

**CHAPTER II**  
**PERFORMANCE AUDIT**

## CHAPTER II

This chapter contains Performance Audit on 'Rural Water Supply Schemes'.

### LOCAL ADMINISTRATION AND PUBLIC WORKS DEPARTMENTS

#### 2.1 Performance Audit on 'Rural Water Supply Schemes'

##### Executive Summary

The Union Territory Government of Puducherry implemented Rural Water Supply (RWS) schemes to provide safe and clean drinking water to rural population. Performance Audit of RWS schemes was conducted to assess whether utilization of ground water, creation of required infrastructure for supply, operation and maintenance of RWS schemes was economical, effective and that the water supplied met with quality requirements. Performance Audit revealed following significant audit findings:

Implementation of RWS schemes suffered due to unregulated extraction of ground water and non-adoption of supply norms, which would adversely affect sustainability of limited ground water source.

Designing of schemes deviating from the norms prescribed by Central Public Health and Environmental Engineering Organisation resulted in avoidable extra expenditure.

Water charges levied were not sufficient to meet the Operation and Maintenance expenses as envisaged in the National Water Policy and there was also huge arrear in collection of water charges.

The quality of water supplied was not as per the prescribed standards.

##### 2.1.1 Introduction

The Union Territory of Puducherry comprises four geographically isolated regions viz., Puducherry, Karaikal, Mahe and Yanam. Mahe and Yanam are urban areas and only Puducherry and Karaikal have rural population

of 4.86 lakh<sup>1</sup> spread over 10 Commune Panchayats<sup>2</sup> (CP). The Union Territory Government of Puducherry (UT Government) is implementing Rural Water Supply (RWS) schemes as part of its policy to provide potable, protected and permanent drinking water supply facilities to rural population. The Eleventh Five Year Plan document (2007-12) of UT Government proposed to give thrust for qualitative improvement of water, augmentation/rehabilitation of supply systems and sustained availability of water on long-term basis by improving performance and cost effectiveness. Drinking water supply in Puducherry region relies totally on ground water resources while Karaikal region depends both on surface and ground water. The Public Works Department (PWD) is responsible for creation of infrastructure facilities such as sinking of borewells, erection of pump sets, construction of overhead tanks/underground sumps, laying of distribution lines and commissioning of the Water Supply System. During 2008-13 an amount of ₹ 110.69 crore has been spent towards implementation of various RWS schemes.

### 2.1.2 Organisational set up

The Secretaries to the Government of Puducherry, Public Works and Local Administration (LAD) are administrative heads for planning RWS schemes. The Chief Engineer, PWD, is responsible for formulation and execution of RWS schemes. The Director, LAD is responsible for Operation and Maintenance of RWS Systems handed over by the PWD with the assistance of Commissioners of CPs.

### 2.1.3 Audit objectives

The audit objectives were to assess whether

- Proper policies/plans in line with National Water Policy were formulated, based on assessment of requirement and availability of water to provide safe and adequate quantity of drinking water to rural population as per norms
- Adequate attention was accorded to ensure sustainability of water sources and environmental issues were suitably addressed
- Financial Management was effective and funds were provided in a timely fashion and schemes were executed and implemented within the stipulated time and cost
- Repairs and maintenance of the existing water supply assets were effective for ensuring uninterrupted water supply

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<sup>1</sup> Includes population of Ariyankuppam, Manavelly, T.R pattinam and Villianur census towns as they fall under their respective CPs.

<sup>2</sup> Ariyankuppam, Bahour, Manadipet, Nettapakkam and Villianur in Puducherry region; Kottucherry, Nedungadu, Neravy, T.R. Pattinam and Thirunallar in Karaikal region.

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- Mechanism for monitoring of quality of water supply and surveillance was adequate and effective.

#### **2.1.4 Audit Criteria**

The performance audit was benchmarked against criteria derived from the following sources:

- National Water Policy 2002
- Central Public Health and Environmental Engineering Organisation manual on water supply (CPHEEO)
- Guidelines, instructions issued by GOI and the UT Government from time to time
- Plan Documents of UT Government
- Vision 2020 document of UT Government.

