
Chapter – IV

Performance Audit

Municipal Administration and Urban Development Department

4 Water Supply in Urban Local Bodies

4.1 Introduction

Water is a natural resource essential for human existence. Lack of safe drinking water affects the health and wellbeing of the public. The provision of safe and adequate drinking water to the increasing urban population continues to be one of the major challenges. The objective of water supply system is to ensure supply of safe and adequate quantity of water at reasonable cost to the user. In order to encourage personal and household hygiene, proper planning is necessary in the formulation and implementation of water supply projects. Emphasis has to be laid on both the aspects of the system namely, planning and management (technical and financial). The responsibility for supply of potable water to urban population rests with the Urban Local bodies (ULBs).

4.2 Funding pattern

Urban Local Bodies (ULBs) meet the expenditure towards provision of water supply through grants received from GoI and State Government, loans from World Bank besides their own resources. Releases and expenditure during the period 2011-16 in the State towards water supply schemes were as under:

Table 4.1

(₹ in crore)

Year	UIDSSMT ¹			State Government (Plan Grant)		World Bank	
	Releases by SLNA ²		Expenditure	Releases	Expenditure	Releases	Expenditure
	GoI Share	State/ULB Share					
2011-12	97.52	53.02	159.30	43.19	52.42	0	0
2012-13	59.36	37.58	102.02	66.08	66.16	91.38	0
2013-14	11.59	13.28	27.00	78.88	71.91	21.12	55.49
2014-15	7.49	15.95	16.06	11.59	9.37	137.78	168.55
2015-16	1.73	21.15	*	19.02	13.10	210.50	192.85
Total	177.69	140.98	304.38	218.76	212.96	460.78	416.89

Source: Information furnished by Engineer-in-Chief, Public Health and APUFIDC

* Data not furnished

4.3 Organisational set-up

The ULBs function under the administrative control of the Principal Secretary, Municipal Administration and Urban Development (MA&UD). The Commissioner and Director of Municipal Administration is Head of the Department assisted by

¹ Urban Infrastructure Development Scheme for Small & Medium Towns, a component of Jawaharlal Nehru National Urban Renewal Mission (JNNURM)

² State Level Nodal Agency

Regional Deputy Directors of Municipal Administration at regional level. The Chairperson is being nominated among the elected members of ULBs. Municipal Commissioners are the executive heads. The ULBs transact their business as per the provisions of the Acts concerned. The Public Health and Municipal Engineering Division is responsible for undertaking all capital works whereas, the maintenance works are looked after by the Engineering wing of ULB.

4.4 Audit framework

4.4.1 Audit objectives

Performance Audit of Water Supply in 13 Urban Local Bodies was carried out with the objective of assessing whether:

- i. the planning process for provision of infrastructure and maintenance of water supply in ULBs was adequate and effective;
- ii. sound financial management principles were adhered to in respect of project execution, realisation of revenue and operation & maintenance; and
- iii. the optimum quantity and quality of water was supplied as envisaged.

4.4.2 Audit criteria

Audit findings were benchmarked against criteria sourced from the following:

- i. Bye-laws and council resolutions adopted in the respective ULBs for supply of water;
- ii. Manuals on (i) Water Supply and Treatment, (ii) Operations and Maintenance issued by Central Public Health and Environmental Engineering Organisation (CPHEEO) under Ministry of Urban Development, Government of India (GoI);
- iii. National Water Policy, 2012 issued by Ministry of Water Resources, GoI;
- iv. Andhra Pradesh Financial Code, Andhra Pradesh Public Works 'D' code, Andhra Pradesh Municipalities Act, 1965 and Hyderabad Municipal Corporation (HMC) Act, 1955;
- v. Government Orders issued by State Government from time to time on water supply; and
- vi. Service Level Benchmarks (SLB) prescribed in Thirteenth Finance Commission guidelines.

4.4.3 Audit sample

Audit sample included 13³ out of 108⁴ Urban Local bodies in Andhra Pradesh. The sample was selected through stratified sampling method based on lowest lpcd (litres per capita per day) in each stratum⁵.

4.4.4 Audit scope and methodology

The Performance Audit on Water Supply in 13 ULBs covering the period 2011-12 to 2015-16 was conducted between March and June 2016. Audit methodology involved scrutiny of relevant records/documents in the Office of Engineer-in-Chief (ENC), Public Health & Municipal Engineering Division, Commissioner and Director of Municipal Administration, Andhra Pradesh Urban Finance Infrastructure Development Corporation (APUFIDC) and selected ULBs. Apart from scrutiny of records, physical verification of site, wherever required, was conducted with departmental officials. Beneficiary survey covering 50 consumers in each ULB was also done to assess the response of the consumers.

An Entry conference was held (March 2016) with the officials of the department wherein audit objectives, scope, criteria and methodology were explained. Exit Conference was held with the Government representatives in November 2016 to discuss audit findings. Replies (December 2016) of the Government have been suitably incorporated at appropriate places in the report.

4.4.5 Acknowledgements

Audit wishes to acknowledge the co-operation and assistance extended by the State Government and its officials during the conduct of this audit.

Audit findings

The findings emanating from the Performance Audit are discussed in the subsequent paragraphs.

4.5 Planning

Water is a prime natural resource, a basic human need and a precious asset for the State. Planning and development of water resources need to be governed by the existing conditions and needs in the State.

4.5.1 State Water Policy

State Government had formulated Water Policy in 2008 based on National Water Policy of 2002. State Government had yet to frame policy/guidelines based on

³ Dhone (Kurnool district), Guntakal (Anantapuramu), Gudur (SPSR Nellore), Markapur (Prakasam), Nandigama (Krishna), Narsipatnam (Visakhapatnam), Pedana (Krishna), Piduguralla (Guntur), Pithapuram (East Godavari), Salur (Vizianagaram), Tirupati (Chittoor), Vijayawada (Krishna) and Vizianagaram (Vizianagaram)

⁴ Two Nagar Panchayats formed on or after 2012 were not considered for sampling.

⁵ Stratum I (<= 70 lpcd), Stratum II (>70 and <=135) and Stratum III (>135)

National Water Policy 2012 as per local requirement. Provisions of Central Public Health and Environmental Engineering Organisation (CPHEEO) manuals were being followed by the State Government in respect of Water Supply and Treatment and Operations/Maintenance.

Government replied (December 2016) that State Water Policy was under consideration.

4.5.2 Water Regulatory Authority

As per National Water Policy 2012, an independent Water Regulatory Authority was to be formed to ensure equitable access to water for all and its fair pricing for drinking and other uses. The Water Regulatory Authority was not yet established (June 2016), which meant that the objective of securing uniformity in operations of water supply and pricing for supply of water in ULBs was not achieved.

Government replied (December 2016) that a State Level Committee was being formed to discuss the formation of independent Water Regulatory Authority.

4.6 Water source

Sustainability of surface water or ground water is necessary for effective supply of qualitative and quantitative water to the public.

4.6.1 Identification of water source

As per National Water Policy, urban and rural domestic water supply should preferably be sourced from surface water⁶ in conjunction with ground water⁷ and rain water. The exploitation of ground water resources should be so regulated that the recharging possibilities are not exceeded.

