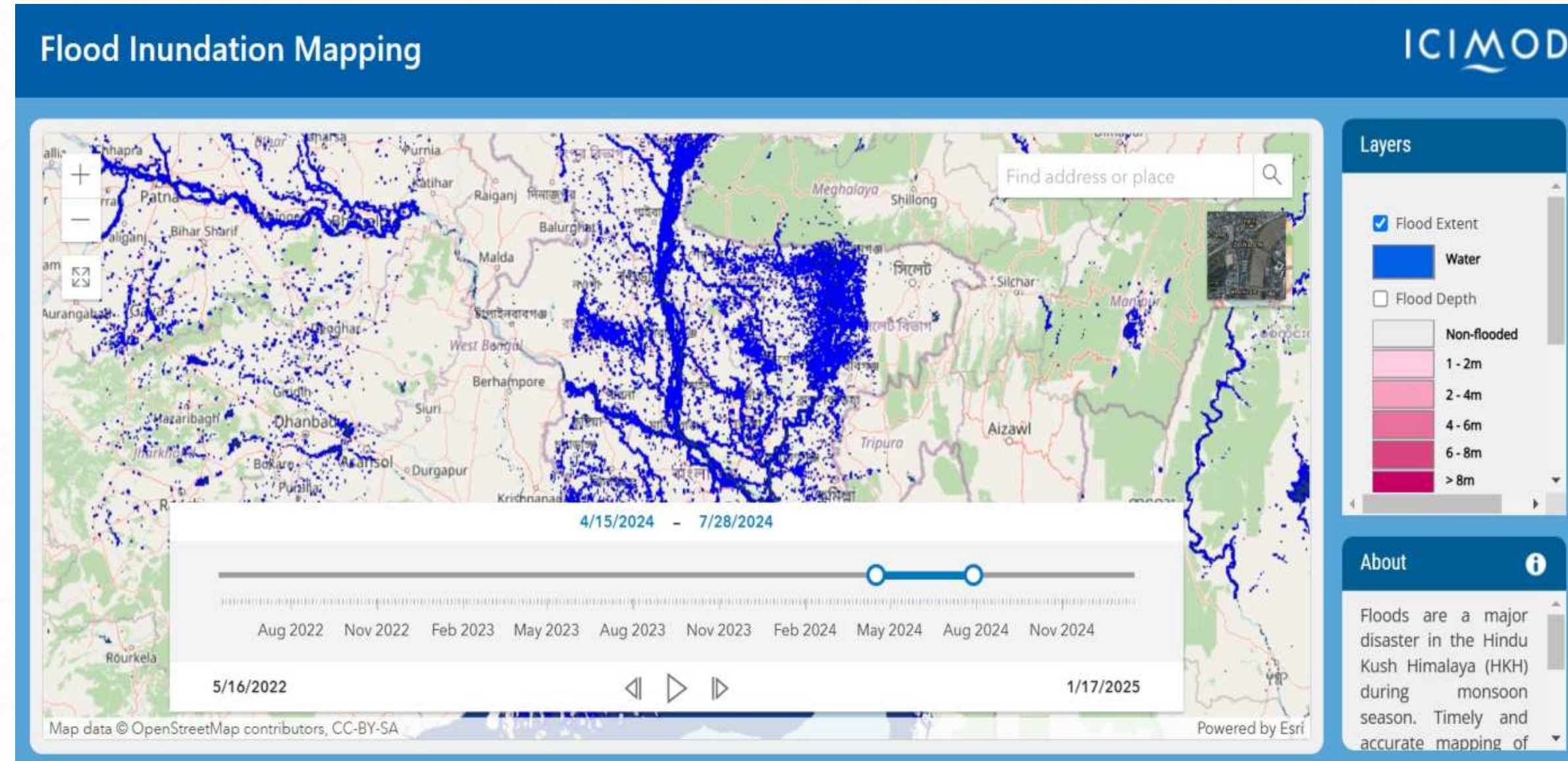
- **Flood inundated area forecasting**
- **Impact based forecasting**
- **Machine Learning algorithm**



