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Jal Jeevan Mission: Initiative for Rural Water Supply by Government of India

Sub-theme: Goal 06 – Clean Water and Sanitation

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Abstract

Water supply and sanitation are the primary infrastructures for every human settlement of any scale and context either urban or rural. In the pre and post-independence era in India, Rural Water Supply is facing challenges not only in environmental conditions but also at social and institutional levels. This results in several issues pertaining to health and hygiene, socio-economic development, and economic progress of the rural communities. This impacts not only local and regional economies but the national as well.

To overcome these issues, the Government of India (GoI) launched a nationwide program named Jal Jeevan Mission (JJM) to provide tap water supply for every household with reliable water source/s, efficient infrastructure, and economically affordable. The mission creates success stories due to the participatory approach of all stakeholders in implementing water supply schemes in rural areas. This will achieve reliable and equitable distribution of water of standard quality and adequate quantity. This paper discusses the overall framework, components, objectives, and expected outcomes of the Jal Jeevan Mission. The paper shall trace the implementation success of the JJM and identify the major roadblocks to its successful implementation. The study shall be based on quantitative and qualitative research as gathered from various reliable sources of information. The conclusion will be derived from the inferences and findings of the study.

Keywords

Jal Jeevan Mission; Rural; Water Supply;

1. Introduction

Pure water is the world's foremost medicine for human and animal health.

The United Nations (UN) declared seventeen Sustainable Development Goals (SDGs) in 2015 for sustainable growth with multiple targets under each goal. These targets to be achieved by 2030 by all party nations. Sustainable development Goal (SDG) 6 focuses on water supply and sanitation for all by 2030 on an equitable and inclusive strategic approach. Jal Jeevan Mission (JJM) supports Target 6.1 i.e. **To achieve universal and equitable access to safe and affordable drinking water for all by 2030**. The mission aims to provide Functional Household Tap connections (FHTC) to every household in all villages in India by the year 2024. The quality and quantity of water supplied to every household is assured as per the prescribed standard. The mission addresses various complexities such as social,

environmental, as well as technical. Also, it covers the capacity building of institutional set-ups, local communities and providing innovative technologies in an affordable manner while considering environmental factors. bridging the gap between technological solutions, economic limitations and environmental challenges.

The components under this mission comprise various aspects such as water supply infrastructure, source generation and/or augmentation, appropriate technology for water purification and distribution, retrofitting of existing systems if any, gray water management, capacity building of all stakeholders.

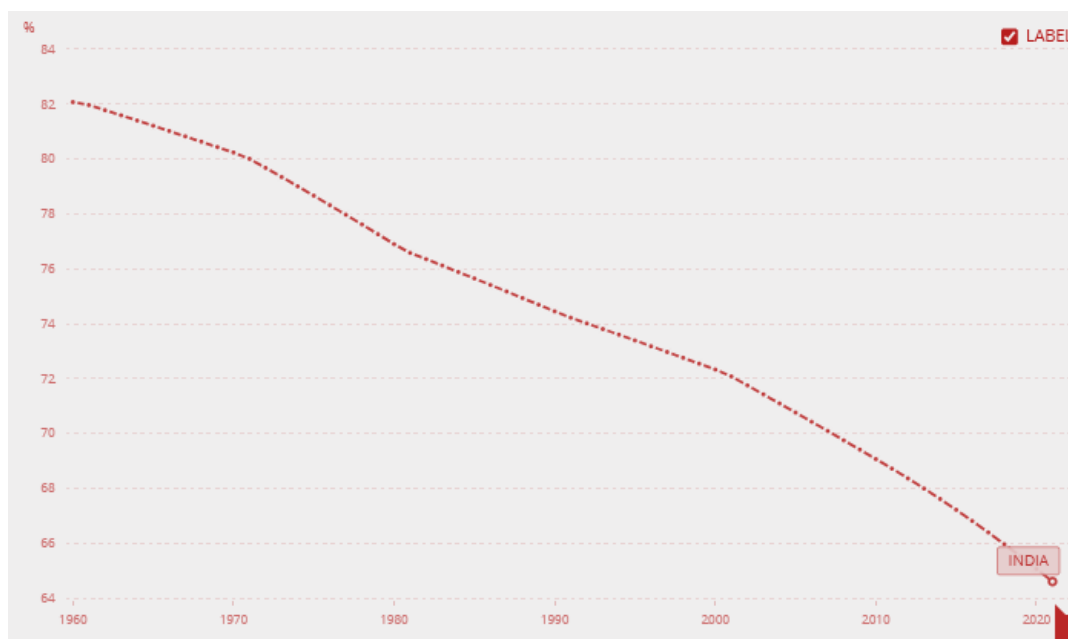
Designing a water supply scheme for any village/ city/ region needs a strategic approach for the successful completion of the project/s. Monitoring, operations and maintenance (O & M) of the scheme is also under the scope of the mission. A baseline study needs to be carried out to evaluate environmental, social, and economic conditions of local and regional level.

