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Government of Puducherry

**Department of Science, Technology & Environment  
Puducherry Pollution Control Committee**

## **EIACP HUB NEWSLETTER**

*Status of Environment Related Issues in Puducherry*

# **STATUS OF WATER QUALITY OF 2023 IN THE U.T. OF PUDUCHERRY**

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# STATUS OF WATER QUALITY IN THE U.T. OF PUDUCHERRY (2023)

## Introduction:

The Union Territory of Puducherry comprises four geographically distinct regions: Puducherry, Karaikal, Mahe, and Yanam. Puducherry, the largest region, is situated along the Coromandel Coast of the Bay of Bengal, approximately 135 kilometers from Chennai. Formerly the capital of French India, Puducherry is bordered by Tamil Nadu on three sides and the Bay of Bengal to the east. Karaikal, located about 130 kilometers south of Puducherry, also lies along the East Coast, while Mahe, situated along the Malabar Coast in the Western Ghats, is about 70 kilometers from Calicut Airport and is surrounded by Kerala. Yanam, on the other hand, is located near the East Godavari district of Andhra Pradesh.

Known for its unique geographical setting and coastal ecosystems, the Union Territory faces significant challenges in managing and maintaining its water quality. Groundwater and surface water resources are essential for meeting the regions agricultural, domestic, industrial and ecological needs. However, increasing urbanization, industrialization and agricultural runoff have placed immense pressure on these water systems, leading to depletion and degradation of water quality.

Water quality monitoring plays a vital role in addressing these challenges by systematically assessing the physical, chemical and biological properties of water to ensure its safety for human consumption, ecological health and regulatory compliance. This process involves collecting and analyzing water samples from various sources to detect pollutants and monitor trends. Effective water quality monitoring is crucial for ensuring safe drinking water, protecting aquatic ecosystems and promoting sustainable water resource management in the region.

This article provides an overview of the current status of water quality in **U.T of Puducherry**, with a focus on key parameters and trends observed in 2023. It highlights the ongoing efforts to monitor and improve water quality in light of the region's growing environmental pressures.

## Objectives of Water Quality Monitoring:

The primary objectives of water quality monitoring in the Union Territory of Puducherry are centered on ensuring sustainable management and safe use of water resources. These objectives include:

- i) **Understanding Pollution Levels and Control Requirements:** To identify the nature and extent of pollution affecting water bodies and determine the necessary control measures to mitigate it.
- ii) **Evaluating the Effectiveness of Pollution Control Measures:** To assess the adequacy of existing pollution control strategies and their effectiveness in reducing water contamination.
- iii) **Monitoring Water Quality Trends:** To track and evaluate changes in water quality over time, providing insights into emerging issues and long-term trends.
- iv) **Assessing Assimilative Capacity of Water Bodies:** To determine the ability of a water body to naturally absorb and break down pollutants, helping to optimize pollution control efforts and reduce associated costs.
- v) **Understanding Environmental Fate of Pollutants:** To study how different pollutants behave in aquatic ecosystems, including their distribution, degradation, and long-term impact on water quality.

Evaluating Water Fitness for Various Uses: To assess the suitability of water for different purposes, including drinking, agriculture, industry, and ecosystem support, ensuring that water quality meets the required standards for each use.

## Water Quality Monitoring Stations in U.T. of Puducherry :

U.T. of Puducherry has 34 stations under National Water Quality Monitoring Programme (NWMP). The details of water body-wise and frequency-wise no. of monitoring stations are shown in the figure below:

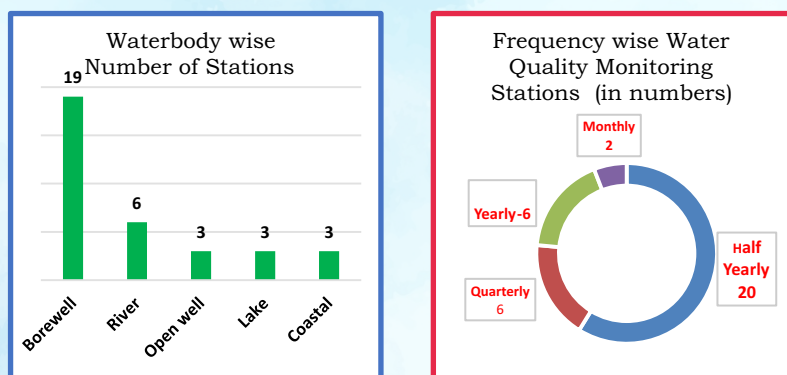


Fig 1: Water Quality Monitoring Stations

## **National Water Quality Monitoring Program (NWMP):**

The National Water Quality Monitoring Programme (NWMP) is a key initiative in India aimed at assessing and monitoring the quality of the country's water resources. The primary objective is to

