

Short Communication

Variability and time series trends of rainfall and temperature in Indian Himalaya

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India is among the worst affected nations where the changes in temperature and rainfall have been observed (IPCC 2014). Generally reduced rainfall and rising temperature results in drought, whereas high intensity rainfall limits ground water recharge by accelerating runoff thus causes floods. Therefore, strengthening and better understanding of temperature and rainfall trends in the region could provide robust technical information for improving land and water management to enhance crop productivity in the face of climate change. Generally local climate data are limited, assessment methods are usually not uniform and the instrumentation is not sufficiently standardized (Negi *et al.*, 2012). Therefore the present study was made to analyse the changes in climatic parameters for understanding vulnerability of north western Himalayan state of India.

seasonal and annual series was analysed by using the non-parametric Mann-Kendall (MK) test. The MK test checks the null hypothesis of no trend versus the alternative hypothesis of the existence of increasing or decreasing trend (Mann, 1945; Kendall, 1975).

The Mann-Kendall statistic is given by:

$$S = \sum_{i=1}^{n-1} \sum_{j=i+1}^n \text{sign}(x_j - x_i)$$

Where n is the number of data points x_j and x_i are two generic sequential data values.

The magnitude of the trend in the annual, seasonal and monthly time series data of temperature and rainfall was determined by using Sen's nonparametric method (Sen, 1968). The Sen's estimator is the median of slopes of all data