2. Water Supply in Rural India

2.1 About Rural India

In India, about 65% of the total population lives in villages. The economy of these villages is predominantly in the primary sector. The population shifts from villages to cities leading to rapid urbanization. The reasons for these shifts are multiple; the push and pull factor. Push from villages due to lack of resources, the low service level of infrastructure, uncertainty in weather conditions that affect the primary sector economy, etc. On the other hand, the pull factor from the cities attracts the workforce, both skilled and unskilled for better employment opportunities, better infrastructure facilities, connectivity, etc..

Figure 1: The graph below shows the decline in the rural population in India in 6 decades



Source:- <https://data.worldbank.org/>

2.2 Need of Water Supply in Rural Areas

In many villages in India piped water supply was not given much attention by governing bodies of all levels; local, state as well as national. Water needs for rural communities are as below:-

01. Domestic purpose: Water for drinking, bathing, washing, cleaning, etc.
02. Animal Husbandry: Water for Cattles/ domesticated animals, poultry, dairy, butchery, fishery, etc.
03. Agriculture: Irrigation for agriculture, horticulture, floriculture, and sericulture activities
04. Industries: Cottage industries, agro-industries, other industries

2.3 Challenges for implementation of Water Supply Schemes in villages

Many challenges are being faced by governing agencies for designing and implementing water supply schemes in rural areas.

Majorly three reasons could be identified for implementing water supply schemes in the rural area.

1. Environmental Factors

2. Lack of Community Awareness
3. Institutional Limitations

2.3.1 Environmental Factors:

Environmental factors are the foremost considerations for designing the water supply scheme.

Temperature and rainfall are the foremost considerations for designing and implementing any water supply scheme.

Climatic factors are a) solar radiation and temperature b) relative humidity, and c) prevailing wind.

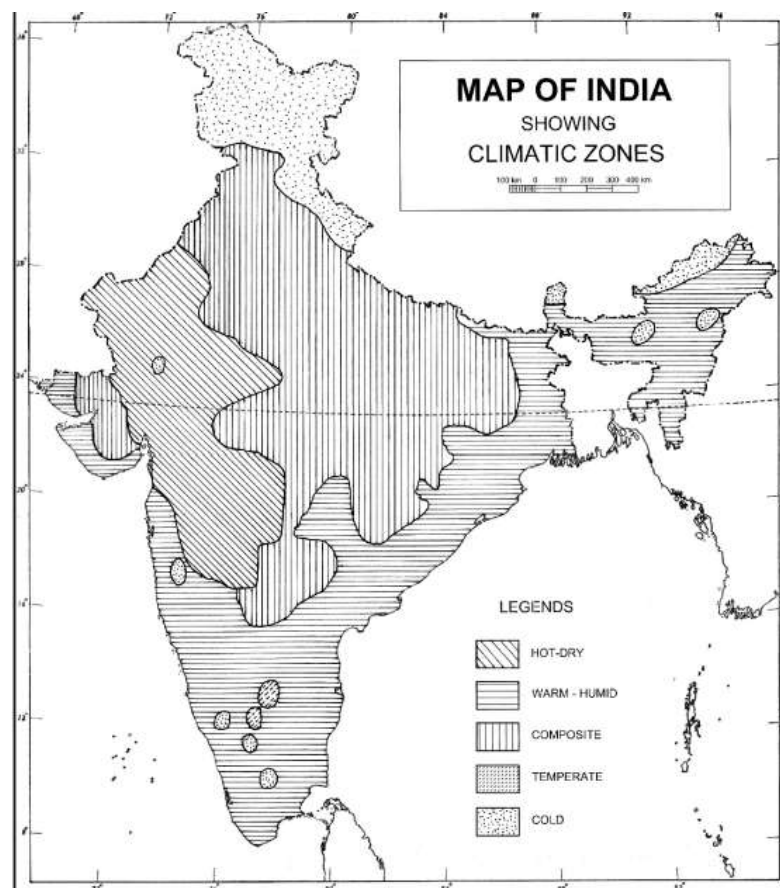
Climatology: India is divided into five climatic Zones.

