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STUDY OF RAINFALL PATTERN IN CHAKSU TEHSIL, JAIPUR, RAJASTHAN, INDIA

ESTUDIO DEL MODELO DE LLUVIA EN CHAKSU TEHSIL, JAIPUR, RAJASTHAN, INDIA

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ABSTRACT

Underground water is the main source of irrigation which depends on the rainfall. Inconsistency and irregularity in the occurrence and intensity of rainfall influence adversely the agriculture and allied activities. The years in which an area received good rainfall yield high agriculture production as water is available in abundant. This paper is an attempt to analysis the rainfall pattern for last 30 years in study area by calculating the rainfall deviation.

Keywords: Rainfall, Agriculture, Deviation, Seasonal variation etc.

RESUMEN

El agua subterránea es la principal fuente de riego que depende de la lluvia. Se encuentra la inconsistencia e irregularidad en la ocurrencia e intensidad de la lluvia que influyen negativamente en la agricultura y las actividades aliadas. Los años con buenas precipitaciones disfrutan de la alta producción agrícola ya que el agua está disponible en abundancia. Este documento es un intento de analizar el patrón de lluvia durante los últimos 30 años en el área de estudio calculando la desviación de lluvia

Palabras clave: lluvia, agricultura, anomalía estandarizada, variación estacional.

INTRODUCTION

Indian Farmers have been faced the difficulties in farming, due to the inconsistency and irregularity in the rainfall pattern. This Unpredictable nature of rainfall has created the disparity among the regions on basis of water availability i.e. One region is water surplus and

another one is water deficient. This disparity leads to raise the disparities in other sectors and become hurdle for the execution or implication of any policy.

India receives 80% of total precipitation from the South-West monsoon in months (June-September). The concentration of rainfall in particular months arises the condition of water scarcity in many parts of country during the non-monsoon months (Jain et al. 2012 and Kumar et al. 2010). The impact of this skewed nature of monsoon can be easily trace in western part of the country especially Rajasthan state. The state is characterized by the Great Thar Desert and The Aravalli range. The state is dominated by two opposite type of climate i.e. western halve is completely desert area having arid and semi-arid climate and eastern halve is characterized by humid and sub-humid climate. The state is divided in two halves by The Thar desert which pass through the state (Upadhyay 2014). Jaipur district is situated in eastern part of Rajasthan state and bounded by Sikar and Mahendrgarh (Haryana State in north, Tonk in south, Alwar, Swai-Madhopur and Dausa in east and Nagur in the west. The rainy months of district are June, July, August and September, summer months from March to May, winter from December to February and October – November are considered transit months (Tyagi et al. 2011).

Chaksu tehsil is located in south eastern part of Jaipur district. The latitudinal extension of tehsil including Kotkhawada Tehsil is 26°30'N to 26°46'N and longitudinal expansion is 75°45'E to 76°10'E. It is surrounded by the Bassi Tehsil in North, Sanganer in North West, Phagi in west, Tonk district in South, Swai-Madhopur in South east and Dausa in east. The normal rainfall is 58.25 cm. The area is drained by seasonal rivers like Morel, Dhund etc.

The study is carried with objective to analysis the rainfall pattern in Chaksu tehsil for last 30 years.

MATERIALS & METHODS

For study, the secondary data of rainfall is used from the government site: http://www.water.rajasthan.gov.in/wrd#cd-search (Table 2 & 3). The statistical tools are employed to analysis the annual rainfall of study area. The results are depicted by graphs drawn in Microsoft-Excel.

Following formula is employed to analysis the Rainfall deviation in study area (IMD):

$$1.Rainfall\ Deviation\ Rfdev\ (\%) = \{(Rfi - RFn)/RFn\} \times 100$$

Where, Rfi is current rainfall for a comparable period (mm)

RFn is the normal Rainfall (30 years average for the same period in mm)

