

The logo for ICIMOD, consisting of the letters 'I', 'C', 'I', 'M', 'O', 'D' in a white, sans-serif font. A small, white, wavy line is positioned below the 'M' and 'O' characters.

ICIMOD

A satellite view of the Earth from space, showing the curvature of the planet and the atmosphere. The landmasses are visible in shades of brown and tan, with some blue patches representing water bodies. A large white zigzag graphic is overlaid on the left side of the image.

Introduction to floods in Nepal

Manish Shrestha

Date: May 2023

Flood: means when an overflow of water submerges land that is usually dry

Floods are one of the most frequent, destructive and costliest disaster

Types of floods:

- River flood
- Flash flood
- Inland flood
- Coastal flood



Seasons

Winter (December-February)

Usually dry and cold. Morning fog and frost are common in valleys and hilly areas.

Few spell of rainfall especially in the northwest region - originates from west, Mediterranean sea.

Spring (March – May) or Pre monsoon

Thunder shower. Occasional hail.

More frequent in the hilly regions compared to terai region.

Summer (June-September) or Monsoon

About 80% of the annual precipitation falls during this period.

July is the wettest month.

Originated from eastern part of Nepal – bay of Bengal.

Rainfall occurs specially at evening and night. Floods and landslides are common

Autumn (October-November) or Post monsoon

Less rainfall occurs.

November is the driest month.

Nepal's stand in disaster

- 12th position on climate vulnerable country (Global climate index, 2021)
- 30th position on water induced disaster (MOHA, 2018)
- 20th position on overall naturally caused disaster (MOHA, 2018)
- Urban flood and inundation hazards are rising



Credit: Sky news



Floods in Nepal

Between

2011-2022

1800+
Event

causing more than

870 death

&

200 injured

Rs. 16.8 Arab
(~ USD 129 million)
economic damages

*August 2017 flood- 36 out of 77 districts affected,
1.7 million people affected*



Causes of floods

Natural

- High intense/continuous rainfall
- Rapid snowmelt
- Glacial lake outburst
- Landslide dam outburst