Table 1: The table below shows major climatic zones, mean monthly maximum temperature and mean monthly relative humidity in each zone in India.

Climatic Zone	Mean Monthly Maximum Temperature (Degrees Celsius)	Mean Monthly Relative Humidity Percentage
1. Hot and Dry	> 30	< 55
2. Warm and Humid	> 30	> 55
3. Temperature	> 25	> 75
4. Cold	< 25	All Values
5. Composite	In this climatic zone any season doesn't last for more than six months	

Reference: National Building Code (NBC) 2005

Figure 2: Map of Climatic Zones in India



Source: National Building Code (NBC) 2005

- a) **Hydrology:** Hydrology refers to the study of Surface water bodies and Groundwater aquifers, Soil moisture, and their qualitative and quantitative assessments. Hydrology directly influences human activities and local ecosystems. The type and amount of precipitation in any form plays a role in hydrology.
- b) **Geology:** The geological characteristics of the area determine the pattern of surface runoff and infiltration of the stormwaters study helps to derive hydrological patterns on the local and regional level as well as Rain Water Harvesting techniques.
- c) **Topography:** Topography or landform des drainage patterns of the local as well as regional level. It is also a major consideration while designing the water supply scheme. This decides the capital cost as well as the Maintenance and Operation cost of the water supply scheme.
- d) **Ecology:** Local and regional ecosystems need to be considered for various reasons. Interdependence between living organisms and non-living matters in the environment drives not only environmental quality but social and economic progress as well. Ecosystem services are directly related to this.
- e) **Demography:** The trend of population either growth or regression decides the level of service delivery. The demographic data of any settlement either rural or urban helps to analyze birth rate, death rate as well as migration trend. Demographic analysis is required for the population forecast which is the base for a water supply scheme for 20 – 30 years.
- f) **Land use:** Land Use refers to the land cover and use of land for human activities. The land cover is natural features on land (forest, water bodies) with least human interventions; land use for human activities is deliberate attempt of land for built environment (human settlements) and land alterations (agricultural, plantation purpose).

2.3.2 Lack of Community Awareness:

For any water supply scheme community awareness of the rights and responsibilities toward safe and assured water supply is a must. This community awareness leads the scheme towards sustainability in terms of utility and financial recovery. Community awareness is required in the following:-

- Use of clean water for human and animal consumption
- Efficient and optimum use of water through Reduce, Reuse, Recycle and Replenish approach
- To maintain and manage available water resources for quality and quantity assurance through an inclusive and participatory approach.
- To pay the water bills timely

Community awareness can be achieved by involving Non- Governmental Organizations (NGOs), Community Based Organizations (CBOs), Social and Political leaders, Community groups, etc. through counseling, and public meetings on the individual, HH, and community levels.

2.3.3 Institutional Limitations:

Public institutions/ governing agencies such as Gram Panchayat (Village level), Zilla Panchayat (District level), Water Supply department (State level) etc. have their own limitations. These limitations are lack of resources in terms of technological innovations, financial resources, inadequate infrastructure and facilities, etc.