#### **2.1.5 Audit Scope and Methodology**

Performance Audit was conducted during April-August 2013 and records relating to the period 2008-13 were test-checked at Government Secretariat, Directorate of Local Administration, the Chief Engineer office, PWD, Public Health Division - PWD (Puducherry and Karaikal) and five CPs<sup>3</sup> (out of 10 CPs) selected on simple random sampling method. Prior to commencement of audit, entry conferences were held (April 2013) with the Secretaries of PWD and LAD wherein the audit objectives, audit criteria and methodology of audit were discussed. Audit findings were discussed with the Secretaries of PWD and LAD in exit conferences held during December 2013 and their replies have been incorporated.

### **Audit Findings**

#### **2.1.6 Planning**

##### **2.1.6.1 *State Water Policy is yet to be notified***

The National Water Policy, 2002 formulated (April 2002) by Government of India, *inter alia*, prescribes that

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<sup>3</sup> Bahour, Villianur, Kottucherry, Neravy and T.R.Pattinam

- exploitation of ground water resources should be regulated and over exploitation of ground water should be avoided especially near the coast to prevent ingress of seawater
- efficiency of utilization in all diverse uses of water should be optimized and an awareness of water as a scarce resource should be fostered
- besides creating additional resources, adequate emphasis needs to be given to physical sustainability of existing resources by levying water charges for various uses in such a way that they cover at least the operation and maintenance charges.

Towards achieving these objectives, National Water Policy stipulated that State Water Policy should be formulated within two years for effective management of water resources. However, the Department of Science and Technology, Puducherry, formulated a State Draft Water Policy (SDWP) only in November 2012 containing a section on Drinking water regarding periodical monitoring of quality of water, water pricing for ensuring physical and financial sustainability of the systems, etc., and called for comments from all stake holders. As such SDWP is yet to be notified (December 2013) even after lapse of nine years.

The UT Government replied (January 2014) that State Water Policy is being finalized. However, in absence of such policy, the available ground water resources were over-exploited, slackness in periodical monitoring of water quality was noticed and demand charges raised were not sufficient to meet the operation and maintenance cost as discussed in succeeding paragraphs.

#### **2.1.6.2 Failure in regulation of ground water extraction**

#### **Over extraction of ground water resource**

With a view to regulate extraction of ground water, the UT Government declared (February 2005) Puducherry and Karaikal regions as notified area and any user who proposes to use ground water has to get permit from State Ground Water Authority (SGWA) for sinking borewell and fix Bulk meters at strategic points to measure the water supplied as mandated by CPHEEO. Though ground water level continued to deplete at the rate of one to 1.5 metre per year as per the report (2008-09) of State Ground Water unit, SGWA permitted PWD and CPs to drill 259 borewells under RWS during 2008-13. An analysis of number of borewells, population and quantity of water extracted in sample CPs as on March 2013 against the requirement of maximum of 70 Litres Per Capita per Day (lpcd), indicated excess extraction as given in **Table 1** below:

**Table 1 – Over extraction of water in sample CPs**

Commune Panchayats	Number of borewells	Population (census 2011)	Requirement at 80.5 <sup>4</sup> lpcd (MLD)	Actual extraction (MLD)	Excess drawal (MLD) (5-4)	Actual lpcd supplied (5/3)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Bahour	50	68757	5.53	22.01	16.48	320
Villianur	111	126798	10.21	42.44	32.23	335
Kottucherry	19	23186	1.87	1.06	- 0.81	46
Neravy	6	12841	1.03	1.96	0.93	152
T.R.Pattinam	6	21335	1.72	4.03	2.31	189
<b>Total</b>	<b>192</b>	<b>252917</b>	<b>20.36</b>	<b>71.50</b>	<b>51.14</b>	

(Source: Details furnished by CPs and information in col. 4 to 7 worked out by audit based on norms; MLD – Million litres per day)

Against requirement of 20.36 MLD of water, 71.50 MLD was extracted resulting in excess extraction of 51.14 MLD except in one CP (Kottucherry). The UT Government replied (January 2014) that CPs would be directed to effect metered water supply in rural areas to avoid wastages and to follow CPHEEO norm for piped water supply. It further stated that action would be initiated to provide bulk water meter at borewell points in future.