In the State, 30 out of 110 ULBs were completely dependent upon sub-surface water, whereas 71 ULBs were wholly dependent upon surface sources. Nine ULBs were dependent on both the sources.

Of the 13 test-checked ULBs, six⁸ ULBs were observed to be completely dependent upon sub-surface sources, five ULBs (Dhone, Guntakal, Gudur, Pedana and Tirupati) were dependent on surface sources and the remaining two ULBs (Markapur and Vijayawada) on both the sources. In six ULBs⁹ additional sources of water supply were planned from nearby reservoirs/river as the existing sources were drying up.

Government accepted the audit observation and stated (December 2016) that the new water supply improvement schemes were planned/taken up with surface water as source.

⁶ Rivers, lakes and reservoirs

⁷ dug up wells, bore wells, tube wells and infiltration galleries

⁸ Nandigama, Narsipatnam, Piduguralla, Pithapuram, Salur and Vizianagaram

⁹ Nandigama, Narsipatnam, Piduguralla, Pithapuram, Salur and Vizianagaram

4.6.2 Sustainability of source

The continuous supply of drinking water depends upon existing capacity of the available source. Sustainability of water source is essential to ensure adequate water supply throughout the year. In four¹⁰ test-checked ULBs, water sources were not sustainable and water supply was inadequate ranging from 30 per cent to 70 per cent of the projected yield. Uncontrolled sand quarrying had affected the depth of infiltration wells resulting in reduction of yield. Hence, proposals were submitted for drawal of water from new sources *i.e.*, rivers and reservoirs; these proposals were pending for approval. Thus, sustainability of water source was not ensured by ULBs for adequate water supply.

Government stated (December 2016) that measures to prevent uncontrolled sand quarrying and un-interrupted and adequate supply of water would be planned.

4.6.3 Replenishment of ground water table

Ground water needs to be conserved¹¹ by reuse of recycled water. Artificial recharge¹² of ground water can be achieved by direct recharge¹³ and surface flow harvesting¹⁴.

With a view to conserving ground water, State Government made harvesting of rain water in all group housing and commercial establishments mandatory¹⁵ in 1998. Later in June 2000¹⁶, it was made mandatory for buildings constructed on plots measuring 300 sq. mts and above. No step was taken by the ULBs to educate the public on the importance of ground water recharging/rain water harvesting. Construction of Rain Water Harvesting Structures (RWHS) was found to be grossly inadequate in the test-checked ULBs. Out of 10,834¹⁷ building permissions accorded during 2011-16, an amount of ₹1.55 crore was collected as a token amount for construction of RWHS by the ULBs. However, only 149¹⁸ RWHS were constructed at a total cost of ₹1.92 lakh and the balance amount of ₹1.53 crore remained unspent. Penal action¹⁹ taken, if any, against non-adherence to Government rules against building owners (for not constructing RWHS) was not forthcoming from the records.

¹⁰ Narsipatnam, Pithapuram, Salur and Vizianagaram

¹¹ Paragraph 3.8.2 of manual on O&M

¹² Paragraph 3.10 of manual on O&M

¹³ Recharge of wells, injected wells and Rain Water Harvesting Structures

¹⁴ Tanks and ponds

¹⁵ G.O.Ms No. 422 MA dated 31 July 1998

¹⁶ G.O.Ms No. 350 dated 9 June 2000

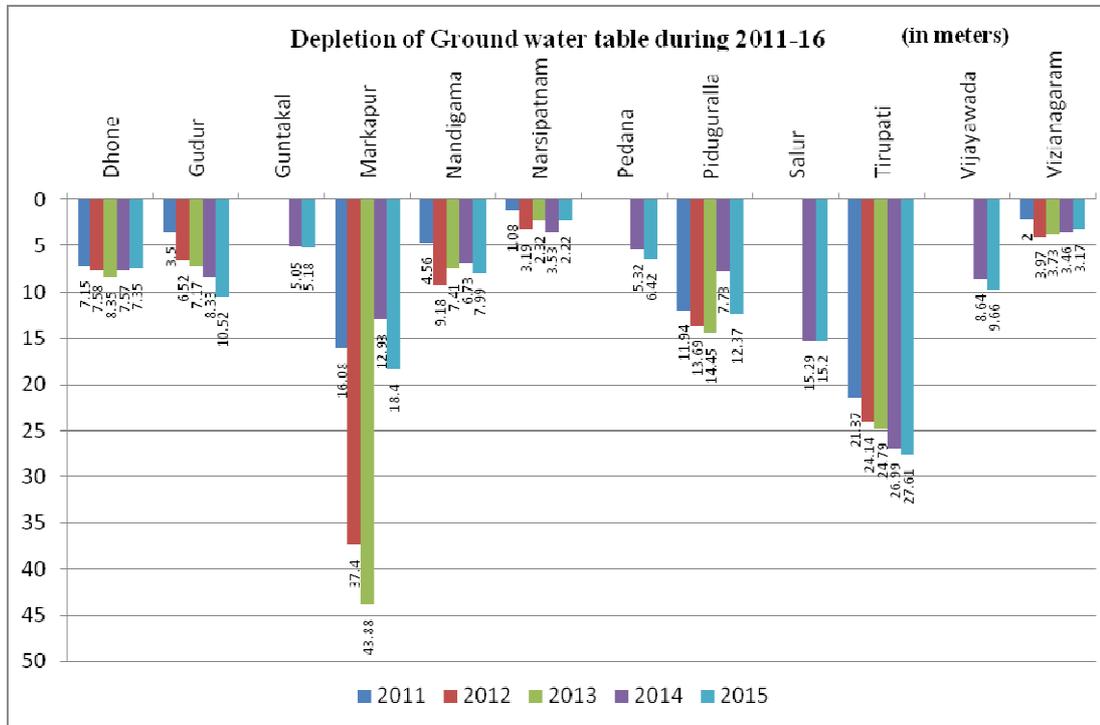
¹⁷ Dhone-680, Gudur-695, Guntakal-1,830, Markapur-771, Nandigam-715, Narsipatnam-706, Pedana-400, Piduguralla – 726, Pithapuram – Nil, Salur-689, Tirupati -1,396 and Vizianagaram-2,226

¹⁸ Dhone-2, Gudur-2, Narsipatnam -20, Salur – 15 and Tirupati – 110

¹⁹ As per section 340 of Andhra Pradesh Municipalities Act, 1965, a fine which may extend to five hundred rupees subject to a minimum of fifty rupees and to a further fine which may extend to one hundred rupees subject to a minimum of ten rupees for each day during which offence is proved to have continued after the first day.

Thus, the failure to comply with the mandatory provisions of water harvesting resulted in the objectives of conservation/recharge of ground water not being achieved. The pre-monsoon (month of May) ground water levels (in meters) of test-checked ULBs during the period 2011-16 are given in the chart below.

Chart 4.1



Source: Data furnished by Ground Water Department, Andhra Pradesh

Data was not furnished in respect of Pithapuram ULB

In eight²⁰ ULBs, there was depletion in ground water during May 2015 as compared to May 2011. This was acute in Markapur, Piduguralla and Tirupati ULBs. No action was initiated by ULBs for rejuvenation or recharging of sub-surface water. However, during 2015-16 there was improvement in ground water level due to good rainfall and water conservation works taken up by the Government.

