An Overview of Water Management in Murtijapur Tahsil of Akola District

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Abstract

The usage of water in every sector has drastically changed the scenario in day today life for human beings and its related issues. The growth of population created scarcity of water all over India. Specifically in Akola district particularly in Murtijapur tahsil water utility is in industry major irrigation, less rain created gap in the environment. People have to be made aware about proper use of water and its management with this over all recharge of ground water can be replenished. It is very important as how to save water and save earth. The remedial steps and action plan is more important for water conservation. During monsoon season (June to September) rain water percentage is heavy as imbalanced. Therefore conservation rain water is a need of time and effort shall be collectively activated for the management water.

The present paper has attempts an overview with problems of water management and remedies in Murtijapur tahsil.

Keywords : *Water, irrigation, Rainfall, Groundwater, Management, Remedies*

Introduction

Water management is an important issue for the future conservation of water development. In the universe only 1% water is useful for drinking and out of this 1% water 98% of water is available in the source of ground water. India is the number one country of world which maximum depends on the source of ground water. The use of ground water in India is near about 246 cubic meters and always faces the problem of drinking water in summer season. Murtijapur tahsil is the part of Vidarbha region and temperature is high in summer season and found in between 42^0 C to 47^0 C. Many villages in the study region have faced the problems of drinking water in summer season. Present paper has attempts an overview and discuss the problems and remedies of water management in Murtijapur tahsil.

Objectives

The specific objectives of the present research paper are as follows

i) To discuss the problems about water management in Murtijapur tahsil
ii) To study the rainfall distribution in the study region.
iii) To study the availability of water storage and use of water in last five years.
iv) To analysis the relationship between water storage and use of water in the study region
v) To suggest the remedies about water management in the study region.

Data Source & Research Methodology

The present research work has been carried out with the help of secondary source of data. Secondary data was collected from the Water Resource Department, Groundwater Survey and Development Agency Office Akola and Socioeconomic Review of Akola district.

All collected data arranged in statistical format and shows in the table also important statistics is shown in the suitable graphs. Relation between two variables is shown on the regression line.

Study Area

Murtijapur is one of the important tahsil in Akola district of Maharashtra state. Study region Murtijapur is the part of Purna watershed and lies in between 20^0 31'47" North latitudes to $20^0$51' 25"

North latitudes and 77^0 08' 10" East longitudes to 77^0 33' 34" East longitudes above the Tropic of Cancer (Figure No 1). Tahsil covered total 790 sqkm geographical area and it is 13.80% to the geographical area of Akola district. North to south maximum expansion of the region is near about 38 km and east to west maximum expansion is 37 km respectively. Total population of the tahsil is 174650 and out of them 51.35% male and 48.65% female population according to the census year 2011.

Akola tahsil located towards west of the region, Amravati district is located towards north to middle east of the region and Washim district is on middle east to south of the study region.

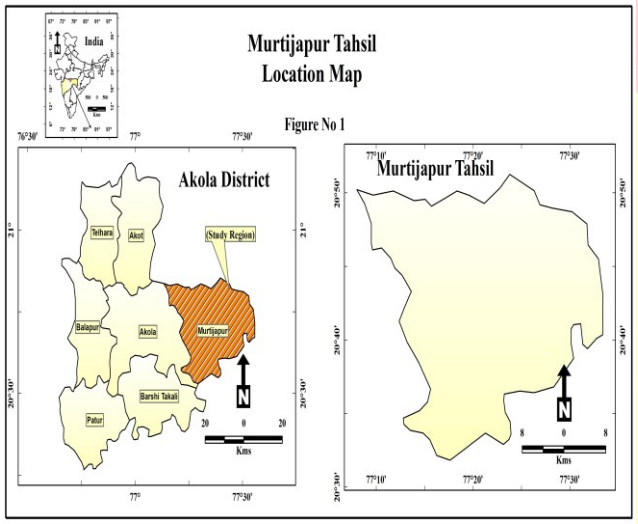


Figure No 1

Problems in Water Management in the Region

The problems about water management in the study region are explained as follows,