- Evaluate the status of water quality across various water bodies, including rivers, lakes, groundwater, and coastal areas.
- Monitor changes in water quality over time to identify trends and assess the impact of pollution control measures.
- Detect and identify the sources of pollution to devise strategies for prevention and control.
- Provide data and information to support policy-making and planning for sustainable water resource management.
- Enhance public awareness about water quality issues and encourage community participation in water conservation and pollution control.

## **Roles of NWMP in Puducherry:**

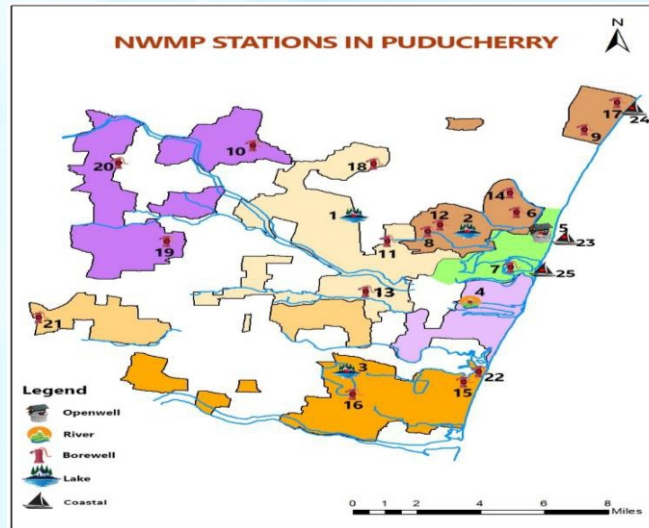
Puducherry Pollution Control Committee (PPCC) under NWMP conducts regular sampling and analysis of water quality in various water bodies across all the region of Puducherry, including ground water, rivers, lakes, and coastal areas and compiles data on various physical, chemical, and biological parameters of water quality. This includes testing for pollutants like heavy metals, nutrients, pathogens, Microbes and organic compounds.

Publish water quality reports and make data available to the public, government agencies, and other stakeholders. Assist local authorities in identifying pollution hotspots and devising action plans to mitigate pollution sources. Aid in enforcing environmental regulations by providing scientific data that support compliance and enforcement actions. Encourage research activities focused on improving water quality monitoring techniques and developing innovative solutions for water management.

By fulfilling these roles, the NWMP plays a crucial part in maintaining and improving the water quality in U.T. of Puducherry contributing to the health of its ecosystems and the well-being of its inhabitants. With funding support from the Central Pollution Control Board, the Department of Science, Technology, and Environment and the Puducherry Pollution Control Committee have been conducting periodic water quality monitoring at several places as part of the National Water Quality Monitoring Programme (NWMP). In Mahe and Yanam regions, yearly monitoring was conducted in surface water bodies and open well; whereas in Puducherry and Karaikal regions, ground water monitoring is conducted before and after the monsoon season and surface water bodies were monitored monthly and quarterly basis.

