

# Climate Services of the Science and Technology Department Govt of Kerala



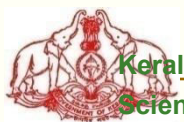
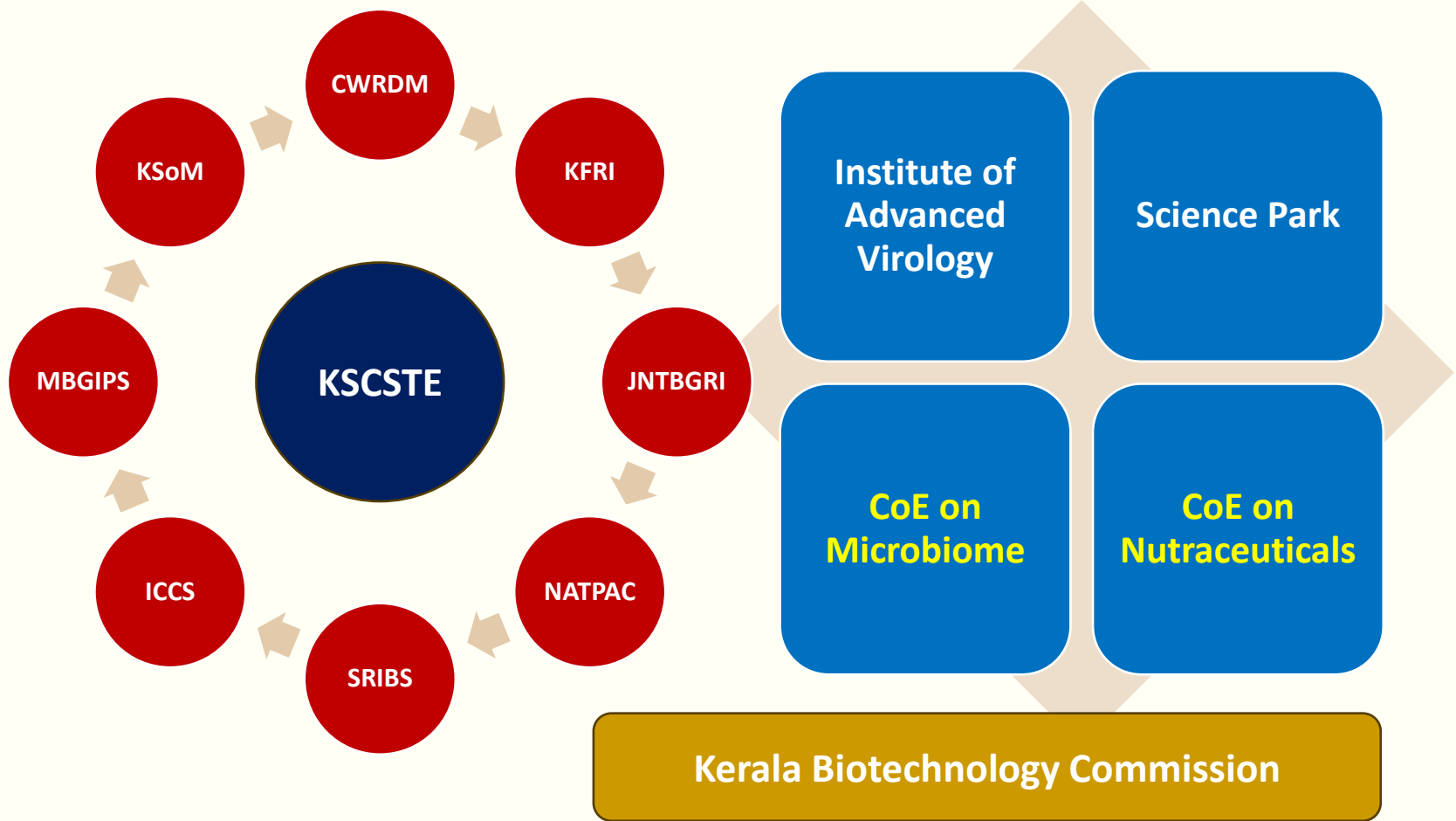
*Brief overview presented by*

**Dr. KP Sudheer**

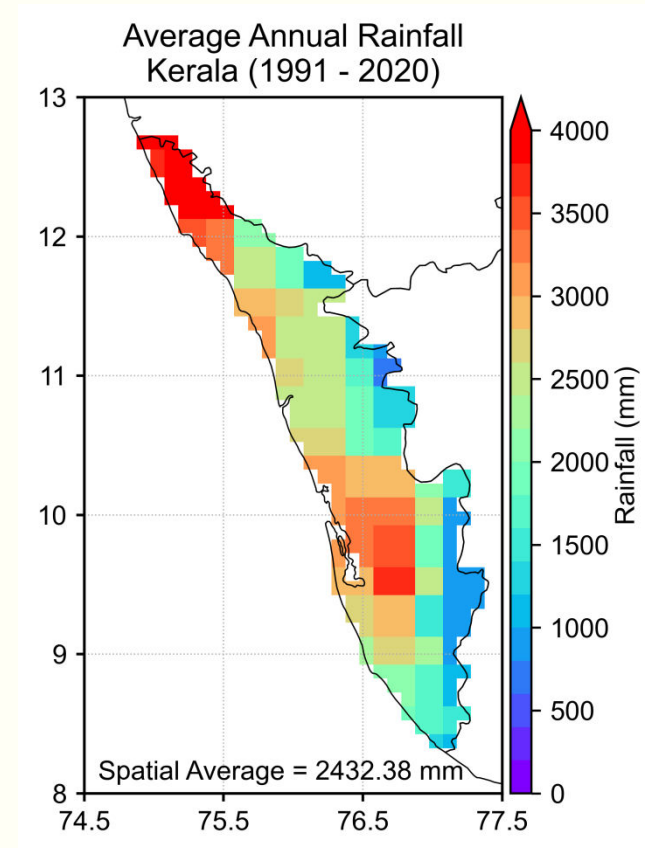
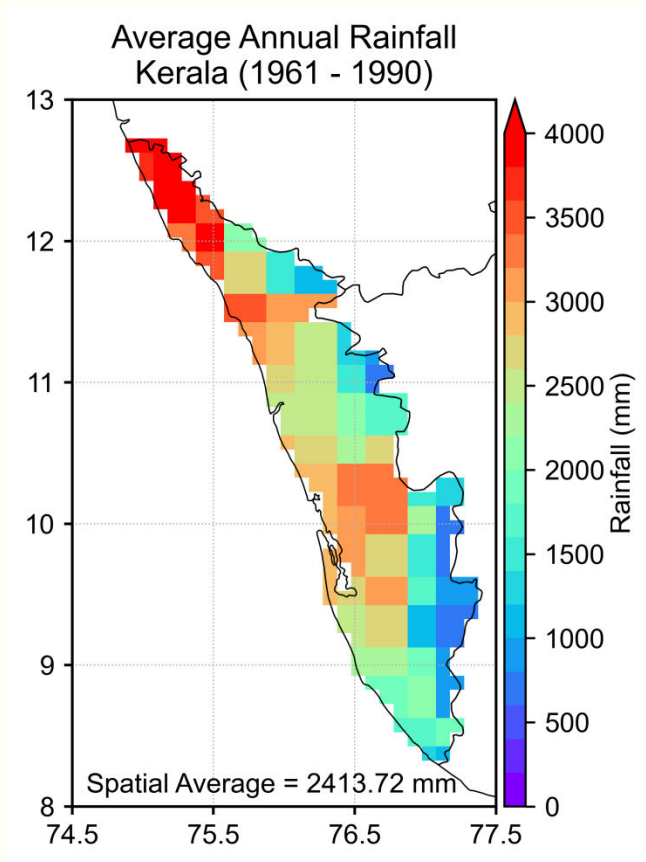
**Principal Secretary, Science and Technology Department, Govt. of Kerala**



