

CHAPTER V
WATER QUALITY
MONITORING AND
SURVEILLANCE

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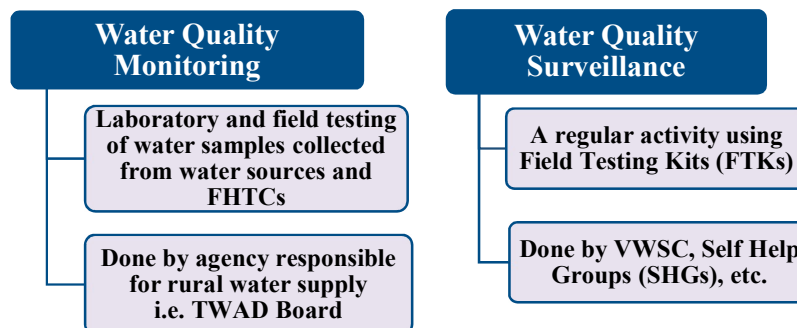
WATER QUALITY MONITORING AND SURVEILLANCE

The water testing laboratories functioned without any mechanism for referring positively tested samples to higher level laboratories. Further, four District laboratories in the selected districts functioned without NABL accreditation. The infrastructure and equipment were found to be lacking in all the 18 laboratories (including State laboratory) at various levels across the selected districts. The water quality testing conducted by TWAD Board divisions was inadequate as all the 13 prescribed parameters were not tested. No water quality tests were conducted by using Field Testing Kits in any of the selected districts.

5.1 Introduction

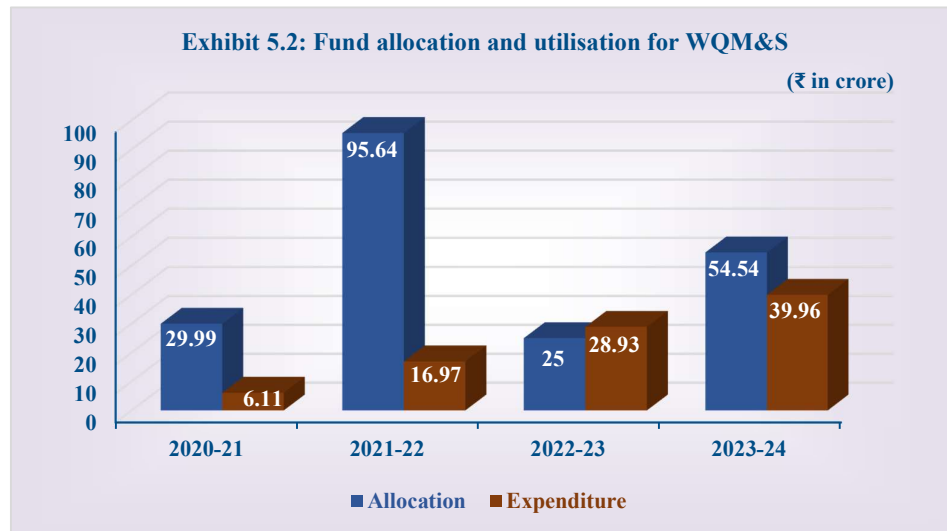
The Operational Guidelines of JJM issued by GoI prescribes Water Quality Monitoring and Surveillance (WQM&S) for ensuring the quality of water supplied through FHTCs. These activities involve testing of water samples collected from water sources by Department in water quality testing laboratories, Surveillance using Field Test Kits (FTKs) by community, sanitary inspection, etc. Up to two *per cent* of JJM funds of the State are to be allocated for WQM&S which is done as per the Uniform Drinking Water Quality Monitoring Protocol¹ (UDWQMP). The WQM&S framework is described in **Exhibit 5.1**.

Exhibit 5.1: Water Quality Monitoring and Surveillance framework



GoTN Operation Guidelines stipulate that the District Water and Sanitation Mission (DWSM) is responsible for monitoring water quality. The funds allocated towards WQM&S under JJM are intended for monitoring and surveillance of water quality at the field level in habitations, as well as for establishing and upgrading water quality testing laboratories at the State, District and Sub-district levels. The fund allocation and utilisation for WQM&S during 2020-24 are detailed in the **Exhibit 5.2**.