## NWMP Stations:

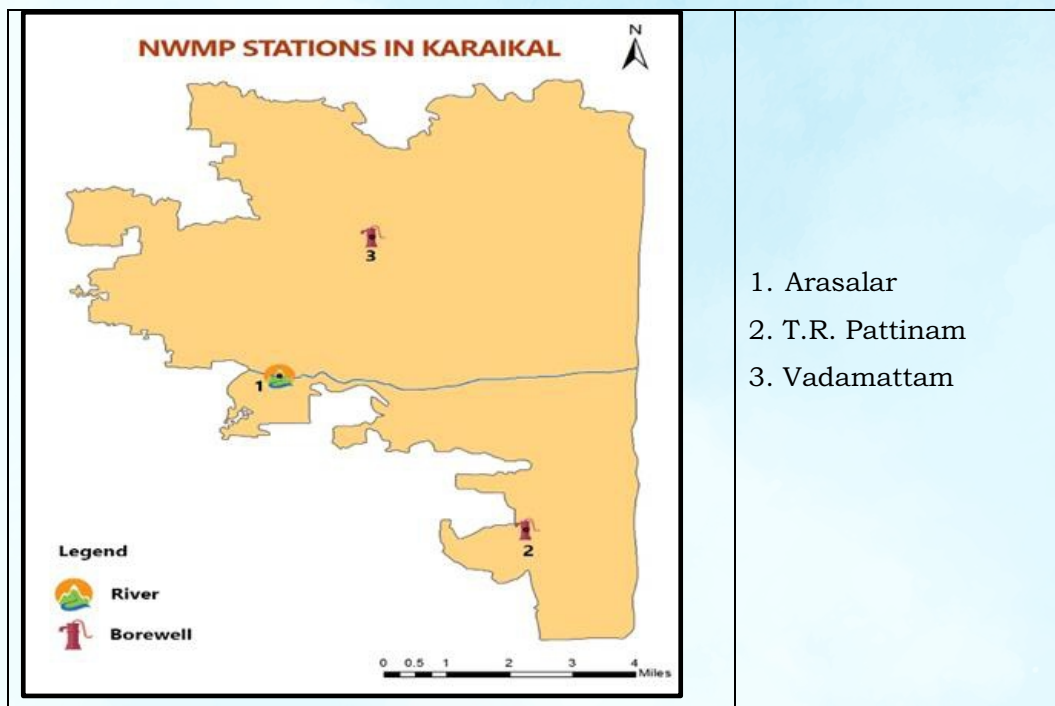
Sites for water quality assessments are selected based on hydrological and geographical diversity, ecological significance, industrial, agricultural, drinking purposes and vulnerability to pollution. Sites are also chosen for clean reference points for baseline comparisons.



