



GEOMORPHIC IMPACT ON RAINFALL OF MAHARASHTRA

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ARTICLE INFO

Article History:

Received 15th January, 2021
Received in revised form
19th February, 2021
Accepted 20th March, 2021
Published online 30th April, 2021

Key Words:

Rainfall, Geomorphic Impact,
Maharashtra, Sahayadri.

ABSTRACT

Climate of a region along with other factors is mainly also affected by rainfall. On the other hand, rainfall distribution is affected by geomorphology of a region, wind direction, presences of humidity etc. India being a monsoonal climate, experiences reversal of winds i.e. South-West monsoon winds and North-East winds. Keeping this in mind, the present research paper tries to make out pattern of spatial distribution of rainfall in Maharashtra and explore whether rainfall distribution in Maharashtra is affected by geomorphology. Findings shows that there is a variation in spatial distribution of rainfall. From west to east (central Maharashtra) sudden decrease in amount of rainfall is there and again gradual increase is there towards east of Maharashtra. this is due to geomorphic units or divisions in Maharashtra. The role of Sahayadri (Western ghats) i.e. its north-south location acting as relief barrier for humid winds is very much significant in rainfall distribution in Maharashtra.

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Citation: Dr. Deepali Chahande. "Geomorphic Impact on Rainfall of Maharashtra", 2021. *International Journal of Current Research*, 13, (04), 17129-17131.

INTRODUCTION

India with monsoon climate have unique feature in wind pattern, south-west and north-east. The south-west monsoon winds are mainly responsible for rainfall in India during June to September. Maharashtra as a part of India comes under the influence of this monsoon climate. It mainly consists of three seasons- hot and dry summer, the wet humid monsoon and dry cold winter season. The climate mainly rainfall element of a region is more or less controlled by geomorphic features of that region. Rainfall is one of the major elements of climate and weather. Rainfall of a region depends on location, altitude, distance from sea/ocean, any relief barrier and geomorphic units along with other factors. In the case of Maharashtra also geomorphology or physical features plays a significant role in spatial distribution of rainfall.

MATERIAL AND METHODS

Hypothesis- The research paper tries to make out whether geomorphology has impact on rainfall distribution.

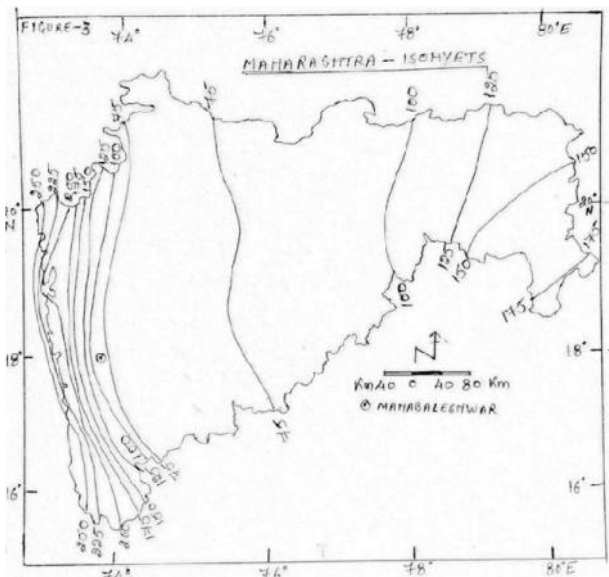
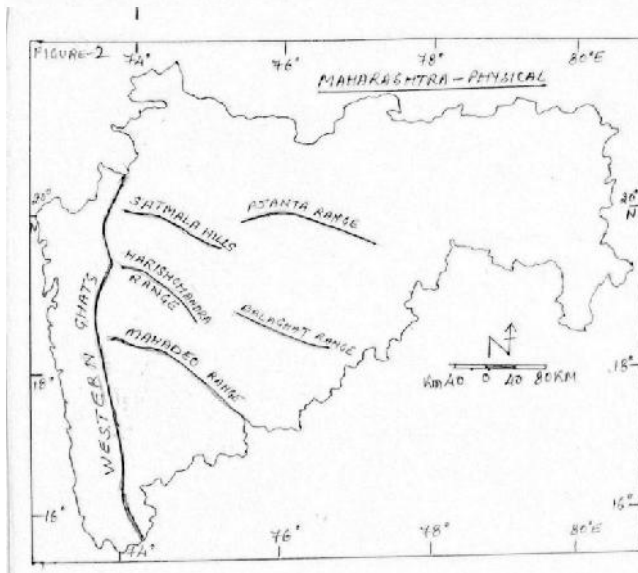
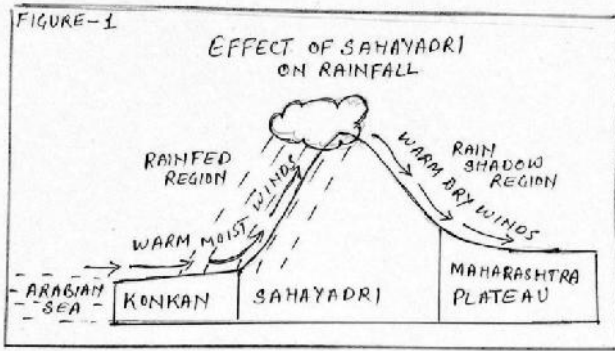
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Objectives: Keeping the above view, the present research paper tries to

