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Research Paper

Characteristics of Rainfall Over West Khandesh Region of Maharashtra [India]

Geography

KEYWORDS : Rainfall zone, Distribution, Variability, Coefficient, Intensity, Phenomenon

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ABSTRACT

The study region falls under assured rainfall zone and 70 percent area has received rain with amounting 500 mm to 1200 mm. Study area has receives rain mainly from South-West monsoon which comes in beginning of the June and withdraws on the end of September. The average annual rainfall of the study area is 780 mm, Nawapur and Akkalkuwa tahsil have received highest rainfall of amounting 1139 and 1219 mm. respectively. Both tahsil has situated on the windward valley of between Satpura and Shyadri mountain. A whereas Sakri tahsil received lowest rainfall of 514.1 mm .The physiographic characteristics of Nawapur and Akkalkuwa tahsils is that, they has been situated at the foothills of Satpura and Sahyadri respectively and secondly they fall under the high rainfall zone. However Sakri tahsil has been observed variation in rainfall characteristics in terms of less rain receiving areas. The Western part of the tahsil has received maximum rainfall while Eastern part of the tahsil has received less rainfall as well as observing minimum rainy days. Thereby, Sakri tahsil has an annual rainfall of about 514.1 mm (2003).

Introduction

Rain is liquid precipitation as opposed to non-liquid kinds of precipitation such as snow, hail and sleet. Rain requires the presence of a thick layer of the atmosphere to have temperatures above the melting point of water near and above the Earth's surface. The necessity of irrigation is determined by the amount of rainfall received during the period when plants require water most and hence demand for irrigation depends on the spatial and seasonal distribution of rainfall. The characteristics of variation in rainfall affect agriculture as a whole; therefore, it needs detail investigation. Jagannathan and Ramamurthy (1961) have studied forecasting on rainfall anomaly over Bombay. Mooley and Apprao (1970) have studied the statistical distribution of five week rainfall over India. Indian meteorological department has been forecasting on rainfall and delineate water scarcity and drought prone areas in Maharashtra. The necessity of irrigation is determined by the amount of rainfall received during the period when plants require water most and hence demand for irrigation depends on the spatial and seasonal distribution of rainfall. The characteristics of variation in rainfall affect agriculture as a whole; therefore, it needs detail investigation. The amount of rainfall is very high in the month of July. In the Western part of the study region receives high amount of rainfall, it decreases eastwards of study region. About 88 percent rainfall is received from South-West monsoon, while remaining is in the form of thunder showers in the post monsoon season come from North. It is also known as withdrawals of monsoon from Indian subcontinent.

Location of Study Region

West Khandesh region has comprises by Dhule and Nandurbar district. The total geographical area of Dhule district is 8063 sq km and it lies between 20°38′ to 21°61′N and 73°50′ to 75°11′E. Nandurbar district lies between 21°00′ to 22°03′N and 73°31′ to 74°32′E. Total geographical area of the district is 5087 Sq km For the research purpose both Dhule and Nandurbar district have been taken into consideration as a study area. Thereby location of both Dhule and Nandurbar district lies between 20°38′ to 22°03′N and 73°47′ to 75°11′E, it comprises ten tahsils spreading over an area of 13,150 sq km, which is 4.3% of Maharashtra state.

Objectives

The objectives of this research paper are to asses intensity of rainfall and to see the distribution of rainfall and indentify drought prone patches in study area.

Database and Methodology

This study is based on secondary data. The monthly data on rainfall were collected from nine rain gauge stations in study region. The data were collected and surmised by agricultural college of Dhule, has been used for study. Intensity of rainfall calculated for the year 2003 and for calculating variability data was used from 1991 to 2003. Following table is prepared through available data.

Salient features on rainfall over Khandesh Region.

