Journal of Research and Development
A Multidisciplinary International Level Referred and Double Blind Peer Reviewed, Open Access
ISSN : 2230-9578 | Website: https://jrdrvb.org Volume-17, Issue-11| November- 2025

Original Article

Geographical Analysis of Change in Average Annual Rainfall and Its Impact on Change in Water Availability in West Vidarbha Region

Dr. Shivanand S. Kumar[1], Pratap Rajabhau Sarvagod[2]
[1]Professor and Research Guide, Post Graduate Department of Geography, Government Vidarbha Institute of Science & Humanities, Amravati
[2]Research Scholar (Ph.D.) and Assistant Professor, Post Graduate Department of Geography, Government Vidarbha Institute of Science and Humanities, Amravati.
Email: sshivanandkumar@gmail.com

Manuscript ID:
JRD -2025-171121
ISSN: 2230-9578
Volume 17
Issue 11
Pp. 119-122
November. 2025
Submitted: 17 Oct. 2025
Revised: 28 Oct. 2025
Accepted: 12 Nov. 2025
Published: 30 Nov. 2025

Abstract

Precipitation is important for sustaining life on Earth, maintaining the proper functioning of the water cycle and providing water for drinking and agriculture. Precipitation regulates climate, supports ecosystems, and maintains water levels in rivers, lakes, and groundwater. Precipitation fills rivers, lakes, and groundwater reservoirs. This water is vital for drinking, agriculture, and industry.Present paper reveals the analysis of impact of change in rainfall on the change in water availability in West Vidarbha region.

KeyWords: *Rainfall, Volume of Change, Water, Availability*

Introduction

Rainwater (precipitation) is very important for all water sources such as rivers, lakes and groundwater, as it helps to recharge all these sources. Rainwater raises the water table, making water sources like wells and borewells last longer. This water can be stored and recharged to the groundwater, thereby preventing waterlogging or flooding and improving the quality of drinking water.West Vidarbha is also known as the Amravati division. There are a total of five districts in this region and this region is completely dependent on natural water sources for water.The present research paper studies the average annual rainfall in Western Vidarbha, its changes, and the impact of rainfall changes on water availability.

Objectives of the Study

The specific objectives of the present study as follows,
To study the district wise average annual rainfall in West Vidarbha region.
To study the district wise volume of change in average annual rainfall.
To study the impact of rainfall changes on the change in water availability in the study region.

Data Source and Methodology

The present discussion is based on the secondary source of data. The required data is collected from Agricultural Commissionerate Statistical Department, Pune 'Water Conservation Department' and 'Ground Water Management Plan' etc.The collected data is presented in a table and its distribution is shown in a map. The correlation is shown by a correlation line. The data presented is for the years 2001, 2011 and 2021.Volume of Change is calculated by following formula

Volume of Change = Current value – Initial Value

Study Area

West Vidarbha is located in the central part of India and this division consists of five districts, namely Amravati, Akola, Yavatmal, Washim and Buldhana.The latitudinal extent of West Vidarbha is between $19^0$24' north latitude to $21^0$41' north latitude and the longitudinal extent is between $75^0$55' east longitudes to $78^0$56' east longitude.

Address for correspondence:
Dr. Shivanand S. Kumar, Professor and Research Guide, Post Graduate Department of Geography, Government Vidarbha Institute of Science & Humanities, Amravati

How to cite this article:
Kumar, S. S., & Sarvagod, P. R. (2025). Geographical Analysis of Change in Average Annual Rainfall and Its Impact on Change in Water Availability in West Vidarbha Region. Journal of Research and Development, 17(11), 119–122. https://doi.org/10.5281/zenodo.17851865

Quick Response Code:
Website: https://jrdrvb.org/
DOI: 10.5281/zenodo.17851865
OPEN ACCESS

Journal of Research and Development
A Multidisciplinary International Level Referred and Double Blind Peer Reviewed, Open Access
ISSN : 2230-9578 | Website: https://jrdrvb.org Volume-17, Issue-11| November- 2025

The total geographical area of West Vidarbha is 46,547 sq km which is 14.75% of the total area of Maharashtra state.

Average Annual Rainfall

In Table No. 1, the district -wise annual average rainfall and its distribution of changes have been shown during the study sector in the study sector.

Table No. 1
West Vidarbha – Average Annual Rainfall and Volume of Change
2001 to 2021

District	Average Annual Rainfall in mm			
	2001	2011	2021	Volume of Change 2001 to 2021
Amravati	928.45	1017.59	829	-99.45
Akola	986.53	621	612	-374.53
Washim	864.03	1003.7	892.1	28.07
Buldhana	989.4	628.9	785	-204.4
Yavatmal	1068.25	1133.16	911.3	-156.95
Total	**967.33**	**880.87**	**805.88**	**-161.45**