1) Major problem in the study region is about drinking water because only 'Uma' medium project has provided the drinking water facility to the villages in the region. Other small projects have only use for the irrigation. For the drinking purpose the maximum villages in the region depending on the groundwater source.
2) The northern part of Murtijapur tahsil is the zone of salinity near the Purna River. The average pH value of ground water and Purna River in this salinity zone is near about more than 7.5 and it is not very much suitable for the purpose of irrigation as well as drinking.
3) In the study region till farmers are used the traditional methods for the irrigation purpose like flood flow of water and it is directly cause the level of groundwater potentials.
4) The ph value of soil in salinity zone is more than 8.5 and it is also affected the groundwater potentials.
5) The awareness about water management like increasing the level of groundwater potentials, rain water harvesting etc till not developed in the region.
6) In summer season problems of dry zone occurred in last some years due to the irregularity of rainfall and extreme heat.

Water Management in the Region

Total 149 habited villages are present in the tahsil and out of them 122 villages has the facility water by tap. Remaining villages are totally depending on the groundwater for the drinking.

In the region total 33 villages has faced the major problem of water scarcity and out of them only 3 villages get the water supply from tanker. There is no till management about water supply in water scarcity region of the tahsil.

Water Project in the region

Uma Medium Project:- In the study region 'Uma' is the medium water project is available since the year 1981. This is only one project in the tahsil which supplies water for an irrigation and drinking both purpose. The height of this dam is 20.5 meter and 17 km length with 14.1 million cubic meter maximum storage capacity of water. The availability of water, rainfall and other factors from last fiver is shown in table no 1.

Table No 1 – Uma Project

Year	Water Storage (Million Cubic meter)	Rainfall in mm	No of Wells	No of Villages Water Supply		Use of Water Storage		No of Bore well s
				Agriculture	Drinking	Agriculture	Drinking	
2014	2.94	425				1.65	0.82	**52**

-15			191	32	57			
2015-16	3.22	560				1.93	0.82	**55**
2016-17	11.68	650				10.39	0.82	**65**
2017-18	1.10	395				0.19	0.82	**71**
2018-19	**11.68**	**750**				**10.12**	**0.82**	**78**

Source – Uma Project Office, Murtijapur

It seems that the rainfall is directly effects on the storage of water; in 2017-18 the average rainfall of the region is 395 mm which is the lowest in last fiver years and in this year the storage of the water is also lowest. In 2016-17 and 2018-19 the storage of water is 11.68 million cubic meter because the average rainfall is also increased.

In this region the total 32 villages gets the benefits of irrigation for agriculture and 57 villages gets the benefits for drinking water. Every year total 0.82 million cubic meter water used for drinking purpose. Variations are found in the use of irrigation purpose, in the year 2016-17 and 2018-19 more than 10 million cubic meter water is used for irrigation and in 2017-18 lowest water (below 1 mcm) is used for irrigation because this year rainfall is also lower in the region.

Number of wells are constant 191 from 2014-15 to 2018-19 but the number of bore wells are increased from 52 to 78. Increasing number of bore wells are also the main reasons to reduce the level of groundwater.

Pimpalshenda Mini Project: -

The use of this water project is limited for the purpose of agriculture only. There is no scheme till developed for the use of this water for drinking purpose. The maximum water storage capacity of this project is 2.43 mcm. The details of this project are shown in table no 2.

Table No 2 – Pimpalshenda Mini Project

Year	Water Storage (Million Cubic meter)	Rainfall in mm	No of Wells	No of Villages Water Supply		Use of Water Storage		No of Bore wells
				Agriculture	Drinking	Agriculture	Drinking	
2014-15	0.76	360	15	5	No Scheme	0.57	No Scheme	**19**
2015-16	0.02	310	18			0		**19**
2016-17	2.43	650				2.14		**22**
2017-18	0.08	345				0		**27**
2018-19	**2.43**	**750**				**2.17**		**29**

Source – Uma Project Office, Murtijapur

Under this project total 15 wells are found from the year 2014-15 to 2017-18 and 3 wells are increased in 2018-19. The average rainfall is higher in 2018-19 and it is 750 mm therefore the storage of water and use of water for agriculture is also recorded maximum in this year.

Total 5 villages gets the benefits of this project and number of bore wells are also increased from 19 to 29.