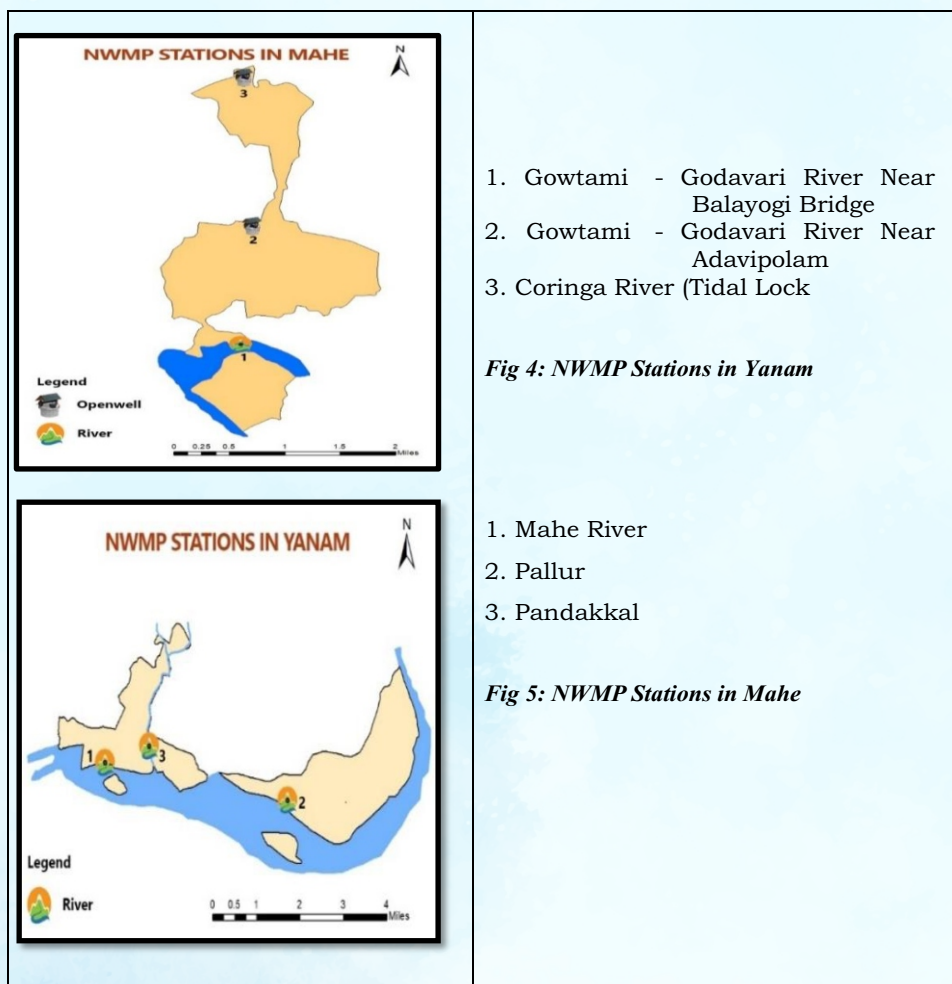
*Fig 2: NWMP Stations at Puducherry*

|    | Location                    | Sl. No. | Location  |
|----|-----------------------------|---------|---|
| 1  | Ousteri Lake                | 14      | Maruthi School  |
| 2  | Kanagan Lake                | 15      | Echangadu   |
| 3  | Bahour Lake                 | 16      | Bahour Borewell   |
| 4  | Chunnambar River            | 17      | Chevalier Sellane Government Higher Secondary School, Kalapet |
| 5  | Chetty Koil, Mission Street | 18      | DhanderarKulam, Sedarapet                                     |
| 6  | Krishna Nagar               | 19      | Kothapurinatham,Thiruvandarkoil                               |
| 7  | Thengaithittu               | 20      | Thirukkanur   |
| 8  | Muthirappalayam             | 21      | Madukarai   |
| 9  | Pondicherry University      | 22      | Panithittu  |
| 10 | Katterikuppam               | 23      | Kuruchikuppam Beach   |
| 11 | Kurumbapet                  | 24      | Kalapet kuppam Beach  |
| 12 | Mettupalayam                | 25      | Thengaithittu Beach   |
| 13 | Uruvaiyar                   |         |   |

*Table 1: NWMP Locations in Puducherry*



**Fig 3: NWMP Stations in Karaikal**



## Surface Water Quality (2023):

### Key Water Bodies Monitored

In 2023, regular monitoring of surface water quality was carried out in major water bodies of Puducherry, including:

- Chunnambar River
- Arasalar River
- Mahe River
- Gowtami – Godavari River
- Coringa River
- Ousteri Lake
- Bahour Lake
- Kanagan Lake

### Water Quality Indicators

The surface water quality was evaluated using several standard parameters, including:

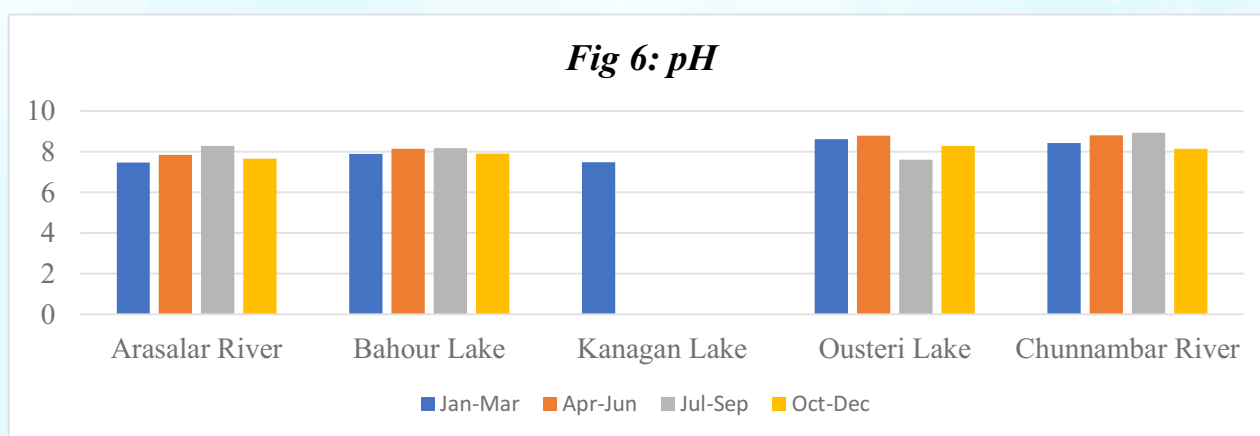
- pH:** A measure of the acidity or alkalinity of water.
- Dissolved Oxygen (DO):** Indicative of the health of aquatic life and the level of oxygen available in water.
- Biochemical Oxygen Demand (BOD):** Represents the organic pollution load and the amount of oxygen required for microbial decomposition.
- Chemical Oxygen Demand (COD):** Measures the total quantity of oxygen required to oxidize both organic and inorganic matter.
- Total Dissolved Solids (TDS):** A measure of all organic and inorganic substances dissolved in water.
- Nitrate ( $\text{NO}_3$ ) and Phosphate ( $\text{PO}_4$ ):** Nutrient levels that often indicate agricultural runoff and can lead to eutrophication.
- Faecal Coliform:** An indicator of bacterial contamination and potential health risks from human or animal waste.