Government accepted the audit observation (December 2016) and assured that necessary steps would be taken for construction of Rain Water Harvesting Structures (RWHS).

²⁰ Gudur, Guntakal, Markapur, Nandigama, Pedana, Piduguralla, Tirupati and Vijayawada

4.7 Infrastructure for Water supply

4.7.1 Water Treatment Plant

To ensure safe and potable drinking water, it is to be treated under various processes depending on the quality of raw water. Water Treatment Plants (WTP) should, therefore, be planned to supply water that is hygienically safe, aesthetically attractive and palatable. Audit observed that -

- Water Treatment Plants were available and functioning in all the six test-checked ULBs where surface water was the source.
- Water Treatment Plants were not available in other six²¹ test-checked ULBs where sub-surface water was the source.
- In Gudur ULB, clariflocculator²² of the WTP installed (December 2012) was not functional as of May 2016.

Thus, the ULBs had not ensured the supply of safe and potable drinking water to the consumers.

Government accepted the audit observation (December 2016) and stated that the Water Treatment Plants were not provided where sub-surface water was the source.

4.7.2 Service Reservoirs

The Service Reservoirs²³ provide a suitable reserve of treated water with minimum interruptions of supply due to failure of mains, pumps etc. The minimum storage capacity of service reservoirs depends on factors such as design population, per capita water supply, peak factor and continuous water supply. In two²⁴ test-checked ULBs there was shortfall in the storage capacity of service reservoirs ranging from 9.40 MLD to 18.80 MLD with reference to water drawn from the source. Due to shortage of storage capacity, the frequency of pumping requirement would be high, requiring higher electricity consumption.

Government stated (December 2016) that proposals were under way for construction of additional Service Reservoirs under AMRUT²⁵ scheme.

4.7.3 Inadequate distribution network

The objective of distribution system is to convey wholesome water to the consumers at adequate residual pressure in sufficient quantity at convenient points so as to achieve continuity and maximum coverage at affordable cost. In the 10²⁶ test-

²¹ Nandigama, Narsipatnam, Piduguralla, Pithapuram, Salur and Vizianagaram

²² The purpose of clariflocculator is to remove particulate impurities especially non-settable solids particularly collides and colour from water being treated

²³ Paragraph 10.4.1 of Water Supply and Treatment manual

²⁴ Guntakal and Tirupati

²⁵ Atal Mission for Rejuvenation and Urban Transformation

²⁶ Dhone (12), Guntakal (92), Markapur (75), Nandigama (90), Narsipatnam (83), Pedana (61), Pithapuram (34), Salur (7), Tirupati (10) and Vizianagaram (57)

checked ULBs there was shortfall in the coverage of pipeline network when compared with internal road length. The shortfall ranged from 7 per cent to 92 per cent. Water was supplied through water tankers in the uncovered areas which had resulted in inequitable distribution of water supply to the households and proved expensive to ULBs. Piduguralla ULB was dependent upon bore wells/stand posts due to non-availability of distribution network for household connections.

Government replied (December 2016) that as per availability of funds laying of new distribution lines would be taken up under various schemes.

4.7.4 Non-installation of flow meters

The measurement of flow in water supply systems is an indispensable requirement for the purpose of assessment of source and its development, transmission, treatment, distribution, control of wastage etc. However, flow meters were not installed at source/treatment plant/distribution zones in eight²⁷ test-checked ULBs. In three²⁸ ULBs, though flow meters were available, these were not functional. The quantity of water supplied was assessed on the basis of the capacity of the reservoir and the duration of pumping to Elevated Level Service Reservoirs (ELSRs). In the absence of flow meters, actual quantity of water supplied by the ULBs could not be ascertained.

Government accepted the audit observation (December 2016) and assured that the Bulk Flow meters were now proposed to be installed in the ongoing schemes with the funds available with the ULBs and installation of bulk flow meters would be made compulsory in all the future schemes.

4.8 Execution of projects

4.8.1 Project proposals during transition phase

As per JNNURM guidelines²⁹ funds were to be provided to only those towns and cities where elected bodies were in position. State Government submitted (November 2013) project proposals in respect of 12³⁰ ULBs under UIDSSMT for approval during the transition phase³¹, which were not covered under JNNURM phase-I. However, GoI did not consider (December 2013) the proposals, since elected bodies were not functioning in the ULBs and transition period for sanctioning of projects under JNNURM was coming to a close. As a result, the ULBs were deprived of the resources for ensuring clean water supply to their citizens.

²⁷ Dhone, Guntakal, Narsipatnam, Piduguralla, Pithapuram, Salur, Tirupati and Vizianagaram

²⁸ Gudur, Markapur and Pedana

²⁹ Paragraph 4.3 of UIDSSMT guidelines of JNNURM

³⁰ Amalapuram, Atmakur, Gooty, Jangareddygudem, Nandikotkur, Narsapuram, Narsipatnam, Parvathipuram, Proddatur, Salur, Tiruvur and Yeleswaram

³¹ Transition period of two years beginning from 2012-13 to complete the approved projects under JNNURM-I and to implement the pending reforms at the State and ULB level

4.8.2 Status of projects

In the State, 54 projects³² with administrative cost of ₹2,780.14 crore were executed during the period 2011-16. These projects were funded by GoI, State Government/ULB and World Bank. Of these, 42 projects were commissioned and 12³³ projects were in progress. In the test-checked ULBs, out of 10 projects, six projects were commissioned and four projects were in progress.

Government replied (December 2016) that the projects which were in progress would be completed by April 2017.

4.8.3 Irregular payment of Central Excise Duty

Central Excise duty is exempted³⁴ on pipes (outer diameter of 10 cm) when used as integral part of Water Supply projects.

However, Tirupati Municipal Corporation paid central excise duty of ₹11.07 lakh on pipes used for water supply and related works during the review period. The Corporation accepted the irregular payment.

Government accepted the audit observation (December 2016).

4.9 Water Demand/Supply management

Water demand management involves measures which aim at reducing water demand by optimal utilisation of water supplies for all essential and desirable needs. Water supply management aims at improving the supply by minimising losses and wastage and unaccounted for water in the transmission mains and distribution system.

4.9.1 Gap between demand and supply

Thirteenth Finance Commission had fixed Service Level Benchmark (SLB) as 135 lpcd for per capita supply of water. Where Underground Drainage was not there the benchmark was fixed as 70 lpcd³⁵. Against targeted supply of 135 lpcd in 56 ULBs, 45 ULBs had not achieved the target and 33 out of 54 ULBs had not achieved the targets in water supply of 70 lpcd.

In five³⁶ test-checked ULBs, current demands were met. In seven³⁷ test-checked ULBs, gap existed between demand and supply ranged from 27 per cent to 80 per cent as detailed in **Appendix- 4.1**. In three³⁸ test-checked ULBs, improvement schemes were sanctioned and were in progress as of June 2016, while

³² GoI (37 projects), State Government (11) and World Bank (6)

³³ Anantapuramu, Badvel, Dhone, Guntur, Kakinada, Markapur, Piduguralla, Pithapuram, Ramachandrapuram, Tadipatri, Tanuku and Vizianagaram

³⁴ Department of Revenue Tax Research Unit, Ministry of Finance, GoI circular No. 945/6/2011-CX dated 16 May 2011

³⁵ Paragraph 2.2.8.3 of CPHEEO Manual on Water supply and Treatment

³⁶ Dhone, Pedana, Pithapuram, Tirupati and Vijayawada

³⁷ Gudur, Guntakal, Markapur, Narsipatnam, Piduguralla, Salur and Vizianagaram

³⁸ Markapur (70 per cent), Piduguralla (89 per cent) and Vizianagaram (65 per cent)

in the other five, no such scheme was drawn up. Gap in supply was expected to persist till the sustainability of water source is ensured and all the water supply improvement schemes were to be completed to achieve the objectives as envisaged.

