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# Rainfall Analysis of Ludhiana and Bathinda Districts using Markov Chain Model

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***Abstract:*** The Markov chain model is a good tool to analyze the historical data to access and predict the forthcoming events. In the field of Soil and Water Engineering, use of Markov chain model gives a clear idea of rainfall pattern to grow crop as well as to conserve rainwater by installing soil and water conservation techniques. Punjab has divided into different climatic regions Bathinda and Ludhiana falls under South-west part of Punjab and Central part of Punjab. Ludhiana and Bathinda receives about 700 mm and 500 mm of annual rainfall. As the central part of the Punjab is facing problem of lowering groundwater so rainwater harvesting in this part is very important and south-western part is having mixed problem of brackish groundwater, rising water table and salinity in this region; so the study of the historical data is a great help for managing crop production in these areas. Out of 30 years rainfall data (1985-2015) for central region (Ludhiana), Markov chain model predicted that the probability of wet spell is considerable less as compared with dry spell throughout the year. The wet spell starts from the 26$^{th}$ SMW to 38$^{th}$ SMW whereas dry spell remain there from 39$^{th}$ SMW to 25$^{th}$ SMW. Similarly, for South West region (Bathinda), the wet spell started from 25$^{th}$ SMW to 38$^{th}$ SMW and rest of the part of the year remain as dry.

***Keywords***: Rainfall analysis, Markov Chain model, Wet spell, Dry spell