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Impact of Temperature Change on Changing Water Availability in West Vidarbha Region

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Abstract

The effect of climate change is where, when and how much water is available. These results change by region and can harm the health of the people and the seminar. For example, rising temperatures, drought and decreasing snow are putting more pressure on the water supply to the southwest. In contrast, the northeast and southeast can cause severe storms and torrential rains, which can endanger the infrastructure of the old water (such as dams, gutter and water processing facilities). Temperature change may exposure to higher levels of smog can cause or worsen asthma, heart disease, and lung cancer. Heat-related illnesses may also increasing. Changing temperature and climate patterns can affect the spread of diseases. Droughts and changing weather patterns make agriculture more difficult and can diminish or reduce water supplies. For both agriculture and rural urban settlements. Extreme weather and temperature results in various events and resource loss are forcing people from their homes. Changing temperature and climate patterns may results in floods can destroy homes and livelihoods, and heat can make outdoor work more difficult. Temperature change is also linked to increased poverty and low income. Present paper reveals the analysis of impact of temperature change on the change in water availability in West Vidarbha region.

Keywords: *Temperature, Rainfall, Volume of Change, Water, Recourses, deforestation Availability, storms, floods, drain the ponds, soak, urbanization*

Introduction

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. Temperatures are higher in Western Vidarbha. In the past few years, temperatures have increased in every district of this region. This affects the distribution of rainfall and therefore also affects the available water resources.

The present research paper studies the average annual rainfall in Western Vidarbha, its changes, and the impact of those changes on water availability.

Objectives of the Study

The specific objectives of the present study as follows,

1. To study the district wise annual average temperature in the study region.
2. To study the district wise volume of change in temperature.
3. To study the impact of change in temperature 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 'Regional Metrological Department, Nagpur', '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°24' north latitude to 21°41' north latitude and the longitudinal extent is between 75°55' east longitudes to 78°56' east longitude. 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 Temperature

The following table no. 1 shows the distribution of district-wise annual average temperature and its change from 2001 to 2021 in the study area.

Table No. 1

West Vidarbha – Average Annual Temperature and Volume of Change 2001 to 2021

District	Average Annual Temperature in Degree Celsius			
	2001	2011	2021	Volume of Change 2001 to 2021
Amravati	26.7	27	27.8	+1.1
Akola	26.2	28.3	28.9	+2.7
Washim	26.6	27.6	28.2	+1.6
Buldhana	24.9	28.1	28.6	+3.7
Yavatmal	25.7	26.2	27.4	+1.7
Total	**26.02**	**27.44**	**28.18**	**+2.16**

Source: Regional Metrological Department, Nagpur

The total annual average temperature recorded in Western Vidarbha in the year 2001 was 26.02^0 C. Then in 2011, this temperature increased by 1.42^0 C and this record was found to be 27.44^0 C. In the year 2021, the temperature increased by 0.74^0 C compared to 2011, reaching a record of 28.18^0 C. This means that the temperature has increased every year.

The lowest temperature recorded in Buldhana district in the year 2001 was 24.9^0 C. The average altitude of this district is higher than other districts. Therefore, the annual average temperature is found to be low. The record in the three districts of Amravati, Akola and Washim was 26 to 27^0 C. In Yavatmal district, the record was moderate, i.e. 25.7^0 C. The annual average temperature in Amravati district is found to be highest during this period.

In the year 2011, Akola district recorded the highest annual average temperature (28.3^0 C). This was followed by Buldhana district with an annual average temperature of 28.1^0 C, a significant increase compared to 2001. The increasing urbanization in Buldhana district is mainly responsible for this increase in temperature. During this period, the lowest temperature recorded in Yavatmal district was 26.2^0 C. While in other districts, this record ranged between 27 and 28^0 C.