- Technological Innovations: In water supply schemes various technologies are innovated at various stages; for source augmentation, water purification, water distribution as well as water recycling.
- Financial Support: Funding is one of the key elements for any development activities.
- Accountability of work and funds
- Inadequate Infrastructure and Facilities
- Measures for capacity building

To bridge the gap between available resources and actual demand/ requirement for water supply schemes, some policies and programs need to be framed meticulously and to be implemented strategically.

2.4 Any water supply scheme comprises the following parameters.

- The maintenance of water resources in terms of quality and quantity of water.
- Water Treatment plant for safe water of prescribed standards.
- Water Distribution network (ESR/ GSR, pumps, pipes, ferrules etc.) to supply the water to consumers/ HHs.
- Water meters for measuring the quantity of water at the consumers' end
- Recovery of water charges from the consumer
- Operation and Maintenance (O & M) of the scheme.

2.5 Current Scenario in villages in India

The current condition of the villages in India is not as developed as compared to the urban areas. Women have to travel in search of water for many kilometers altogether to get water worth drinking. They don't have water connections coming directly to their houses, which leads to washing the vessels in nearby rivers or small lakes, resulting in the contamination of the water body. The hand pump wells also run dry because of the exhaustion of resources.

Figure 3: The images represent water scarcity in Indian Villages



Source: Internet

2.6 Government Initiatives for Water Supply in Rural India

The government has prepared various programs for Rural Water Supply. Few

2.6.1 National Rural Drinking Water Program (April 2009)

The program was launched in 2009 and its aim was to provide adequate and safe drinking water for household and cooking purposes to each and every household in rural areas. It provided 18% of the rural population with potable drinking water and 17% of the rural households were given household connections. The program's components include the following in an attempt to address the emerging challenges in the rural potable water sector in terms of availability, sustainability, and quality:

- Coverage: To provide appropriate and safe drinking water supply to partially served, unserved, and slipping back habitations;
- Sustainable: To enable States to achieve local drinking water security;
- Desert Development Program (DDP): Areas to address extreme conditions with low rainfall and poor water availability.
- Running, repairing, and replacing drinking water supply projects and supporting other activities.

The program could not achieve the target due to various reasons and the inefficiency of institutional

2.6.2 Atal Bhujal Yojana (April 2020)

Atal Bhujal Yojana (ATAL JAL) is being implemented in 80 districts of 7 States, namely, Gujarat, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan, and Uttar Pradesh with an aim to improve community-led sustainable groundwater management, through various ongoing Central and State schemes. It also aims at bringing about behavioral change at the community level through awareness programs and capacity building for fostering sustainable groundwater management. The Atal Bhujal Yojana has been implemented since 01.04.2020. The status of funds allocated and spent under this scheme is given below:

Scope of Atal Bhujal Yojana

The scheme aims to tackle four crucial problems related to sustainable groundwater management: state-specific institutional mechanisms for sustainable groundwater management; increased groundwater recharge; improved efficiency of water use and strengthened community-based institutions to foster groundwater management.

2.6.3 Jal Jeevan Mission (August 2019)

Jal Jeevan Mission is a reformed and upgraded version of the Project National Rural Drinking Water Programme (NRDWP). The Indian Government has restructured the NRDWP into the Jal Jeevan Mission (JJM) with the purpose of offering Functional Home Tap Connections (FHTC) to every rural household called Har Ghar Nal Se Jal (HGNSJ), by 2024.

Features of the Jal Jeevan Mission

This mission will resolve the lack of tap water connections by making the tap connections work. It is based on local management of both how much water is used and how much is available. This mission will build local infrastructure for things like harvesting water, putting water directly into the earth, and managing household wastewater so it can be used

again. By 2024, each person in a rural home will be able to get 55 litres of water every day from a tap connection. The mission helps the community come up with a plan for the water that includes a lot of information, education, and communication.

3. About Jal Jeevan Mission



3.1 About Jal Jeevan Mission (JJM)

Jal Jeevan Mission was declared on 15th August 2019 by the Honorable Prime Minister of India Shri. Narendra Modi and launched by the Ministry of Jalshakti, Government of India (GoI). The mission aims to provide “Functional Household Tap Connection (FHTC) to every household in all villages by the year 2024. “**Har Ghar Jal**” is a tagline that literally means **Water in Every House**. The rural water supply scenario in India is not up to the standard in terms of quality and quantity.

