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DYNAMIC TRENDS OF RAINFALL EXTREMES IN SRI LANKA

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ABSTRACT

Changes in extreme weather and climate events have significant impacts on environment and are among the most serious challenges to the society. Among them floods and droughts are crucial weather extremes. To date, these hazardous extremes are becoming more frequent. World Meteorological Organization (WMO) emphasizes the importance of the studies relevant to the above phenomena and motivates the countries by providing necessary indices and guidelines on analyzing these weather extremes.

Sri Lanka is also undergoing these weather extremes and among them severe rainfall extreme events are one of the frequent weather hazards. These events cause vast damages to many sectors. Therefore, it is a timely important to identify the spatial and temporal dynamics of rainfall extremes over the country to examine the trends in frequency and intensity of extreme rainfall events.

This study was mainly based on ascertaining the dynamic trends of rainfall extremes across the country for the period of 1981 to 2010. Extreme rainfall events were identified using daily rainfall data collected from the Meteorological Department for the particular period. The RCLimDex 1.0 package, designed by the Expert Team on Climate Change Detection and Indices (ETCCDI) was used in this analysis. WMO also recommended this package for analyzing extreme weather events providing guidelines in 2009. Ten rainfall extremes indices including frequency indicators and intensity indicators were utilized in identifying extreme events.

Based on the main objective, trends of above mentioned two index types were analyzed using different techniques. Spatial and temporal trends were mapped using IDW interpolation technique in Geographical Information System. Box plots and basic statistics were used to analyze the spatial and temporal trends of rainfall extremes. Non parametric Mann

Kendall test was used to detect the trends and their significance using XLStat software.

Most of the extremes were concentrated in the southern eastern quarter of the country. There too higher influence was seen in Western Province including Colombo, Ratmalana. Likewise eastern regions including Trincomalee, Batticaloore were exposed to risk of the rainfall extremes. Inversely dry extremes occur in other dry zonal regions. But the impact is becoming lesser. Ratmalana is highlighted with significant increasing trends in most of the wet extremes excluding simple daily intensity index and consecutive wet days. Nuwara Eliya shows the decreasing trends of almost all the extreme indices. However, with the passage of time, decreasing trends of intensity indicators of Rathnapura were visible even though the trends were not significant. Rathnapura is the region which has mostly succumbed to the impact of rainfall extremes as most of annual maxima of extremes in Sri Lanka are recorded in Rathnapura. This impact seems to be shifting towards western province. These detections of trends of spatial and temporal patterns of rainfall extremes facilitate in decision making and planning related to disaster management and development in Sri Lanka.

Key words: Extreme rainfall events, frequency indicators, intensity indicators, spatial pattern, temporal trends.