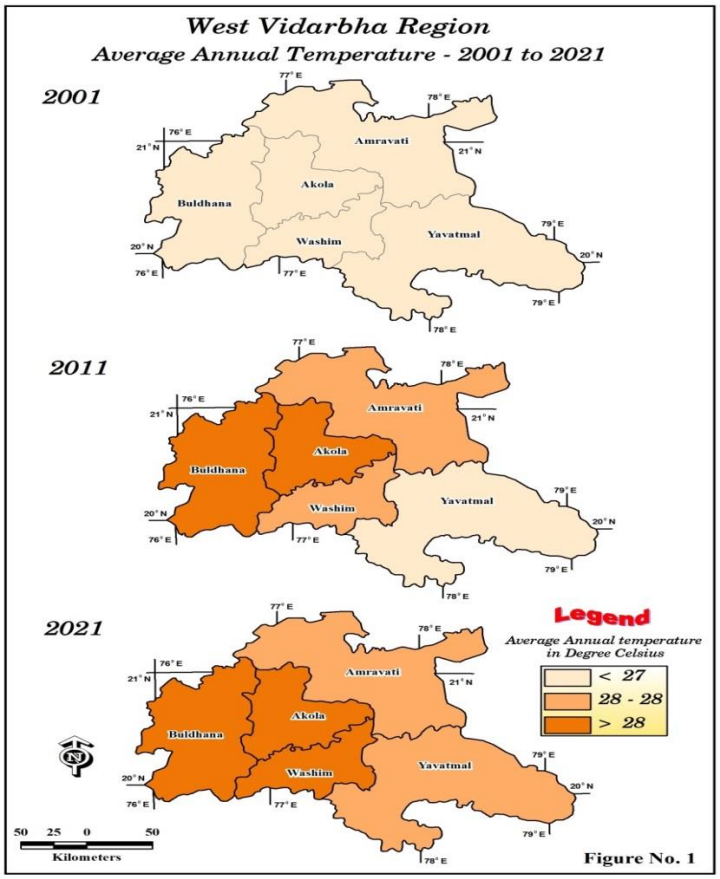

Figure No. 1

Currently, i.e. as of the year 2021, the highest annual average temperature recorded in Akola district is 28.9° C. During this period, the annual average temperature of all three districts, Washim, Buldhana and Akola, is between 28 and 29°C. The natural vegetation cover in all three districts of Akola, Washim and Buldhana is less than that of Amravati and Yavatmal districts. This has an impact on the temperature in these districts. The annual average temperature recorded in Yavatmal district is 27.4° C and in Amravati district is 27.8° C, which is lower than other districts. However, the temperature has increased compared to the previous period.

Volume of Change in Average Annual Temperature (2001 to 2021)

A study of the change in annual average temperature in the study area from 2001 to 2021 shows that there has been an increase in temperature in every district. The annual temperature increase of 2.16° C is observed in the entire study area between 2001 and 2021. The highest temperature change is observed in Buldhana district. The temperature in this district has increased by 3.7° C between 2015 and 2021. This increase is observed to be due to increasing urbanization and low forest cover.

The increase in Akola district is 2.7° C, which is also found to be high. In Yavatmal (+1.7° C), Washim (1.6° C) and Amravati (+1.1° C) districts, the temperature increase is found to be between 1 and 2° C. The increase in the annual average temperature in Amravati district is less than that of other districts. Amravati district has the highest natural vegetation cover in Western Vidarbha. This has had a positive impact on controlling temperature rise. However, the increase in temperature is a matter of concern.