-) analyze pattern in spatial distribution of rainfall in Maharashtra and
-) explore impact of geomorphic units/features on rainfall distribution in Maharashtra

Methodology-The present research paper is based on secondary data provided on IMD websites and others and also makes use of other published sources to get required rainfall data of Maharashtra. The isopleths technique was used for analyzing spatial distribution of rainfall. Thereafter spatial distribution of rainfall was correlated with physical features to see the impact of those features on rainfall in Maharashtra. Accordingly at macro level geomorphic map and isohyets map was prepared to get a better vision of rainfall pattern in Maharashtra.

Study Region: The Maharashtra state came into existence on first May 1960 as a Marathi speaking state. Its geographical location extent is 15⁰45' north to 22⁰ north of latitudes and 72⁰45' east to 80⁰45' east of longitudes. It has a unique geomorphic units, mainly large part of Maharashtra is covered with Deccan plateau (Deccan trap). Towards west it is bounded with large water body i.e. Arabian Sea. Administratively and regionally divided into six divisions.



Maharashtra being a part of India has convectional rainfall and with presence of Western Ghats have relief rainfall. Maximum rainfall occurs during Southwest monsoon season with southwest humid winds. In general June to September is the rainy season. South west monsoon enters Kerala on first June and covers whole India by July.

FINDINGS AND DISCUSSION

For exploring and understanding the rainfall pattern and distribution, it is necessary to understanding the geomorphic units. Physical divisions of Maharashtra play an important role in spatial distribution of rainfall.

Macro physiographic of Maharashtra: Figure-1 and figure-2 depicts three main physiographic divisions of Maharashtra. The distinct geomorphic divisions are-

-) Konkan lowland
-) The Sahyadri
-) Maharashtra plateau (Deccan plateau-major part of Maharashtra)

Konkan lowland lies between Arabian sea and sahayadri. Width of lowland ranges between 30 to 60 km. a very narrow belt hence rivers' cycle of erosion is of short duration and runs approximately parallel to each other evolving parallel drainage pattern.

The Maharashtra *plateau* specifically Deccan plateau covers most of the region in Maharashtra. The origin of Deccan Plateau is contributed to volcanic eruptions and Lava deposition. Majority of the Maharashtra topography is under plateau having variation in relief features. It contains the hills such as Ajanta Satmala, Shambhu Mahadev, Harishchand etc. The River system of plateau proof that the slope of the peninsular Plateau of India is slightly eastward.