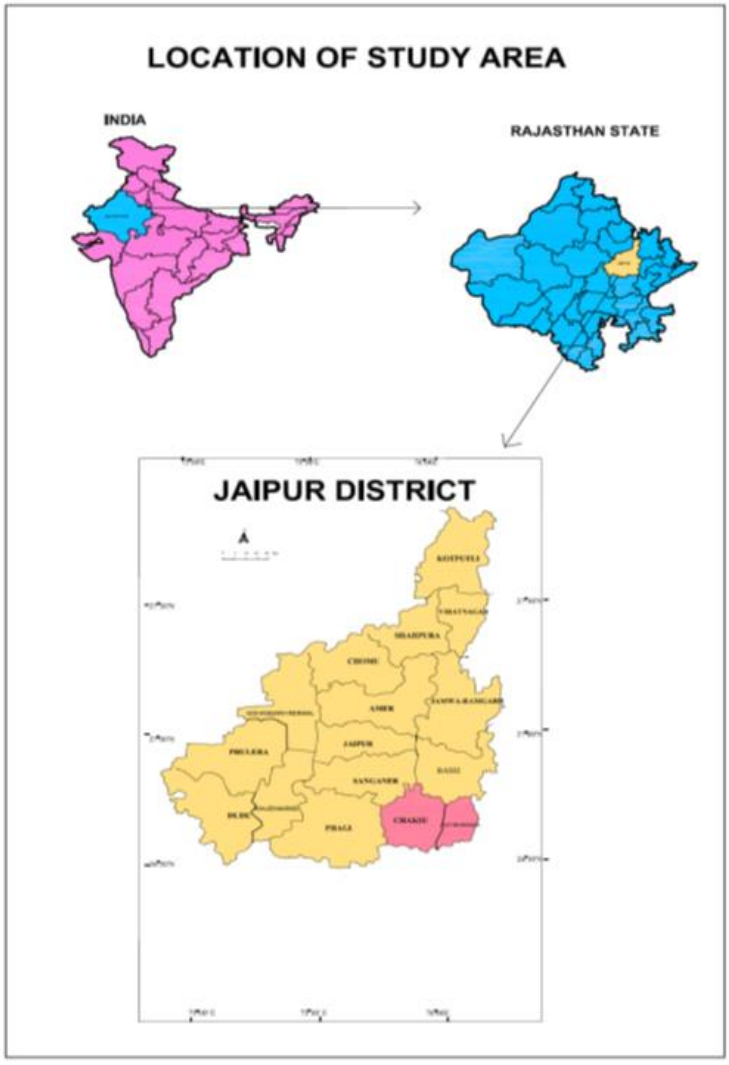

Figure 1: Location of study area

Table 1.Categorization on the basis of rainfall deviation (Indian Meteorological Department)

Deviation from Normal Rainfall (%)	Category
More than +20	Excess
+19 to -19	Normal
-20 to -59	Deficient
-60 to -99	Scanty/ Large Deficient
-100	No Rain

Table 2: Rainfall Deviation (Departure from Normal) for Chaksu tehsil for years (1988-2017)

Years	Annual Rainfall (mm)	$Rf_i - RF_n$	Deviation (%)	Categorization based on Deviation (%)
1988	306	-233.433	-43.27	Deficient
1989	369.1	-170.333	-31.58	Deficient
1990	519.8	-19.6333	-3.64	Normal
1991	528.8	-10.6333	-1.97	Normal
1992	546	6.56667	1.22	Normal
1993	309.6	-229.833	-42.61	Deficient
1994	415	-124.433	-23.07	Deficient
1995	550.5	11.06667	2.05	Normal
1996	1153	613.5667	113.74	Excess
1997	718.5	179.0667	33.20	Excess
1998	624.6	85.16667	15.79	Normal
1999	427	-112.433	-20.84	Deficient
2000	356	-183.433	-34.00	Deficient
2001	406.8	-132.633	-24.59	Deficient
2002	215	-324.433	-60.14	Scanty
2003	639.6	100.1667	18.57	Normal
2004	442	-97.4333	-18.06	Normal
2005	513.4	-26.0333	-4.83	Normal
2006	342.6	-196.833	-36.49	Deficient
2007	577.4	37.96667	7.04	Normal
2008	735.4	195.9667	36.33	Excess
2009	424	-115.433	-21.40	Deficient
2010	928	388.5667	72.03	Excess
2011	685	145.5667	26.99	Excess
2012	640.6	101.1667	18.75	Normal
2013	606.3	66.86667	12.40	Normal
2014	699	159.5667	29.58	Excess
2015	388	-151.433	-28.07	Deficient
2016	846	306.5667	56.83	Excess
2017	270	-269.433	-49.95	Deficient

Source:http://www.water.rajasthan.gov.in/content/water/en/waterresourcesdepartment/WaterManagement/IWRM.html