Government replied (December 2016) that the gap between demand and supply would be covered as and when the proposed water supply projects were completed/taken up under new projects.

4.9.2 Duration of Water Supply

Service Level Benchmark (SLB) of round the clock water supply was prescribed by the Thirteenth Finance Commission, which had not been achieved in any of the test-checked ULBs. In 110 ULBs, periodicity of water supply ranged from twice in a day to once in five days and duration of supply ranged from less than one hour to three and half hours per day.

Government replied (December 2016) that steps were being initiated to supply water as per Service Level Benchmarks.

4.9.3 House Service Connections (HSCs)

Thirteenth Finance Commission (TFC) had prescribed a Service Level Benchmark of 100 *per cent* coverage of water supply connections to the households in the ULBs. However, it was observed that out of 30.78 lakh properties covered under property tax in the State, only 13.01 lakh (42 *per cent*) households were provided with water supply connections. In the eight test-checked ULBs, out of 2.16 lakh properties only 0.48 lakh properties (22 *per cent*) were provided with water connections.

In two³⁹ test-checked ULBs, Comprehensive Water Supply Improvement Scheme was taken up with World Bank aid. In two⁴⁰ test-checked ULBs, DPRs were not approved by GoI due to the absence of elected body and closure of the UIDSSMT scheme under JNNURM. In Gudur ULB, even though the scheme was completed (April 2012), only 4,200 household connections were given as against the targeted connections of 11,680. In Piduguralla ULB, bore wells/stand posts were provided, instead of household connectivity. In three⁴¹ test-checked ULBs, household connectivity was provided in a phased manner. In two⁴² test-checked ULBs, DPRs submitted by the ULBs for approval were pending with State Government as of April 2016.

Thus, the objective of providing safe and clean drinking water to all the households in the test-checked ULBs remained unachieved.

Government replied (December 2016) that necessary steps would be taken to provide household connections by the ULBs concerned. However, it did not spell out any specific steps planned by it.

³⁹ Markapur and Vizianagaram

⁴⁰ Narsipatnam and Salur

⁴¹ Dhone, Guntakal and Tirupati

⁴² Nandigama and Pithapuram

4.9.4 BPL households not covered

With a view to reducing the burden on urban poor seeking tap connection, State Government had granted (July 2008) concessional household service connection charges of ₹200 (instead of ₹1,200) and had directed (December 2012) ULBs to conduct a ward level survey of BPL households to provide household connections. The survey was yet to be taken up in ten⁴³ test-checked ULBs. Data collected from revenue/ULB authorities showed that 1.78 lakh⁴⁴ BPL households were yet to be provided connectivity.

Government replied (December 2016) that necessary steps would be taken to provide BPL household connections by the ULBs concerned. However, it did not spell out any specific steps planned by it.

4.9.5 Metering of water connections

Water meter is a scientific instrument for accurate measurement of quantity of water distributed to the consumers and fulfills the need to know the quantity of water produced and distributed. As per O&M manual⁴⁵, metering of water supply is desirable to minimise the wastage and to maintain the economic pricing of water. The benchmark for metering water supply connections prescribed by the Thirteenth Finance Commission was 100 *per cent*; however, water meters were not installed in seven⁴⁶ test-checked ULBs. In the remaining six⁴⁷ ULBs, water connections were metered to the extent of six *per cent*⁴⁸ only. ULBs stated that consumers were not coming forward for installation of meters. Further, metering of water connections was not made mandatory by ULBs. As such, the objective of minimizing wastage, ascertaining quantity and economic pricing of water could not be achieved.

In two⁴⁹ test-checked ULBs, 470 out of 556 water meters were not functioning prior to 2011-12. No action was taken as of June 2016 to rectify the problem. The ULBs continued to levy water charges at fixed rate, irrespective of actual consumption, due to non-installation of water meters causing possible loss of revenue to ULBs.

Government replied (December 2016) that consumers were not coming forward for installation of water meters and that necessary steps were being taken to create general awareness in public and proposals would be formulated for mandatory installation of meters in the new schemes. However, the shortfall arose primarily because metering of water connections was not made mandatory by ULBs. As per

⁴³ Dhone, Gudur, Markapur, Narsipatnam, Pedana, Piduguralla, Pithapuram, Salur, Tirupati and Vizianagaram

⁴⁴ Dhone– 8,424, Guntakal– 26,631, Gudur– 17,173, Markapur- 17,020, Narsipatnam- 26,493, Pedana– 5,668, Pithapuram– 14,105, Salur- 14,482 and Vizianagaram– 48,412

⁴⁵ Paragraph 1.2.2 of Manual on O&M

⁴⁶ Dhone, Markapur, Nandigama, Narsipatnam, Pedana, Piduguralla and Salur

⁴⁷ Guntakal, Gudur, Pithapuram, Tirupati, Vijayawada and Vizianagaram

⁴⁸ 10,741 connections out of 1,82,702 connections

⁴⁹ Gudur and Vizianagaram

the manual of the Central Public Health and Environmental Engineering Organisation adopted by the State, this was to have been made mandatory.

4.9.6 Unaccounted for Water

Unaccounted for water (UFW) is leakage of water which mostly occurs in the distribution system and house service connection. A systemic approach towards wastage was required to save considerable quantity of water and prevent possible contamination. As per the manual on Water Supply and Treatment upto 15 per cent⁵⁰ of water wastage i.e., UFW is allowed. In Salur and Vizianagaram ULBs, UFW was within the limits. In eight⁵¹ test-checked ULBs the percentage of UFW was beyond the benchmark. In the absence of flow meters and water meters, correctness of UFW reported could not be ascertained.

Government replied (December 2016) that a decision was to be taken to formulate guidelines and rules for installation of flow meters and water meters.

4.10 Water quality management

Safe water is essential for good health of the community⁵². Improvement in drinking water quality had a direct impact on improvement in the health of the consumers. Water supply agencies are responsible for supply of safe water to consumers and to monitor its quality.

4.10.1 Water sample tests

Water supply and treatment laboratories with adequate facilities and manned by qualified personnel are essential for inspection and evaluation of the suitability of water supplied for public use. Water supply and treatment manual⁵³ prescribes laboratory examination of physical, chemical, bacteriological and biological analysis of water samples to confirm the quality of water.

In all the test-checked ULBs (except Tirupati and Vijayawada) laboratory facilities were not put in place as part of the water supply system. In Gudur ULB, provision was made for construction of laboratory in the estimate for 'Improvement of Water Supply Scheme' in January 2008. Though the water supply scheme was completed in April 2012, construction of laboratory was not taken up. In the absence of this, water sample tests were conducted in the Regional/District Public Health Laboratories (RPHL/DPHL) concerned only on random basis, instead of on regular basis as stipulated in paragraph 15.3.4 of the Manual on Water Supply and Treatment. Thus, due to the lack of laboratory facilities in ULBs, there was shortfall in the coverage of tests during audit period as detailed in **Appendix- 4.2**.