### Findings:

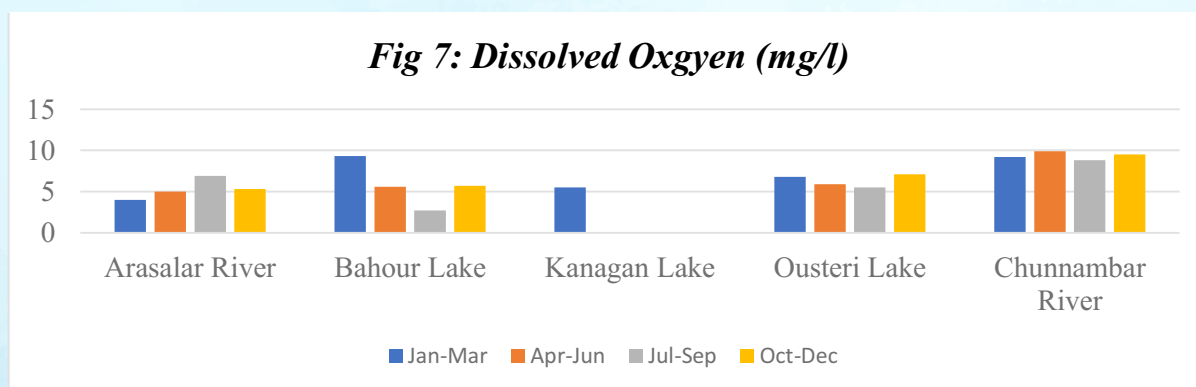
- ❖ Dissolved Oxygen (DO) meets the Primary Water Quality Criteria for Surface Water Bodies - Class of Water B (water used for organized outdoor bathing) as per Environment (Protection) Rules 1986 of  $\geq 5\text{mg/l}$  in all the Surface water bodies except in Bahour lake (2.7 mg/l) during July quarter and in Arasalar river (4.0 mg/l) during Jan quarter.
- ❖ Value of pH is within the primary water quality criteria for all surface bodies except Ousteri for Jan (8.61) & April (8.78) quarters and Chunnambar for April (8.80) & July (8.93) quarters.

- ❖ The concentration of Biological Oxygen Demand (BOD) at Chunnambar River during the April quarter (4.5 mg/l), July quarter (9.0 mg/l) & October quarter (3.7 mg/l), at Bahour Lake during the July quarter (12.0 mg/l) and at Ousteri lake during Jan quarter (5.0 mg/l) is not meeting the Primary Water Quality Criteria of  $\leq 3$  mg/l. In all other water bodies, BOD is within the criteria.
- ❖ In Mahe River, pH, DO and BOD meets the Primary Water Quality Criteria.
- ❖ In case of Yanam region, the Biological Oxygen Demand (BOD 4.7 mg/l) and Dissolved Oxygen (DO: 3.8 mg/l) in Coringa River (Tidal lock) are not meeting the primary water quality criteria for bathing water.
- ❖ Higher BOD level and low DO indicates localised contamination due to sewage, agriculture runoff and other waste disposal practises, posing a risk of eutrophication and algal blooms, particularly during the monsoon season.