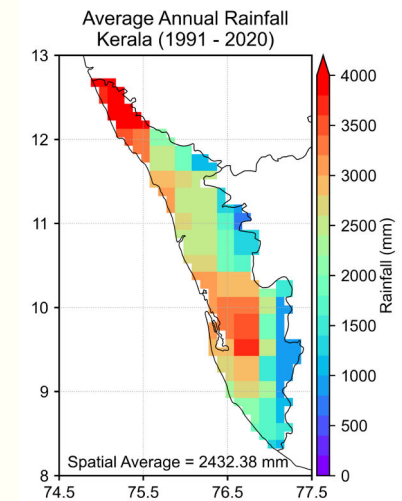
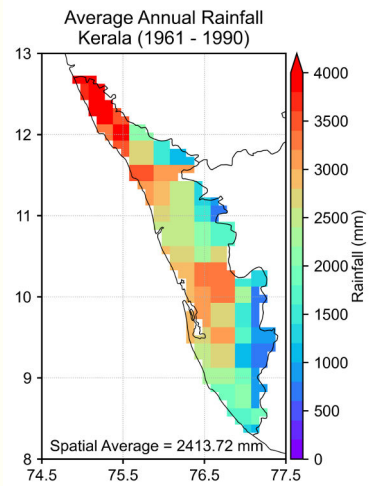
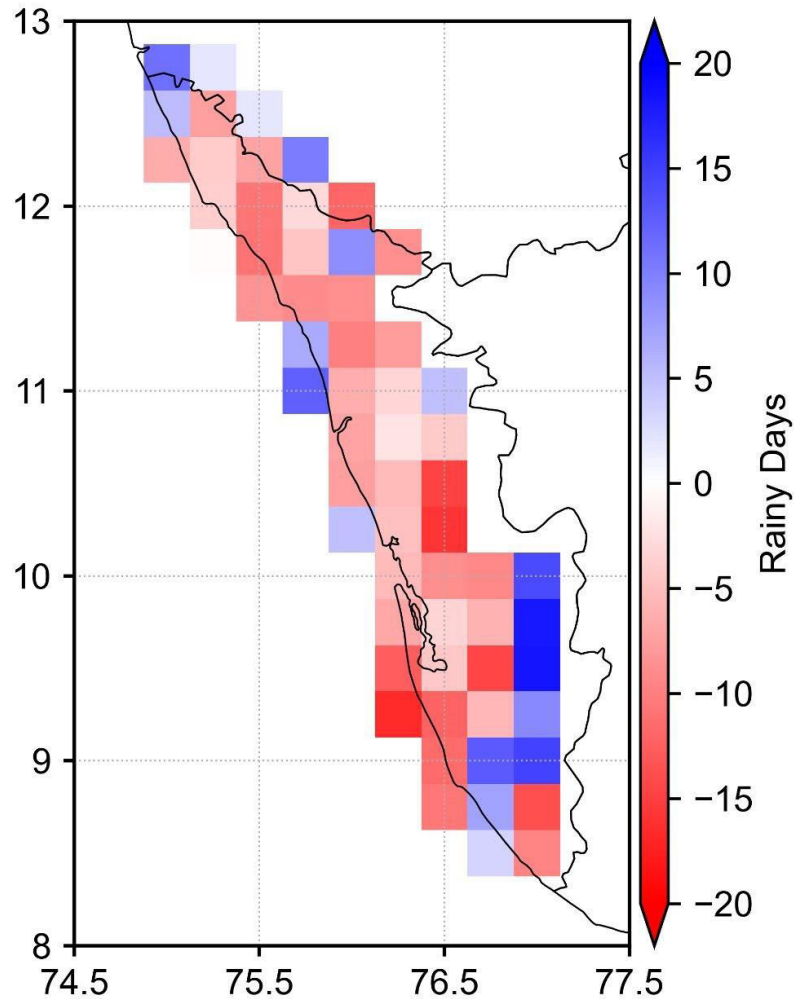
# Science & Technology Institutions in Kerala