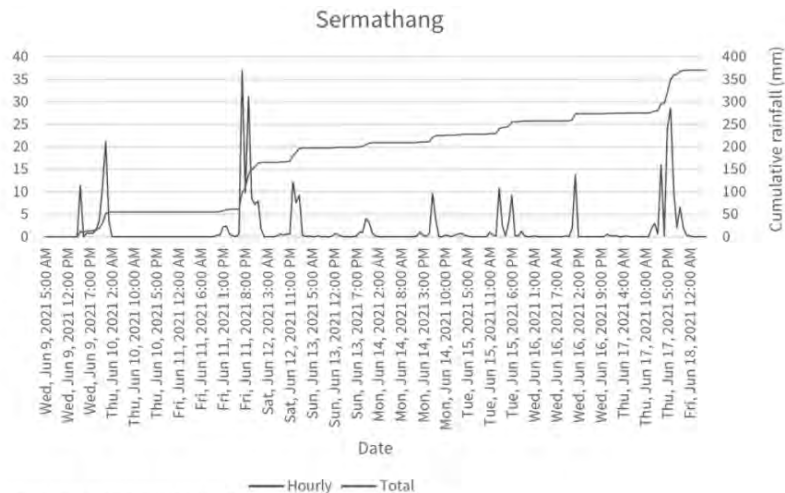
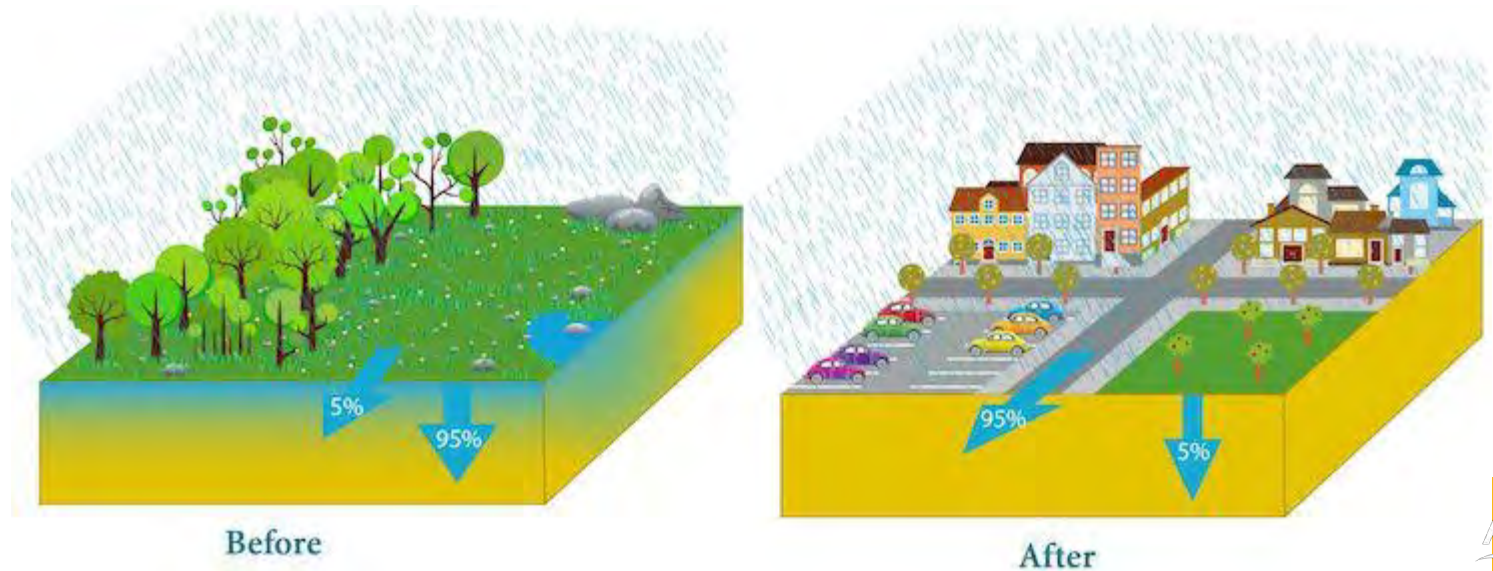


Figure 2: Hourly rainfall recorded by the DHM weather station at Sermathang (2625 masl).

Non- Natural

- Dam break
- Unmanaged settlement (congested drainage system, encroachment of river banks)
- Deforestation/LULC change – infiltration rate/increases runoff
- Deposition in river bed (sand or other debris)
- Dams/reservoir (embankment on the Indian side)



Flood management practices

Structural approach - Grey infrastructural

- to stop water overflowing from the river bank
- to reduce kinetic energy
- to stop water entering into the houses