### Puducherry and Karaikal

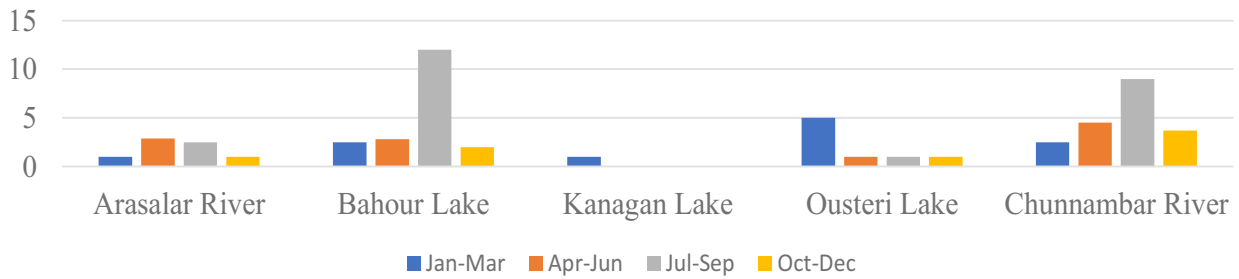


**Note:** As per the primary water quality criteria for bathing water of class B, pH should be between 6.5 and 8.5. Water sampling was not carried out during April, July and Sept 2023 quarters at Kanagan Lake.



**Note:** As per the primary water quality criteria for bathing water of class B, DO should be 5 mg/l or more.

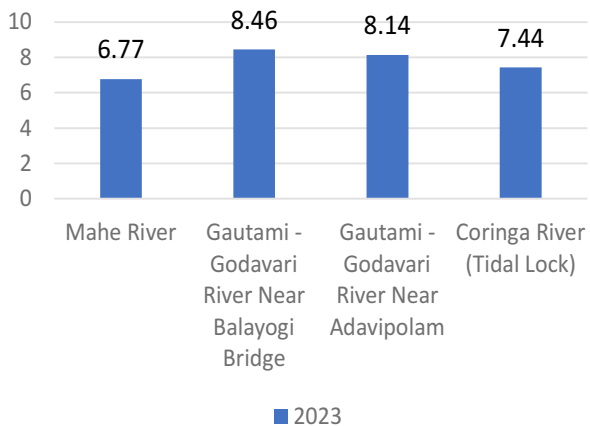
**Fig 8: Bio-Chemical Oxygen Demand (mg/l)**



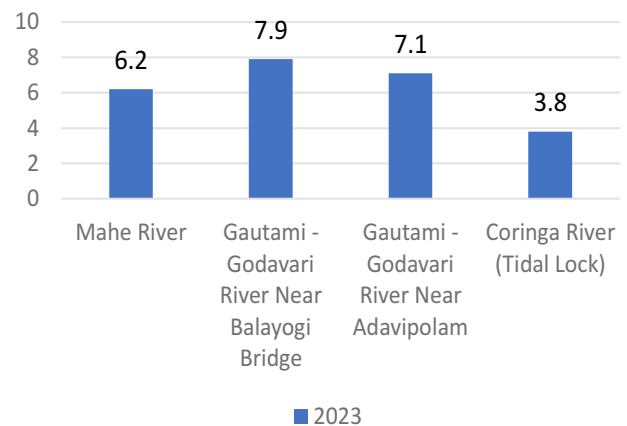
**Note:** As per the primary water quality criteria for bathing water of class B, BOD should be 3 mg/l or less.

## Mahe and Yanam

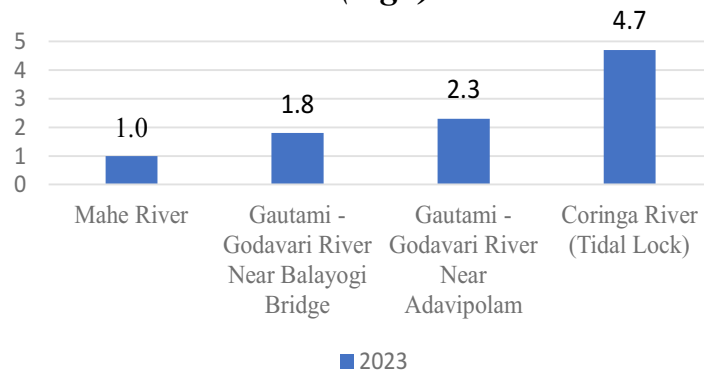
**Fig 9. pH**



**Fig 10. Dissolved Oxygen (mg/l)**



**Fig 11. Bio-Chemical Oxygen Demand (mg/l)**



## Ground water Quality (2023):

### Groundwater Sources Monitored

Groundwater forms the primary source of drinking water and irrigation in Puducherry. In 2023, groundwater quality was monitored through bore wells and open wells across urban and rural areas, including:

- Puducherry Urban
- Karaikal
- Mahe
- Yanam

### Water Quality Parameters

The analysis of groundwater quality was conducted using parameters such as:

- Total Hardness:** Indicates the concentration of calcium and magnesium ions.
- Chloride ( $\text{Cl}^-$ ):** High concentrations can indicate saltwater intrusion or contamination from industrial and domestic wastewater.
- Fluoride ( $\text{F}^-$ ):** Excess fluoride can cause dental and skeletal fluorosis.
- Nitrate ( $\text{NO}_3^-$ ):** High nitrate levels may indicate agricultural runoff or sewage infiltration and cause Methemoglobinemia (Blue Baby Syndrome)
- Electrical Conductivity (EC):** Reflects the total ion concentration and is an indicator of salinity.
- Iron (Fe):** High iron levels can cause aesthetic and taste issues, as well as staining of plumbing fixtures.

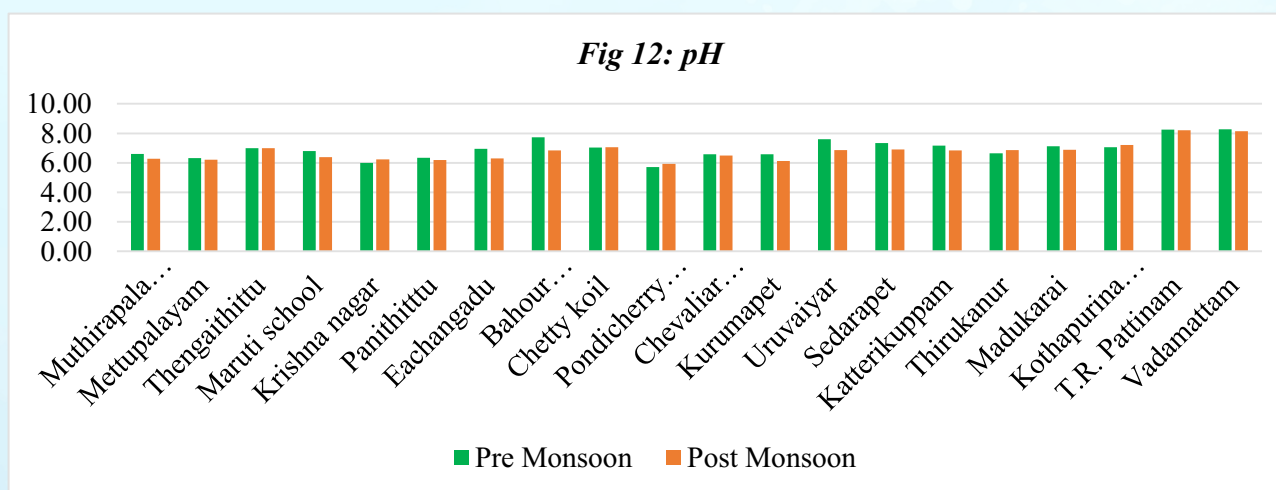
### Findings:

All the General parameters and Trace metals are within the permissible limit except the followings:

- ❖ pH value is slightly out of range of 6.5-8.5 for drinking water standard in some of the borewells viz., Krishna Nagar (6.22), Mettupalayam (6.20), Pondicherry University (5.92), Panithittu (6.18), Muthirapalayam (6.28), Maruthi School (6.38), Eachangadu (6.29) and Kurumapet (6.12) borewells in Post-Monsoon and Krishna Nagar (6.00), Mettupalayam (6.32), Pondicherry University (5.71), Panithittu (6.34) borewells in Pre-Monsoon.