# Climate Change Signals - Kerala



# Change in Number of Rainy Days

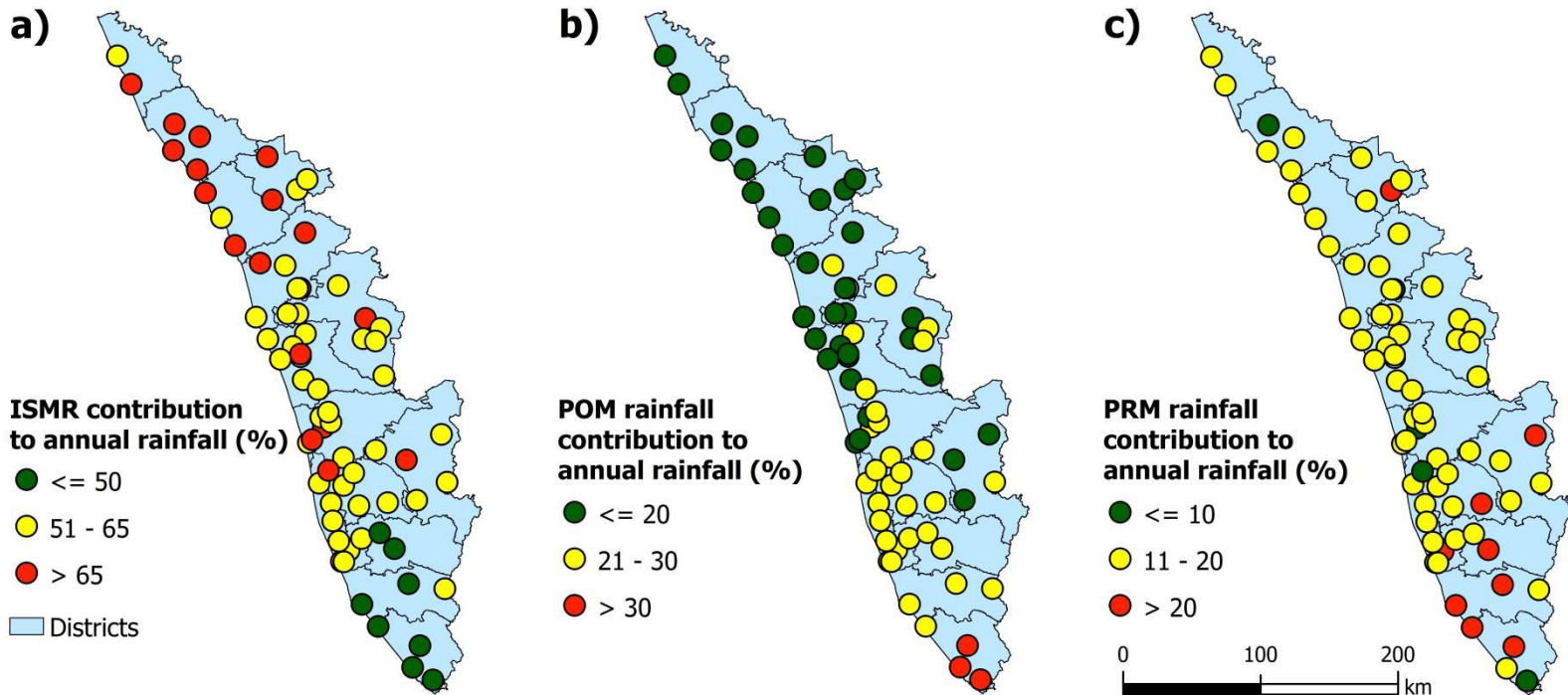


# Institute for Climate Change Studies, Kottayam

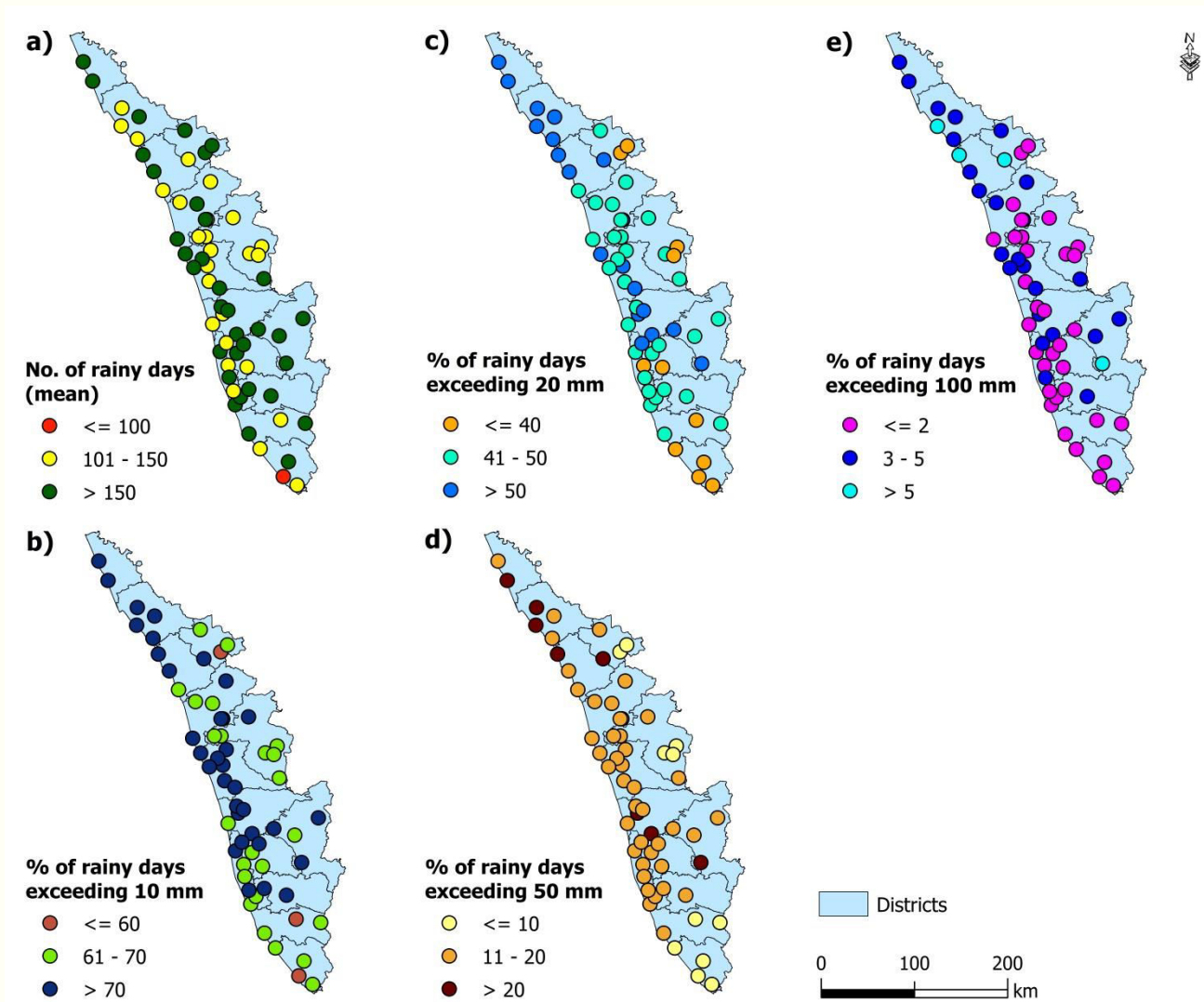


To empower Kerala's preparedness for the anticipated global consequences of climate change, and to enhance its resilience and adaptability using science, technology, and self-awareness

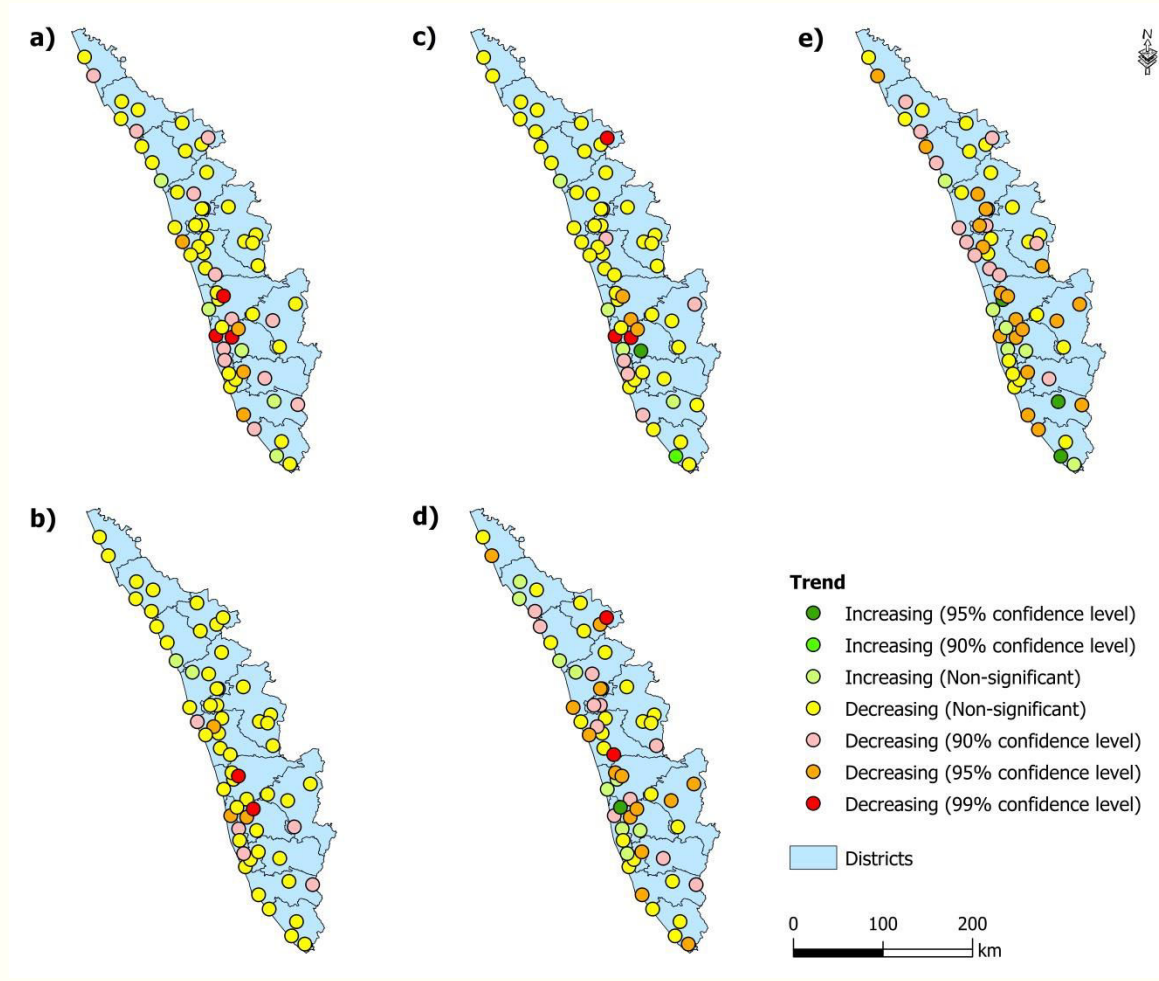
# Spatial variability of the contribution of seasonal rainfall towards the annual rainfall of Kerala