⁵⁰ Paragraph 2.2.8.3 of CPHEEO manual on Water supply and treatment

⁵¹ Percentage – Dhone (20), Gudur (32), Guntakal (25), Markapur (20), Narsipatnam (50), Pedana (35), Pithapuram (40) and Tirupati (21).

⁵² Paragraph 9.2 and 9.4 of CPHEEO manual on O&M

⁵³ Paragraph 15.3.4 of manual on Water supply and Treatment

Government replied (December 2016) that action would be initiated to provide laboratories with the necessary facilities; however, it failed to show any plan towards addressing this gap.

4.10.2 Survey and surveillance

Water quality monitoring and surveillance is a continuous process, along with vigilant assessment and control of safe potable water supply, to be undertaken by the ULB. Surveillance is an investigative activity which was to be undertaken by an agency consisting of the members from State Public Health Engineering Department (PHED), Local Health Authority, Chief Medical Officer/Health Officer and Pollution Control Board, to identify and evaluate factors posing health risk related to drinking water supplied. The surveillance agency had to communicate to the water supply agency and pinpoint the risk areas and give advice for remedial action.

However, no such surveillance agencies were formed in any of the test-checked ULBs. Thus, in the absence of surveillance agencies, safe water supply to consumers could not be taken as having been achieved.

Government accepted the audit observation (December 2016) and assured that water quality monitoring and surveillance agencies would be formed.

4.10.3 State Pollution Control Board

The Andhra Pradesh Pollution Control Board (APPCB) monitors the water bodies under National Water Monitoring Programme which is available in the public domain. The Board monitors the water pollution generated by the industries/Urban Local Bodies by issuing notices and stipulates standards for discharge of effluents by the industries/Urban Local Bodies. On the directions of Honorable High Court of Andhra Pradesh (February 2006) the Government of Andhra Pradesh (GoAP) had directed all the Commissioners of Municipalities/Municipal Corporations/Nagar Panchayats to protect the drinking water from pollution by ensuring that garbage discharge or industrial waste did not flow into any of the water channels which cause health hazards.

APPCB had issued (January 2013) notices prohibiting all the ULBs from discharging untreated sewerage into the water bodies and prescribed construction of Sewerage Treatment Plants (STPs) to treat water before discharge. Further, APPCB had reported that the water quality of main rivers was not satisfactory. It was observed that Vizianagaram and Salur ULBs were discharging the drainage water into the Pedda cheruvu and Vegavathi river, respectively (main drinking water sources), whereas in the other four⁵⁴ test-checked ULBs, no measures were taken for treating the drainage water before disposal.

Government replied (December 2016) that necessary guidelines in this regard would be formulated, as ULBs had to protect drinking water from pollution.

⁵⁴ Dhone, Guntakal, Markapur and Pedana

4.11 Operations and Maintenance

Operation⁵⁵ refers to hourly and daily operations of the components of a system such as plant, machinery and equipment. Maintenance involves keeping the plant, equipment, structures and other related facilities in optimum working condition for supply of quality water to the consumers.

4.11.1 Improper planning

- i. For planning future augmentation and improvement of water works in operation, certain key records⁵⁶ relating to supply of water are required to be maintained. However, history sheets of pumps and motors, preparation of maps showing the entire network etc., were not maintained by any of the test-checked ULBs.

Government accepted the audit observation (December 2016) and assured that action would be initiated to maintain the key records.

- ii. Preventive maintenance⁵⁷ has to be planned for maintenance of the pipelines, servicing of valves, expansion joints etc., to act against possible contamination and improve pressure in the distribution system. In five⁵⁸ test-checked ULBs, preventive maintenance was not carried out.

Government stated (December 2016) that replacement of old pump sets, distribution pipelines, valves etc., was in progress.

- iii. Maintenance schedule is required to be prepared to improve the level of maintenance of water transmission system through improved coordination and planning of administrative and field work and through the use of adequate techniques, equipment and materials. An action plan was to be prepared for Operation and Maintenance. None of the test-checked ULBs had prepared any maintenance schedule for O&M activities.

Government accepted the audit observation (December 2016) and assured that action would be initiated to prepare action plan for maintenance schedule.

Thus, due to failure in preparation of maintenance schedule and planning for preventive maintenance, repairs to water transmission system were attended only as and when complaints were received. Non-maintenance of basic records resulted in operating problems not being brought on record.

⁵⁵ Paragraph 2.2 of CPHEEO O&M Manual

⁵⁶ Paragraph 2.3.11, 3.6.1.8, 4.3.8.1 of manual on O&M – List of tools and plants, history sheets of works/equipment, updated transmission system map, flow meter readings at upstream and downstream, man-hours spent on routine operations, age of pipes, quality of pipes etc.; and Paragraph 13.3.6 of manual on Water supply and treatment – daily and cumulative supply over the years, number of connections of various sizes given and cumulative number of connections each month, water treated and the supply billed

⁵⁷ Paragraph 4.3.3.2 of manual on O&M

⁵⁸ Gudur, Narsipatnam, Pithapuram, Salur and Vizianagaram

4.11.2 Response to complaints

In eight⁵⁹ test-checked ULBs it was noticed that the average response time to attend complaints was one to two days. In addition, no norms were fixed for rectifying the defects to ensure optimum response and to avoid wastage of safe potable drinking water.

Government replied (December 2016) that delay in average response time to attend the complaint was due to shortfall in manpower and assured to take necessary steps.

4.11.3 Staffing pattern

The Water Supply and Treatment (WST) manual⁶⁰ prescribed staffing pattern of five functionaries' such as pumping house operator, fitter, helper, electrician/mechanic and watchman for O&M of water works, based on capacity/quantum of water supply. The staffing pattern prescribed and men-in-position in the test-checked ULBs are given below.

Table 4.2

Name of the post	Staffing Pattern	Men in Position	Shortfall	Percentage of shortfall
Pump House Operator	62	0	62	100.00
Fitters	121	4	117	96.69
Helpers	83	5	78	93.98
Electrician/Mechanic	7	0	7	100.00
Watchman	46	18	28	60.87
Total	319	27	292	91.54

There was substantial shortfall in staffing pattern in 10⁶¹ out of 13 test-checked ULBs and in three⁶² test-checked ULBs, the information was not furnished. Instead of filling-up the vacant posts which are technical in nature, the ULBs were outsourcing personnel for the respective posts for O&M and water works.

Government replied (December 2016) that action was being taken up to fill up all the vacancies in the ULBs, but no evidence was produced to audit to substantiate the claim.

4.11.4 Inadequate training

To carry out O&M tasks effectively and efficiently, there is a need for strengthening technical, operational and managerial categories of staff. Every supervisory and operating staff engaged for water works should be subjected to appropriate training

⁵⁹ Dhone, Guntakal, Markapur, Narsipatnam, Pithapuram, Salur, Tirupati and Vizianagaram

⁶⁰ Paragraph 13.11 of CPHEEO Manual on Water Supply and Treatment

⁶¹ Dhone, Gudur, Guntakal, Markapur, Narsipatnam, Pedana, Pithapuram, Salur, Tirupati and Vizianagaram

⁶² Nandigama, Piduguralla and Vijayawada

course⁶³ at least once in every three/five years during his service. Training was imparted only in 10⁶⁴ out of 110 ULBs. No training was imparted to staff at any of the test-checked ULBs, except Vizianagaram ULB. As such, efforts were not made to upgrade and enrich the skills of the personnel engaged in water supply system.