### **2.1.6.3 Formulation of water supply schemes without conducting habitation survey**

Planning and Research department obtains plan proposals every year in terms of habitations/villages/population from PWD to be covered in the ensuing year and fund requirement for implementation of RWS schemes. It was noticed that PWD proposed water supply schemes without conducting any habitation survey to identify the status of existing drinking water supply and quantity/quality of water. The UT Government claimed in the Draft Annual Plan 2007-08 that all the villages were fully covered under RWS. However, in absence of habitation survey, the department lost the opportunity to identify the habitations which had slipped back from fully covered to partially/not covered and to plan suitably.

The Government replied (January 2014) that water supply schemes were formulated based on the census report as per CPHEEO norms and the habitation survey was conducted to assess the exact population. The Puducherry region had to cater to the needs of migrating population from Tamilnadu and hence additional borewells were required beyond the

<sup>4</sup> Includes 15 per cent on 70 lpcd towards unaccounted transmission loss as per CPHEEO norms

replacement borewells in lieu of defunct borewells. However requirement of water should have been provided based on the habitation survey.

## **2.1.7 Scheme Implementation**

### **2.1.7.1 Construction of OHTs with capacity more than required**

**Over Head Tanks were constructed with capacity more than the required norms leading to excess expenditure**

As per CPHEEO guidelines, designing of schemes should be based on projected population for design period and respective daily water supply requirement. CPHEEO further prescribes that design period of Over Head Tank (OHT) should be for 15 years. However, it was noticed that in respect of four schemes, PWD had projected the population for 30 years instead of 15 years as prescribed by CPHEEO. As a result the respective four OHTs under these schemes were constructed with excess capacities than required at a cost of ₹ 3.54 crore (**Appendix 2.1**).

Had PWD correctly adopted population projection for 15 years, the cost of construction of OHTs could have been limited to ₹ 2.18 crore (approximate). Further construction of OHTs with higher capacity than required would only lead to over exploitation of ground water and excess supply as discussed earlier as water is being supplied to the present population from these OHTs, which were filled twice a day. Thus, wrong adoption of population figures by PWD resulted in construction of OHTs with excess capacity than actually required leading to an excess expenditure of ₹ 1.36 crore.

Though the Government justified (January 2014) the design period taken as 30 years, they accepted audit observation and stated that future design would be made for 15 years.

### **2.1.7.2 Objective of preventing seawater ingress not achieved**

Vision 2020 document suggested (March 2003) that due to sea water intrusion upto five to seven kilometers in coastal areas, any extraction of ground water has to be done only beyond this distance. Considering sea water intrusion in coastal villages of Bahour CP having a projected population of 13718, the work of “Augmentation of water supply system to coastal villages in Bahour Commune (South Zone)” was taken up by PWD during 2003-04 with an aim of providing water from two new borewells to be sunk at villages located at a distance of more than six kilometers from shoreline.

Though the work of construction of OHT was completed (March 2006) at a cost of ₹ 77.74 lakh, the work of sinking two new borewells was not taken up due to paucity of fund. Works of laying distribution lines and other sub works were completed at a cost of ₹ 249.65 lakh and the scheme was handed over to the CP in August 2012 after connecting OHT with existing four old borewells located within three kilometers from shoreline in the villages of Bahour CP itself. Thus the objective of preventing extraction of

ground water in coastal area to avoid ingress of seawater was defeated despite an investment of ₹ 327.39 lakh.

When pointed out, the UT Government replied (January 2014), that only existing four borewells were connected without going for new borewells. Drawing more water from existing borewells in the coastal area would only result in ingress of seawater.