Embankment



Sand bags



Check dams

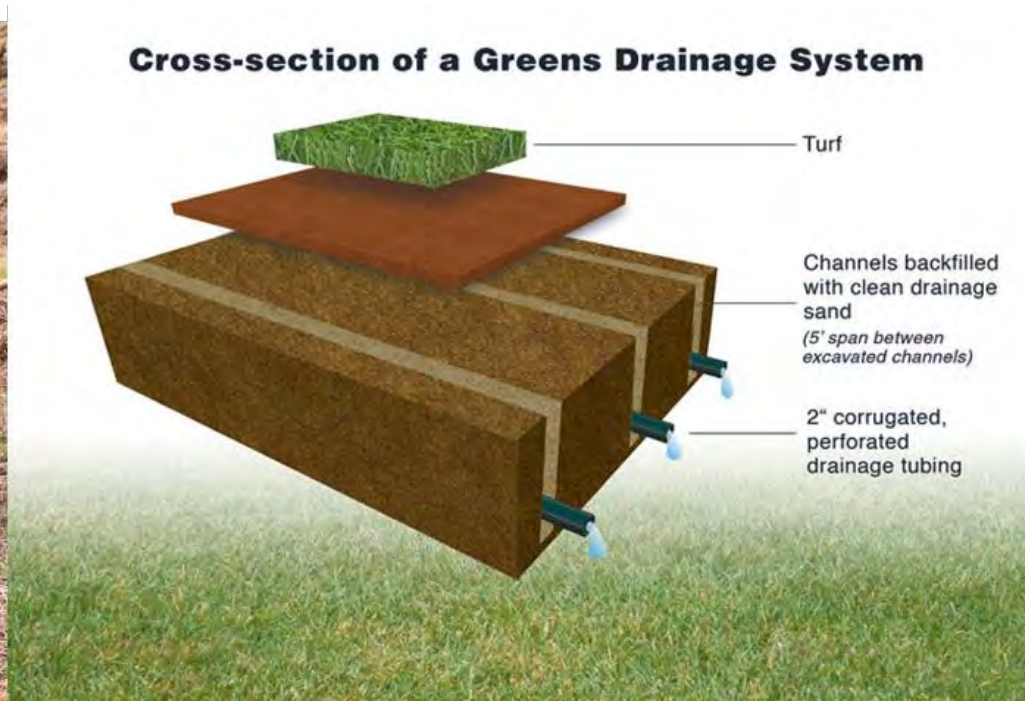
Flood management practices

Structural approach - Green infrastructural

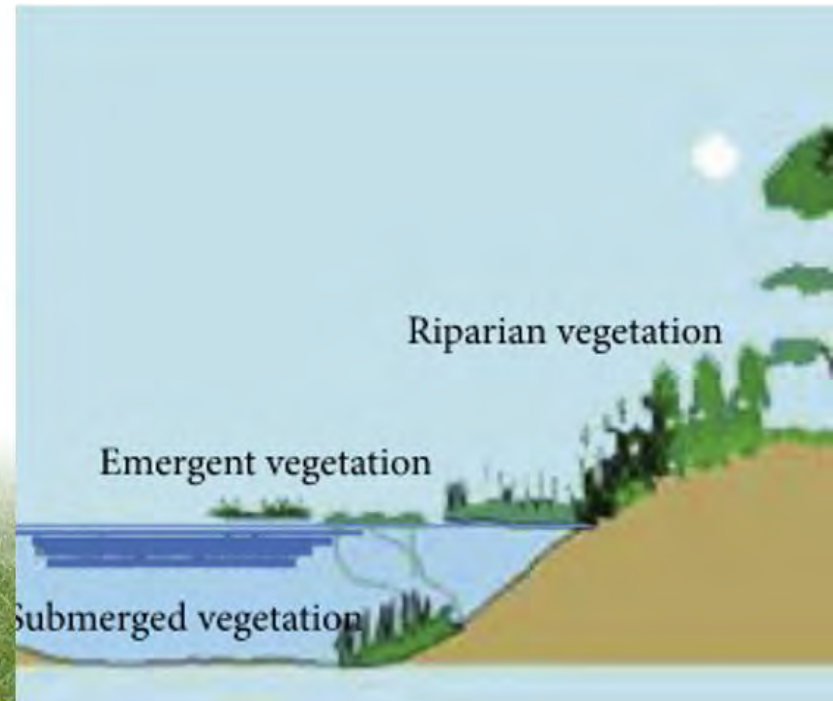
- to increase permeability/ infiltration
- reduce erosion
- control the overland flow/ direct runoff



