

# Draught Mitigation Measures in Osmanabad District

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**Abstract** - The Marathwada region, which traditionally receives scanty rainfall due to its geographical locations, and have been facing severe scarcity of drinking water since so many years. Maharashtra government initially has propelled a program named Jalyukta Shivar Abhiyan (JSA) to make Maharashtra a dry season free state by 2019. In April 2016, the situation was so bad that Latur city had to be supplied with water with the help of railway wagons. Hence the decision was taken by Government of Maharashtra to set up ambitious the Water Grid. Israel's national water company, Mekorot has chosen to undertake the project. This article focuses on methods of structures under JSA and how implementation of JSA in Osmanabad district has benefitted the community. This article also focuses on the new ambitious project Marathwada Water grid launched by government, to prevent water scarcity and draught problems and also focuses on how the concerned project will be implemented by connecting Major 11 dams through integrated pipelines. The research paper has highlighted draught issue and its mitigation measures and certain recommendations in Osmanabad district of Marathwada Region.

**Key Words:** Draught, Jalyukta Shivar Yojana, Marathwada Water Grid, Osmanabad

## 1. INTRODUCTION

Maharashtra has constantly confronted dry seasons. The dry spell has endured for four back to back years and has influenced drinking water security and harvest creation and profitability seriously everywhere throughout the Maharashtra state. Marathwada region is facing severe scarcity of drinking water due to scanty rainfall since 2 to 3 years. There is acute shortage of drinking water not only in rural areas but also in urban areas. The Marathwada region receives an average rainfall of 683 mm, 30% lower than the country as a whole. Hence this region is more susceptible to droughts.

Recently, Water was brought by railway from Miraj, Dist. Sangali from a distance of 300 Kms to meet the drinking water demand of Latur city. Due to the situation of water scarcity and drought in Maharashtra, the state government has also resorted to the option of artificial rain and cloud seeding. But the experiments have not yet been very successful in Maharashtra. To avoid this situation Maharashtra government had initially launched the project "Jalyukta Shivar Campaign" in Maharashtra for drought-free state by 2016- 2019. This project involved deepening and widening of streams, construction of cement and earthen stop dams, work on nallas and digging of farm pond.

Even though after implementation of "Jalyukta Shivar Campaign" water scarcity and draught related problem have not been completely mitigated. To overcome draught situation, some permanent solution need to be implemented. Under such circumstances, state government prepared grid water supply scheme to meet the drinking and industrial water needs similar to the pattern of Gujarat and Telangana called as "Marathwada Water Grid" system.

## 2. OBJECTIVES

### 2.1 Jalyukta Shivar Yojana

1. To arrest maximum runoff in the village area.
2. To create Decentralized Water Bodies.
3. To increase the Groundwater Level in Drought areas.
4. To create new structures of water conservations
5. To create awareness and encourage people for efficient use of water for farming

## 2.2 Marathwada Water Grid

1. To prepare plan, design and tentative estimate for Integrated Piped network of drinking water and industrial water for Marathwada region so as sufficient water is made available for drinking / Industrial use throughout the year.
2. To prevent scarcity of water in Marathwada region through integrated pipe network.
3. To save money that need to be spent on temporary scarcity mitigation measures.

### 2.2.1 Scope of Work – Marathwada Water Grid

1. Assessment of demand of water for drinking, commercial and industrial purpose required up to 2050 in Osmanabad district and check whether it should meet with demand obtained from proposed grid.
2. Determination of Water quality parameter (TDS, pH, Turbidity etc) and Checking of determined water quality parameter as per IS 10200:2012
3. Necessary land required for pipe line and other structure need to be studied.
4. Difficulties raised during pumping of water from Ujni need to be studied in detail.
5. Study of cost – benefit analysis considering 2050 year as return period.