# Average number of rainy days in Kerala and the percentage of rainy days exceeding daily rainfall of (b) 10 mm, (c) 20 mm, (d) 50 mm, and (e) 100 mm

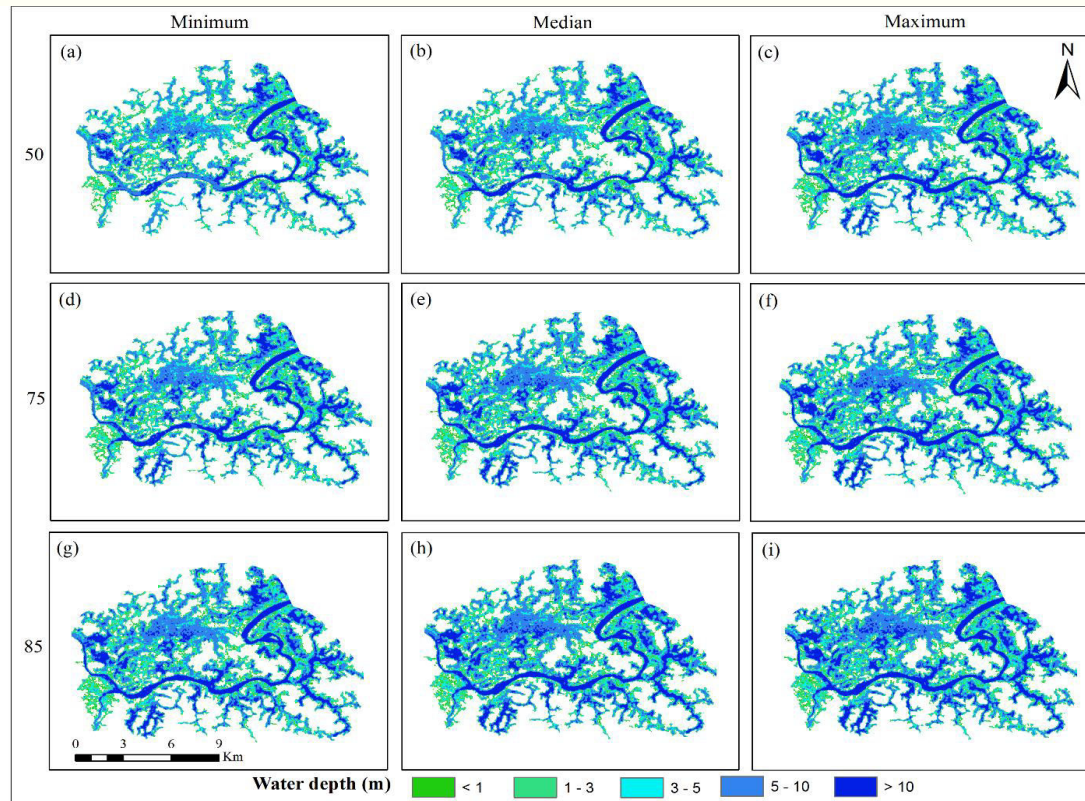


# Trends in rainfall pattern of Kerala: (a) annual, (b) Indian summer monsoon, (c) post-monsoon, (d) winter and (e) pre-monsoon



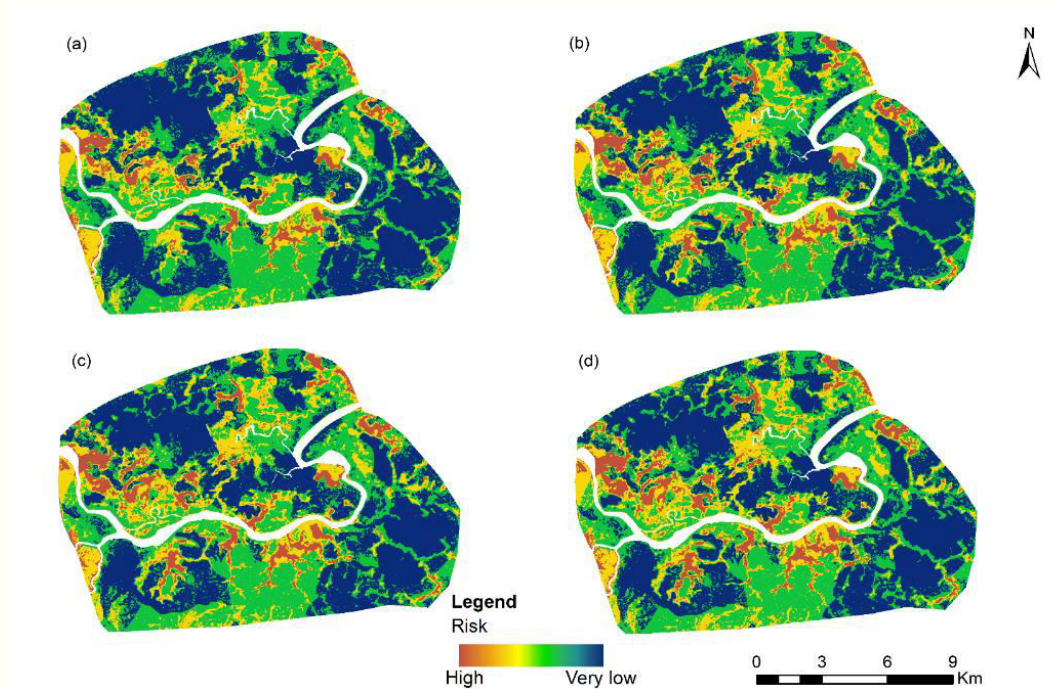


# Flood Inundation Library



# Flood Risk Maps

To develop quick flood response plans and can also be used for developing long term flood plain management schemes