The Mean of rainfall variables is (RFn) = 539.43 mm

Standard Deviation of the series (σ) = 207.7269 mm

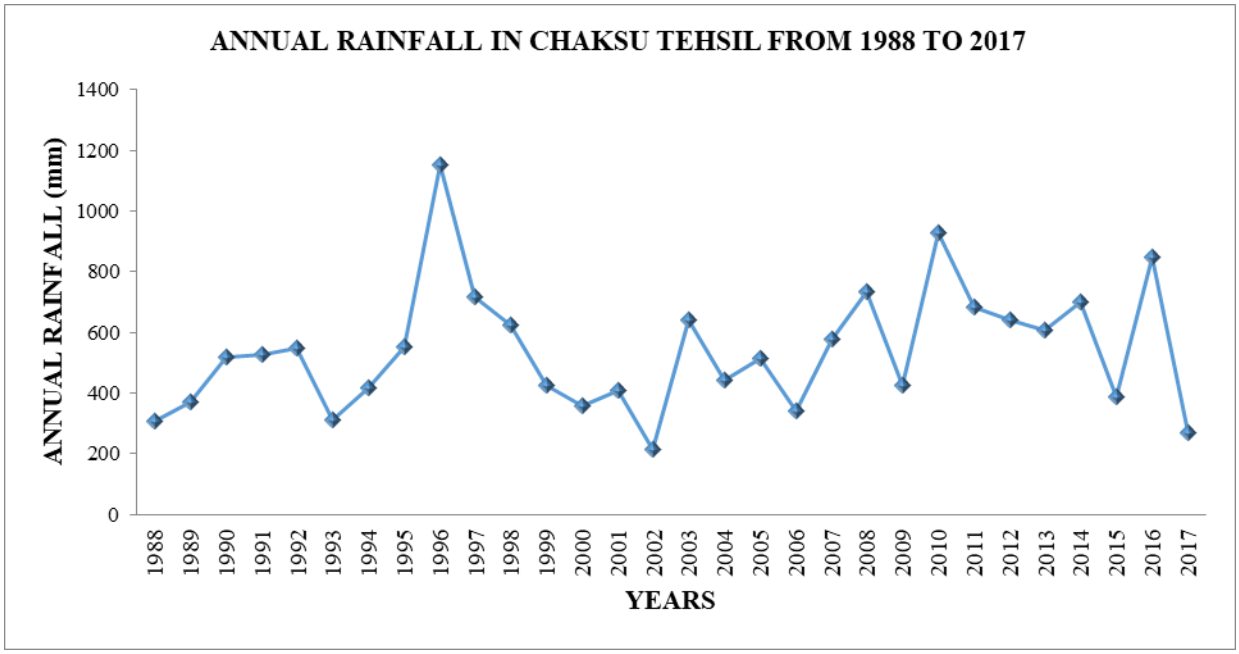

Figure 2. Annual Rainfall in Chaksu Tehsil from 1988 to 2017

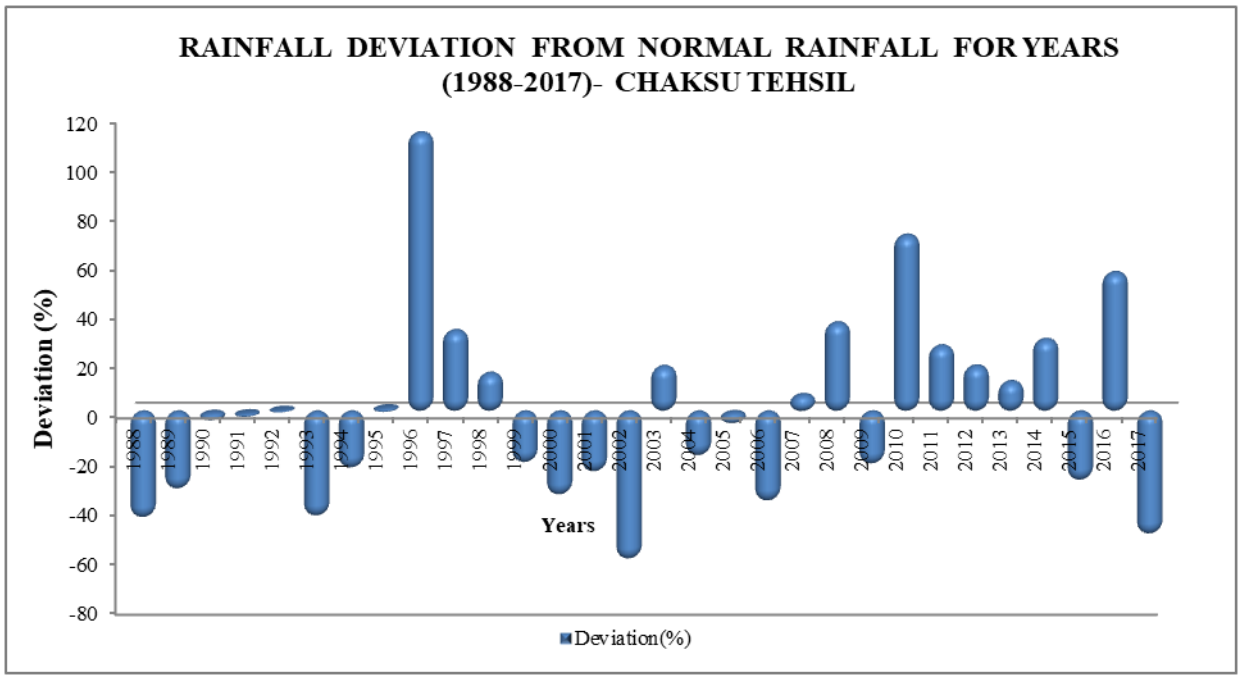

Figure 3: Schematic Diagram of Deviation from Normal Rainfall for Year (1988-2017)- Chaksu Tehsil

RESULTS AND DISCUSSION

Fig.2. demonstrate the annual rainfall pattern over the Chaksu tehsil form 1988 to 2017. It is clear from the figure that highest amount of rainfall was recorded in year 1996 which was 1153 mm. In other years, rainfall is noticed either normal or below normal rainfall. After the year 2000, there is found zig-zag shape in the graph as the annual rainfall rise and falls alternately.

