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## **Village water supply in Maharashtra State**



### **OBJECTIVE AND THE NEED -**

The objective of this project is to provide safe, potable and adequate drinking water to 17112 identified villages of Maharashtra. Out of 35778 villages, as per 1971 census, about 17112 villages have been identified as problem villages as on April 1980.

The State Government decided to provide water supply to these villages during Vith Five Year Plan period of 1980-85. In India the responsibility of providing water supply facilities to the population in the urban and rural areas vests with local bodies with the financial assistance from the State Government while the overall control is exercised by the Govt. of India through the Ministry of works and Housing.

At the level of State Government, this programme in rural areas is planned and implemented by Rural Development Department whereas in urban areas it is planned and implemented by the Urban Development Department through various agencies of the State Govt., including the local Self Govt. of the State. The provision of potable water supply facilities in urban and rural population is an important aspect which has been considered in the successive five years plans of India. So far about 1% to 2% of plan allocations were earmarked for this programme. However, in the 6th five year plan, this allocation has been increased to about 4% of the total planned provisions. It has been estimated that at the beginning of 6th five year plan i.e., April 1980 about 30% of the population in rural areas had access to a reasonably safe drinking water supply. This is considered to be much on lower side compared to the corresponding levels of services in the other developing nations. The 6th Five year plan, therefore aims at stepping up the programme in this sector. Simultaneously, a decade programme (1981-90) has also been drawn in order to provide 100% water supply services in the urban and rural areas of India.

The review taken at the beginning of the sixth five year plan revealed that out of 35778 revenue villages in Maharashtra covering a rural population of 41 millions, 17112 villages covering about a population of 14 millions were still required to be provided with safe drinking water supply.

### **GENERAL STATISTICS OF THE STATE**

#### Location:

The state of Maharashtra forms a major part of peninsular India with the coast in its Western Side. It lies between 16.4 and 22.1 degrees North latitude and 72.6 and 80.0 degrees East longitude.

#### Area :

The Maharashtra State is the 3rd largest State in India with an area of 0.308 million sq.kms.

#### Population:

The population of the State is 62 millions as per 1981 census with about 65% population from rural area.

#### Geology:

About 80% of the area of State is covered by Deccan Trap. The other hard rock constituting schiest, gneisses, quartzites, granites are exposed in Eastern, Southern and Western parts of the State covering the areas of Nagpur, Bhandara, Chandrapur, Yawatmal, Nanded, Ratnagiri and Kolhapur districts. The rocks belonging to cuddapah series occur on large scale in Yawatmal, Chandrapur & Kolhapur district.

They mostly include lime stones, shales and quartzitic sandstone. The coal bearing Gondwana formations occur in Nagpur, Chandrapur, and Yawatmal districts only. Alluvial belt of Recent to sub-recent origin occur in Amaravati, Akola, Buldhana, Jalgaon and Dhule districts along Tapi and Purna rivers.

#### Climate:

The climate of the Maharashtra State is Tropical. The maximum temperature is 38°C and the minimum temperature is 29°C .

#### Rainfall :

There is considerable variation in the rainfall among the different parts of the state. Heavy rains pour over the Ghats and the Coastal districts of Thane, Raigad and Ratnagiri. At certain places in the Ghats, it is more than 3000 mm. The major part of the state, however, lies in the rain shadow of the Ghats, with the rainfall average around 700 mm. and in some area even less than 500 mm. The rainfall of the state ranges from 500 mm to 3000 mm.

The annual revenue and capital budget of the state is around Indian Rupees 35774

millions (100 Indian Rupees=5.952 sterling pounds as on 26th August 1985).

An abstract of the General Statistics is given below :

i) Area of the state	3,08,000 sq.km.
ii) Population as per 1981 census	62 millions
iii) Urban Population	21 millions
iv) Rural Population	41 millions
v) Average Density	164 person/sq.km.
vi) Rate of growth of population	2.4% per annum
vii) No. of corporations	9 Nos.
viii) No. of Municipal councils.	217 Nos.
ix) No. of Districts	30 Nos.
x) No. of towns	289 Nos.
xi) No. of Revenue villages (inhabited)	35,778 Nos.
xii) No. of Zilla Parishads	29 Nos.
xiii) No. of Panchayat samitis	296 Nos.
xiv) No. of Gram Panchayats	24,016 Nos.