¹ Issued by the Ministry of Drinking Water and Sanitation, Government of India, in February 2013.



(Source: Details furnished by TWAD Board)

5.2 Lack of adequate infrastructure and equipment for Water Quality Testing

Central Public Health and Environmental Engineering Organisation's (CPHEEO) Manual 2005, stipulates that the agency operating the water supply system is primarily responsible for ensuring that the water supplied meets quality standards. This requires regular physical, chemical and bacteriological testing of water samples. In Tamil Nadu, the RD&PR Department and the TWAD Board are responsible for monitoring water quality. The details of District, sub-district and Block level laboratories in the six selected districts are given in **Table 5.1**.

Table 5.1: Details of laboratories established in six selected districts

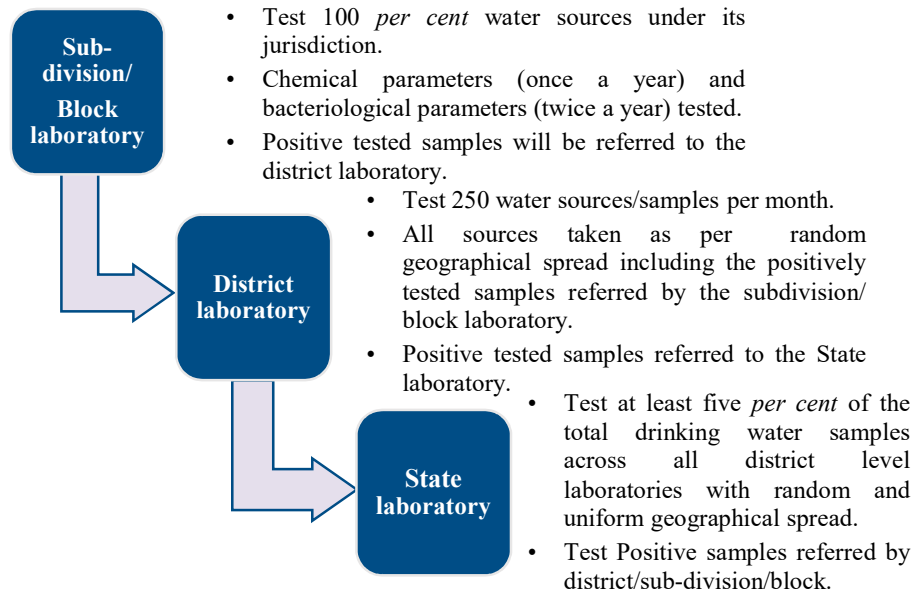
District	Total blocks in the district	District laboratory	Sub-district laboratories	Block laboratories
Coimbatore	12	1	1	1
Nagapattinam	6	1	0	0
Ramanathapuram	11	1	1	1
Salem	20	1	3	1
Theni	8	1	0	1
Viluppuram	13	1	1	1
Total	70	6	6	5

(Source: Details furnished by TWAD Board divisions)

5.2.1 Absence of reporting mechanism to higher laboratories

As per the JJM Operational guidelines, the broad guidelines for undertaking testing of sources/samples at different level are given as **Exhibit 5.3**.

Exhibit 5.3: Guidelines for testing of water samples



As given in **Exhibit 5.3**, the block/sub-division laboratories are required to refer positive tested samples to the District laboratory which was to test all sources taken as per random geographical spread including the positive tested samples referred by the subdivision. However, Audit observed that the district laboratories did not function as per their intended role, but were rather operating as Block laboratories covering few specific blocks. This was in contravention of the roles envisaged as per the guidelines.

For instance, in Ramanathapuram district, three laboratories were operational one each at District, Sub-district and Block level. However, the jurisdiction of the District laboratory was restricted to only four blocks (**Table 5.2**).

Table 5.2: Details of allocation of blocks to laboratories in Ramanathapuram district

Name of Laboratory	Jurisdiction
District laboratory, Ramanathapuram	Bogalur, Ramanathapuram, R.S.Mangalam, Thiruvadanai
Sub-district laboratory, Paramakudi	Kadaladi, Kamuthi, Mudukulathur, Paramakudi
Block level laboratory, Uchipuli, Mandapam	Mandapam, Nainarkovil, Thiruppullani

(Source: RWS Division, TWAD Board, Ramanathapuram)

Government replied (April 2025) that the same number of manpower were engaged for District, Sub-district and Block level laboratories. Hence, jurisdiction were fixed evenly. The reply is not tenable since the district laboratory is functioning as a block laboratory which consequently resulted in the district devoid of certain higher functions performed through it.

