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A Review on Improvement in Water Supply System in Saline Track Area. Case Study of 105 Villages R.R. Water Supply Scheme in Amravati District.

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ABSTRACT: 105 Villages R.R. Water supply scheme is a multi-villages water supply scheme commissioned by MJP in year 2012 under Bharat Nirman Program of government of India. The M & R of this scheme is towards MJP including recovery of water tax. Most of the included villages in this scheme are quality affected & from saline track area. This scheme was designed with 40 LPCD rate of water supply. Since last few year villagers are not satisfied from the quantity of water which they are getting through this scheme. Now "Jal Jeevan Mission" program is launched by government of India. Target of the government is to supply water to villagers at 55 LPCD & "Har Ghar Jal". Under this program MJP is retrofitting this scheme with 55 LPCD rate of water supply. The aim of the proposed research work is to study that increase in rate of water supply by 15 LPCD is sufficient to solve the problem of villager living in saline track area.

I. INTRODUCTION

The existing water supply schemes drawing water from canals or rivers as a source shall have to be converted to draw water from storage reservoirs with closed conduits in a phased manner. Integrated use of other sources including groundwater shall also be explored. It has been observed that Ground water of some areas in Maharashtra state specially some villages of Amravati, Akola and Buldhana districts comes under saline track area. Some villages of Amravati district i.e. in Daryapur, Anjangaon, Bhatkuli, Amravati, Chandur Bazar & Achlapur tahasil come under saline track area. Underground water of this area is not suitable for drinking purpose or irrigation purpose due to high salinity.

105 VILLAGES R.R. WATER SUPPLY SCHEME:

This is a multi-villages water supply scheme commissioned by MJP in year 2012 under *Bharat Nirman Programme* of government of India, in which 105 villages of four talukas i.e. Bhatkuli, Amravati, Achlapur, & Chandur Bazar are covered. The M & R of this scheme is towards MJP including recovery of water tax. Most of the included villages in this scheme are quality affected & from saline track area. Taluka wise No. of villages & population are given in the table -1.

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Table No. 1: -Taluka Wise No. of Villages & Population

Taluka	No. of villages covered	Population 2008	Population 2023
Amravati	21	61687	74709
Achalpur	4	6080	7365
Bhatkuli	57	90653	109792
Chandur Bazar	23	57410	69525
Total	**105**	**215830**	**261391**

EXISTING WATER SUPPLY SCHEME

Existing water supply scheme means the multi villages (RR) water supply scheme which was administrative approved by Govt of Maharashtra on 13.08.2008 vide G.R. No. Bha.Ni.Ka.2008/Pra.Kra.27 /W.S-10, Mantralaya Mumbai and which was technically sanctioned by Chief Engineer, MJP Region, Nagpur on 10.09.2008 vide letter No. TB/2636. This scheme was commissioned in March 2012 & till date water is being supplied to public of villages which were included in this scheme. This scheme is named as "*105 Villages R.R. Water supply scheme*" as No. of included villages in this scheme are one hundred & five. The sanctioned cost of this scheme was Rs.114.74 Crore (Net) and Rs.134.81 Crore gross including 17.5% ETP charges i.e. Rs.20.08 Crore. The main important factor of the scheme is that, this scheme is 100% on gravity basis & no pumping is required for lifting of water from source to consumer tap. This scheme in implemented under *Bharat Nirman Programme* of Govt. of India.

COVERAGE:

This scheme covers the 105 villages of 4 talukas of different categories. Taluka wise & category wise description of included villages are as below.

Taluka	No. of included villages	No. of Quality affected villages	No. of Saline track area villages	No. of Partly covered villages	No. of Newly added villages
Chandur Bz.	23	6	8	7	2
Bhatkuli	57	26	28	3	0
Achalpur	4	1	3	0	0
Amravati	21	19	0	0	2
Total	**105**	**52**	**39**	**10**	**4**

table shows that out of 105 Villages 91 (52 + 39) villages were affected, that means water supplied to them was not of proper quality.

FINANCIAL PATTERN:

This scheme was *under Bharat Nirman Programme* of Govt. of India but it was not fully funded by Central Government. Financial pattern was as below.

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Sr. No.	Name of Scheme	No. of included villages	Sanctioned cost	Share of GOI	Share of GOM	Public Contribution
1	105 Villages R.R.W.S. Scheme	105	134.81	80.30	41.03	13.480
				121.33		13.480

SOURCE:

Gross storage	:-	41.759 MM^3
Live storage	:-	41.759 MM^3
Dead storage	:-	41.759 MM^3
TBL	:-	455.00 M
HFL	:-	453.50 M
FTL	:-	442.00 M
LSL	:-	430.00 M

Vishroli village is located about 15 Km. away from Chandur Bazar town towards north in Satpuda range.
The scheme is proposed from Purna medium project because in this dam 4.76 MM3 water reservation for rural water supply scheme was already sanctioned in *Bruhad Arakheda Programme*. But that sanctioned scheme was not implemented & commissioned under *Bruhad Arakheda Programme* of Govt. of Maharashtra (In 1997-1998). Most of villages which was included in that sanctioned scheme were then included in this 105 villages R.R. Water Supply Scheme. Required water reservation for this scheme was 4.77 MM3 which was nearly same as already sanctioned water reservation & no need of additional water reservation in Purna dam was required.

