CHARACTERISTICS OF MONSOON RAINFALL IN LAST FOUR DECADES OVER AN URBAN AREA OF THE GANGETIC PLAINS

Archisman Barat* and P. Parth Sarthi
Department of Environmental Science, School of Earth, Biological and Environmental Science
Central University of South Bihar (CUSB) SH-7, Gaya- Panchanpur Road, P.O: Fatehpur District- Gaya (Bihar) PIN- 824236, India
Email : archismanbarat@cub.ac.in

Introduction

Unplanned expansion of urban areas has a bigger role in changing weather and climate patterns of their surroundings. Fast urbanisation is often linked with diminishing greenery, changes in land use, land cover, increase in air pollution levels and formation of urban heat islands. Many of the research has already linked the changes in temperature (Peng et al. 2012, Shastri et al. 2017, Barat et al. 2018) and precipitation (Shastri et al. 2015) regimes with the urbanisation.

In the present study characteristics of monsoon rainfall in last four decades is analysed over the city of Patna ,Bihar to find the possible influence of urbanisation on monsoon rainfall over the Gangetic plains.

Objectives

To address the research question, it has been aimed :

To study the possible changes in the characteristics of precipitation during Indian Summer Monsoon (ISM) season over the urban area of Patna using the CHIRPS high resolution gridded dataset.

Data & Methodology

Climate Hazards Group InfraRed Precipitation With Station Data (CHIRPS) version 2.0 daily data (Funk et al. 2015) is considered with ~0.05°×0.05°(5566m) spatial resolution.
As the data has to be spatially resolvable at the urban scales for the experiment, hence this dataset is chosen for the analysis.

The urban areas are delineated using very high-resolution Copernicus CGLS-LC 100 (v. 3.0.1) land cover data (Buchhorn et al. 2020) from Proba-V satellite.

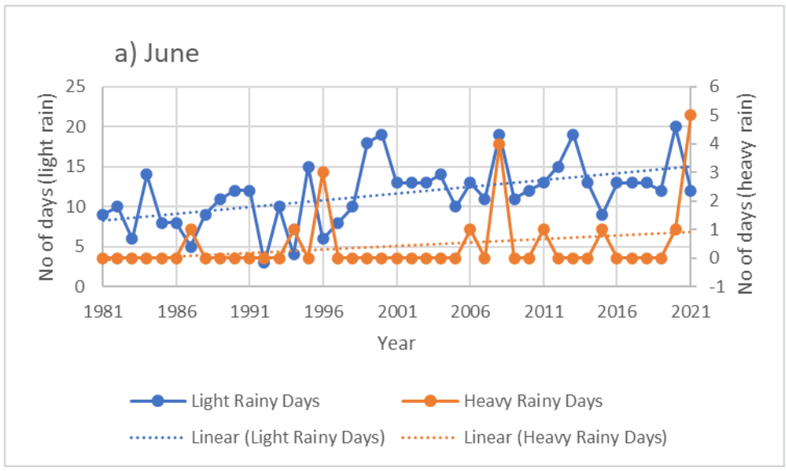
The data is extracted over the urban areas of city of Patna, in Bihar, India using GEE platform (Gorelick et al 2017).

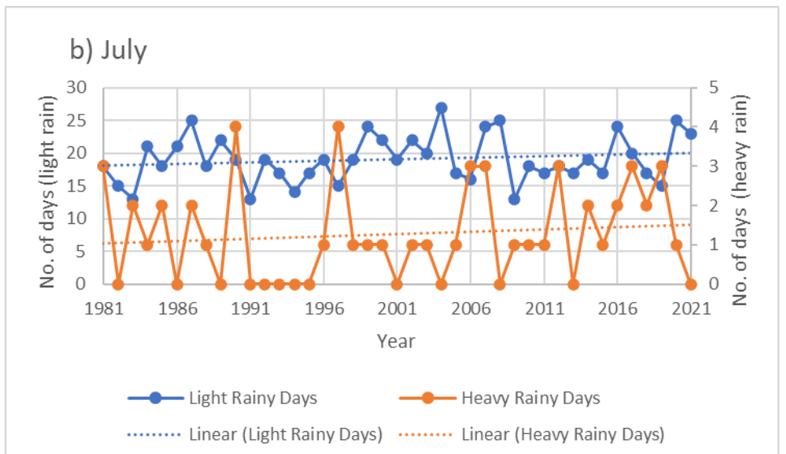
The daily data is sorted into groups of a) low to moderate rainfall events or Light rainy days(LRD) (upto 35.6mm/ day) and b) rather heavy to extremely heavy rainfall (>35.6mm/day) events or heavy rainy days (HRD) during the last four decades (1981-2021).