Afforestation upstream



Increase drainage

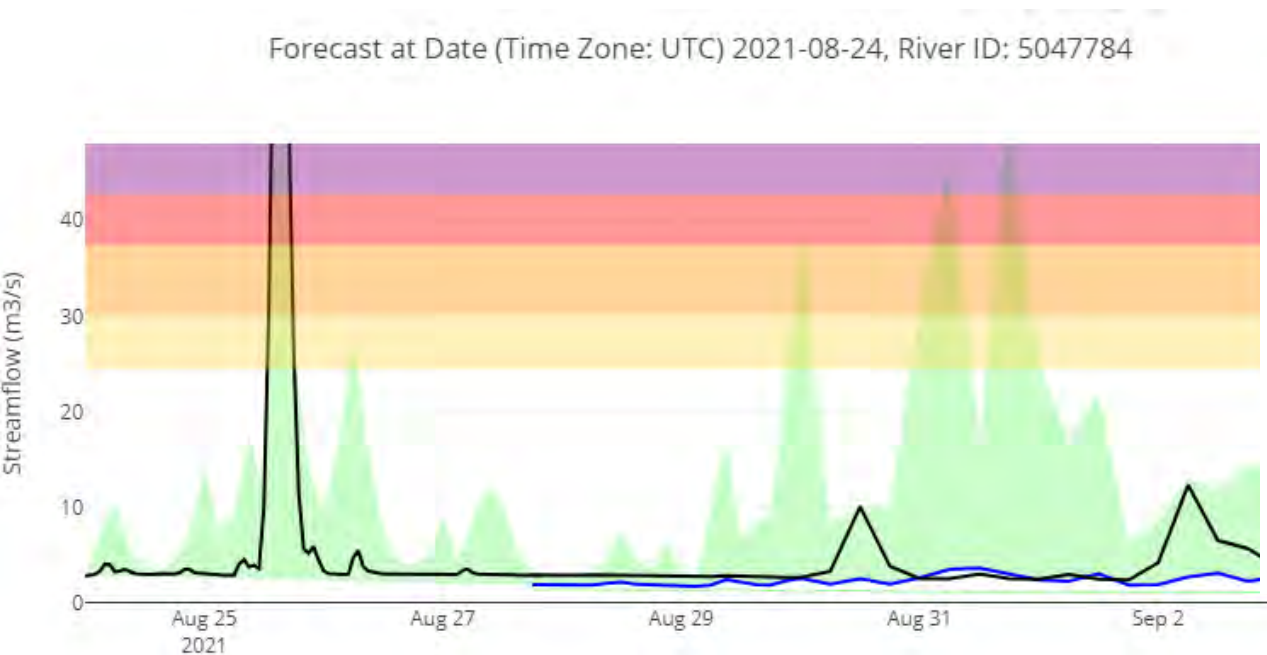


Vegetation in river banks

Flood management practices

Non-structural approach - Flood forecasting and early warning system

- o to give advice about impending flooding so people can act to minimize the negative impact of floods
- o Evacuate to higher ground/ crop harvesting, shift animals to higher ground /Prepare sand bags, emergency kits



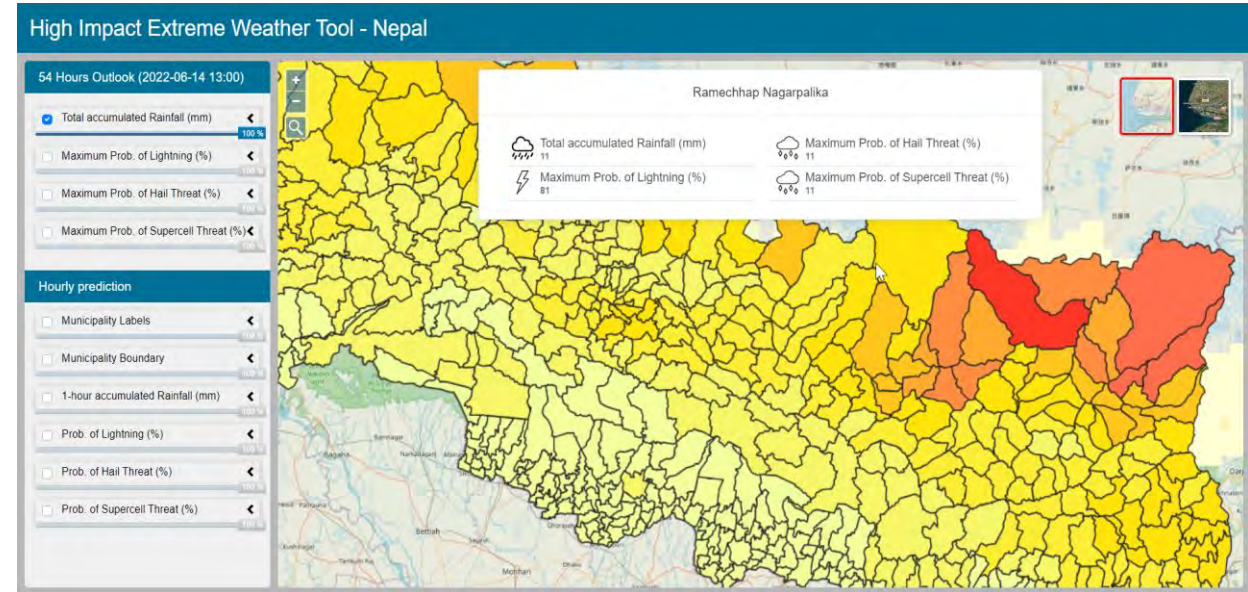
SERVIR's weather and flood prediction tools

