Rainfall Pattern Analysis and Build Rainfall Forecasting Model

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Identifying the rainfall pattern is increasing demand for each and every country to prepare plans for future. Also identifying the rainfall pattern is very important to prevent and to prepare for upcoming natural hazards. For a country like Sri Lanka, Rathnapura district has a very complicated climate pattern. Sometimes floods were occurred rapidly and severe droughts take place again in a few months. So a study of the rainfall pattern is very important to understand these climatic changes. So the main objective of this study was to build a model to forecast the rainfall pattern using existing rainfall data of the study area. The study was also aimed to validate seasonal changes up to some extent using Standard Precipitation Index (SPI). For this study, statistical approach was carried out to find the pattern or trend of the rainfall data. First, eight Rain Gauge locations were selected inside of the study area. Then rainfall data from eight rain gauge locations were collected from the Meteorological Department of the Sri Lanka. Various statistical methods such as Regression analysis, Trend analysis, SARIMA model, were used to identify most suitable statistical methods to predict precipitation data. After utilizing all above mentioned methods, SARIMA model was identified the most suitable method to derive the model with required accuracy with 95% confidence level for the obtained results. Then models were derived separately for Gauge Stations. Then values were forecasted using those models. Due to the deviation of forecasted values with the actual values, validation procedure was carried out by using derived SPI values. Then output was mapped with the aid of Arc GIS software to get the rainfall contour maps of future forecasts for first five months in 2016 year. Then graphs were drawn to identify the relationship between predicted precipitation values and SPI values. Finally, with the aid of the derived models, forecasted values and derived graphs; final conclusion has made as there wasn't any identifiable or clear trend in precipitation amount in the study area according to this research.

Keywords: Rainfall pattern, statistical approach, SARIMA model, rainfall contour map, SPI value