The program focuses on supplying water on a regular basis to every household with service level at the rate of 55 liters per capita per day (lpcd) and of prescribed quality. To achieve the goal of the Jal Jeevan Mission in its true spirit, the latest technology in the development of water resources, water treatment, and supply of water and its implementation is required. For the latest, the Ministry organizes various programs and workshops on Innovative Technologies from time to time. This ministry invited innovators/innovative technologies in the field of water and sanitation to present their innovations in front of the state government officials/implementers.

3.2 Components of Jal Jeevan Mission (JJM)

JJM covers the following components in the overall implementation of the program.

3.2.1 Development of In-village Piped Water supply (PWS) infrastructure for tap water connection to every household;

Functional Household Tap Connection (FHTC) to every household in villages by reliable water supply in terms of quality and quantity is the main aim of JJM. Quantity is 55 lpcd and quality is as prescribed in the Manual of Water Supply and Treatment 1999 by the Centre for Public Health and Environmental Engineering Organization (CPHEEO). The following parameters are some of the parameters prescribed by the CPHEEO Manual of Water Supply and Treatment.

Table 2: The table shows characteristics, types of characteristics, and acceptable limit for drinking water

Sr. No.	Characteristics	Type	Acceptable Limits
1	Turbidity (NTU)	Physical	1
2	Color (Units in Platinum Cobalt Scale)	Physical	5
3	Taste and Odour	Physical	Unobjectionable
4	pH	Chemical	7.0 – 8.5
5	Total Dissolved Solids (mg/l)	Chemical	500
6	Total Hardness (as CaCO ₃) (mg/l)	Chemical	200
7	Chlorides (Cl) (mg/l)	Chemical	200
8	Sulphates (SO ₄) (mg/l)	Chemical	200
9	Fluorides (F) (mg/l)	Chemical	1.0
10	Nitrates (NO ₃) (mg/l)	Chemical	45
11	Calcium (Ca) (mg/l)	Chemical	75
12	Magnesium (Mg) (mg/l)	Chemical	≤30
13	Iron (Fe) (mg/l)	Chemical	0.1
14	Manganese (Mn) (mg/l)	Chemical	0.05
15	Copper (Cu) (mg/l)	Chemical	0.05
16	Aluminum (Al) (mg/l)	Chemical	0.03
17	Alkalinity (mg/l)	Chemical	200
18	Residual Chlorine (mg/l)	Chemical	0.2
19	Zinc (Zn) (mg/l)	Chemical	5.0
20	Phenolic Compounds (mg/l)	Chemical	0.001
21	Arsenic (As) (mg/l)	Chemical	0.01
22	Lead	Chemical	0.05
23	Mercury	Chemical	0.001
24	E Coli	Bacterial	0
25	Fecal Coliform	Bacterial	0
26	Gross Alpha Active (Bq/l)	Radio Active	0.1
27	Gross Beta Active (Bq/l)	Radio Active	1.0

Reference: CPHEEO manual, Water Supply, and Treatment

3.2.2 Development of reliable drinking water sources and/ or augmentation of existing sources to provide long-term sustainability of the water supply system

Identification of existing water source/s and/ or development of new water sources is one of the foremost decisions to be taken in the design of any water supply scheme. The water sources may be surface or groundwater. The existing water sources may need to be augmented with appropriate techniques/ technologies. Also, the development of new water sources may be required to suffice the water requirements of the village. Various environmental and manmade factors need to be considered for the same.

3.2.3 Wherever necessary, bulk water transfer, treatment plants, and distribution network to cater to every rural household;

Multi-village schemes may be feasible in certain areas. In such schemes water resource/s, a common treatment plant, distribution network, and ancillary components are made as per the requirement. Such schemes are financially viable in the villages located on difficult terrains, less population, water stressed areas.

3.2.4 Technological intervention for treatment to make water potable (where water quality is an issue, but quantity is sufficient);

In whichever area water is available but the quality of water is not proper then by setting up an innovative water treatment system in that area water is made potable and then proper water distribution system is laid to provide tap water connection to every household.