# Flood Management in Real time

## NWP

- GEFS | 21 ensemble members
- 10-days ahead forecast | 3 hour interval

## HEC-HMS

- Watershed hydrologic model
- DEM, Soil, Land use, Reservoirs
- Ensemble flood hydrographs

## HEC-RAS

- 2D hydrodynamic model
- Channel geometry | Boundary conditions
- Inundation area and depth

Ensemble Inundation Maps

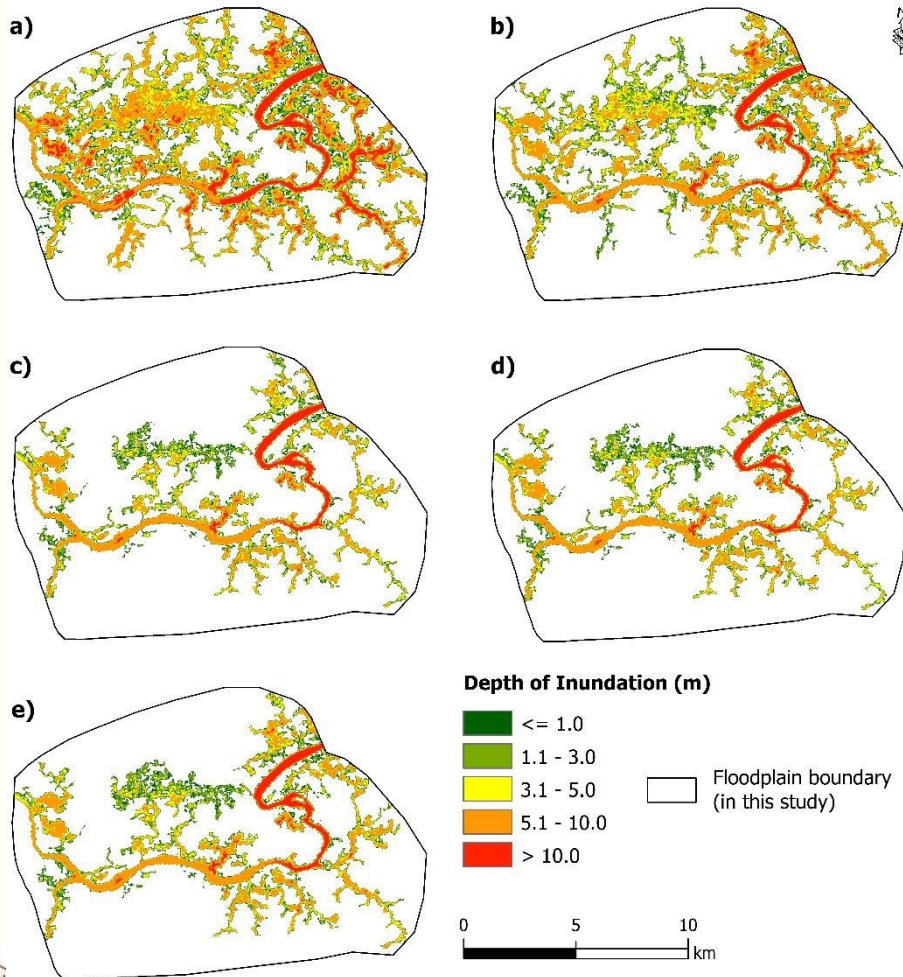


Decision-making

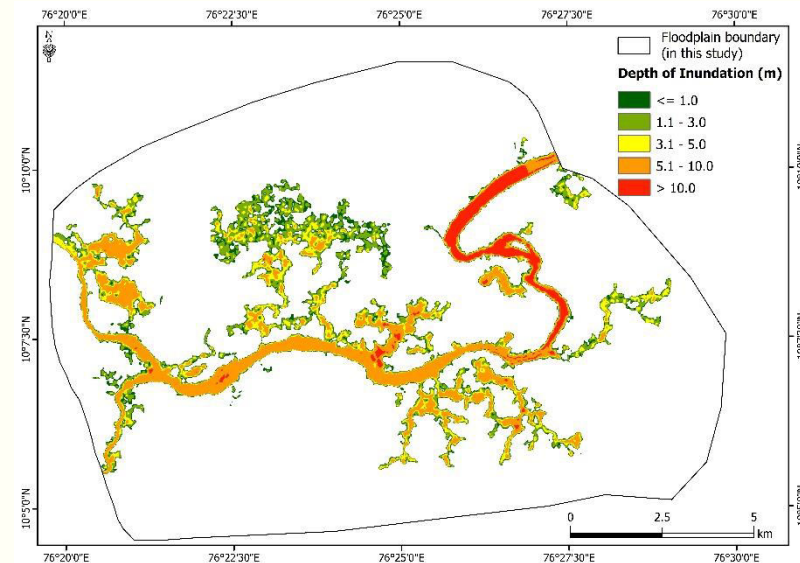


# Verification – 2020 August

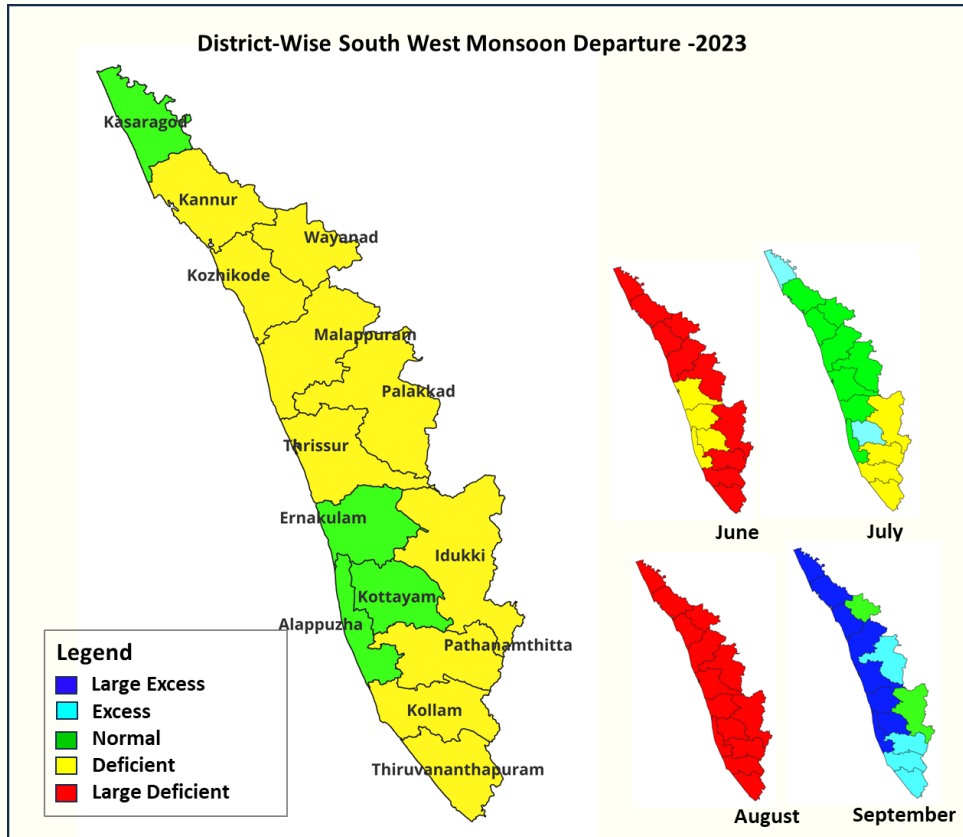
Possible inundation  
(selected ensemble hydrographs)