The *Sahyadri* range or Western Ghats divides Maharashtra into two remarkable geomorphic units- (i) Maharashtra plateau (ii) Konkan lowlands., and third being Sahyadri itself. It runs parallel to the coast line of Arabian sea and have a with a very narrow belt of konkan lowland between them.. It acts as a water divide for these two physiographic features. It not only acts as a water divide but also act as an economic divided for konkan and plateau. The average height of Sahayadri is approximately 1000 metres. Some of the peaks are Mahabaleshwar (1438 m), kalsubai (1646 m), salher (1567 m). *Thal ghat* and *Bhor ghat* are the significant passes connecting konkan and plateau. The main branch off of the sahaydri are Mahadeo, harishchandra and balaghat range. Sahyadri significantly act as a relief barrier for South-west humid winds coming from the Arabian Sea. It looked like a hill range, steep slope from Konkan region and gentle slope from Maharashtra plateau region that is Eastern part.

Spatial Distribution of Rainfall: Figure-3 portrays the spatial distribution of rainfall in Maharashtra with isohyets lines. It shows that towards Konkan region, that is western slope region of Sahyadri receives heaviest rainfall with annual average about 650 cm. The heavy rainfall in this region is attributed to windward slope of western ghats. Amboli (south konkan) receives around 720 cm rainfall. Besides more rainfall, gradient or variation in rainfall is also steep. Within few kilometers of distance rainfall amount changes which is clearly visible by isohyets. Windward slope region having rainfall is known as rain fed region. Sahayadri being parallel to Arabian sea, act as a barrier for Arabian Sea monsoon branch (Figure 1 and 4). When these humid winds come across with Sahyadri range, Orographic uplift of warm and humid air occurs followed by condensation and precipitation. Maximum humidity was discharged on this windward side slope. Rainfall amount suddenly decreases towards east of Sahyadri or western ghats due to their leeward slope. The districts located towards east of the western ghats receives very less rainfall. Pune receives on an average 60-65 cm, Dhule around 45-50 cm. Overall central Maharashtra receives on an average rainfall in between- 60- 80 cm. Some of the regions are in driest zone.

This is because when Southwest monsoon winds crosses Sahayadri, no or very less humidity was remained with them (dry winds) and leeward slope remains dry. This is the most significant factor for drought or dry climatic condition in Central Maharashtra. This region comes under rain-shadow area. Eastward from central Maharashtra, there is an increase in amount of rainfall. Vidarbha region, mainly east Vidarbha received rainfall about 100 cm rainfall. The rainfall amount increases here is due to dynamic role of Bay of Bengal monsoon branch along with Arabian sea monsoon branch. Both monsoon branches contribute for increase in rainfall in east Maharashtra.

Figure-3 also clearly depicts three distinct regions of rainfall on the basis of isohyets

-) Heavy or more rainfall region (Konkan region, West of Sahaydri ranges)-
-) Moderate rainfall region (Vidarbha)
-) Less rainfall region (central Maharashtra, east of Sahaydri ranges)

Conclusion

All natural factors, physical processes along with geomorphic units definitely have an impact on rainfall of Maharashtra. The presence of Arabian Sea, north south direction of Sahyadri range acting as a barrier and combined effect of both monsoon branches towards east of Maharashtra affect the spatial distribution of rainfall in Maharashtra.three main findings are

-) Rainfall is heavy or more towards west of sahayadri (rain fed area)
-) Rainfall abruptly decreases east of sahayadri (rain shadow area)
-) Rainfall slowly increases towards east of Maharashtra due to the Arabian Sea branch and Bay of Bengal branch.

Like the Himalaya acts as a relief barrier and it plays a vital role in distribution of rainfall and determining Indian climate, in the same way the Sahyadri also plays an significant role in rainfall amount and decisive in weather and climate of Maharashtra. Formulated hypothesis acceptably proves that physical divisions or geomorphology of Maharashtra affect the rainfall distribution.

Limitation-The present research paper has broadly (at macro level) looked into physical features of the Maharashtra as per objectives. It has not dealt with micro or minor physical features.

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