- The High Impact Weather Assessment Toolkit (HIWAT) - Nepal
- Flash Flood Prediction Tool – Nepal
- Streamflow Prediction Tool - Nepal



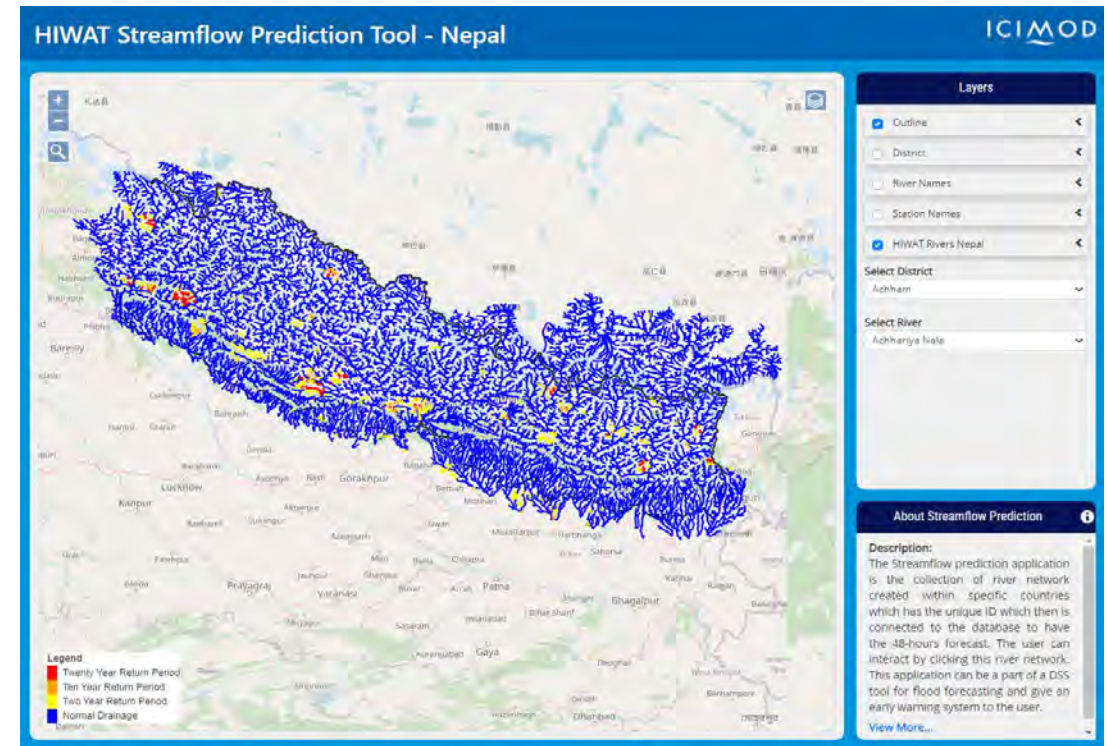
High-Impact Weather Assessment Toolkit (HIWAT) - Nepal

- Numerical weather prediction model
- 54-hour lead time
- Rainfall, temperature, lightning strikes, winds, hail damage
- Website: <https://servir.icimod.org/science-applications/high-impact-weather-assessment-toolkit-hiwat-nepal/>