Inundation with  
observed discharge



# Is Kerala under Threat of Drought ?



## Departure of Rainfall (%D)

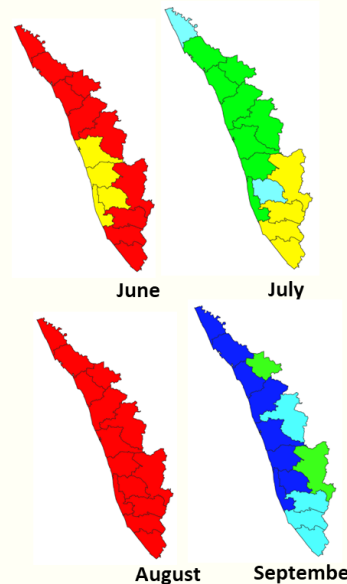
Large Excess :  $\%D \geq 60\%$

Excess:  $20\% \leq \%D < 60\%$

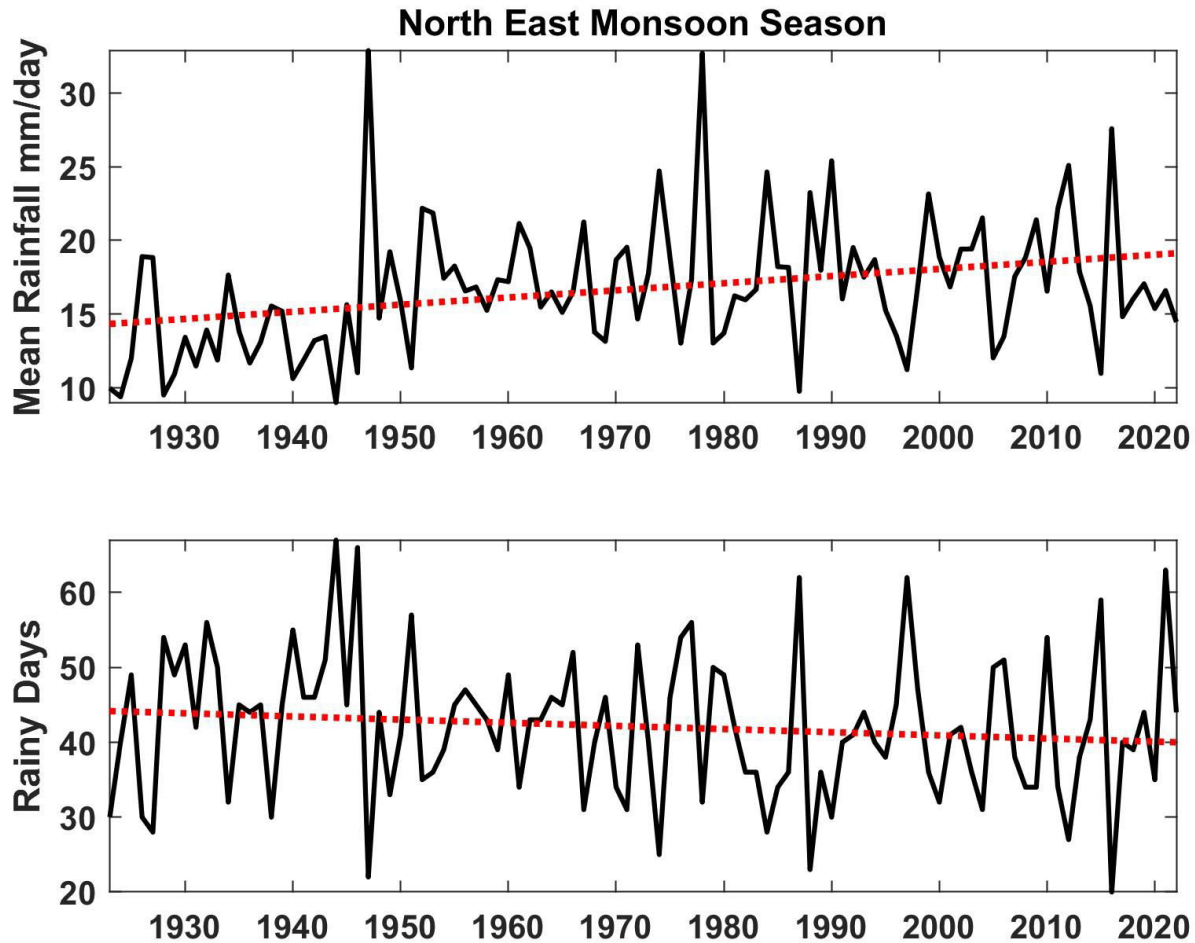