5.2.2 Laboratories functioning without accreditation

The JJM Operational Guidelines issued by GoI stipulates that drinking water quality testing laboratories should be accredited under IS/ISO/IEC 17025 for basic water quality parameters, with gradual upgrades to other parameters based on local conditions. The GoTN Operational Guidelines also mandates that the TWAD Board should take necessary steps to obtain National Accreditation

Board for Testing and Calibration Laboratories (NABL) accreditation for all District-level Water testing laboratories in a phased manner. The status of accreditation in six selected districts is given in **Table 5.3**.

Table 5.3: Details of accreditation obtained by laboratories

District	NABL accreditation validity until	Lab functioning without renewal of NABL accreditation (November 2024)
Coimbatore	30/01/2024	10 months
Nagapattinam	21/04/2024	7 months
Ramanathapuram	23/02/2024	9 months
Salem	31/07/2026	Not Applicable
Theni	21/04/2024	7 months
Viluppuram	11/09/2026	Not Applicable

(Source: Records furnished by TWAD Board Divisions)

As of November 2024, four out of six district water testing laboratories in the six selected districts have been operating without NABL accreditation for periods ranging from seven to ten months.

Government replied (April 2025) that necessary action has been taken to renew the accreditation. However, the fact remains that the laboratories continued to function without renewal of accreditation which was in contravention of the GoI and GoTN guidelines.

Recommendation 10: The Government must ensure renewal of accreditation of the water testing laboratories at the earliest.

5.2.3 Lack of Equipment/Infrastructure in laboratories

As per the CPHEEO Manual, Water quality testing laboratory is the backbone of water quality surveillance. A well-located and well-equipped analytical laboratory with competent staff is very essential to evaluate the efficiency of water utility services in terms of water quality.

(i) Infrastructure

The details of infrastructure available and shortfall in the State laboratory and 17 laboratories established in the selected districts are given in **Appendix 5.1**.

The infrastructure and other equipment/instruments, recommended by the UDWQMP were found to be lacking in the 17 established laboratories at various levels across the six selected districts.

(ii) Equipment/Instruments

Significant shortfalls concerning equipment/instruments required for effective water quality testing were observed in the State laboratory and across all 17 established water testing laboratories in the six selected districts as detailed in **Appendix 5.2**.

Audit noticed that, in spite of the mandate to ensure proper infrastructure and fully equipped facilities for comprehensive water quality monitoring, the laboratories were found lacking in essential testing equipment, tools and other supporting infrastructure at both district and sub-district levels to perform bacteriological and chemical tests effectively, as recommended by the

UDWQMP and outlined in the Operational Guidelines. These deficiencies included critical testing instruments, reagents, and supporting facilities necessary for accurately detecting and analysing key water quality parameters such as chemical contaminants (arsenic, fluoride, nitrate, etc.) and bacteriological indicators (E.coli, coliform bacteria, etc.).

Government replied (April 2025) that the details of essential equipment, tools and other supporting infrastructure are collected and tender works for the same are under process. The reply is not acceptable since funds were available for purchase of equipment despite which the laboratories functioned with shortage of infrastructure and equipment.

5.3 Testing of water sources and parameters

The details of testing of water sources done in six selected districts during 2019-24 by TWAD Board laboratories and their results are given in **Table 5.4**.

Table 5.4: Details of number of water sources tested

District	Number of water sources	Number of tests conducted	Number of sources with contaminants above permissible limit	
			Bacteriological	Chemical
Coimbatore	6,243	15,702	0	0
Nagapattinam	1,561	21,847	2	36
Ramanathapuram	5,013	65,001	5	843
Salem	32,916	99,855	64	275
Theni	5,920	18,500	0	0
Viluppuram	11,207	10,280	0	0
Total	62,860	2,31,185	71	1,154

(Source: Details furnished by TWAD Board divisions)

- Audit observed that the Block and VP level officials were also not aware of the issue of contamination as they did not maintain any record in this regard.
- Further, Audit tested 43 water samples in selected districts and found that the test results of all the five water samples taken in Coimbatore District and two samples taken in Ramanathapuram District were found not of potable quality.