In the exit conference, Government accepted the audit observation (December 2016) and assured of taking appropriate measures for imparting training.

4.12 Revenue on water supply

It is essential to establish a sound financial management system to make the water supply system financially viable. This can be achieved by controlling expenditure and increasing the income. Thirteenth Finance Commission had stipulated Service Level Benchmark of 100 *per cent* cost recovery in water supply services. A tariff structure was to be evolved to recover the O&M cost and have a surplus for debt servicing and depreciation. Control of O&M expenditure could have been achieved by preparing an annual budget of income and expenditure based on realistic estimates.

4.12.1 Gap in cost recovery

The major source of revenue under water supply was from collection of water charges from households, Government and commercial establishments besides water connection charges. Expenditure comprises salaries and wages, consumables, electricity charges, repairs and replacement charges. Water charges⁶⁵ are to be fixed by the utility taking into account the expenditure on various heads, such as, operating cost, establishment cost, depreciation, debt services, asset replacement fund etc.

ULBs have to generate revenue and incur expenditure for O&M activities as no funding was provided by the State Government. Revenue and expenditure on water supply in respect of test-checked ULBs during 2011-16 are given in the chart below.

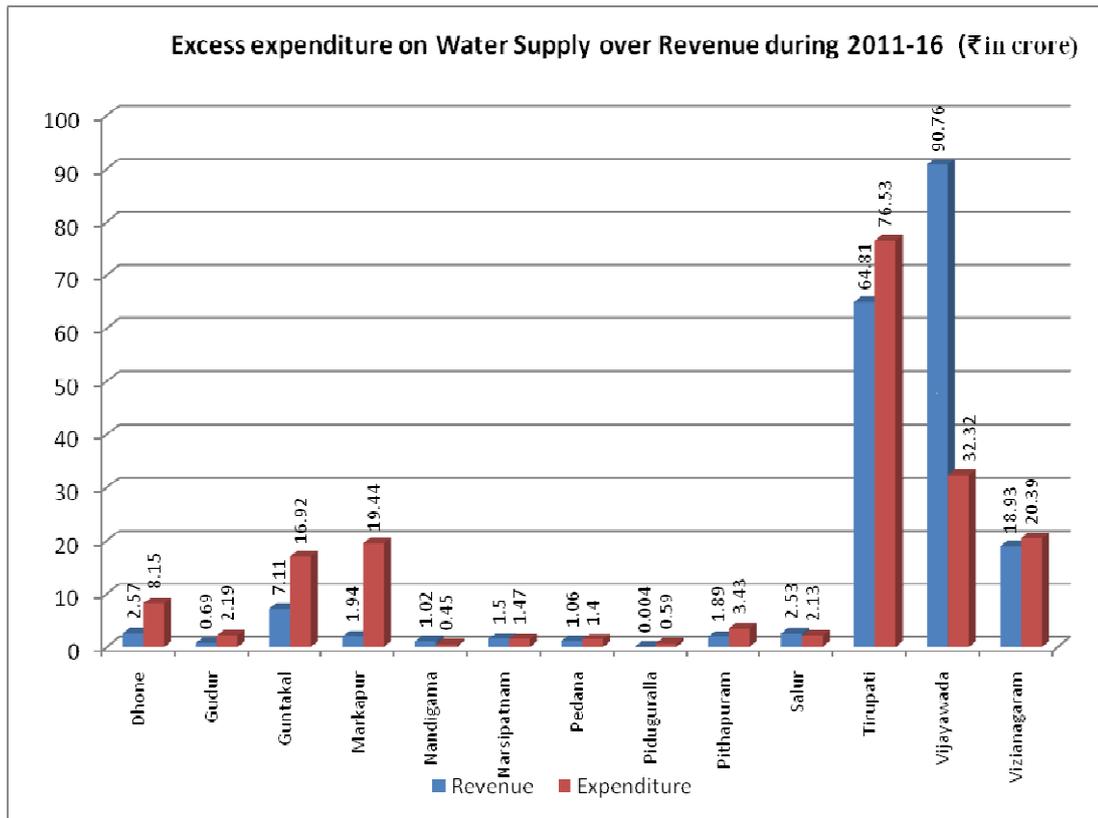
⁶³ Paragraph 14.6 and 17.12 of CPHEEO Manual on Water Supply and Treatment

⁶⁴ Technical: Anantapuramu, Atmakur, Palasa, Proddutur, Puttaparthi, Rayachotty, Srikakulam and Vizianagaram

Managerial: Atmakur, Gudivada, Ponnur, Puttaparthi, Srikakulam and Vizianagaram;
O&M: Puttaparthi, Rayachotty and Vizianagaram

⁶⁵ Paragraph 13.2 of CPHEEO manual on O&M

Chart 4.2



Source: Revenue and expenditure account furnished by the test-checked ULBs.

In nine⁶⁶ test-checked ULBs, expenditure exceeded revenue. Out of this, in four⁶⁷ ULBs, the gap was acute.

For any financially self-sustained water utility, the tariff should be reasonably fixed. In four⁶⁸ ULBs, tariff was revised during the period 2013-15. In six⁶⁹ ULBs, tariff fixed during the period 1998-2012 was not revised. In Guntakal, Markapur and Tirupati ULBs, the gap was acute even after revision of tariff during 2014-15.

Government had issued orders (August 2004) to fix water charges for domestic consumers at ₹100 per month. In four⁷⁰ ULBs, water tariff was less than the minimum. Audit assessed loss of revenue as ₹seven⁷¹ crore during the period covered due to non-implementation of Government orders regarding water charges.

Gap in cost recovery would persist until ULBs treat the water as an economic good and evolve a proper tariff structure with improved collection efficiency.

⁶⁶ Dhone, Gudur, Guntakal, Markapur, Piduguralla, Pedana, Pithapuram, Tirupati and Vizianagaram

⁶⁷ Dhone, Guntakal, Markapur and Tirupati

⁶⁸ Guntakal, Markapur, Tirupati and Vijayawada

⁶⁹ Dhone (2012), Gudur(2001), Pedana(1998), Pithapuram(2011), Salur(2007) and Vizianagaram (1999)

⁷⁰ Gudur(₹75), Pedana(₹60), Salur(₹70) and Vizianagaram (₹60)

⁷¹ Gudur(₹0.57 crore), Pedana(₹1.37 crore), Salur(₹0.53crore) and Vizianagaram (₹4.53crore)

Government stated (December 2016) that steps were being taken to enhance the tariff under AMRUT, Andhra Pradesh Municipal Development Project (APMDP) and other schemes. The reply was not acceptable since review of the gap had to be done for all the ULBs to improve tariff/collection efficiency.