Shivan Mini Project: -

This project is also limited only for the purpose of irrigation in agriculture. Total storage capacity of this dam is 4.15 mcm and till no any scheme developed for the use of drinking water. The last five years details of this project are shown in table no 3.

Table No 3 – Shivan Mini Project

Year	Water Storage (Million Cubic meter)	Rainfall in mm	No of Wells	No of Villages Water Supply		Use of Water Storage		No of Bore wells
				Agriculture	Drinking	Agriculture	Drinking	
2014-15	1.63	450	8	6	No Scheme	1.12	No Scheme	**0**
2015-16	1.40	380	9			0.8		**0**
2016-17	2.48	405	10			1.90		**13**
2017-18	0.42	345	10			0		**18**
2018-19	**4.15**	**685**	**11**			**3.47**		**18**

Source – Uma Project Office, Murtijapur

The maximum average rainfall in this region is occurred in the year 2018-19 (685 mm) and maximum supply of water for irrigation is also recorded in the same year. The above details show the irregularity of rainfall and it directly affects on the storage of project.

Total 6 villages get the benefits of this project for agriculture. Number of wells and bore wells are increased from 2014-15 to 2018-19. In the year 2017-18 no benefits found of this project because the water storage was below 1 mcm and this is due to the low rainfall in last five years.

Weather of the Region

In the study region the ratio of average rainfall is 742.80 mm and gets the rain averagely from 35 to 40 days in a year. All rivers of this region get the water from rain water and rainfall is irregular in the study region. Maximum rivers are dry in summer due to the extreme heat.

May is the warmest month of the year. The temperature in May averages 35.2°C. In December, the average temperature is 21.8°C. It is the lowest average temperature of the whole year. Table no 4 shows the month wise weather condition for the study region. Table no 4 (A) shows the average temperatures and rainfall from January to December month and table no 4(B) shows the actual (June to September) rainfall from year 2007 to 2017.

Table No 4 (A) – Average Temperatures and Rainfall in Murtijapur Tahsil

Months	Avg. Temperature (°C)	Min. Temperature (°C)	Max. Temperature (°C)	Rainfall (mm)
January	22.2	14.7	29.8	10
February	24.7	16.6	32.8	3
March	28.8	20.7	37	9
April	32.9	25.3	40.5	9
May	35.2	28.1	42.4	12
June	31.8	26.2	37.5	126
July	27.6	24	31.3	243
August	27	23.5	30.5	153
September	27.3	23.2	31.4	163
October	26.8	20.7	33	43
November	23.7	16.5	31	11
December	21.8	14.1	29.5	4

Source – en.climate-data.org/asia/india/maharashtra/murtijapur-24385/

Table No 4 (B) – Actual Rainfall (June to September) in Murtijapur Tahsil

Average Rainfall (mm)	Average Rainfall June to September (mm)										
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
742.8	1006.7	483.3	485.6	838.8	876.7	861.3	881.34	678.5	654.4	793.6	495.8

Source – GSDA, Akola

The actual rainfall from June to September month of the tahsil is reduced in last 10 years and it is direct affect on the water storage and groundwater both.

Groundwater of the Region

Central Ground Water Board (CGWB) has carried out the ground water resources in 2009 and it is shown in table no 5.

Table No 5 – Ground Water Resources in Murtijapur Tahsil (Figures in Hector per Meter)

Net Annual Ground Water Availability	Existing Gross Ground Water Draft for Irrigation	Existing Gross Ground Water Draft for Domestic and Industrial water Supply	Existing Gross Ground Water Draft for All uses	Provision for Domestic and Industrial Requirement for 2025	Net Ground Water Availability for Future Irrigation Development	Stage of Ground Water Development (%)
5475.612	2192.574	246.2764	2438.85	492.7832	2794.828	44.54

Source – Ground Water Information Akola District Maharashtra, Govt of India Ministry of Water Resources Central Ground Water Board

The stage of groundwater development in the region is 44.54% and it is necessary to develop the groundwater development for future requirement.