Government replied (April 2025) that villages that were affected with water contamination of chemical and bacteriological parameters were provided with CWSS scheme with river water sources. Thus, the reply indicates the lack of action to restore the water source with proper rectificatory action in case of presence of contaminants. Further, the reply was silent on the mandatory testing to be done.

- The JJM Operational Guidelines issued by GoI prescribes a list of 13 basic water quality parameters² to be tested along with the acceptable limit for each and the permissible limit in the absence of

² pH value, Total dissolved solids, Turbidity, Chloride, Total alkalinity, Total hardness, Sulphate, Iron, Total arsenic, Fluoride, Nitrate, Total coliform bacteria, E.coli or Thermotolerant coliform bacteria.

alternate source. Scrutiny of the test results received indicated that test for arsenic, a chemical contaminant and one of the 13 basic parameters that poses serious health risks, was not conducted in any of the tested samples.

- For bacteriological contamination, only faecal coliform testing was performed instead of total Coliform and E.coli or Thermotolerant Coliform bacteria, which is the standard parameter.
- Thus, the water quality testing conducted by TWAD Board divisions was incomplete as the water quality testing was not done adequately for all the 13 prescribed parameters which impacted the accuracy and reliability of the test results, resulting in potential health risks undetected.

Government replied (April 2025) that there was no arsenic contamination in drinking water in Tamil Nadu as it is geo-genic in nature. The reply is not acceptable since it accounted for natural sources of contamination (geo-genic) only but was silent on other sources like industry/factory contamination, one of the reason based on which testing this parameter was also made mandatory.

Recommendation 11: The Government should ensure that all equipments are purchased to make the laboratories fully functional at the earliest for comprehensive water testing in order to take timely remedial action.

5.4 Non-utilisation of Field Testing Kits

The Operational Guidelines of GoI mandates that VWSCs must ensure water quality testing using Field Test Kits (FTKs). The tests were to be conducted by trained member of Self Help Groups and the results must be updated on the JJM-WQMIS web portal. GoTN Operational Guidelines stipulates that the test results must be reported to the Village Panchayat Secretary, who would maintain a water quality register. The BDO(VP) must cross-verify 5 per cent of VPs monthly, ensuring tests are conducted every 15 days and recorded. The details of FTKs distributed to the selected districts for the period 2019-24 are as given in the **Table 5.5**.

Table 5.5: Details of FTKs supplied to districts (year-wise)

District		Coim-batore	Naga-pattinam	Ramana-thapuram	Salem	Theni	Vilup-puram
Number of Blocks		12	6	11	20	8	13
Number of VPs		228	193	429	385	130	688
FTKs supplied	2019-20	0	0	0	0	130	688
	2020-21	228	0	0	385	130	688
	2021-22	228	193	429	0	130	688
	2022-23	228	0	429	385	130	688
	2023-24	228	0	0	385	130	688

(Source: Details furnished by TWAD Board Divisions)

Audit observed that, there was no uniformity in the distribution of FTKs as only three out of six selected districts reported to have received FTKs during 2020-24. The reasons for non-uniformity in supply of FTKs was not furnished.

Further, Audit observed that despite the distribution of FTKs and training provided to SHGs, no water quality tests were conducted by these trained members in any of the selected districts. It was further confirmed during the JPV in selected blocks and VPs that the FTKs were in unopened condition indicating complete non-utilisation of the kits as shown in **Exhibit 5.4**.



Key provisions such as maintenance of FTK registers, periodic verification by the BDO and local monitoring were not implemented. Consequently, the intended community-level water quality surveillance, as outlined in the Operational Guidelines, was not done. Furthermore, FTKs have a shelf life of one year and since almost all of them were not used. This rendered the procurement of the kits as wasteful.