Normal:  $-20\% \leq \%D < 20\%$

Deficient:  $-60\% \leq \%D < -20\%$

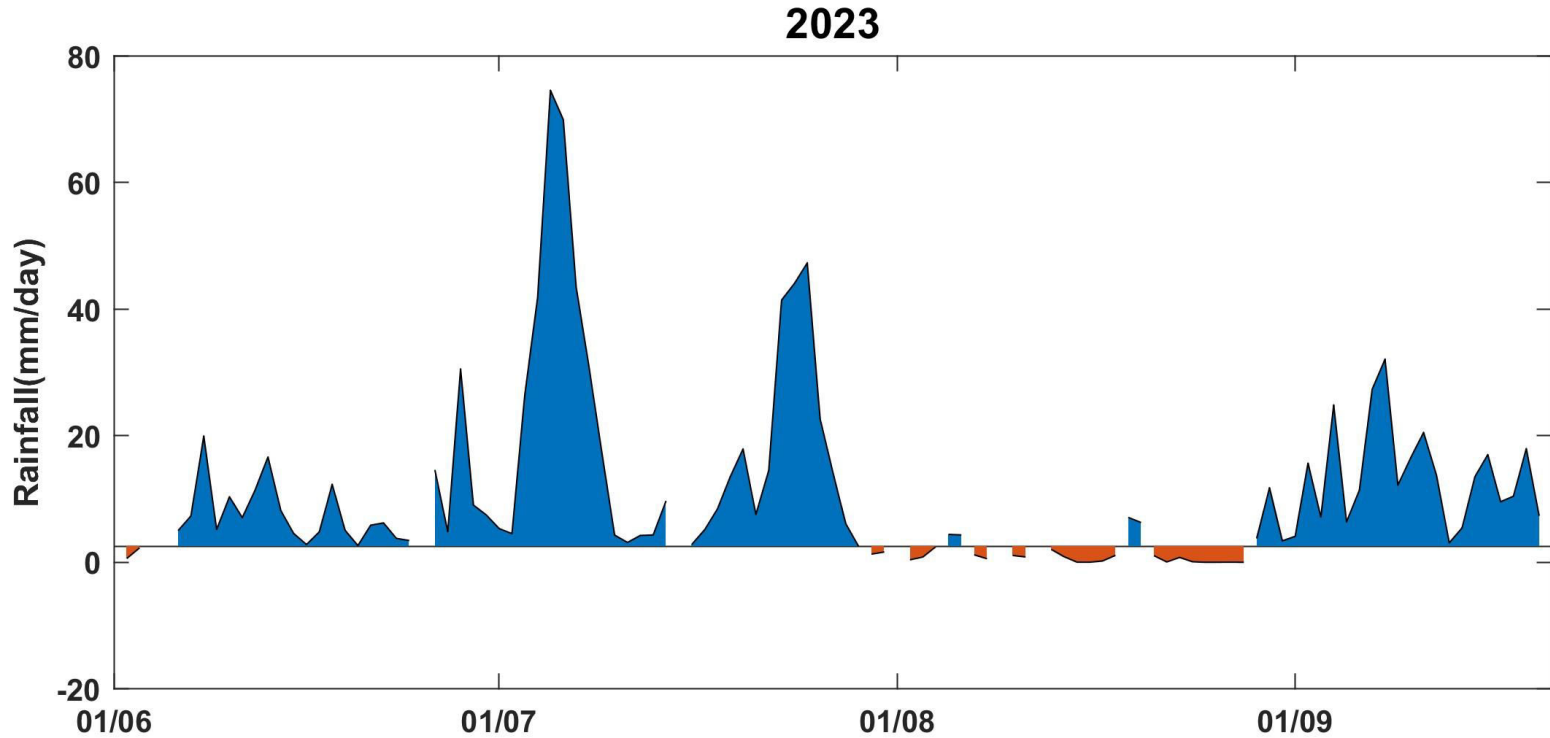
Large Deficient:  $-100\% < \%D < -60\%$



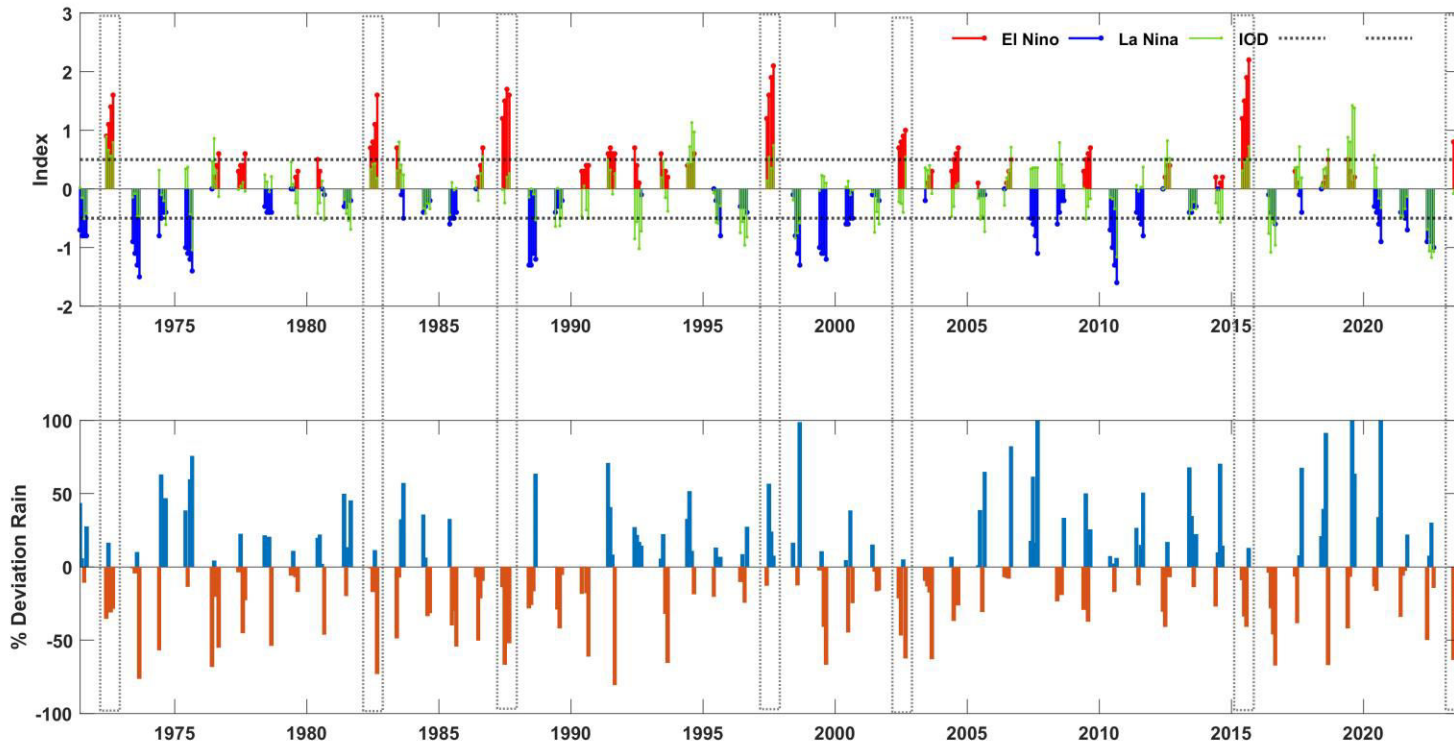
# Long term changes in mean rainfall and rainy days