# Flood Inundation Mapping (HydroSAR)

- **Uses Sentinel-SAR data**
- **30 m resolution -> 20 m**
- **Coves Bangladesh, Bhutan, Nepal, NE-India**
- **Data available as soon as the satellite passes**
- **User friendly portal**
- **Download option for further analysis**

<https://geoapps.icimod.org/FloodInundation/>

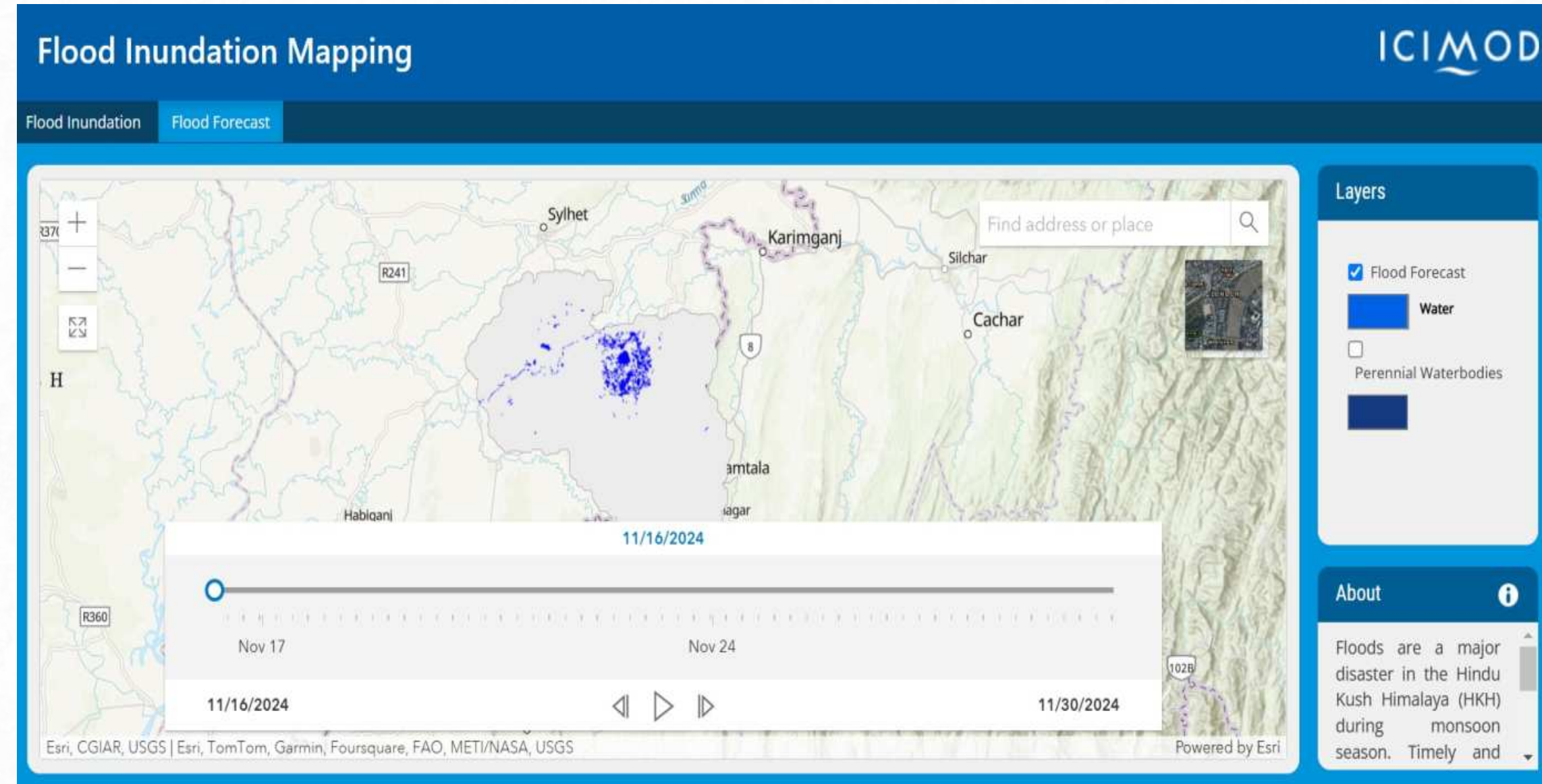




# Flood inundation forecasting

- **Uses AI to forecast flood inundation maps**
- **Flood maps from HydroSAR and Steamflow Prediction Tool**
- **10 days forecast**
- **Beta Version**