In Akola district some of the villages under different tahsils are monitored by two different agencies where Fe (iron) was monitored by GSDA along with other parameter, whereas CGWB data excluded Fe in ground water analysis. According to them the Villages in Murijapur tahsil has TDS (Total Dissolved Solid) ranging from 17-50%. Also total hardness, magnesium and calcium values were exceeding in 33-100% of the samples which could be due to some natural presence of magnesium and calcium based minerals in groundwater. The overall groundwater quality of Murtijapur tahsil is very poor.

The groundwater level data in Murtijapur tahsil of the year 2011 with long term trend is shown in table no 6.

Table No 6 – Water Level Data (2011) with Long term trend (2001-10)

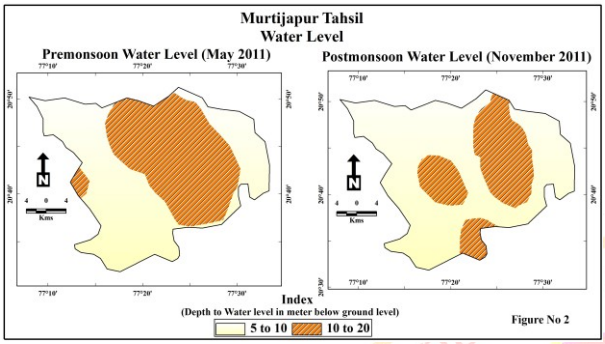
Premonsoon (m bgl)	Postmonsoon (m bgl)	Fluctuation (m)	Premonsoon Trend		Postmonsoon Trend	
			Rise (m/yr)	Fall (m/yr)	Rise (m/yr)	Fall (m/yr)
8.25	2.45	5.80	-	0.0048	0.3313	-

Source – Ground Water Information Akola District Maharashtra, Govt of India Ministry of Water Resources Central Ground Water Board

Water level of the region is near about 8.25 m bgl (meter below ground level) in premonsoon and 2.45 m bgl after postmonsoon. The fluctuation of water is the 5.80 meter and it is second highest in the Akola district.

In premonsoon at middle part of Murtijapur tahsil average water depth is 10 to 20 m bgl and in remaining region the depth is found 5 to 10 m bgl. The area of water depth 10 to 20 b bgl covered 347 sqkm and 5 to 10 m bgl covered 443 sqkm area of the tahsil.

In postmonsoon area of water depth 10 to 20 b bgl covered 205 sqkm and 5 to 10 m bgl covered 585 sqkm area of the tahsil. The picture of water depth in premonsoon and postmonsoon is shown figure no 2.



Other Water Storages in the Region

Table no 7 indicates the important lakes/reservoirs and their water storage in the region.

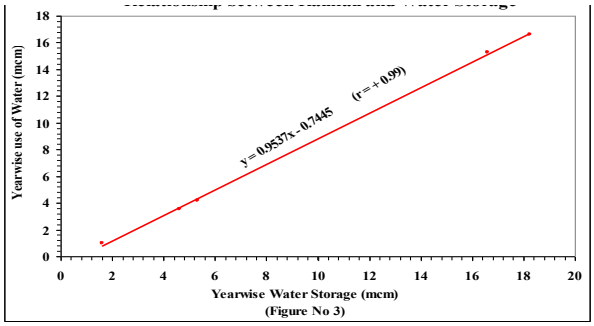
Table No 7 – Important Lakes and Water Storage

Name of Lake /Reservoirs	Irrigation Capacity (Hector)	Water Storage (mcm)
Wadgaon Storage Lake	125	**880**
Borgaon Percolation Lake	-	**164**
Dhanora Village Lake	-	**37.14**
Borgaon Scheme	142	**1231**
Dalambi Village Lake	-	**48.51**

Source – Water Resource Department, Murtijapur

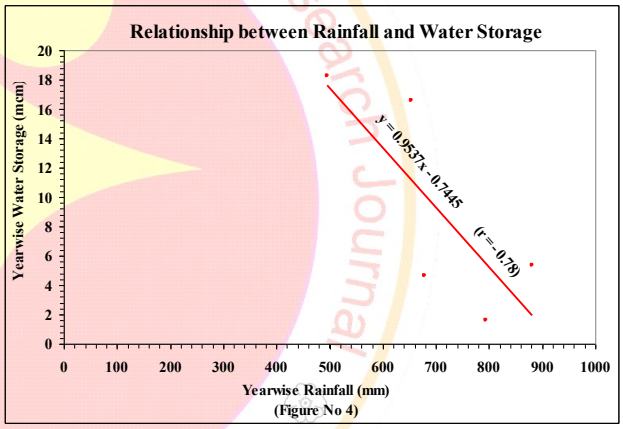
Relationship between Water Storage and Use of Water

The relation between water storage and use of water from the year 2014-15 to 2018-19 is found high degree positive (r = + 0.99). It clearly indicates that the increasing the water storage increases use of water and vice versa. It is necessary to increase the water storage and controls the use of water for avoid the water scarcity. The relation between these two variables is shown in figure no 3.