### **2.1.7.3 Excess expenditure due to non-consideration of DI pipes**

Ductile Iron (DI) pipes are more flexible and elastic and less brittle than Cast Iron (CI) pipes. DI pipes are strong and stand up better to hydraulic pressure tests as required by service regulations and are approximately 30 *per cent* lighter than conventional CI pipes with same life period as that of CI pipes. Moreover, cost of DI pipes was less than that of CI pipes. In view of above, UT Government directed (October 2006) PWD to adopt DI pipes to the extent possible for water supply lines. Despite this, in respect of 5 OHTs<sup>5</sup> constructed during 2008-13, PWD utilized CI pipes for inlet, outlet, overflow and washout lines, thus leading to an excess expenditure of ₹ 12.32 lakh.

UT Government accepted audit observation and stated (January 2014) that in future DI pipes would be utilized in RWS schemes.

### **2.1.7.4 Creation of unnecessary infrastructure**

(i) UT Government accorded (March 2011) expenditure sanction for ₹ 18.20 crore towards implementing the scheme of “providing water supply scheme for Manavelly, Thattanchavadi, G.N. Palayampet, Odiyampet and adjoining areas in Villianur Commune Panchayat” and water was proposed to be extracted from seven borewells. When construction of OHT was in progress, PWD proposed (August 2011) to provide pumping main from another existing borewell located in Athuvaikalpet, in addition to seven borewells to improve source to OHT by utilizing savings available in the estimate of above work. After obtaining necessary approvals, this work was completed at a cost of ₹ 23.71 lakh. Scrutiny of project report revealed that yield from the seven borewells originally proposed was sufficient to supply water to OHT for the designed population under the scheme. As such executing this work in addition to the seven borewells was unnecessary resulting in avoidable expenditure of ₹ 23.71 lakh.

UT Government replied (January 2014) that as the command area of OHT is designed including Athuvaikalpet, it is essential to utilize the existing borewell in Athuvaikalpet. But, the entire command area could be adequately covered with yield from seven borewells originally proposed

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<sup>5</sup> Chinna Arachikuppam, Sendhanatham, Moorthikuppam, Pathakudy and Melakasakudi



and work of connecting this borewell was actually taken up probably to utilize the savings which was not in order. Further, this borewell had become defunct as it was damaged by local miscreants even before commencement of scheme, and thus expenditure on this account remained unfruitful.

(ii) To augment water supply source in coastal areas, UT Government sanctioned (December 2003) the work of 'Augmentation of Water supply to the Coastal village of Bahour CP (North zone)'. Work was designed to supply 1.40 MLD of water to the projected population of 20065 in the year 2033 spread over eight villages. Scheme was commissioned in November 2010. Meanwhile, PWD proposed (August 2010) sinking of another bore well at Kirumampakkam village along with pumping main for a cost of ₹ 25.89 lakh and completed the work in January 2012. Scrutiny of records revealed that the OHT was connected to five other borewells having yield of 2.43 MLD which was more than sufficient to meet the demand as proposed in the project report. As such the additional infrastructure created at a cost of ₹ 25.89 lakh was unnecessary.

During exit conference, the Department replied (December 2013) that considering the excess yield all the sources would be operated with reduced pumping hours.

### **2.1.8 Operation and Maintenance of water supply system**

Infrastructure facilities created by PWD in rural areas for RWS are handed over to respective CPs except those created in Headquarters area of five CPs in Puducherry region, which are operated and maintained by the Public Health (PH) Division, PWD on behalf of CPs.

#### **2.1.8.1 Non-revision of domestic water charges**

**Domestic Water charges levied were not sufficient to meet the O & M expenses**

National Water Policy stipulates that water charges shall be fixed so that revenue derived from water supply should meet at least the Operation and Maintenance (O & M) charges. Besides, the Vision 2020 document indicated that cost of supply of water being ₹ five per cu.m, under-pricing of water at the rate ₹ 0.50 per cu.m for domestic consumers is a major cause for over extraction and suggested that the initial hike of water charges should not be less than ₹ two per cu.m and ultimately the domestic consumer should pay the full cost of domestic water supply. A review of the water charges levied by CPs and PWD revealed the following:

(i) In respect of systems maintained by CPs, water charge was levied at the rate of ₹ 10 per month per water connection (₹ 20 in Manadipet CP) since 1984. **Table 2** gives the details of demand charges raised and the corresponding O & M expenses of CPs in Puducherry and Karaikal region.