Figure 3. Illustrate the departure from normal rainfall. Tehsil received the normal rainfall for maximum time (11 years), rainfall deficiency during 11 years, Scanty rainfall only in one year (2002). Study area received rainfall in excess amount for 7 years (Tables 2 and 3).

Table 3. Classification of years in according to rainfall regime (IMD)

Category	No. of year	Percentage
Excess	7	23.3
Normal	11	36.7
Deficient	11	36.7
Scanty	1	3.3
No Rain	0	0.0
Total	30	100.0

It is concluded that rainfall of area is mainly categorized into three groups: normal, excess and deficient. In last 30 years, Years with normal and excess rainfall in totality are 18 while for deficient it is 12 years in totality. This is good sign that new agriculture policies and strategies could be applied in study area as the occurrence of rainfall is in favour.

REFERENCES

Akinyemi O., Ayeni O.A., Faweya O. and Ibraheem G.A.(2013) ' Statistical Study of Annual and Monthly Rainfall Patterns in Ekiti State , Nigeria', International Journal of Pure and Applied Sciences and Technology, 15: 1–7.

Ekwe, C.M., Joshua K.J., Igwe E.J., and Osinowo A.A., 2014. Mathematical Study of Monthly And Annual Rainfall Trends in Nasarawa State, Nigeria., IOSR Journal of Mathematics,10: 56-62.

Jain Sharad K., and Kumar Vijay, 2012. Trend analysis of rainfall and temperature data for India. Current Science. 102: 37-49

Kaur Surinder & Purohit M.K., 2015. Rainfall Statistics of India – 2015. India Meteorological Department (Ministry of Earth Sciences). Retrieved from: http://hydro.imd.gov.in/hydrometweb/(S(ah0kjd55lgvs5siowd4f0jvl))/PRODUCTS/Publications/Rainfall%20Statistics%20of%20India%20%202015/Rainfall%20Statistics%20of%20India%20-%202015.pdf

Kumar V., Jain S.K., and Singh Y., 2010. Analysis of Long – term rainfall trends in India 'Hydrological Science Journal, 55: 484 – 496.

Kundu Arnab, Chatterjee Siddhartha, Dutta Dipanwita & Siddiqui A.R., 2015. Meteorological Trend Analysis in Western Rajasthan (India) using Geographical Information System and Statistical Techniques. Journal of Environment and Earth Science, 5: 90-99.

Meena A.L., and Bisht P., 2017. Study of variability of rainfall and suitability of farming in sub- humid region: a case study of Jaipur District, Rajasthan, India. Sustainability, Agri, Food and Environmental Research, 5: 41-45.

Meena A.L., and Bisht P., 2017. Analytical Study of Annual and Monthly Rainfall Pattern in Bassi Tehsil, Jaipur. Indian Journal of Geography, 21: 127-134.

Palchaudhuri, M., and Biswas S., 2013. Analysis of Meteorological Drought using Standardized Precipitation Index (A Case Study of Puruliya District, West Bangal, India). World Academy of Science , Engineering and Technology International Journal of Environment Chemical, Ecological, Geological and Geophysical Engineering, 7: 167-174.

Sharma Anand. Rainfall Based Indices For Drought Monitoring. Indian Meteorological Department.https://www.ncfc.gov.in/downloads/Workshop_drought_16feb2017/SPI%20BEST.pdf

Singh, O.P., Singh, S.S., and Kumar S., 2012. Rainfall Profile of Jaipur, Government of India, Ministry of Earth Sciences, Indian Meteorological Department

Tadvi R., and Vanmala, A., 2016. A Geographical study of Rainfall Variability in Nandurbar District. International Journal of Science and Research (IJSR), 5: 416-418.

Upadhyay, H., 2014. Variability of Rainfall in Rajasthan (1960-2009). International Journal of Innovative Research and Review, 2: 17–19.

Yadav Sunil Kumar, Nath Satyendra & Gautam Shweta.2018. Analysis of rainfall variability in western Rajasthan, India. Journal of Pharmacognosy and Phytochemistry, 7: 1592-1595.

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