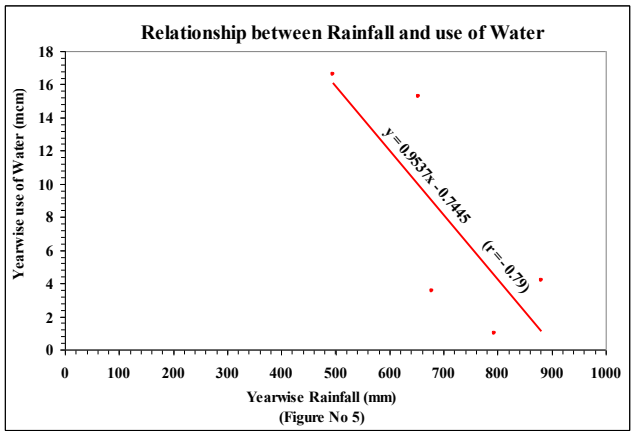
Relationship between Rainfall and Water Storage

The relationship between these two variables is found negative (r = - 0.78) (Figure No 4). There is fluctuation in rainfall and in water storage also but the water storage in the region is not fulfilling due to the irregularity of rainfall. It is necessary to increase the water storage as per rainfall zone in the region.



Relationship between Rainfall and Use of Water

The relation between last five years rainfall and storage of water is also found negative (r = - 0.79) (Figure No 5). The use of water in the study region is high compare to the average rainfall of the tahsil. It is very important to control the excess use of water and increases the ratio of average rainfall.



Conclusions and Remedies

Rainfall of the region is directly effects on the water storage of the region but water storage management of the region is not fulfilling compare to the rainfall of the tahsil. Management of water in the study region is not found appropriate because the relation between rainfall and water storage also rainfall and use of water is calculated negative. Storage of water is very low as compare to the growing population and their use for drinking as well as irrigation both. The last five years data of rainfall shows the irregularity of rainfall but the use of water is increased every year. Therefore the relation between them is negative.

Water storage and its use is near about same in the region therefore it is necessary to increase the capacity of water storage and reduce the use of water. The depth of groundwater is also moderate in the region and in saline zone it is not suitable for drinking purpose. Irregularity of the rainfall also affects on the level of ground water in Murtijapur tahsil.

In Murtijapur tahsil only 3 villages in water scarcity region gets the water supply from tanker but 30 villages are till faced the problem of water shortage especially in summer season.

Remedies

i) First upon to protect the environment to stop the forest degradation because degradation adversely effect on the rainfall.
ii) To spread the awareness about benefits of drip irrigation methods and demerits of flood irrigation method because drip irrigation method is useful for both the growth of crops and remains the depth of groundwater.
iii) Rain water harvesting technique till not developed in the region. It is necessary to create the awareness about water management and provide the training about rain water harvesting in rural and urban both regions.
iv) To reduce the soil erosion and increase the organic matter in soil of the region because it helps the water fall deeper into the soil.
v) Everyone in each household should limit the use of water and reduce the speed of tap water in the house. Also increase the efficiency of water use.
vi) To increase the water filtration process in water scarcity region.
vii) To excavate the fields in the villages also expand the ponds and reservoirs to extend the water storage capacity.
viii) To increase the disinfection of water in salinity zone of the region.
ix) To collect the overflow from watering plants in the region.

Water is life. Water is not only use for drinking but also need for the agriculture, industry as well as every work. Human life cannot be imagining without water. The carefully use and conservation drop of water is the need of present and future.

Every citizen of the study region should participate in water management and raise awareness about it. The government should also provide necessary guidance from time to time.

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