## 3. LITERATURE SURVEY

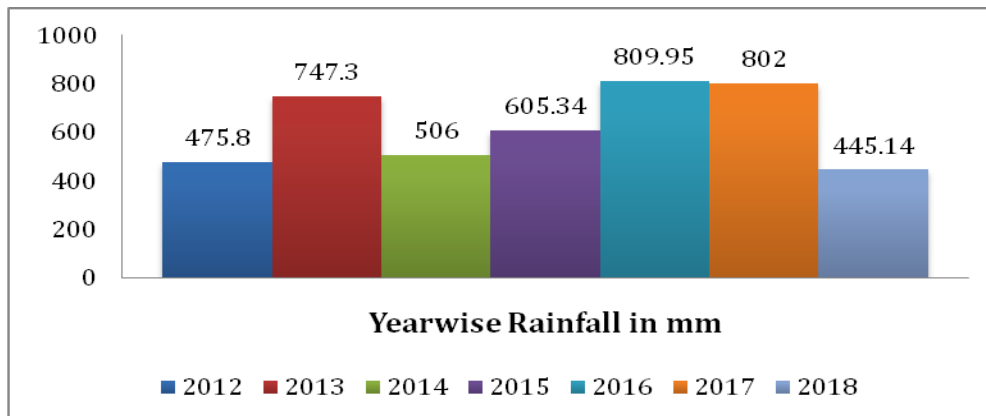
1. **Dr. Sampat Kale, Dr. Jitendra Kumar Gond** The paper analyses draught hit Honala Village condition in Tuljapur, Osmanabad District. The study analyses the village suffers from acute water shortage during summers due to low rainfall for past few years. As a result, there is increase in number of farmers committing suicides. Further, the causes were analyzed and conservation measures proposed.
2. **Mustaq Ahmad Jabir Shaikh, Farjana Sikandar Birajdar** The present study has attempted to find out the water scarce zone of the Osmanabad district and to create the awareness about the less availability of water to the stakeholders which are suffering from water scarcity. The GIS technique was used to map the depletion of water level information and prediction of water scarce zone of Osmanabad.
3. **Inamdar S. R.** The paper analyses Jalyukta Shivar campaign of Darphal village in Osmanabad District. Author concluded that In Jalyukta Shivar campaign; by Scientific Approach they can easily achieve predetermined goals of a Campaign.
4. **Mr. P. A. Vedpathak, Prof. P. A. Hangargekar** the paper analyses impact assessment of Jalyukta Shivar Yojana on Five Villages in Ambejogai, Dist. Beed studied with respect to rainfall, availability of drinking water, Ground water table and irrigation potential of the village. Author concluded due to implementation of JYS, there is increase in availability of drinking water in the villages and increasing level of groundwater.
5. **Michele Mutchek and Eric Williams** discussed potential sustainability benefits and challenges relating to the adoption of smart water grids. This paper discusses to fill this gap by presenting a vision of how smart technologies could be implemented at several scales and combined to contribute to more sustainable and resilient water systems.
6. **Michael Allen, Ami Preis, Mudasser Iqbal and Andrew J. Whittle** The paper presents a case study about the operation of the Water-WiSe platform in Singapore association with Public Utilities Board (PUB). This paper conclude the Water-WiSe system provides key monitoring, decision support and feedback components that will form the building blocks of the Smart Water Grid.
7. **Seung Won Lee, Sarper Sarp, Dong Jin Jeon, Joon Ha Kim** This study introduces a schematic methodology for smart water grids (SWGs) for use in water management platforms, which integrates information and communication technology (ICT) into a single water management scheme. SWG technology is based on the creation of ICT integrated water management solutions to guarantee the security of water quantity and the safety of water quality.
8. **Seongjoon Byeon, Gyewoon Choi, Seungjin Maeng and Philippe Gourbesville** The paper discusses implementation of the Smart Water Grid concept on Yeongjongdo Island in Korea. Author explained the concept of smart grid combined with usage of ICT for water management. Author suggested water distribution system with loop concept without considering the additional water treatment plant.

## 4. MATERIALS AND METHODOLOGY

### A. Area of Study – Osmanabad District

Osmanabad district is situated in the Balaghat hilly region. It is 760m above mean sea level. It lies between Latitude 18.1853°N to Longitude 76.0420°E. Osmanabad situated in Krishna River basin and Godavari Basin. District area is 7569 Km<sup>2</sup>, out of which 129.01 Km<sup>2</sup> is urbanized and remaining 7439.99 Km<sup>2</sup> is Rural. Average rainfall of Osmanabad district is 600 to 800 mm. This rainfall is unpredictable in tune with Indian Monsoon.

**Table -1: Rainfall of Osmanabad District from Year 2012 to 2018**



**B. Ground water – Osmanabad District**

Ground water is the predominantly used for irrigation. As per Central Ground water board, Ground water which is major source of irrigation accounts of 74.50% of net irrigated area. The ground water exploration reveals that the ground water quality has deteriorated due to contamination of fluoride and nitrate. Along with it, Due to continuously low rainfall in this region, its irrigation capability has drastically affected. As per the Maharashtra Agricultural Department, only a fifth of Osmanabad cultivated land is irrigated.

**4.1 Jalyukta Shivar Yojana**

**4.1.1 Structures under JYS**

**1. Earthen Nala Bund (ENB) –**

The earthen bund is constructed where the loose boulders are not available. The soil of the surrounding area is used for the construction of bund. The earthen bund is supported by the vegetation plantation on it. The top of the earthen bund is of 0.60 meter. The height of the bund is upto 1 meter. This type of bunds are constructed in low rainfall and upto 10 ha catchment area of watershed.