**Table 2 – Shortfall in meeting O & M expenditure**

Region	Demand Charges* (₹ in crore)	O & M expenditure (₹ in crore)	Percentage of demand charges against O & M expenditure
Puducherry	1.75	13.35	13
Karaikal	0.63	4.67	13

\* calculated at ₹ 10 per connection per month

No tariff revision for domestic consumers was considered for nearly three decades and as a result demand charges levied during 2008-13 could meet only 13 *per cent* of the O & M charges as shown in **Table 2** above.

(ii) In respect of systems maintained by PWD, water charges were levied for domestic consumers at a rate of ₹ 0.50 per 1000 litres or ₹ 45 per quarter on a flat rate basis in the event of defective meters. Mention was made in Audit Report 2006-07 (paragraph 3.1.8.2) that existing water tariff does not meet even the O & M charges as stipulated by CPHEEO.

Though in reply to above para UT Government stated (November 2007) that Audit views would be considered as and when the water tariff is revised, tariff revision was done for commercial supply alone during January 2010 and tariff for domestic supply was not revised to meet the O & M expenses. Further, as of September 2013, there was an arrear of ₹ 10.66 crore on account of water charges yet to be collected from the consumers, indicating slackness in collection.

The UT Government replied (January 2014) that proposal for revision of tariff is under consideration and action is being taken to collect arrears.

### **2.1.8.2 Non-functioning of water meters**

Demand charges for water supplied were collected on quarterly basis. In the sample CPs of Bahour and Villianur, 4585 out of 5706 meters, available under the control of PWD, were in a state of disrepair (80 *per cent*) as of December 2012. Scrutiny of water charges collected revealed the following:

- Though non-functioning water meters accounted for 80 *per cent*, no action was taken to rectify them.
- 4,585 consumers had not paid flat rate charges for a period ranging from three months to 39 months amounting to ₹ 26.81 lakh.
- 110 commercial consumers were levied water tariff at domestic rate.

- Though rules provided for disconnection of water service in case of defaulters, no concrete action was taken by PWD except publishing notification in newspapers.

The UT Government replied (January 2014) that action is being taken to levy commercial tariff for commercial consumers.

#### **2.1.8.3 Non-collection of water charges**

Maintenance of 1,110 water connections pertaining to five villages<sup>6</sup> which were earlier maintained by Villianur CP were handed over to PWD during the year 2006. Audit scrutiny revealed that since their transfer neither PWD nor CP levied water charges on these water connections due to communication gap regarding number of connections handed over by CP, resulting in loss of revenue amounting to ₹ 9.99 lakh<sup>7</sup> to PWD during the last five years.

The UT Government replied (January 2014) that action would be taken to collect the water consumption charges from the consumers.

#### **2.1.8.4 Unauthorised connections not regularized**

Bahour and Villianur CPs had a total of 16427 water connections as of October 2013. However a survey conducted by Health Department through Primary Health Centres revealed that 21929 houses had water connections in Bahour and Villianur CPs. This indicates poor implementation/monitoring leading to loss of revenue at the rate of ₹ 6.60 lakh<sup>8</sup> per annum.

When pointed out, UT Government replied (January 2014) action would be taken to identify unauthorized connections.

#### **2.1.9 Quality of water supplied**

Bureau of Indian Standards (BIS) and CPHEEO prescribed biological, chemical and physical norms for ensuring quality of drinking water supplied. If quality of water is not satisfactory necessary remedial measures have to be taken to ensure safe and clean drinking water. In UT, water samples are collected and forwarded to Laboratories for quality check. Following deficiencies were noticed in quality of water supplied.