Sr.No	Station	Rainfall [mm]	Rainy Days	Intensity of Rainfall	Average Rainfall [mm]	Coefficient of Variation (1991 to 2003)
1	Dhule	605.1	40	15.13	633	23.32 %
2	Sakri	514.1	51	10.08	507	21.35 %
3	Shirpur	658.3	45	14.63	657	27.65 %
4	Shindkheda	558.3	41	13.62	569	21.47 %
5	Nandurbar	622.10	57	10.91	680	29.66 %
6	Nawapur	1139.00	58	19.64	1254	20.38 %
7	Shahada	807.90	51	15.84	891	29.72 %
8	Taloda	807.30	55	14.68	1060	23.56 %
9	Akrani	844.80	64	13.20	1133	28.96 %
10	Akkalkuwa	1219.80	70	17.43	1181	26.10

(Compiled by researcher)

Rainy Days

The values are given in table reveals that in the Akkalkuwa tahsil have observed maximum number of rainy days amounting 70. While, Dhule tahsil has received 40 rainy days. It means that the decreases in rainy days in certain tahsil which affects on agricultural practices. Akkalkuwa tahsil has neighboring location with Satpura and Sahyadri spurs therefore whole area of tahsil received rain with maximum rainy days.

Intensity of rainfall

The rate at which rain falls is obviously related to problems of run-off, soil percolation, evaporation, soil erosion and flood control. Information about intensity of rainfall is therefore just as vital to an understanding of rainfall regimes as are mean values of total rainfall. Unfortunately, data about rainfall intensities are not very satisfactory, because there are few stations equipped with a reliable polygraph or with sufficient personnel to make eye observations during rain spells. Most climatic tables

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do, however, give some information about the total rainfall for a limited number of stations. The term intensity is used here in the context of rainfall received during 24 hours period. The intensity of rainfall (I) is calculated by employing the formula I = A/n, propounded by Monkhouse and Wilkinson (1971), where 'A' is the total rainfall over a given period of time and 'n' is the total number of hours of rain. Calculated value are depicted in table 1.3 reveals that, Nawapur tahsil has high intensity of rainfall with amounting 19.64 mm, followed by Akkalkuwa with 17.43 mm. intensity of rainfall. Lowest intensity of rainfall observed in Sakri and Nandurbar tahsil while Shirpur, Shindkheda, Taloda, Shahada, Dhule and Akrani tahsil have 11 to16 mm intensity of rainfall.

Spatial Distribution

A spatial distribution is the arrangement of a phenomenon across the Earth's surface and a graphical display of such an arrangement is an important tool in geographical and environmental statistics. The distribution of the rainfall over the study area is uneven, its effect by physiographic features. The rainfall is heavier in the Western, Northern part of study area. The area of foothills of Satpura Mountain in Shirpur tahsil has received higher rainfall. At Nawapur tahsil has an annual rainfall during the South-west monsoon constitutes about 1250 mm of average annual rainfall. July treated as a rainiest month of the study region. Central part of study region received less rainfall. Distribution of rainfall of the study region may be classified into further zones. **North-West and extreme Western zone** of heavy and assured rainfall which comprises Western part of Sakri, Nawapur, Akkalkuwa, Taloda and Akrani tahsil with 1000 mm to1200 mm rainfall per annum. The rainfall is relatively higher and assured thereby, crop grown in this part are Rice and other cereals in rain fed condition. **North-Eastern** tahsil such as Shahada, Shirpur and Western part of Sakri and Nandurbar has been included in the zone of moderate and regular rainfall. These parts receive 700 to 800 mm of rainfall. **Central part** of region namely Dhule and Shindkheda tahsil receive less than 600 mm rainfall per annum. This part generally regarded as drought prone part of the study area.

Rainfall Variability (CV)

The term variability, the state or characteristic of being variable describes how spread out or closely clustered a set of data. Rainfall variability is a change in the statistical distribution of rainfall over period of time that range from decades to hundreds of years. According to the IMD, if the annual or seasonal CV is 30 percent or more the rainfall is said to be of an erratic in nature and the subdivision or district or tahsil classified as drought prone. Variability in excess of 20 percent implies a great risk in farming, as such, the need for irrigation for successful cropping has been felt in the region. The rainfall variability is calculated here by computing the rainfall data for 13 year i.e. 1991 to 2003. Rainfall variability in the spatial pattern of CV is of great help in ascertaining relative water needs in general rainfall of the study region. The variability values depicted in table 2.3 ranges from 20 to 30 percent. The high variability is confined in the region of dykes and residual hills. These areas are located mostly in Southern portion of Shahada, Dhule tahsil, Eastern portion of Nandurbar, Eastern part of Sakri and Shindkheda tahsil. They have receives lowest annual rainfall felt as drought prone to drought frequently, thus creating low reliability of rainfall. In the Western part and the region of Satpura are the areas of assured rainfall zone where the co-efficient of variability ranges between 20 to 22 percent.

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