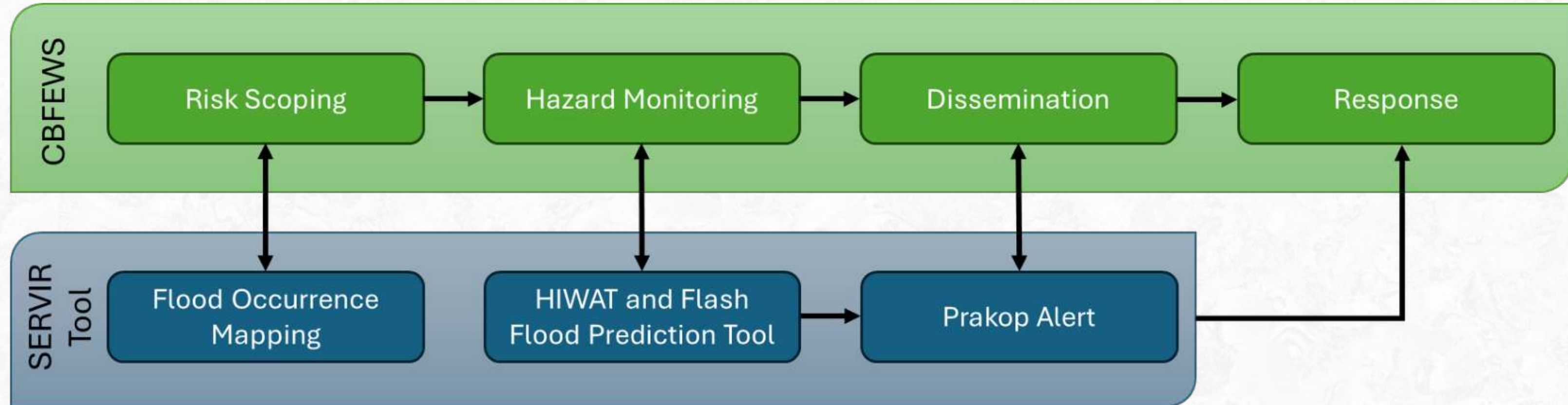
**<https://geoapps.icimod.org/testbox/FloodForecast/#>**





# Synergizing SERVIR science applications and Community Base Flood Early Warning System (CBFEWS)

To increase lead time for communities





# Partnerships



**SERVIR**  **HINDU KUSH HIMALAYA**



## National Level

BMD, DHM, FFWC, PMD, NCHM, NDRRMA



## Community Level

DRR Focal person, Red cross, Start fund Nepal, School, Communities

## Inclusive capacity building

- **Several capacity building workshops organized – system installation, ToT, On the Job Training, Orientation**
- **We supported caretaker, allowing the participant to fully engage in the workshop.**



**“During last August's flooding, I monitored ICIMOD’s HIWAT, Streamflow Prediction Tool, and data from national agencies to decide on activation [distributing cash aid],” - Laxmi Awasthi DRR advisor for the Mercy Corps**



The image features a large satellite dish antenna mounted on a tall, white, cylindrical tower. The dish is a complex grid of metal panels. The background is a deep blue night sky filled with numerous stars. On the left side, there is a large, abstract graphic element consisting of overlapping, curved shapes in shades of yellow, orange, and red, resembling a stylized flame or a comet tail. The text "Thank you" is written in a clean, white, sans-serif font, positioned to the right of the antenna dish.

**Thank you**