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<sup>6</sup> Agaram, Koodapakkam, Olavaikal, Poraiyur and Senthatham

<sup>7</sup> ₹ 45 x 1110 x 20 quarters (five years :2008-13)

<sup>8</sup> 5,502 x ₹ 10 (minimum levied by CPs) x 12 months

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**Quality of water supplied could not be ensured due to delay in communicating the test results of water samples**

### **2.1.9.1 Deficiencies in quality of water supplied**

Indian Standard 10500:1991 stipulated that if bacteriological test results showed presence of coliform organism, repeat sampling had to be done immediately to confirm the result for taking remedial measures. Water samples were collected by staff of Primary Health Centres of the respective CPs and submitted in the labs for water quality monitoring. Though test results of samples delivered were available the next day, results were collected only when staff made their next visit to the Lab for submission of next batch of samples.

Out of 2,412 samples, 704 (29 per cent) were found to be not fit for drinking/not satisfactory in respect of bacteriological testing. However, the test results were collected only after a delay of nearly 7 to 28 days. As a result, repeat sampling in respect of quality affected water could not be done immediately defeating the very objective of sample testing. Apart from this, water from 22 borewells was found to be unfit due to high iron content while water from 16 other borewells was found to be with high sodium content indicating possible sea water intrusion.

During exit conference the Secretary to Government replied (December 2013) that necessary instructions would be issued to get the results on the day of test itself and that all sources would be tested and orders would be issued to close the quality affected borewells.

### **2.1.9.2 Non-availability of equipment for testing the presence of heavy metals**

Indian Standard 10500:1991 stipulates that drinking water should be tested for 43 physical and chemical parameters to ascertain its quality other than bacteriological, pesticide residues, virological, biological and radioactive tests. However, water samples were tested only for 21-22 parameters. The presence of heavy metals/toxic elements such as Copper, Aluminium, Chromium, Cadmium, Mercury etc., could not be analysed, as necessary equipment was not available. Hence, PH Division proposed (March 2010) to purchase an Atomic Absorption Spectrophotometer (AAS) to analyse them. However no action was taken in this regard and water is supplied without testing for presence of heavy metals in violation of stipulated norms.

When pointed out, the UT Government replied (January 2014) that action would be initiated at the earliest to procure Atomic Absorption Spectrophotometer.

### **2.1.9.3 Non supply of Field Test Kits**

Under 'National Rural drinking water quality monitoring and surveillance Programme' 100 per cent of Rural Drinking water sources must be initially



screened for water quality by nine easily detectable parameters such as pH, salinity, hardness, alkalinity, nitrate, fluoride and bacteriological testing etc., GOI also instructed all State Governments (August 2010) to procure Field Test Kits (FTKs) and distribute them to all Gram Panchayats. Though UT had 98 village panchayats, only 33 FTKs were available and the same were retained by PH laboratory on the ground that village panchayats lacked proper institutional setup. As such, none of the village panchayats were provided with FTKs and the objective of initial screening, which could be easily done as envisaged through supply of FTKs, stands defeated.

The UT Government replied (January 2014) that FTKs could not be issued to Gram Panchayats as there was no proper institutional setup viz., CCDU which is required for the continuous water quality monitoring and surveillance activities and hence the procured FTKs were utilized in laboratory for testing purpose and also for demonstration during training session. However, reply goes against the instructions of GOI.

#### **2.1.10 Conclusion**

Implementation of RWS schemes suffered due to unregulated extraction of ground water and non-adoption of supply norms, which would adversely affect sustainability of limited ground water source. Designing of schemes deviating from the norms prescribed by CPHEEO resulted in avoidable extra expenditure. Water charges levied were not sufficient to meet the Operation and Maintenance expenses as envisaged in the National Water Policy and there was also huge arrear in collection of water charges. The quality of water supplied was not as per the prescribed standards.

#### **2.1.11 Recommendations**

- Steps may be taken to regulate over exploitation of ground water to ensure sustainability of the scarce resource.
- Necessary norms may be complied with for implementing the RWS schemes effectively and economically to avoid creation of idle assets.
- Due care may be taken to ensure safe and clean drinking water as per prescribed standards.