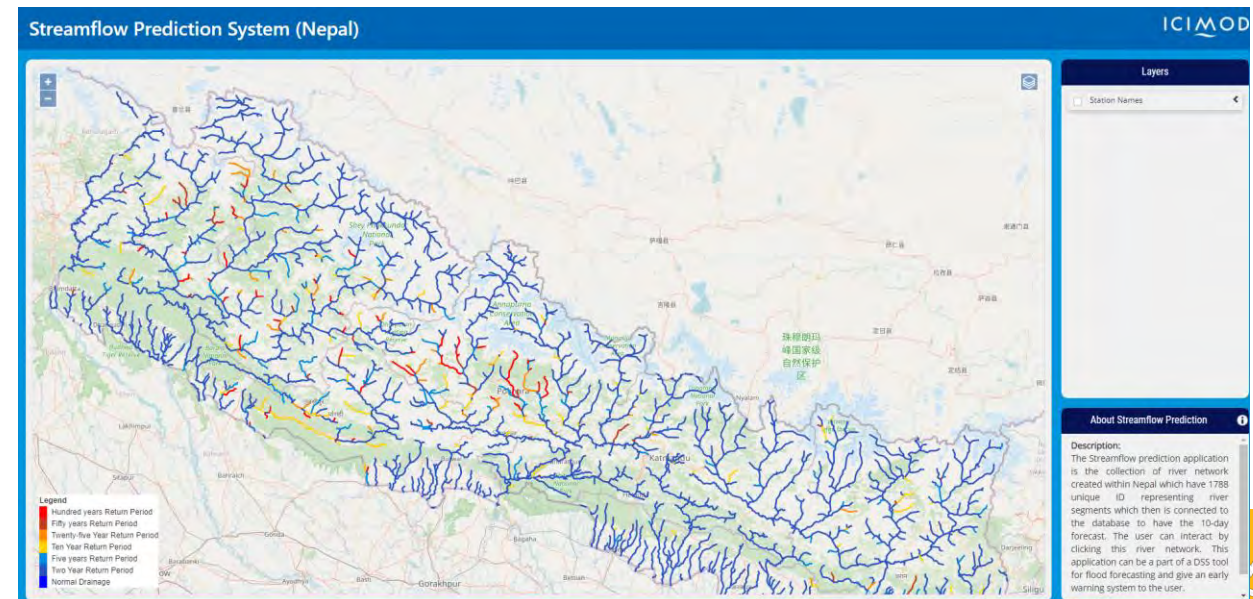
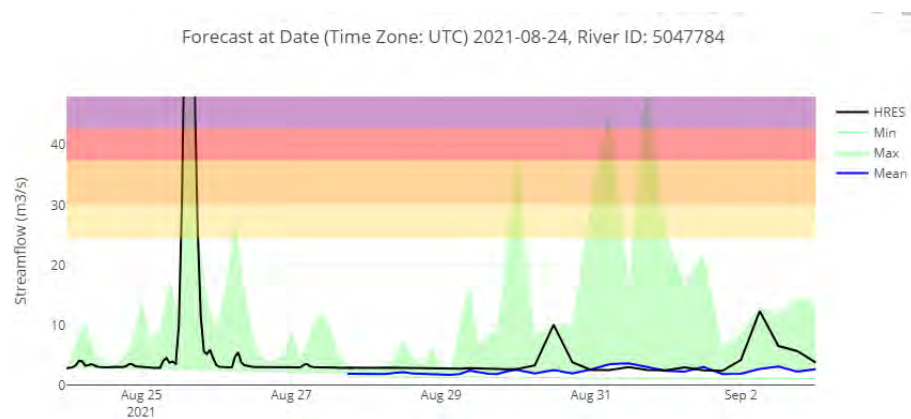
Flash Flood Prediction Tool - Nepal

- HIWAT forecast into RAPID hydrological model
- 54-hour lead time
- Designed for smaller river prone to flash floods
- Website: <https://servir.icimod.org/science-applications/flash-flood-prediction-tool-nepal/>