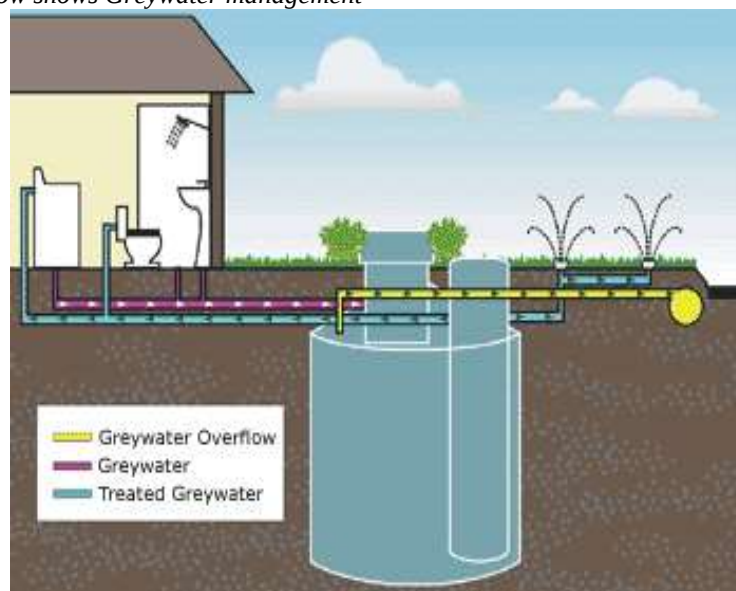
3.2.5 Retrofitting of completed and ongoing piped water supply schemes to provide FHTC at the minimum service level of 55 lpcd.

In many villages there are existing schemes which are not efficiently working or need to be upgraded for its optimum utilization. The minimum service level of 55 lpcd is to be achieved by retrofitting the existing scheme with appropriate measures. This may require repairs, replacements of the components.

3.2.6 Gray water management;

Gray water refers to the waste water generated from kitchen, washing machines, bath rooms containing least pathogens. This type of waste water may not require bacterial and chemical treatment to purify but physico-chemical treatment is sufficient for its reuse. Grey water can be filtered and reused for watering the plants, irrigation etc.

Figure 4: The Image below shows Greywater management



Source: https://cabiblog.typepad.com/hand_picked/2008/08/water-recycling-1.html

3.2.7 Capacity building of various stakeholders, It may contain soap support activities to facilitate the implementation.

JJM has the provision of funding for the capacity building of all its stakeholders.

- **Villagers** need to be aware of cleanliness, and efficient use of water, train them in water resource management, O & M of the scheme, etc. also they need to be empowered to make the scheme technically and financially sustainable.
- **Voluntary Organizations** (NGOs/ CBOs) help villagers upgrade their knowledge, and support for their holistic development.
- **Consultants** are mainly appointed for technical support such as the design of the scheme, innovative technologies to be applied in the scheme, monitoring the progress of the scheme, and commissioning the scheme.
- **Executing Agencies** (Contractors) actually execute the civil, mechanical, and electrical works of the scheme. They should be aware of the latest technologies, and products in the market.
- **Public Institutions** are government organizations responsible for the execution of work, handling financial affairs, monitor the work. They have overall control of the work.

3.2.8 Any other unforeseen challenges/ issues emerging due to natural disasters/ calamities which affect the goal of FHTC to every household by 2024, as per guidelines of the Ministry of Finance on Flexi Funds.

The Ministry of Finance may provide Flexi Funds in achieving the goal if it is affected due to unforeseen challenges/ issues. In such events, the Ministry of Finance provides financial support through the Flexi Funds mechanism.

3.3 Implementation Strategy of JJM

A strategic implementation plan is defined under JJM to achieve the success of the mission. The Central Government has set the guidelines for planning and implementation of the water supply schemes in the villages.

Figure 5: The Image below shows the hierarchical structure of JJM



Source: Author

The Central Government formulated the policy guidelines and funding structure of JJM.

Respective State Governments prepares action Plans and Budgetary Report for Implementation of The scheme.