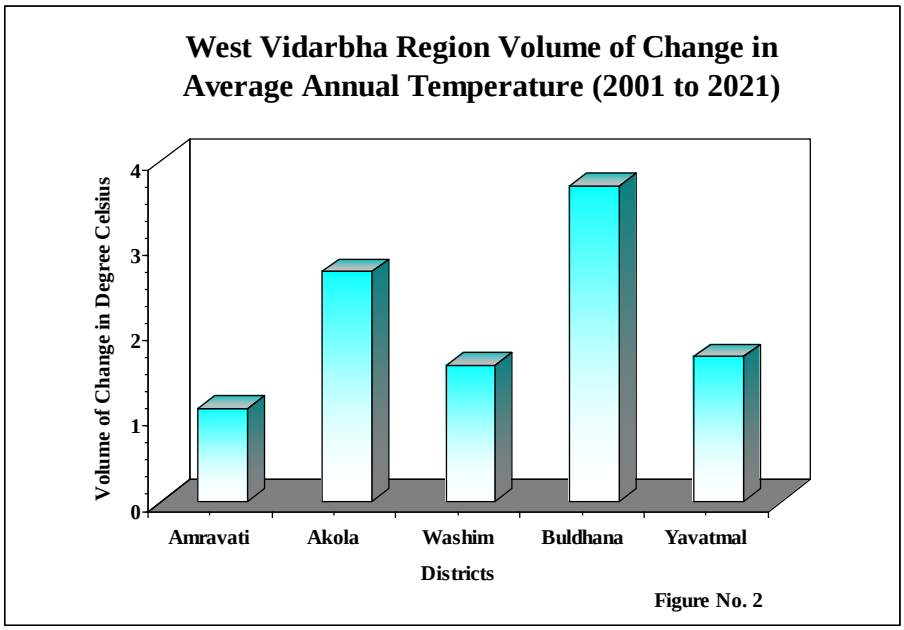

Figure No. 2

Impact of Temperature Change on Change in Water Availability

Table 2 below studies the relationship between temperature changes and water availability in Western Vidarbha from 2001 to 2021, and the following formula has been used to study this change.

Table No. 2

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

District	Change in Temperature (Degree Celsius)	Change in Water Availability (MCM)	'r' Value	't' Stat Value	Level of Confidence
Amravati	1.1	5.98	r = + 0.68 (Moderate Degree Positive)	t = 2.6669	95%
Akola	2.7	152.55			
Washim	1.6	48.2			
Buldhana	3.7	286.75			
Yavatmal	1.7	273.99			
Total	**2.16**	**767.47**			

Source: Calculated by Researcher

In Table 2 above, the correlation between temperature changes and water availability changes in the study region from 2001 to 2021 has been studied and the significance of these correlations has been determined using the 't' test.

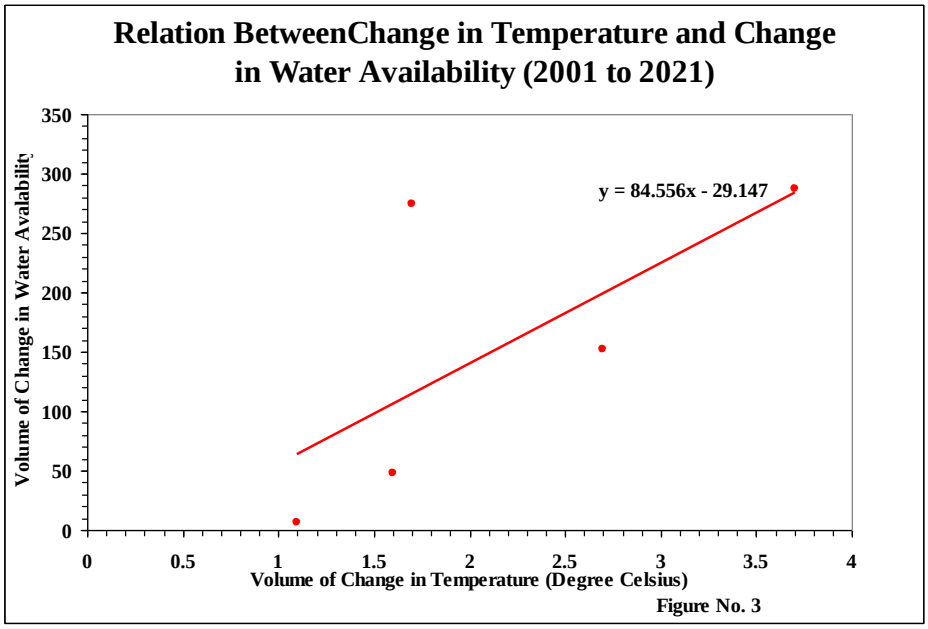

Figure No. 3

From the above table, it can be seen that the correlation between temperature changes and water availability changes in the West Vidarbha region is r = +0.68, which is found to be moderately positive. Also, when the correlation between temperature changes and water availability in the study region was tested using the 't' test value, it was found that t = 2.6669 and the significance of this was found to be 95%.This shows that the impact of temperature changes and changes in water availability in the study region during the study period from 2001 to 2021 is moderately positive.

Conclusions

The annual average temperature has increased in every district of Western Vidarbha between 2001 and 2021. The annual average temperature has increased due to factors such as illegal deforestation, increasing pollution, greenhouse effect, etc. There is also a positive relationship between changes in temperature and changes in water availability. That is, if there is a change in temperature, there is a difference in the availability of water. If the temperature is higher, the evaporation of water becomes more rapid. This also leads to more water being used for consumption.

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.

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Conflicts of interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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