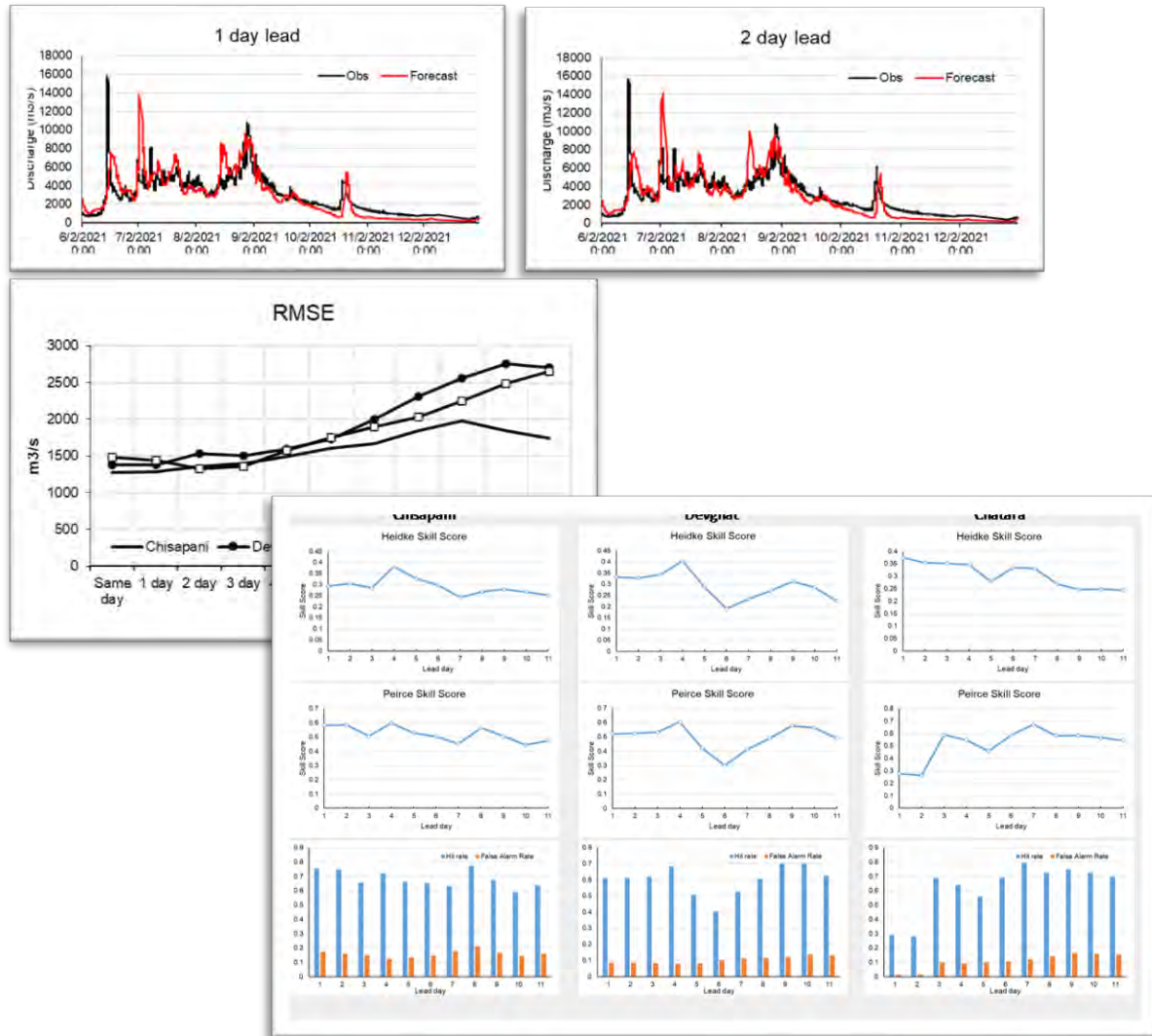
Streamflow Prediction Tool - Nepal

- GloFAS direct runoff routed into RAPID hydrological model
- 10 days lead time
- Designed for larger river
- Source: <https://servir.icimod.org/science-applications/streamflow-prediction-tool-nepal/>