Source - Agricultural Commissionerate Statistical Department, Pune

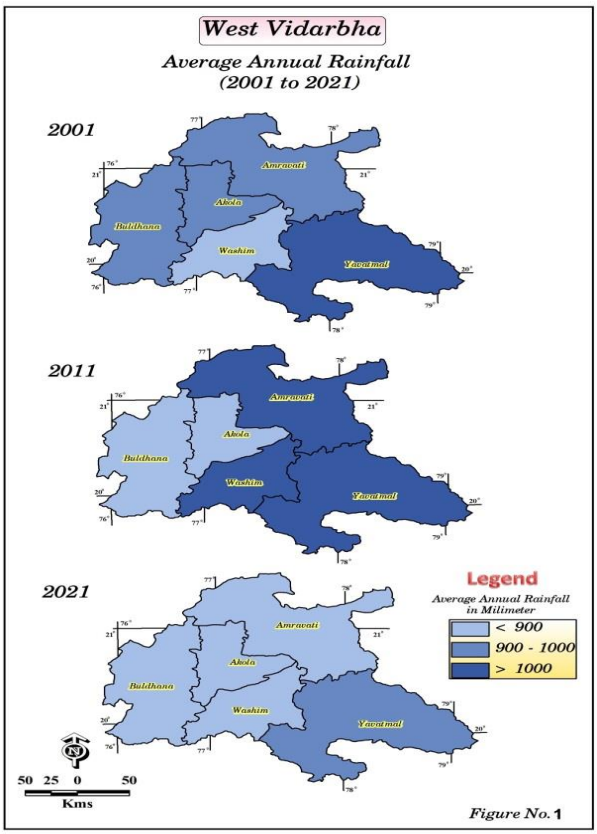


Figure No. 1

The year 2001 was relatively balanced in terms of rainfall for West Vidarbha. This year, the total average rainfall was recorded at 967.33 mm. In the district -wise, Yavatmal district has the highest number of 668.25 mm and Washim district has the lowest rainfall. Also in Akola, Amravati and Buldhana districts, 920 to 990 mm. There was rainfall during the period. This shows that the nature of the weather in the year 2001 was relatively conducive to the nature of the weather.

In the year 2011, the average rainfall in West Vidarbha was recorded at 880.67 mm, which is about 86 mm compared to 2001. District -wise, Amravati (+89mm), Washim (+139mm) and Yavatmal (+65mm) are seen in the rainfall. But in the districts of Akola (-365mm) and Buldhana (-360mm), there is a significant reduction in rainfall.

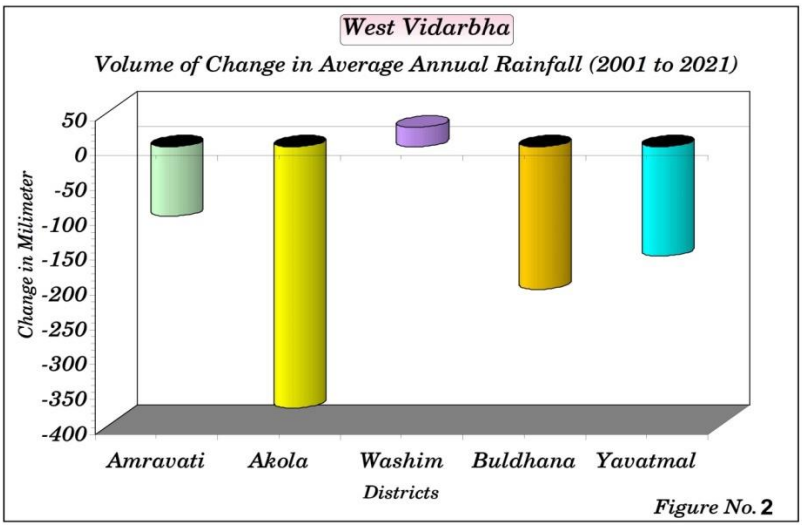
This indicates that the distribution of rainfall in this decade was uneven. In some areas, the situation like heavy rainfall was created and drought was created in some areas. This is a sign of weather volatility.

The year 2021 was relatively unfavorable in terms of rainfall. This year, the total average rainfall was recorded at only 805.88 mm, which means the decrease of -161.45 mm compared to 2001. In the district -wise, the Akola district (612mm) became the lowest rainfall district due to the constant rainfall. This indicates a significant reduction compared to 2001.

Journal of Research and Development
A Multidisciplinary International Level Referred and Double Blind Peer Reviewed, Open Access
ISSN : 2230-9578 | Website: https://jrdrvb.org Volume-17, Issue-11| November- 2025

Volume of Change in Average Annual Rainfall

The average annual study of the study region shows that the rainfall has increased in some districts from the year 2001 to 2011, but from 2011 to 2021, all the districts are seen. The decline in Akola and Amravati districts is significantly significant. During the study period, the average annual rainfall in the region is seen as a decline of 161.45 mm. The highest decrease in the region was in Akola district and is about 374.53 mm. In Washim district, there has been a slight increase in 28.07 mm. In other districts, rainfall has decreased and it is found from 100m to 200 mm. This shows that the condition of the rainfall is a sign of a large number of weather volatility in West Vidarbha. In such cases, there is a need to use water conservation, irrigation projects, change of crops and less dependent techniques in the study region.