#### ORGANISATIONS DEALING WITH RURAL WATER SUPPLY PROGRAMME

##### Maharashtra Water Supply and Sewerage Board:

The Board is a Panel of 11 members to include the Chairman, the member Secretary, 4 secretaries of the Departments as ex-officio members, 3 elected Presidents of the local bodies and 2 nominated technical members. On the executive side, it has 3 Chief Engineers, 13 Superintending Engineers, 50 executive Engineers and about 200 Deputy Engineers for implementation of the programme of rural and urban water supply in the state. Administratively the Board is under the Urban Development Department of the State. The annual turnover of the board is about Rs.1500/- millions.

##### Ground Water Surveys and Development Agency:

The Agency consists of Directorate at the headquarter level under the control of Director who is the Geologist, under him there are 4 regional officers headed by Regional Deputy Deputy Directors who are Geologists. At each of the 29 district, there is a district Geologist and the supporting staff to undertake the works of hydrogeological survey, drilling of bore wells, procurement installation of hand pump & power pumps.

##### Zilla Parishads :

The Zilla Parishad is three tier administration with the Zilla Parishad at District level Panchayat Samiti at Block level and Panchayat at village level. The members of these organisations are partly elected and partly nominated by Govt. The Supervisory control of these organisations is with the Rural Development Department at the State Level. The Board mainly looks after the piped water supply programme costing above 3 lakhs while the G.S.D.A. looks after programme of bore wells with hand pumps and power pumps. The Zilla

Parishad and the village Panchayats undertake the programme of the dug well and the piped water supply schemes of smaller magnitude below Rs.3 lakhs.

#### SELECTION OF PROBLEM VILLAGES ?

##### The criteria for deciding problem villages.

- i) The villages having source at a dist. more than 0.6 km. as per Government of Maharashtra norms.
- ii) The villages having source at a dist. more than 1.6 Km. as per Govt. of India's norms.
- iii) Villages endemic to cholera, where drinking water sources are infested with guinea worm and where sources have excessive chemicals.

#### PROCEDURE FOR IMPLEMENTATION OF PROGRAMME" The rural Water Supply Programme :

It is tackled in three ways viz. Dug well, Bore well with hand pump and Power Pump and piped water supply. The Inter Disciplinary Committee consisting of the Collector and the Chief Executive Officer of the Zilla Parishad assisted by the Executive Engineer, Environmental engineering organisation and the District Geologist, established at each district decides the nature of the scheme for each of the problem villages and prepare the list of least cost solution for these villages. After this is done the District Planning & Development Council finalises the programme of the District within the allocations made available to it.

#### MEASURES ADOPTED FOR SOLVING THE PROBLEM OF DRINKING WATER.

##### Simple Measures:

Water supplied through Bore wells/Tube wells or piped water supply schemes.

##### Preparation of Project :

For the preparation of working plan for the sixth plan period, it was assumed that the villages having population of 2000 and above as per 1971 census would need piped water supply schemes and below that bore wells (at the rate of 1 bore well for 250 souls) may suffice. However, there can not be water tight compartment and the feasibility of the programme is also required to be examined. To study Water resources for bore well: General water Survey and Development Agency carried out the work of ground water assessment for the entire state of Maharashtra under the International development assessment programme for Maharashtra Credit Project. For this purpose, the entire area of the State is divided into 1467 water sheds. Each water shed had the area of about 200 to 300 sq.kms. The parameter for ground for water recharging were considered on the basis of field observations of aquifer conducting

of aquifer conducting geological hydraulic surveys and observations of water table fluctuation. Accordingly bores are drilled & hand pumps are installed on successful bores & power pumps are installed on bores yielding more than 12000 litres/hour.

To study water resources for piped water supply the water sources such as percolation tanks, Irrigation tanks, rivers in the area are observed. The source should be perennial and having adequate yeield. The water is tested chemically and bacteriologically to assess its potability in both the above cases. The drinking water standards prescribed by world Health Organisation are adopted while preparing the project report.

#### BACTERIOLOGICAL STANDARDS :

Water in the distribution system shall satisfy all the three criteria indicated below ;

- 1) E.coli count in 100 ml. of any sample should be zero.
- 2) Coli form organisms not more than 10 per 100 ml. shall be present in any sample.
- 3) Coliform organisms should not be detectable in 100 ml. of any two consecutive samples or more than 50% of the samples collected for the year.

