

# Drinking water quality data, a vision for strategic applications

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**Abstract** – Drinking water quality tests are conducted primarily to monitor and maintain surveillance of the household and community water supply systems. With the use of field-testing methods, costs have reduced and periodic data collection have expanded to points of consumption. These led to significant increase in drinking water quality data and information but also created data redundancy. Instead of archiving, the paper suggests the historical data should be seen as valued asset. Its use in programme and strategic management shall make a better economic sense. Therefore, open sharing of data should be promoted for learning and research. The use of drinking water quality records saves resources from duplication and collection of outdated information. The key challenges are investment in data quality and attracting skilled professionals to the sector.

**Keywords** –Drinking water quality tests, Risk mitigation, Usage.

## 1 Drinking Water Quality Data

### 1.1 Purpose and Data collection

Drinking water quality information constitutes an important component of water works. It provides support in monitoring the water supplies, maintaining quality and meeting the statutory compliances. Information at the points of consumptions i.e. households and institutions are useful in understanding deterioration in quality during transportation, if any. Beyond the technical and operational management reasons, frequent water quality data collection provides a number of actionable insights such as emerging risks of groundwater contamination, influe Therefore, it is highly desirable to collect water quality data from multiple points, although the costs and logistical problems such as, selecting appropriate testing methods and deployment of personnel become high. This paper explores the potential uses of water quality information for the programme and strategic reasons.

### 1.2 Democratization of drinking water quality data

The key barrier in frequent testing of drinking water sources have substantially reduced with use of Field Testing Kits (FTKs) as the tests are conducted at fraction of cost when compared to laboratory testing methods. Tests away from the laboratory settings have been facilitated and the reporting from multiple locations have smoothened with the help of mobile applications. Now it is possible to get the preliminary information on the quality of drinking water used by the citizens in the real time. Monitoring quality data at the point of consumption has added the capacity to take remedial measures within a shorter span of time. The participants in drinking water quality monitoring and surveillance activities have widened to include local institutions, non-government organisation and start-up companies. Access to drinking water quality data have also improved with availability of data in the public domain, web-portals and on-field records.

**Table 1.** Number of drinking water samples tested (All figures in Lakhs)

| Source             | 2022-23 |         | 2023-24 |         | 2024-25 |         | 2025-26 |         | 2026-27* |         |
|--------------------|---------|---------|---------|---------|---------|---------|---------|---------|----------|---------|
|                    | Sample  | Village | Samples | Village | Samples | Village | Sample  | Village | Sample   | Village |
| Jal Jeevan Mission | 170.62  | 5.39    |         |         |         |         | 121.89  | 5.12    | 74.58    | 4.05    |
| PHED West Bengal   | 4.56    | 0.38    | 6.11    | 0.38    | 6.40    | 0.38    | 5.15    | 0.38    | 1.09     | 0.38    |
| PHED Rajasthan     | 2.72    |         | 2.06    |         |         |         |         |         |          |         |

Water sample tested by Jal Jeevan Misson and the state drinking water programmes.

## 2 Drinking water quality data for the Present and Future Needs

### 2.1 Data for Risk mitigation

The main objective behind drinking water quality test and data collection exercises are ensuring deliveries to the users remain safe. This necessitates data collection at regular intervals. Thus, risk against contamination is the key reason for data collection, which is usually seen as short-term needs of the organizations.

### 2.2 Data for Programme Management

Designing behaviour change communication involves extensive use of drinking water quality data. Awareness campaigns, training of the staffs and professionals, communication design etc. are few of the examples. The governments are using data to prioritize the safe water deliveries for the groundwater quality affected regions and water-stressed regions, planning the unique need of the villages served by the small-size schemes etc.

Historical data shall continue to be relevant for the medium-term need, although applications in the programme management will take sharper dip with greater awareness and expansion of safe water schemes reaching to the people.

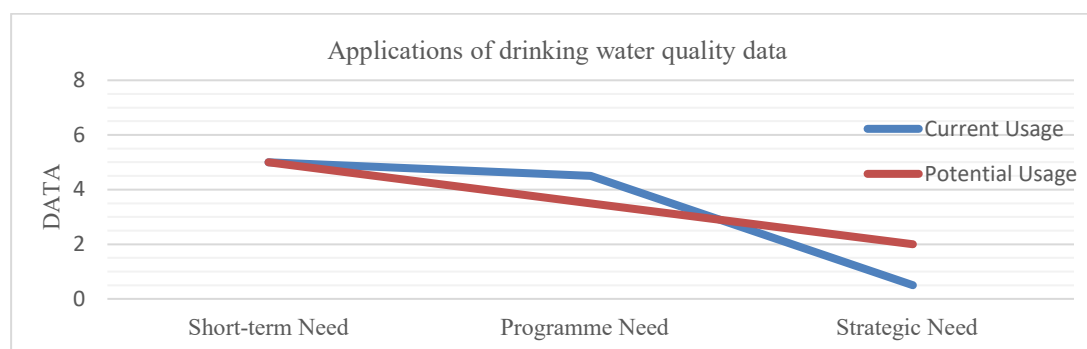


Fig2: A theoretical representation of data collection and its applications

## Data for Strategic Management

More than often, the drinking water quality data is achieved or not available in web-portals or public domains. But the large datasets enable learning. Use of the large databases offers advantages for long-term planning and becomes critical guide, for example, to understand expanding groundwater contaminations of fluoride or nitrate, water bodies such as rivers. With AI/ ML as enabler, the predictive models for degree of association between the parameters, water treatment efficiency, optimization of resources etc. can open up new possibilities.

## 3 Limitations and Suggestions

Data quality and availability affect the value of insights. Data quality is related to the testing methods and data recording and, on the other hand data availability depends upon adequacy and granularity. These are briefly discussed below.

### 3.1 Data quality

FTK results are currently treated as “indicative”. Hence, investments in FTK methods are needed for greater accuracy and consistent with laboratory methods.

### 3.2 Data sharing

Currently the data sharing mechanisms. In India, open data-sharing platforms and water portal exists, but should be strengthened by regular sharing of drinking water quality data.

### 3.3 Professional skills

The persons engaged in testing and recording, storing and analyzing data should be adequate. Engaging the professionals from multiple disciplines will make effective use of data.

## 4 Conclusion

Drinking water quality data is growing throughout the year, but loses its value fast because most of usage are focused on the short-term needs. Improved data storage and sharing mechanism can sustain the usefulness. Data is expensive to generate and hence further use in programme management and strategic decision-making makes better economic sense.

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