

PROJECT TITLE: FLOODS MONITORING

PHASE 2 : Why early flood warning systems do not work

PROJECT DEFINITION:

Floods can be riverine, such as the ones seen frequently in Assam or Bihar, or they can be urban floods largely caused by extremely heavy rainfall coupled with poor stormwater drainage systems. In India, heavy rainfall that causes urban floods is by the India Meteorological Department (IMD), while rising water levels in rivers are monitored by the Central Water Commission (CWC). Presently, there are around operated by the CWC across the country, covering 20 river basins. Many of these stations are used as flood monitoring stations for formulating flood forecasts.

Flood forecasting comprises level forecasting and inflow forecasting. Level forecasts help the disaster management agencies in deciding mitigating measures like evacuation, shifting people and their movable property to safer locations. Inflow forecasting is used by various dam authorities to optimise the operation of reservoirs and ensure safe passage of floodwaters downstream. It also helps ensure adequate storage in the reservoirs for meeting the demand of water during the non-monsoon period.

Flood forecasts are issued by CWC at 325 stations (132 Inflow Forecast Stations + 199 Level Forecast Stations), as per a , and it annually issues over 10,000 flood forecasts. CWC has for dissemination of alerts regarding inundation.

For urban floods, among other things, IMD has a doppler weather radar of 33 stations to support monitoring and forecast of severe weather, such as thunderstorms and cyclones.

The IMD also operates (FMOs) at 14 locations (Agra, Ahmedabad, Asansol, Bhubaneswar, Bengaluru, Chennai, Guwahati, Hyderabad, Jalpaiguri, Lucknow, New Delhi, Patna, Srinagar and Thiruvananthapuram).

But flash floods also pose a challenge to planning agencies, as they cause widespread destruction in a short span. A 2021 NITI Aayog report recommended a "focus on scientific research in development of a model-based system to forecast flash flood (sic) with sufficient lead time".

Recognising their damage potential and a general lack of flash flood warning capabilities, the IMD, in collaboration with the US National Weather Service, has developed a (FFGS) for the South Asian region from October 2020. FFGS can provide warnings about 6-24 hours in advance for South Asian countries, including India, Nepal, Bhutan, Bangladesh and Sri Lanka, covering most of the Himalayan region.

FFGS enables all the member countries to issue impact-based flash flood forecasts at the watershed and also at the city level.

"If India has systems like FFGS, was it able to forecast floods like the ones we are seeing in the northeast?," asks Sridhar Balasubramanian, professor of mechanical engineering, and faculty at the Interdisciplinary Programme on Climate Studies Centre at the Indian Institute of Technology, Bombay. "Presently, our models are unable to predict floods even 24 hours in advance. More integrated effort is needed to build a robust system that can forecast floods at least 48-72 hours before the event."

The IMD gives location-specific for seven days within India's capital cities and issues (which are urgent forecasts) for the next three hours covering over 700 districts. The same forecasting abilities have been extended to cyclones as well.

, including Mumbai, have their own EWS for floods. Mumbai's system is named , but it has shown little success since its inauguration in June 2020. "In Mumbai, iFlows is directly integrated with the forecast, so it is practically the same as the forecast and not an early warning," said Balasubramanian.

India has a of around Rs 15,000 crore for the Flood Management and Border Area Programme (FMBAP) for 2021-26. As part of FMBAP, states can undertake schemes critical for long-term protection against floods, including building infrastructure such as embankments or dams.

We wrote to MoES and the IMD on the effectiveness of the FFGS and iFlows, and will update the story when we receive a response.

Early warning systems for cyclones often inaccurate