# Dry spells in Suth-West Monsoon - 2023

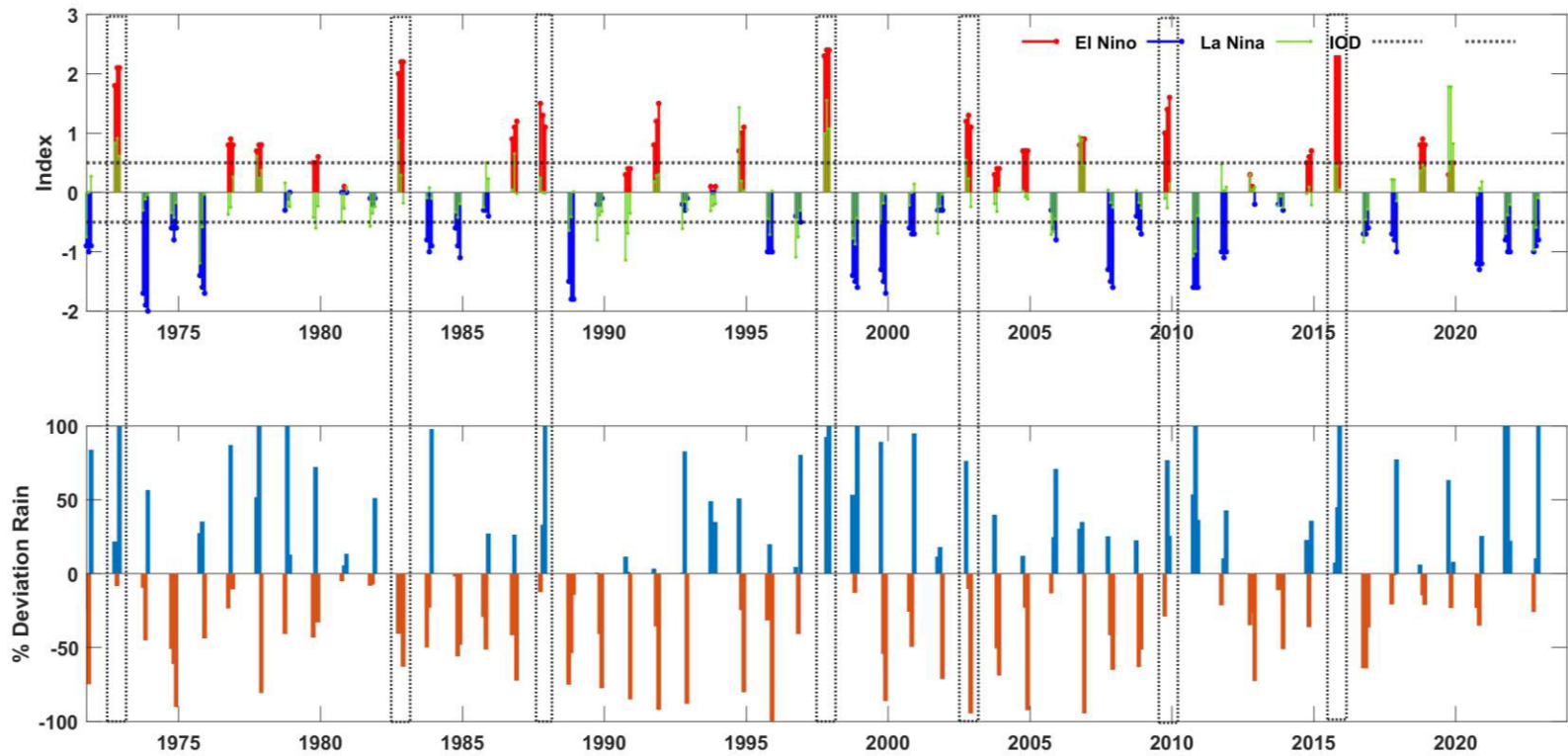


# Percentage deviation in South West Monsoon Rainfall during El Nino and La Nina

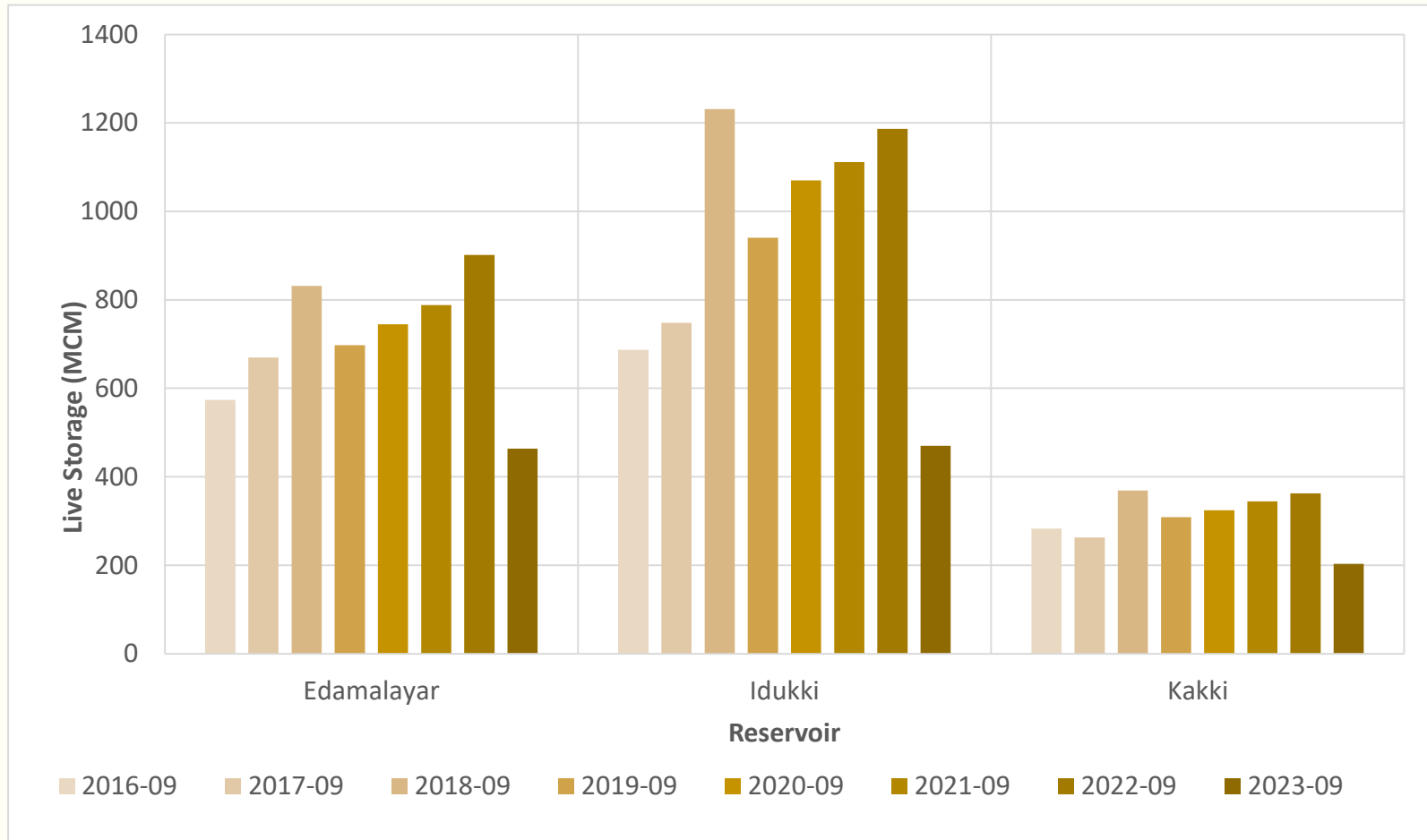




# Percentage deviation in North East Monsoon Rainfall during El Nino and La Nina



# Live Storage at the End of SWM



# Significant Observations

- Cyclone Biparjoy over east central Arabian sea from June 5th to 16th June has taken away a lot of moisture that should have gone into monsoon rains. Hence there was a weakening of monsoon winds towards Kerala which resulted below normal rainfall over the region.
- Mean rainfall per day is increasing, however rainy days are decreasing
- Break periods in monsoon is increasing



# Significant Observations

- IOD was neutral during till August which also didn't support the south west monsoon
- Kerala receives only 20% its total annual rain for North East monsoon season. Most of the dams in Kerala are under 60% deficit
- But the challenge is whether this above normal NE monsoon will be sufficient to meet the deficit created by the south west monsoon.