Zilla Parishad implements the scheme

The respective Gram Panchayats may approach Zilla Parishad for a water supply scheme under JJM for a village/s.

Zilla Parishad prepares the Detailed Project Report (DPR) of every scheme and submits it to the Water Supply Department of the State Government for approval. The DPR comprises Technical and financial proposals. The technical proposal includes Engineering design of water sourcing, water treatment and distribution network. financial proposal includes the cost of the scheme.

Once the proposal is accepted by the Water Supply Department, an Action Plan and budgetary report of the program is prepared. State Government allocates and releases the funds to respective District Panchayats (Zilla Parishad) for implementation of the water supply scheme/s. Zilla Parishad is responsible Implementation of the scheme with participatory approach with the villagers. Zilla Parishad may float tender for the civil work and award the work to the suitable party. Once the scheme is implemented it is handed over to the villagers.

O & M of the scheme, water bill collection is a responsibility of Gram Panchayat with participatory approach

3.4 Funding of JJM

JJM is a joint venture of the Central Government and State Governments. The total cost of the mission is estimated at 3.6 lakh Crore out of which Central Government will share 2.08 Crore. The fund sharing pattern between Centre and States is as follows:

Table 3: The table explains the Central and State Govt. funding share for JJM

States	Central Govt. (%)	State Govt. (%)	Total (%)
Union Territories	100%	0	100%
Nort Eastern and Himalyan States	90%	10%	100%
Rest of the States	50%	50%	100%

Source: <https://pib.gov.in/PressReleasePage.aspx?PRID=1807827>

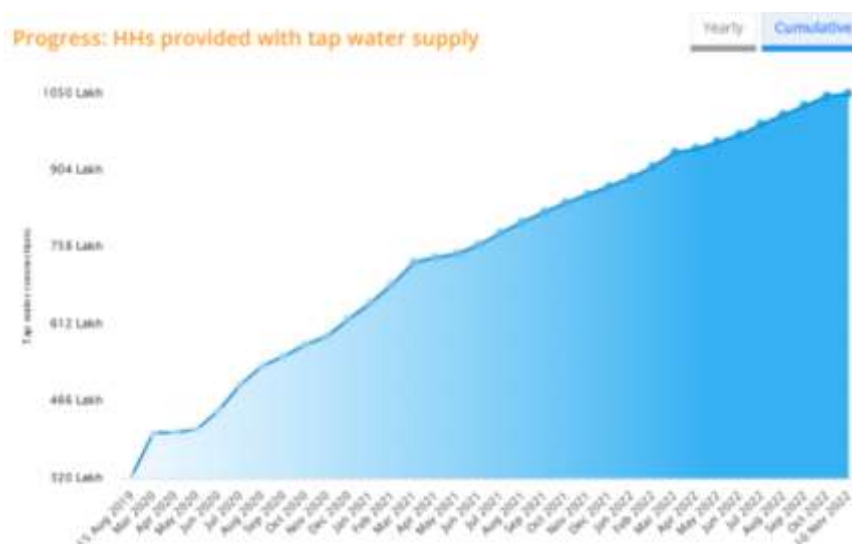
Special weightage is given to the Drought Prone Areas, SC/ ST dominated areas, Water Quality Affected villages, and Sansad Adarsh Gram Yojna (SAGY).

3.5 The Success rate of JJM

The following images show the progress of JJM till 10th November 2022 since its launch in 2019. These numbers show the progress as well as the success rate of Jal Jeevan Mission.



Source: <https://ejalshakti.gov.in/jjmreport/JJMHarGharJal.aspx>



Source: <https://ejalshakti.gov.in/jjmreport/JJMDistrictView.aspx>

4. The Way Forward

The mission will substantially improve the quality of life of the villagers, especially girls and women. The inclusive and participatory approach at every level of the mission will lead socioeconomic development of the village. Sustainable management of Water sources (new and augmentation of existing) can be achieved by various techniques. Retrofitting existing systems may help to deliver a better service level as well as cost-effectiveness. Participation of the local community in the overall planning and implementation process will make them aware and empower them which will be beneficial in the long term. All this will have a positive impact on every level; local, regional, and national level

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