**2. Cement Nala Bund**

Since 1972-73, under the Integrated Watershed Development Programme, the work of cement Nala Bunding is being done for raising ground water level and prevention of soil erosion. This is a permanent structure having long life sustainability.

**3. Farm Ponds**

Farm pond is of small size depression mode for collection of surface runoff and the collected water will be used in scarcity time. These farm ponds are helpful for ground water recharge, if a dug well or a bore well is located near such a farm pond.



Source: <https://www.indiawaterportal.org/>

**Fig. 1: Farm Pond**



Source: <https://commons.wikimedia.org/wiki>

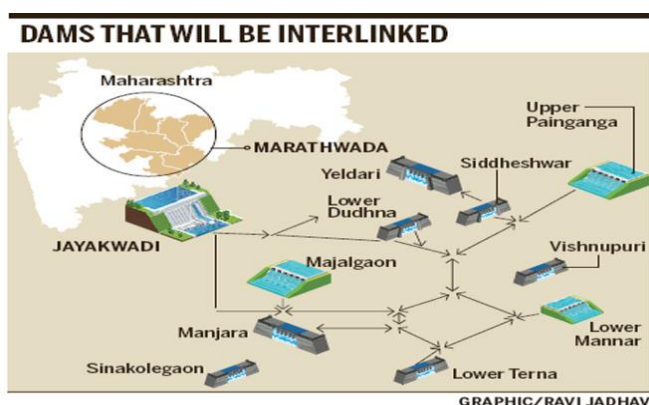
**Fig. 2: Cement Nala Bund**

### 4.1.2 Works under JYS

1. Under the scheme, water streams in a locality are deepened and widened.
2. Efforts made to arrest and store water in small earthen dams and farm ponds in such areas.
3. Maintenance of existing sources like canals and all kinds of wells undertaken.
4. Activities like desilting of water conservation structures and repairs of canals are undertaken.
5. Recharge of dug and tube wells taken up in specific locations.

### 4.2 Marathwada Water Grid

The Marathwada region is dependent on major dams such as Jaikwadi, Majalgaon, Lower Dudhna, Yeldari, Vishnupuri, Manjara, Mannar and Sidhdheshwar and many medium and minor irrigation projects for its water supply. However, due to scanty rainfall during last few consecutive years, these dams had insufficient storage resulting into a water scarcity problem. Hence, to solve this problem government aimed at connecting 11 Major dams through pipes to provide drinking water to households.



Source: <https://www.mid-day.com/articles/israeli-water-heroes-come-to-marathwadass-rescue>

Fig. 3: Dams will be interlinked

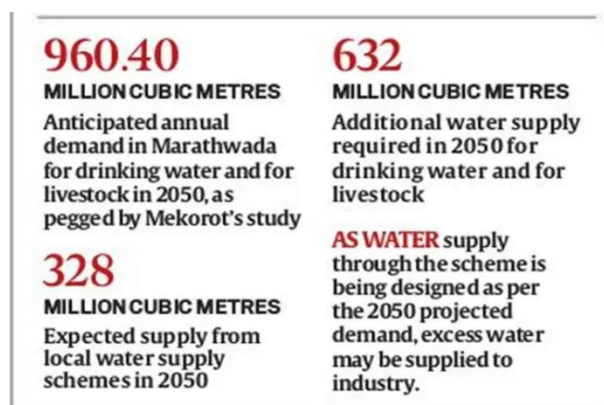


Fig. 4: Expected Water Demand Till 2050 by Mekoret

Osmanabad situated in Krishna River basin & Godavari Basin. 30 villages of Osmanabad taluka, 40 villages from Tuljapur taluka, and total Bhoom & Paranda talukas are in Krishana Basin. That's why the provision of lifting water from Bhima Ujani dam to Shina Kolegaon dam and from Shina Kolegaon dam to Osmanabad district. The total pipe length included in this Osmanabad district is around 727.27Km.

Since at present, source of drinking water of most of the villages are based on only the ground water, so it will be required to supply pure water to the rural population by constructing water treatment plants. The water will be supplied to all the urban & rural local bodies on bulk basis. Along with this, the existing infrastructure created so far for drinking water purpose should also be used along with the main water grid.

