

Rainfall trend analysis a part of Sone river basin in Bihar, India, from 46 year record (1969 – 2014)

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ABSTRACT : Knowing the variations in the general rainfall pattern of a river basin is vital to understanding the hydrological cycle and water budget of the basin. The study of long-term precipitation record is critically important for a country, whose food security and economy rely on the timely availability of water. In this study, the historical 46 year (1969-2014) rainfall data of Arrah, Arwal, Aurangabad, Bhabua (Kaimur), Buxar, Jahanabad, Patna and Rohtas districts catchment area of Sone River basin (SRB), India, were analyzed for seasonal and annual trends. The Mann-Kendall test and Sen's slope model were used to identify the trend and the magnitude of the change, respectively. Five (62.5 %) of the eight stations showed a negative trend. Even though there is a decreasing trend in all of these five stations: Arwal (-1.0672 mm/year), Aurangabad (-1.4139 mm/year), Buxar (-7.8906 mm/year), Patna (-3.1483 mm/year), and Rohtas (-4.8324 mm/year), the trends showed no statistical significance at the 5% significance level with linear trends ranging from -1.0672 to -7.8906 mm/year. Only three stations Arrah (7.1083 mm/year), Bhabua (0.0583 mm/year) and Jahanabad (4.4185 mm/year) showed an increasing trend in rainfall and only Arrah revealed statistically significant trend with a Sen's magnitude of 7.1083 mm/year. The Monsoonal season total rainfall showed similar trends to the annual trend pattern. Five stations are Arwal (-2.1577 mm/year), Aurangabad (-1.7143 mm/year), Buxar (-10.4435 mm/year), Patna (-1.7091 mm/year), and Rohtas (-5.0657 mm/year), the trends showed no statistical significance at the 5% significance level with linear trends ranging from -1.7091 to -5.0657 mm/year. On the other hand, only three stations Arrah (5.9546 mm/year), Bhabua (1.3000 mm/year) and Jahanabad (4.9118 mm/year) showed an increasing trend in rainfall and only Arrah revealed statistically significant trend with a Sen's magnitude of 5.9546 mm/year. However, all negative trends were statistically insignificant at 95% confidence level. The analysis revealed the significantly decreasing precipitation trend in both monsoonal and annual rainfall in the span of 46 years.

Key Words: Trend analysis; Sen's slope (β); Annual rainfall; Monsoonal rainfall; Sone river basin