

## SCIENCE OF MONSOONS

### India needs better science to prepare more effective disaster management plans

The southwest monsoon 2020 has officially drawn to an end with the India Meteorological Department (IMD) declaring a withdrawal of the associated winds and rainfall pattern from India on Wednesday. The over 8% surplus this year has surpassed the IMD's estimates. For the first time since 2010, India got more than 100% of its long period average (LPA) of 88 cm in consecutive years. Last year the country saw record rainfall of 110% of the LPA, the highest in a quarter century. India has never got over 105% of the LPA in consecutive years in at least 30 years, according to records available since 1988 on the IMD website. Meteorologists often speak of two or three decade 'epochs' of rainfall variation. Since 2000, India was in a low patch with several drought years and had barely a handful of above normal or excess rainfall. In that light, the two years of a munificent monsoon could signal a possible return to a rainy epoch. While it could mean more rain, it also implies floods, overflowing dams, landslides and loss of lives. Moreover, surplus rains are not evenly distributed in time and space. Therefore, much like there are attempts to improve flood forecast warnings — especially the short term ones — there ought to be commensurate efforts by authorities and infrastructure agencies to prepare for the environmental and ecological impact of excess rain. This year the IMD undertook a long due revision of the onset and withdrawal dates of the monsoon in India. By this reckoning, the monsoon's normal withdrawal date was October 15. Historically, this has always been a statistical average and the actual withdrawal is usually within a few days of this. However, this year the withdrawal has been extremely delayed. Factoring in these changes must become a key part of a State and city's disaster management preparedness.

The southwest monsoon's withdrawal also heralds the advent of northeasterly winds that bring in the northeast monsoon to parts of peninsular Andhra Pradesh and Tamil Nadu. While significant to the agriculture there, the northeast monsoon contributes 10%-12% of India's annual rainfall, against the southwest monsoon's 75%-80%. That, and its limited geographic spread has meant that the northeast monsoon is not showered with as much research attention. However, studies show that northeast monsoon rainfall displays significant variation and climate models are fairly inaccurate in their forecasts of its unfolding over the subcontinent. There have been significant investments in super computing infrastructure to simulate weather as well as to tune forecasts to go beyond just giving rainfall estimates and factor in the potential damage of floods and cyclones. Building on these, scientists must also put in more effort and design research programmes that better analyse the vagaries of the northeast monsoon. Along with more understanding of how climate is changing locally, India needs better science to prepare more effective disaster management plans and improve resilience in a warming world.