Impact of Rainfall Change on Change in Water Availability

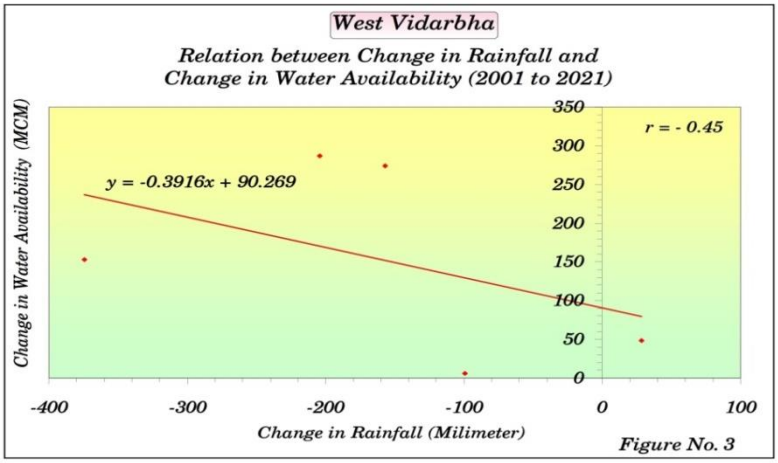
When examining Table No. 2, it is observed that the correlation between changes in rainfall and changes in water availability in the West Vidarbha region is r = - 0.45 and is found to be moderately negative. Also, when the correlation between changes in rainfall and changes in water availability in the study region was tested using the 't' test value, it was found that t = - 3.0007 and the significance of this was found to be 90%.

Table No. 2

West Vidarbha – Relation between Change Rainfall and Change in Water Availability 2001 to 2021

District	Changein Rainfall (mm)	Change in Water Availability (MCM)	'r' Value	't' Stat Value	Level of Confidence
Amravati	-99.45	5.98	r = - 0.45 (Moderate Degree Negative)	t = -3.0007	90%
Akola	-374.53	152.55			
Washim	28.07	48.2			
Buldhana	-204.4	286.75			
Yavatmal	-156.95	273.99			
Total	**-161.45**	**767.47**			

Source – Calculated by Researcher



Journal of Research and Development
A Multidisciplinary International Level Referred and Double Blind Peer Reviewed, Open Access
ISSN : 2230-9578 | Website: https://jrdrvb.org Volume-17, Issue-11| November- 2025

Conclusions

In Amravati district, despite the increase in rainfall in 2011, it has dropped to 829 (612mm) in 2021. Despite the decline in the year 2011 in Washim, there is a slight increase in 2001. Although Buldhana has improved compared to 2011, the total decline is compared to 2001. Yavatmal district has the highest rainfall in 2011, despite the fall in 2021 to 911.3 mm.

In the study area, only Washim district is found to have increased the prevalence. In other districts, there is a decrease in transition. Despite the decline in the region, the water storage has increased due to the construction of various water projects. Therefore, even though the average rainfall decreases, the change in water resources has increased somewhat. Therefore, this correlation is found to be negative.

To prevent global warming, it is necessary to stop the uncontrolled deforestation. There are strict rules in place, but their implementation still needs to be effective. Also, to increase the availability of water, abundant rainfall is needed and it is also necessary to soak that water into the soil. For this, it is necessary to drain the ponds, clean the silt in the ponds, and do rain water harvesting.

The reduced rainfall in the study area is a warning sign of future danger. Illegal deforestation has reduced the forest cover in many areas. This has had a direct impact on the distribution of rainfall. This is the main reason for the decrease in rainfall in Amravati and Yavatmal districts. It is necessary to stop illegal deforestation and increase the forest area through social forestry. This will have a positive impact on the distribution of rainfall, thus creating abundant water reserves for humans and agriculture.

References

1. Bhati,Dr. Vanita (2003):“India Water Resources, Planning and Management”. Universal Scientific Publishers, Jaipur
2. *IPCC, 2021, Climate Change :2021The Physical Science Basis, Intergovernmental Panel on Climate Change, Sixth Assessment Report.*
3. Kolte S. M. (2014), “Statistical Principles and Practice”, Pimplapure & Co. Publishers, Nagpur, pp. No. 367 – 371.
4. Mall, R.K. et al. (2006) – Impact of Climate Change on Indian Agriculture: A Review, Climatic Change, 445–478.
5. Ramos M. C. (2001), “Rainfall Distribution Patterns and Their Change over Time in a Mediterranean Area”, Theoretical and Applied Climatology, 69 (3), Pp 163-170
6. Sarvgod Pratap (2021), “Spatio-Temporal Analysis of Water Resource in West Vidarbha Region of Maharashtra (2001-2021)”, Research Proposal, Sant Gadge Baba Amravati University, Amravati.
7. Sarvgod Pratap and Kumar Dr. S. S. (2025), “Impact of Temperature Change on Changing Water Availability in West Vidarbha Region’, International Journal of Research Studies on Environment, Earth, and Allied Sciences (IJRSEAS), Volume-2 Issue-4, August-2025, Pp 18-22