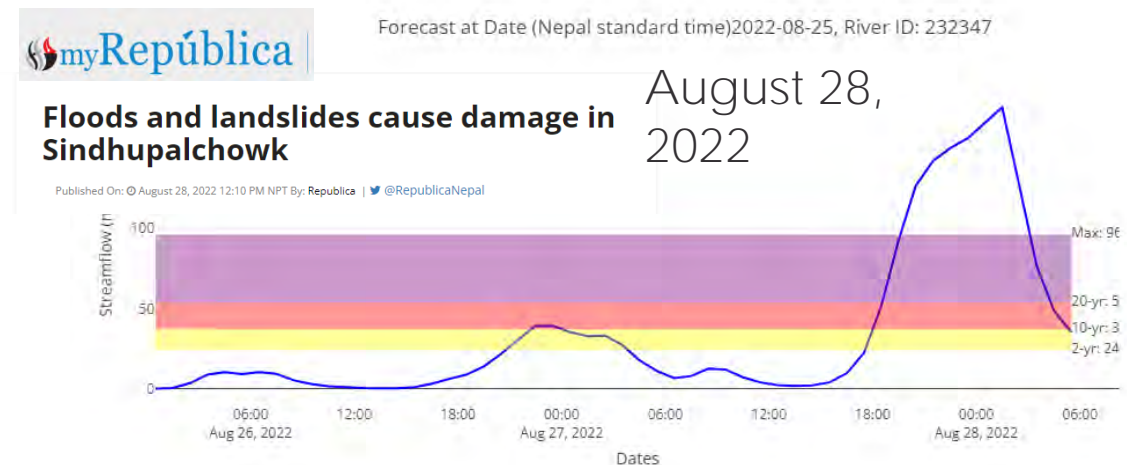
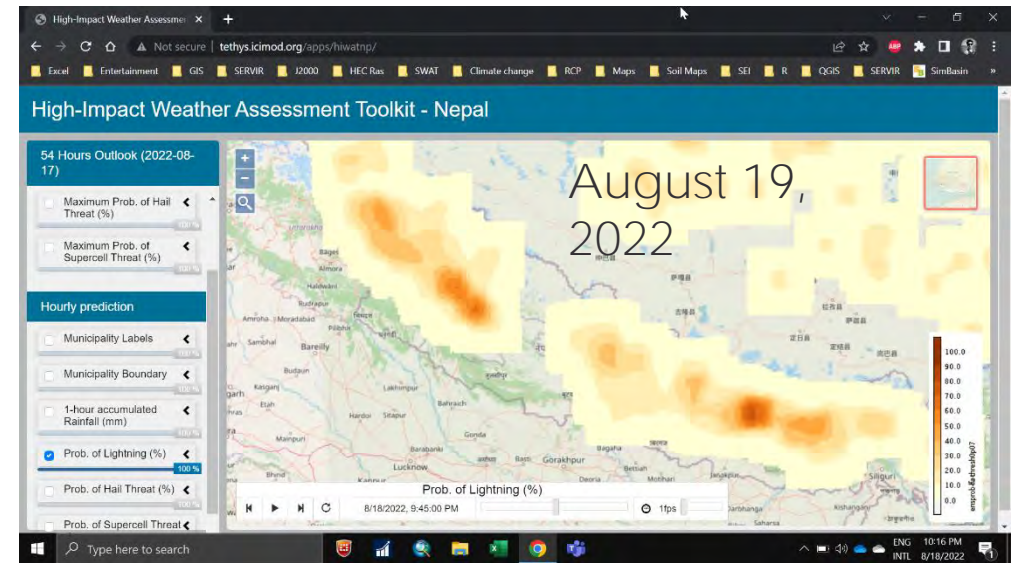


Verification

Quantitative – Based on statistical and score values



Qualitative – Event base



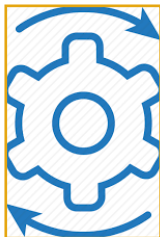
Advantages of ICIMOD's flood forecasting system



Covers entire Nepal
– big and small
rivers



Ample lead time
(54 hrs.-10 days)



Automatic and
easily accessible
via internet



Color code for
different return
period



Reliable/accurate



Free access – no
payment, no
registration



User friendly no
burden to users



Customizable
according to user
needs

Thank you

Protect the pulse.