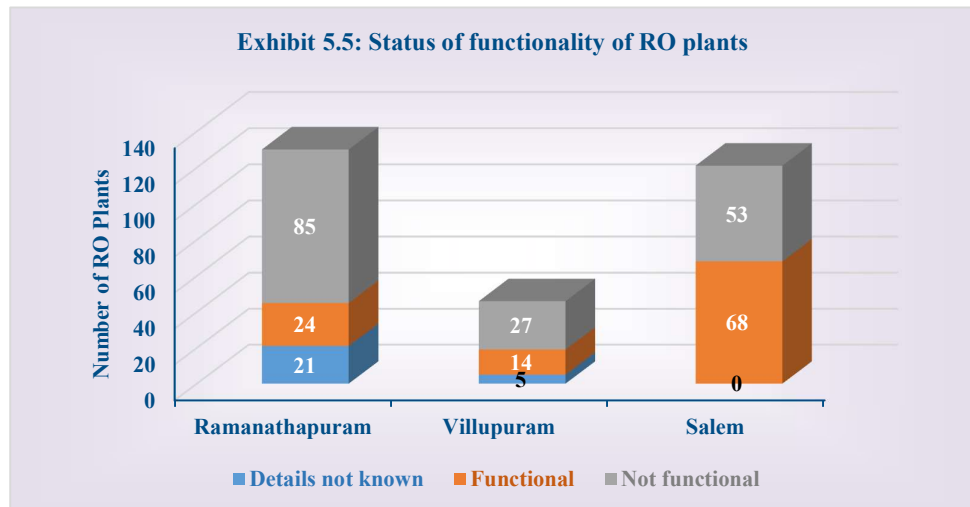
Government replied (April 2025) that during 2019-21, FTKs were not assembled due to non-availability of funds. During 2021-24, FTKs were supplied through contractors for packing and transporting from State level water testing laboratory. It was further stated that every year 5 SHG members in each VP were trained for using FTKs and 24.08 lakh tests were conducted. The reply is not acceptable as there was no shortage of funds under WQM&S and hence, uniform procurement and distribution of FTKs could have been ensured. Further, in the test-checked districts no tests were conducted utilising FTKs.

Recommendation 12: The Government must direct the implementing agencies to ensure optimum utilisation of the Field Testing Kits by conducting tests and recording the same.

5.5 Non-functional Reverse Osmosis plants

Section 110 of the Tamil Nadu Panchayats Act, 1994, stipulated that it was the duty of VPs to provide safe drinking water in rural areas. JJM Operational Guidelines of GoI stipulated that supply of potable water in quality affected areas must be accorded priority and Community Water Purification Plant could be installed towards this effort. It further stated that the choice of technology is left to States to ensure that such systems have robust post installation O&M systems and safe disposal of residue so that they continue to function as per prescribed standards.

GoTN accorded permission to install Reverse Osmosis (RO) plants in rural areas to overcome problems related to water quality in locations with non-potable, salty, or brackish water. As per the details furnished by the DRDAs, 130, 46 and 121 RO plants were installed in Ramanathapuram, Viluppuram and Salem respectively during 2019-21 and the status of functionality of these RO plants is given in **Exhibit 5.5**.



As seen from **Exhibit 5.5**, the non-functional ROs ranged from 43.8 *per cent* to 65.4 *per cent* in the test checked Districts. Some of the non-functional RO plants test checked in Audit during JPV in September 2024 are given in **Exhibit 5.6**.

Exhibit 5.6: Non-functional RO plants in test-checked blocks of Ramanathapuram



Further, the date of installation of RO plant and the date from which the RO plant became non-functional was not documented. The absence of such crucial details, indicate gaps in record-keeping and documentation process. This not only hinders effective monitoring and maintenance of the RO plants but also raises concerns about the overall management and accountability in the implementation of the project. As a result, the intended objective of supplying safe drinking water to the rural population was not achieved.

Government replied (April 2025) that orders were issued to rectify the defective RO plants in Viluppuram district utilising the General funds of the VPs and Panchayat Union as a onetime measure to make them operational. No specific reply was received in respect of the other districts. The reply points to the fact that the objective of installation of RO plants could not be fully achieved and there was lack of monitoring.

Recommendation 13: The Government should direct the Department to ensure the functionality of Reverse Osmosis Plants created for providing potable water.