4.12.2 Water charges

Gudur Municipality had fixed (November 2001) water charges for metered connections at ₹150 per month irrespective of the quantity of water consumed. Demands were not raised in respect of 123 metered connections existing even prior to 2011. Loss of revenue was assessed in audit at ₹11.07⁷² lakh, for which the ULB had assured of raising the demand. During beneficiary survey, it came to light that demands had not been raised for four apartments. ULB agreed to the audit observation and stated that seven more such apartments were also identified and assured of serving demand notices.

Government accepted the audit observation (December 2016) and assured that necessary steps were being taken for collection of water charges in all the municipalities.

4.12.3 Delay in issue of demand notices

As per the Water Supply Bye laws, water charges due for a month are payable before 10th of the subsequent month in the municipal treasury. In case of metered connections, the charges are payable within seven days after the demand is made. However, all the ULBs were raising demand half yearly/annually.

The service level benchmark for efficiency in collection of water supply related charges was 90 *per cent* under Thirteenth Finance Commission. However, the average efficiency in the test-checked ULBs was 41 *per cent*. There were 21,589 chronic defaulters⁷³ from whom ₹7.45 crore remained uncollected. In Vizianagaram ULB, an amount of ₹2.94 crore was outstanding since 1993-94 onwards.

Government accepted the audit observation (December 2016).

4.12.4 Non-Revenue Water

Non-Revenue Water (NRW)⁷⁴ is the extent of water produced which does not earn the utility any revenue. NRW comprises public stand posts, illegal water connections, water theft, metering inaccuracies and leakages in the transmission and distribution networks. Service Level Benchmark for NRW is 20 *per cent*. In all the test-checked ULBs, NRW ranged from 21 *per cent* to 100 *per cent*. In Vijayawada and Markapur test-checked ULBs, NRW was within the limit. In Piduguralla ULB, since only public taps were provided, NRW was 100 *per cent*.

⁷² 123 metered connections x ₹150 x 60 months

⁷³ Defaulting for more than one year

⁷⁴ Difference between the total water produced (ex-treatment plant) and the total water sold expressed as a percentage of the total water produced

In Gudur and Narsipatnam ULBs, 2,367 un-authorized water connections were identified during 2012-13 and 2015-16, respectively. As of March 2016, no action was taken to regularise these unauthorized water connections. This resulted in loss of revenue of ₹1.92 crore (Gudur-₹1.63⁷⁵ crore, Narsipatnam - ₹0.29⁷⁶ crore).

In respect of three⁷⁷ ULBs, since the periods from which unauthorized connections (1,200 nos.) existed were not available, the loss could not be assessed. However, tap donation charges⁷⁸ of ₹67 lakh⁷⁹ were not collected.

However, if corrective action such as individual household connectivity, provision of water meters, replacement of non-functioning water meters, regularisation of unauthorised connections and regular maintenance to avoid leakages, were not taken expeditiously, higher percentage of NRW is likely to continue.

Government accepted the audit observation (December 2016) and assured that action would be taken as per bye-laws to regularise the unauthorised/illegal water connections.

4.13 Other findings

4.13.1 Non-utilisation of funds

- i. Grants of ₹4.33 crore under the Thirteenth Finance Commission received from GoI, were released by the State Government to the four⁸⁰ test-checked ULBs towards water supply works during the period 2011-15. Out of this, only ₹0.39 crore was utilized as of March 2016 and the remaining ₹3.94 crore remained unspent by the ULBs due to reasons such as delayed release of funds, dropping of proposed works, delay in preparation of estimates, etc. This resulted in non-execution of works such as construction of Elevated Level Service Reservoirs (ELSRs), repairs of distribution lines, providing pumping mains from the reservoirs and replacement of pump sets which deprived consumers of improved water supply.
- ii. The GoAP had released Adverse Seasonal Conditional (ASC) grants to meet the requirements of water supply during the summer season. However, the grant released (₹66.41 lakh) remained unutilized in two test-checked ULBs (Vizianagaram-₹62.10 lakh, Pithapuram-₹4.31 lakh), without serving the intended purpose of providing water supply during summer season.

Government accepted the audit observation (December 2016) and assured that steps would be taken for effective utilisation of funds.

⁷⁵ Monthly water charges of ₹7,685 x 2,120 unauthorized connections

⁷⁶ Monthly Charges of ₹11,660 x 247 unauthorized connections

⁷⁷ Dhone (250), Guntakal (600) and Tirupati (350)

⁷⁸ Initial charges (one time) collected from the consumers at the time of providing water connections

⁷⁹ Dhone-₹15 lakh, Guntakal-₹24 lakh and Tirupati-₹28 lakh

⁸⁰ Gudur- ₹1.17 crore, Narsipatnam-₹0.53 crore, Salur-₹0.73 crore and Vizianagaram-₹1.90 crore

4.13.2 Avoidable expenditure for delayed payment of electricity charges

Six test-checked ULBs paid late payment charges of ₹40.04 lakh⁸¹ on account of delays in payment of electricity consumption charges beyond the due dates for the electricity connections taken for water supply arrangements. This was avoidable had the charges been paid in time.

Government accepted the audit observation (December 2016) and assured that priority would be given to payment of electrical consumption charges before due date.

4.13.3 Review of Contract Maximum Demand (CMD)

In respect of High Tension (HT) connections, for the purpose of levy and collection of electricity charges, the billing is to be on the maximum demand recorded during the month or 80 per cent of Contract Maximum Demand (CMD), whichever is higher. For HT connections in three test-checked ULBs, an amount of ₹16.97 lakh⁸² was paid as penalty for exceeding the CMD during the period from August 2013 to March 2016. For HT connections in five⁸³ test-checked ULBs, an amount of ₹34.45 lakh was paid at 80 per cent of CMD even though the consumption was consistently less than 80 per cent every month. The Engineer-in-Chief (PHMED) had instructed (June 2015) all the Commissioners to analyse the HT bills and take necessary corrective action to curtail avoidable expenditure. However, no action was taken to analyze the consumption pattern.

Government stated (December 2016) that revision of CMD according to actual demand to avoid penalty was under consideration.

4.14 Monitoring

4.14.1 Conduct of inspections

Public Health & Municipal Engineering (PH&ME) department, a State Level Principal Agency, had to conduct periodical inspections of water supply schemes maintained by ULBs. No inspections were carried out during the period 2011-15. During 2015-16, inspections were carried out in 20 ULBs (four⁸⁴ are test-checked ULBs) out of 110 ULBs. Thus, there was shortfall in all ULBs in conduct of inspections.

Government accepted the audit observations (December 2016) and assured that necessary inspections would be carried out as prescribed.

⁸¹ Gudur- ₹11.45 lakh, Markapur- ₹0.24 lakh, Pedana- ₹0.39 lakh, Pithapuram- ₹2.25 lakh, Salur- ₹0.69 lakh and Vizianagaram ₹25.02 lakh

⁸² Pithapuram - ₹3.99 lakh, Salur – ₹2 lakh and Tirupati – ₹10.98 lakh

⁸³ Dhone, Gudur, Pedana, Tirupati and Vijayawada

⁸⁴ Gudur, Narsipatnam, Salur and Vijayawada

4.14.2 Public awareness programmes

As per O&M Manual⁸⁵, public awareness programmes are to be conducted regularly for the consumers to sensitise them about potable water not being a free commodity and that it is a value-added commodity with cost implications with the objective of achieving better customer relations, greater water conservation and enhanced organisational credibility. Audit observed that:

- i. In four⁸⁶ test-checked ULBs, public awareness programmes were not conducted. In other test-checked ULBs, no public awareness programmes were conducted except mike announcements.
- ii. Vigilance Committees and Consumer Service Committees to improve the public awareness were not formed.
- iii. Consumer survey was not conducted to obtain feedback from the consumers about the services at regular intervals for refining the service standards.
- iv. The authorities were to list out various aspects of public awareness programmes and work out cost implications for implementing the awareness programmes. None of the test-checked ULBs had provided any budget for implementing awareness programmes except Vizianagaram ULB, which did not conduct any such programme.