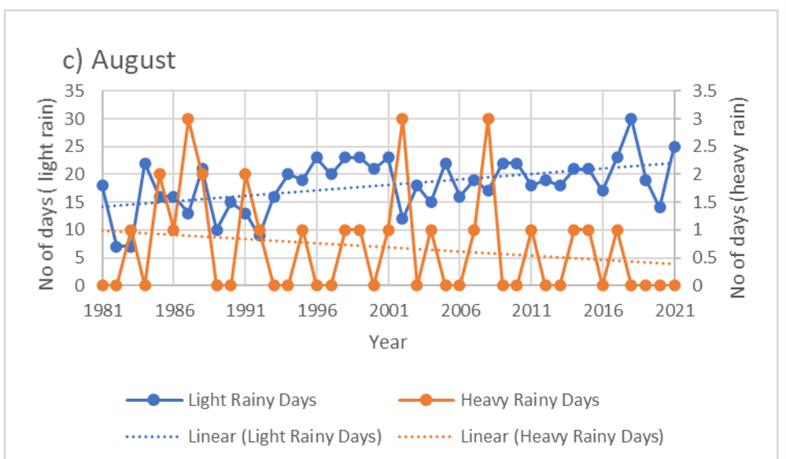
The time-series analysis has been done & trend is also envisaged for the month of June, July, August and September individually.

Results & Discussion

The time series analysis revealed that distinct trend of daily rainfall amount exists for each of the months of Indian Summer Monsoon (ISM), viz, June, July, August and September.







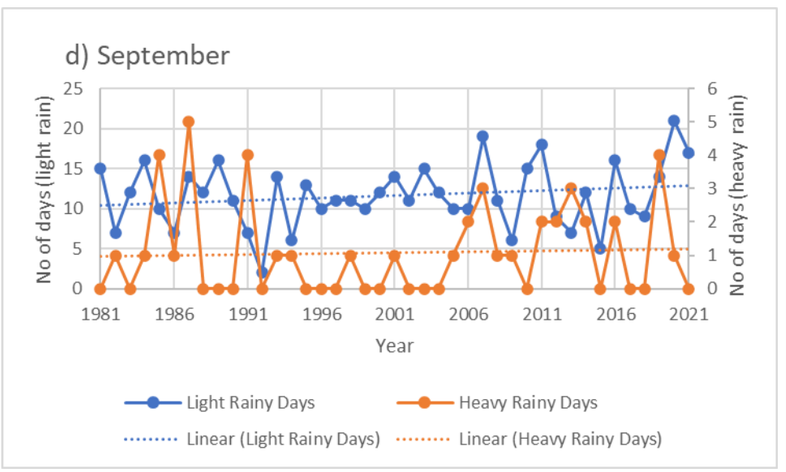


Fig1. Time series showing the trend of frequency of LRD and HRD for the month of a) June b)July c) August and d) September

The fig 1(a) and (c) also revealed that an increment in LRD for June and August is quite evident.

Summary/Conclusion

All the months showed unique signatures in time-series analysis.

An increasing trend in light rainy days is found over Patna for June and August.

In the light of rapidly increasing urbanisation and changing climate in recent past, it may be concluded that the changes is precipitation is much needed to be studied and monitored, especially over the urban areas.

To become climate resilient and to address the disaster risks like urban floodings and urban water scarcity, smart and sustainable policies are much needed in future.

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