TABLE No.5  
DRINKING WATER STANDARDS FOR PHYSICAL AND CHEMICAL QUALITY OF WATER

Sr. constituents No.	Recommended by W.H.O.	
	Max.accept- able concen- tration	Max.allow- able limit.
<b>A) PHYSICAL</b>		
1.Colour(Hazen units)	5	50
2.Turbidity(units)	5	25
3.Odour and Taste	Unobjectionable	
<b>B) CHEMICAL</b>		
4. pH	7 to 8.5	Less than 6.5 or greater than 9.2
5.Total Solids(mg/L)	500	1500
6.Total Hardness as CaCO <sub>3</sub> (Mg./L.)	100	500
7.Calcium(Mg/L)	75	200
8.Magaesium(Mg/L.)	30	150
9.Iron (Mg/L)	0.1	1.0
10.Manganese(Mg/L.)	0.05	0.5
11.Copper(Mg/L)	0.05	1.5
12.Zinc(Mg/L)	5.0	15.0
13.Chloride(Mg/L)	200	600
14.Sulphate(Mg/L)	200	400
15.Phenolic compound (Mg/L.)	0.001	0.002
16.Flūoride(Mg/L)	-	1.5
17.Nitrate(Mg/L)	-	45

Sr. Constituents	Recommended by W.H.O.	
	Max.accept- able concen- tration	Max.allow- able limit.

#### TOXIC

18. Arsenic (mg/L)	-	0.5
19. Cadmium (Mg/L)	-	0.01
20. Cyanide (Mg/L)	-	0.05
21.Lead(Mg/L)	-	0.10
22.Marcuri(Mg/L)	-	0.001
23.Selenium(mg/L)	-	0.01

\* International Standards for Drinking water - WHO 1971.

The rate of water supply at 40 litres per capita per day is adopted for framing rural schemes and 25% losses on gross supply are assumed.

#### Cost estimation of the project

- a) For bore well programme with hand pump Rs.95/- per capita (1 bore for 250 souls)
- b) For bore well programme with power pump Rs.135/- per capita (1bore for 1000 souls)
- c) for piped water supply programme Rs.300/- per capita in plain area.

Rs.400/-per  
capita in hilly  
area.

The above per capita cost have been assumed at March 1984 rates and an escalation, at 10% per year compound is to be added for preparing programme for completion of the scheme.

#### FINANCIAL PATTERN :

100% of financial assistance is given by the Govt. of Maharashtra for executing the dug well, bore well piped water supply programmes in Tribal areas and Dug well and bore well programmes in chronic scarcity and flood affected areas and 95% of financial assistance is made avavailable for Dug well and bore well programmes and piped Water supply scheme in other areas.

The difference is to be made good by way popular contribution.

The Government of India also assists for piped water supply schemes and bore well programme under the centrally sponsored Accelerated Rural Water Supply programme which is in operation in the state since 1977-78.

PLAN OF OPERATION FOR SIXTH PLAN  
PERIOD 1980-85.

#### Programmewise Indentification of villages:

At the commencement of the sixth five year plan 1980-85 out of 35778 inhabited villages in the state, it was estimated that about 17112 problem village still required to be provided with safe and adequate drinking water supply as on 1st April 1980 of these,

12935 villages satisfied the Government of India norm whereas 4177 villages satisfied the state Government norm of difficult villages.

Govt. had decided to solve the problem of drinking water supply of these villages at an estimated cost of Rs.3350/- million (including Rs.200 million towards popular contribution) during sixth plan period by adopting the following measures.

Programme of villages to be covered on 1.4.1980.

Measures	G.O.I. Norms	GOM Norms	Total
1) Piped water supply	3070	1289	4359
2) Bore well programme	9865	-	9865
3) Dug well programme	-	2888	2888
<b>Total</b>	<b>12935</b>	<b>4177</b>	<b>17112</b>

Problem villages covered during Vith Five year plan

I) Government of India's Norm(12935 villages)

Year	P.W.S.	BORE WELL		Dug	Total
		E.C.	P.C.		
1980-81	209	908	1557	-	2674
1981-82	398	1232	1962	340	2932
1982-83	495	788	1007	23	2313
1983-84	411	669	897	-	1977
1984-85	1016	385	471	248	2120
<b>TOTAL</b>	<b>2529</b>	<b>3982</b>	<b>4894</b>	<b>611</b>	<b>12016</b>

II) Govt. of Maharashtra's Norm(4177 villages)

1980-81	102	377	694	10	1183
1981-82	89	305	322	31	747
1982-83	77	189	254	4	524
1983-84	95	427	238	28	788
1984-85	311	136	149	29	625
<b>TOTAL</b>	<b>674</b>	<b>1434</b>	<b>1657</b>	<b>102</b>	<b>3867</b>

Note-P.W.S.: Piped water supply, F.C. Fully covered P.C.-Partially covered.

Out of 17112 problem villages as per above tables, 15883 villages have been covered under piped water supply Bore well and Dug well programme.

d) MAINTENANCE OF THE RURAL DRINKING WATER SUPPLY SCHEMES.