Government replied (December 2016) that wide publicity was being given by the ULBs. However, no evidence to that effect was furnished to audit. No reply was furnished to the other issues.

4.14.3 Water and Energy audit

- i. As per O&M manual⁸⁷, water audit of a water supply scheme was to be conducted to assess the capacity of total water produced by the water supply authority and the actual quantity of water distributed throughout the area of service and also to assess losses both physical⁸⁸ and non-physical⁸⁹ which needed immediate attention and control. However, water audit was not conducted in any of the test-checked ULBs. Thus, the benefits of water audit, such as, containing loss of water by control of leakages and increase in revenues from under-billed consumers, etc., had not been achieved.
- ii. As per O&M manual⁹⁰, energy audit of a water supply scheme should be conducted to regulate the energy consumption and to identify the possible steps

⁸⁵ Chapter 18 of manual on O&M

⁸⁶ Gudur, Narsipatnam, Piduguralla and Pithapuram

⁸⁷ Chapter 15 of manual on O&M

⁸⁸ Leakage of water in the network from pipes, joints and fittings, reservoirs, overflows of reservoirs and sumps

⁸⁹ Theft of water through illegal connections, under-billing through defective meters, water wasted by consumer through open taps, public stand posts etc.

⁹⁰ Paragraph 16.1 of O&M Manual of CPHEEO prescribed periodicity for conducting Energy Audit for various installations

needed to conserve energy and reduce the energy cost, so that water tariff is kept as low as possible. Further, large installations are to have energy audit every year, medium installations once in two years and small installations once in three years. Energy audit was not conducted in any of the test-checked ULBs.

4.14.4 Vehicle Tracking system

The ULBs are supplying water to the un-served areas through water tankers. To keep a watch on the plying of water tankers, the Engineer-in-Chief, Public Health had proposed (March 2015) to implement live Vehicle Tracking System (VTS) in all the ULBs across the State as it was becoming difficult to monitor the water supplied through water tankers. Even though implementation of VTS was under the purview of ULBs, the same was not implemented in any of the test-checked ULBs except Tirupati. Thus, the objective of monitoring of the water tanker serving in unserved areas had not been achieved as VTS was not put in place.

Government replied (December 2016) that action would be initiated for implementation of live Vehicle Tracking System.

4.14.5 Supervisory Control and Data Acquisition (SCADA) and telemetry

As per O&M manual⁹¹, the inspection, monitoring and control of O&M of water utility can be automated partially through telemetry⁹². Telemetry when extended to include actions based on the data for remote control of pumps and other equipment can be Supervisory Control and Data Acquisition (SCADA⁹³). This would facilitate minute real time information from remote terminal units located at the water treatment plant, reservoir, flow meter, pumping stations etc., and transmitted to a central control station where the information is updated, displayed and stored manually or automatically. However, in none of the test-checked ULBs, SCADA or telemetry system was implemented. Due to lack of these systems, the ULBs did not have the real time information on water networks to curb leakages, pilferages and un-authorised connections.

Government replied (December 2016) that action would be initiated for implementation of SCADA and Telemetry to gather real time information on water network in major ULBs.

4.14.6 GIS mapping

Geographic Information System (GIS) is a computer program that combines mapping with detailed information on physical structures with geographic areas. The

⁹¹ Paragraph 12.5 of manual on O&M

⁹² Telemetry enables regular monitoring of the data (hours of pumping, pressure and flow of water in distribution system etc.) on real time basis and the data is reviewed to take decision

⁹³ SCADA a computer aided system which collects, stores and analyses the data on all aspects of O&M

GIS creates a database within a mapped area such as streets, valve chambers/manholes, pipe networks and pumping stations. As per O&M manual⁹⁴, these maps can be used to inform the maintenance crew to locate the place of work. Preparation of GIS based maps by capturing 44 layers of attributes was taken up through contract agency in April 2013 for completion within 11 months with sanctioned cost of ₹4.20 crore. As of June 2016, the work was not completed. Thus, database on physical structures with geographical areas was not available.

Government replied (December 2016) that action would be initiated to complete the work of GIS mapping.

4.15 Findings of Beneficiary survey

Beneficiary survey covering 50 beneficiaries in each test-checked ULB (650 beneficiaries from 13 test-checked ULBs) was conducted to assess the response of the consumers with regard to quantity and quality of water supplied. The results of survey are summarised below:

- i. Water meters were not provided to 94 *per cent* of beneficiaries.
- ii. Majority of the beneficiaries (54 *per cent*) stated that they were not receiving water supply daily. Beneficiaries stated that water was supplied with a gap of more than two days in summer.
- iii. Wherever water was supplied daily, 76 *per cent* of the beneficiaries stated that it was supplied for one hour only.
- iv. Majority (61 *per cent*) of the beneficiaries were using bore well/well in addition to municipal water supply.
- v. 58 *per cent* of beneficiaries felt that water charges levied by the ULBs were reasonable. On the other hand, 78 *per cent* of the beneficiaries were not in favour of increase in water tariff.
- vi. 71 *per cent* of beneficiaries surveyed stated that public awareness camps were not conducted by ULBs to create awareness regarding safe and hygienic drinking water and that problems with regard to water supply were not discussed in Ward/Area sabha.

Government accepted (December 2016) the beneficiary survey findings.

4.16 Conclusion

Water Regulatory Authority was yet to be established for uniformity in operations and pricing for supply of water. Orders for conservation/recharge of ground water were not complied with by the ULBs. Water treatment plants were not available where sub-surface was the source. Water supply was inequitable since distribution network was inadequate. Flow meters were not installed at source/treatment

⁹⁴ Paragraph 8.4.2.3 of manual on O&M

plant/distribution zones. Coverage of households including BPL households was not adequate. Delay in completion of projects affected provision of potable drinking water. There was no action plan for maintenance. There was inadequacy in staffing pattern for operation and maintenance of water works. Gap between demand and supply of water persisted. No water meters were installed for water connections. ULBs did not install their own laboratories and frequency of tests prescribed was not adhered to. Revenue did not match expenditure on water supply arrangements. Monitoring was inadequate. Public awareness programmes were not conducted effectively.

4.17 Recommendations

Audit recommends the following measures for consideration of the Government:

- *Measures for replenishment of ground water should be strengthened to ensure sustainability of water sources.*
- *Adequate steps should be taken to conduct all types of prescribed tests to ensure adherence to the standards for supply of safe drinking water.*
- *The system of Operation and Maintenance should be strengthened to avoid wastage of drinking water and to provide better services.*
- *Water should be treated as an economic good and steps should be taken to reduce gap in cost recovery.*

Government accepted the recommendations made by Audit.