Next benefit of selecting the Purna dam as source was that, it was possible to design scheme on 100% gravity basis as NGL of Vishroli village (Spot of WTP) is 427.00 M & last villages NGL is about 300.00 M. It means near about 127.00 M drop was available from head to tail which was most beneficial for designing the scheme on 100% gravity basis.

II. LITERATURE REVIEW

P. J. Puri , M. K. N. Yenkie, have studied water quality index (WQI) has been calculated for different surface water resources especially lakes, in Nagpur city, Maharashtra (India), for the session January to December 2008; comprising of three seasons, summer, winter and rainy season. Sampling points were selected on the basis of their importance. Water quality index was calculated using water quality index calculator given by National Sanitation Foundation (NSF) information system.

S. Chandra, A. Singh and P. K. Tomar, The main goal of the present study was to assess drinking water quality of various lakes i.e. Porur lake Chennai, Hussain Sager Hydrabad Vihar lake Mumbai in India. For this, lakes water samples were collected from six different sites and composite sample prepared. In general, in-lake alkalinity generation by reduction processes in the Bickford Reservoir during the summer months is simulated by the model. The observed response to snowpack release in Woods Lake and Panther Lake during the spring months is also reproduced by the model. All three model applications are efficiently run on a personal computer system.

Dhumal, et. al., (2018), has studied continuous water distribution network i.e. 24 x7 water supply to every consumer throughout the year using with Watergems software. Now a days, the concept of continues water supply has generated significant interest in India due to its advantages over intermittent system of water supply. Author suggested that

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Watergems is very effectively design tool for design a continuous water supply system than the manual process and it required minimum time and gives accurate results within short period.

Analyzing the existing water distribution system of Surat using Bentleys Watergems: Dilip Babubhai Paneria et al (2017), In this study, the existing water distribution system is simulated through construct of a model using Bentley Water GEMS. It helped in analyzing the entire network system, visualized the effects of constituent components and parameters as well as the pressure at end node is detected low, that shows the consumer near the reservoir having more advantages of water than the one that resides away from the reservoir.

Agarkar, S. V. (2003), Flouride content in drinking water of villages around Chikhli, Dist. Buldana, Maharastra. Asian. Water quality index provides a single number that express overall water quality at a certain location and time, based of several water quality parameters. The objective of water quality index is to turn complex water quality data into information that is useful for public.

Singh, V. et.al.(2004), The potability of groundwater in terms of Water Quality Index (WQ1) of Jaipur city. The results of water investigation show that the waters of the study area are highly contaminated with total solids. As a result of high concentration of TS, water loses its potability and reduces the solubility of oxygen in water. Water of almost all study points is hardened contaminated because of this, people of Korba area are prone for the immediate health problems such as stomach diseases, gastric troubles etc.

BIS. (2012), Indian Standard: Drinking water- Specification. The Radha Kund is forever linked with the Shyam Kund that is situated right beside it. The lake area has many structures, including temples, shrines and memorials. The kunds are used for bathing, washing, worshipping and watering livestock. The kunds get their water supply through rainfall and ground water. As these kunds have mythological importance, a lot of pilgrims and tourists come and stay throughout the year. Religious rituals of pilgrims and visiting of tourists worsen the condition of kunds and their surroundings. Lack of sewerage and drainage system in the surrounding community put the kunds at risk.

RATE OF WATER SUPPLY:

As per CPHEEO manual & norms of *Bharat Nirman Programme* this scheme was designed at the rate of 40 LPCD. There was no additional provision for Institutional demand, cattle demand, fire demand of any type of floating population.

WATER DEMAND:

Net demand	:-	10.46 MLD for Ultimate stage
Gross demand with 15% Losses	:-	13.07 MLD for Ultimate stage

Losses considered were as below

Distribution system	15.00%
MBR to ESR	1.50%
WTP to MBR	1.50%
For WTP	3.00%
Total Losses	18.00%

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COMPONENTS OF THE SCHEME:

Components of the Scheme & details are as below.

1	Raw water gravity main from Dam to WTP		700 mm dia DI K-7 pipes 605 M. 600 mm dia DI K-7 pipes 510 M. **Total 1115 M.**
2	Water treatment plant at Vishroli village		16 MLD (Conventional WTP)
3	Principal Gravity main from WTP to 14 MBR's		500 mm to 100 mm dia DI K-7/ K-9 pipes 125 Km.
4	RCC MBR staging height 15 to 29 M.		14 Nos.
5	Pure water Gravity main from MBR to ESR's		315 mm to 110 mm dia HDPE pipe PE100, 6 Kg/cm^2 225 Km.
6	Proposed RCC ESR 12 Mt. height 30 KL.to 245 KL.		43 Nos.
7	Distribution system		160 mmto75mm dia PVC4 Kg/cm^2 pipes 290 Km.
8	Miscellanies work		
	A	Compound wall to WTP	
	B	Fencing to all MBR & ESR	
	C	M & R for 2 Year	

OBJECTIVES OF STUDY :

1. To forecast the Population of 105 villages for the year 2055 with different method and population for projected area consider with respect to previous data and as per declared by the Maharashtra Jeevan Pradhikarn Amravati.
2. To calculate the demand of water requirement for all villages area as per standards.
3. To collect the data of detailed survey (i.e., contour survey, treatment plant, overhead tanks, distribution system etc.) from MJP Department Amravati
4. To design of Hydraulic model of water distribution network with appurtenances for 105 villages R.R. Water Supply Scheme. (Retrofitting)
5. To study the components of retrofitting scheme as compared with components existing scheme

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