## 5. RESULTS AND DISCUSSION

### 5.1 Jalyukta Shivar Yojana

In Osmanabad District, Jalyukta Shivar Yojana (JYS) have started in 2015. The main objective of JYS in Osmanabad district is to store water and percolate into ground and therefore, increase the ground water table. The impact of water conservation works of "Jalyukta Shivar Yojana" at Osmanabad districts was studied with respect to land use pattern, irrigation potential and productivity of different crops of the village. Following are three year data of works implemented under JYS in Osmanabad District:

Table 2: Three Years of Data of Works in Osmanabad Region

#### 1. For Year 2015 -16

No. of Villages Selected	No. of Works Undertaken	Expenditure	Remark
217	21025	86.54 Cr.	All undertaken Works have been completed. Along with JSY, Water Conservation works also been completed.



**2. For Year 2016 – 17**

No. of Villages Selected	No. of Works Undertaken	Expenditure	Remark
191	16795	74.56 Cr.	Out of 1795, 9800 Work have been completed. During this, 14.73 Lakh meter cube Sediment have been removed. Due to this, 9544.57 Ha. Irrigation Land will be benefited. Owing to this work, 6565.30TMC Water is stored.

**3. For Year 2017 – 18**

No. of Villages Selected	No. of Works Undertaken	Expenditure	Remark
178	10579	Approx. 50 Cr.	

In Osmanabad district, There are 3,700 Construction of Farm Pond Permissions has been given. Out of which 2,224 Farm Pond Construction has completed. For Construction of Farm pond, 596.15 Lakh Cost have been distributed.

Due to implementation of JYS in Osmanabad District following benefits have been observed:

1. Increase in agricultural productivity by 30 to 50 %.
2. Increased the level of groundwater up to 2-3 meter.
3. Increase in cropping intensity by 1.25 to 1.5 times.

**5.2 Marathwada Water Grid**

In Osmanabad District, Jalyukta Shivar Yojana (JYS) have started in 2019. The main objective of JYS in Osmanabad district is to prevent scarcity of water in Osmanabad region through integrated pipe network. The work is in under its primary stage. Work of Construction of tunnel near paranda has been started.

Due to implementation of Marathwada Water Grid in Osmanabad District following benefits can be observed:

1. Osmanabad region will benefit in a big way from this project as it will increase water availability or the people.
2. Osmanabad region is facing water scarcity and draught problems since many years, this project will mitigate problems.
3. Interlinking of dams has potential to fulfill the energy requirement of industrial, agricultural as well as rural households.
4. Osmanabad is facing irrigation scarcity due to unavailability of water since many years; this project will fulfill the requirement of irrigation, which will ultimately leads to increase of economy and employment.

**6. CONCLUSIONS**

While studying the “Jalyukta Shivar Yojana” impact of water conservation works of “Jalyukta Shivar Abhiyan” was studied with respect to rainfall, availability of drinking water, Ground water table, land use pattern, irrigation potential and productivity of different crops of the village. On this information following conclusions are determined:

1. Increase in agricultural productivity 30 to 50 %.
2. Increased the level of groundwater up to 2-3 meter.
3. It is observed that approximately 87% of the total area is cultivable through JSA works.
4. Decrease in area under dry land and increase in area under irrigated crops
5. Reduction in tanker feeding by 90 percent since project implementation.

But, some of the issues raised with the scheme. The works under the scheme appear to hold water, but not to recharge it. For some instance, JSY have become a successful scheme in many aspect of mitigating draught and water scarcity problems.

To overcome draught situation in all respects, Government has launched another scheme "Marathwada Water Grid". This project has been started recently. Hence, as per the nature of project and available information following conclusions can be made:

1. The State Government of Maharashtra has started ambitious project 'Marathwada Water Grid' to prevent scarcity of water in Marathwada region through integrated pipe network.
2. General Information regarding project have studied, which shows water scarcity, irrigation problems will get resolved in future years for Osmanabad District.
3. By implementing this project Money can be saved that need to be spent on temporary scarcity mitigation measures.
4. Economy can also be achieved of scale in supply of water for different purposes.

As Osmanabad District area is draught prone area, so along with the implementation of these two schemes, we need to conserve existing water and recharge it. Following recommendations can also be made in Osmanabad district to increase the water availability, ground water table and irrigation capability:

1. The entire district is under Deccan trap Basalt, Hence only the Dug well is the most viable option for the ground water development.
2. As the area is facing acute rainfall since many years, so Micro Irrigation Methods like Drip irrigation, Sprinkler irrigation, Subsurface irrigation etc. techniques need to be adopted.
3. Ground water is mainly affected by fluoride and nitrate concentrations in these areas. Hence, sanitary protection needs to be provided to control future contamination.
4. In Deccan Basaltic areas, structures like check dams, gully plugs, percolation tanks, nalla bunds etc. are most favorable structures for the artificial recharge.
5. The existing ponds, old wells and water bodies need to be rejuvenated which can act as water conservation structures.

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