It is the legal responsibility of the local body concerned as per three tier system/.

Maintenance of Dug well :

The construction of the dug well is undertaken by the Zilla Parishad from the Government grant and they are maintained by Zila Parishad

Maintenance of bore wells

On completion by Ground Water Surveys and Development Agency, the borewells are

handed over to the concerned local bodies for operation and maintenance.

In order to ensure the proper maintenance and repairs to the hand pumps fitted on bore wells, Government introduced three tier maintenance system from March 1978. The salient features of the system are :

- At village level a responsible person in the village will function as caretaker of the hand pumps. He will report promptly to the Block officer, if the hand pump goes out of order.
- At Taluka level, one mechanic is to be appointed for maintenance of every 100 pumps in the taluka. The mechanic is required to inspect the hand pump periodically and to effect minor repairs as soon as the report about pump going out of order is received from any village or in turn will send report to the district officer i.e. Deputy Engineer, G.S.D.A./Executive Engineer Z.P.
- At district level a pump repairer's team with a mobile van equipped with necessary tools and comprising one mechanical Supervisor, a mechanic and a helper would be set up for doing major repairs for every 5000 hand pumps in the district
- The appointment of the required technical staff are to be made by the Zilla Parishads and the expenditure is to be met from their own resources. The Zilla Parishads are also required to incur expenditure initially from their own resources on maintenance and repairs of the hand pumps. The village Panchayat has to pay Rs.400/- pump/annum to Zilla Parishads for bearing expenses on mechanic.

i) Cost/pump to be paid to Rs. 400/- Zilla Parishad.

Population served/Pump 250 souls

ii) Honourarium to caretaker Rs. 240/-  
Hence maintenance cost per capita per annum  $\frac{640}{250} = 2.6$

assuming 6 souls per house i.e.  $2.6 \times 6 = 15.6$   
Say Rs.16/- per house.

e) Maintenance of power pumps :

Govt. has also introduced a system of maintaining power pumps. As in the case of three tier system of maintenance & repairs to hand pumps a responsible person in the village will function as a care taker of the power pump fitted on bore well. Village Panchayat will take general care of power pump. As and when pump goes out of order, the Sarpanch or Gram Sevak should promptly send report to the Zilla Parishad Office about it. So that the electrician will immediately visit that village for repairing. For maintenance of power pumps one electrician is appointed at Zilla Parishad office for every 50 power pumps installed in the district and is provided with necessary tools, spare parts, accessories etc.

The village panchayat will receive depreciation charges from the tax collected for water. The village panchayat will appoint operator cum caretaker for proper and smooth functioning of the pumps. It is assumed that normally when a power pump is installed on the bore well, population equivalent of 4 stand posts (1000 souls) would at least be served assuming available discharge of bore well.

In order to meet the expenses for running power pump installation the village panchayat will have to collect tax from beneficiaries as given below.

i) Charges for Zilla Parishad Service.	Rs.500/-
ii) Power charges (Assuming 3 B.H.P.)	Rs.500/-
iii) Service rendered by pump operator cum caretaker	Rs.6000/-
iv) Depreciation of power pumps	Rs.400/-
Total	<u>Rs.7400/-</u>

Population served 1000 souls.

Therefore maintenance cost per capita Rs.7.40

Assuming 6 souls/house tax per capita Rs.45/-

f) Maintenance of piped water supply schemes:

It is the policy of the Government of Maharashtra that after implementation, water supply schemes in individual villages are handed over to Panchayats and combined and regional schemes are handed over to the Zila Parishads for operation and maintenance.

g) Tarriff:

In order to make these schemes self-supporting the local bodies are expected to levy adequate water rate and taxes as proposed below and according to provision of bylaws.

A Table indicating the taxes to be recovered from beneficiaries:

Sr. No.	Type of supply	No. of villages	Popula- tion	No. of houses	Rate of tax	Total tax	Re marks.
1	2	3	4	5	6	7	8
1.	Hand pumps with bore well				Rs.16/- per house per year		
2.	Power pumps with bore well				Rs.45/- per house per year		
3.	Piped water supply with surface source				Rs.60/- per house per year		
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<b>Total</b>		<hr/>					

CONCLUSION

If the problem of drinking water in rural area is tackled by appropriate measures systematically with sufficient funds and staff the goal of supplying potable water to all villages by 1990. 1990.

REFERENCES

1. Annual Plan 1980-81 Govt. of Maharashtra Planning Department, July 1980.
2. Water Analysis report, Ground Water Surveys and Development Agency, Maharashtra, 1982.