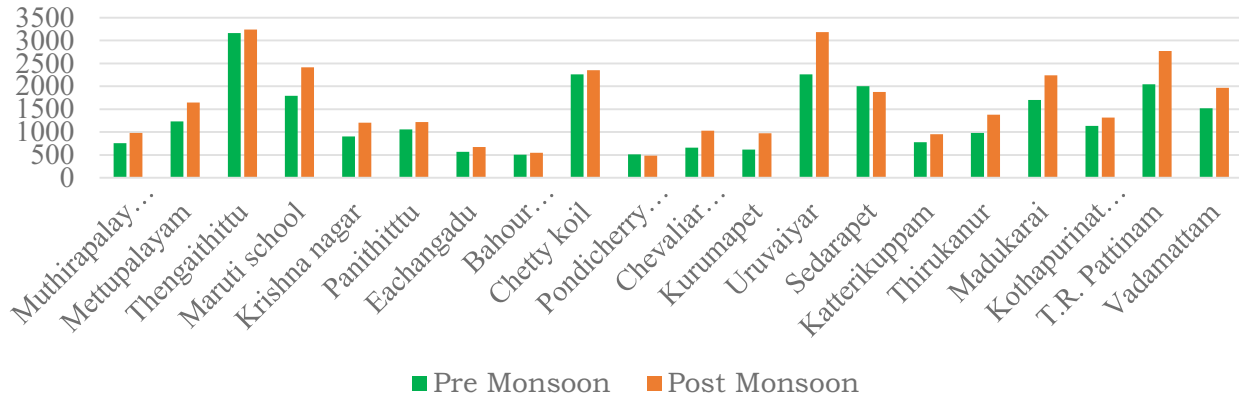
- ❖ The value of turbidity is higher than the permissible limit (5 NTU) in Mettupalayam (6.5 NTU) in Pre-Monsoon. The increase in turbidity in drinking water may be caused by particles seeping through the soil and into the system.
- ❖ Total Hardness is slightly higher than the permissible limit (600 mg/l) in Sedarapet borewell (616 mg/l) during pre-monsoon. Hardness may be due to weathering of limestone, sedimentary rock and calcium-bearing minerals.
- ❖ In Mahe region, pH is lower than the permissible limit of 6.5-8.5 in Pallur (5.42) and Pandakkal (5.07) open wells.
- ❖ Pesticides viz., Alpha HCH, Delta HCH, Gamma HCH, OP DDT, PP DDT, PP DDE, PP DDD, OP DDE, PP DDE, Alpha Endosulphan, Beta Endosulphan, Dieldrin, Aldrin, Malathion, Methyl Parathion, Chloropyriphos, Alachlor, Ethion, Phorate, Endosulfan Sulfate, Butachlor, are Below Detectable Limit in all the locations and in case of trace metals (viz., Copper, Cadmium, Lead, Total Chromium, Zinc, Iron, Arsenic, Mercury and Nickel), all ground water bodies are within the standard limit except Iron in Vadamattam (0.78 mg/l) and Mettupalayam (0.45 mg/l) and Nickel in Kothapurinatham (0.18 mg/l) during post-monsoon.

### Puducherry and Karaikal during Pre and Post-Monsoon

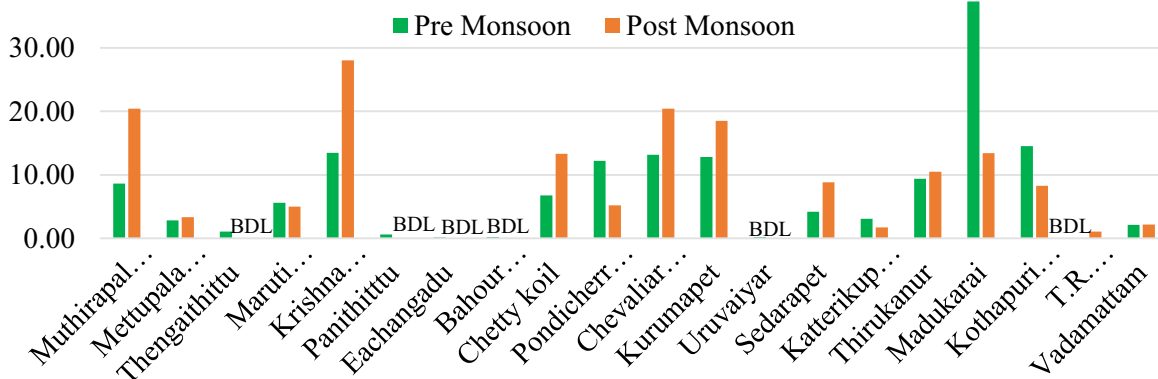


**Note:** Permissible Limit – 6.5 to 8.5

**Fig 13: Conductivity ( $\mu\text{mho/cm}$ )**

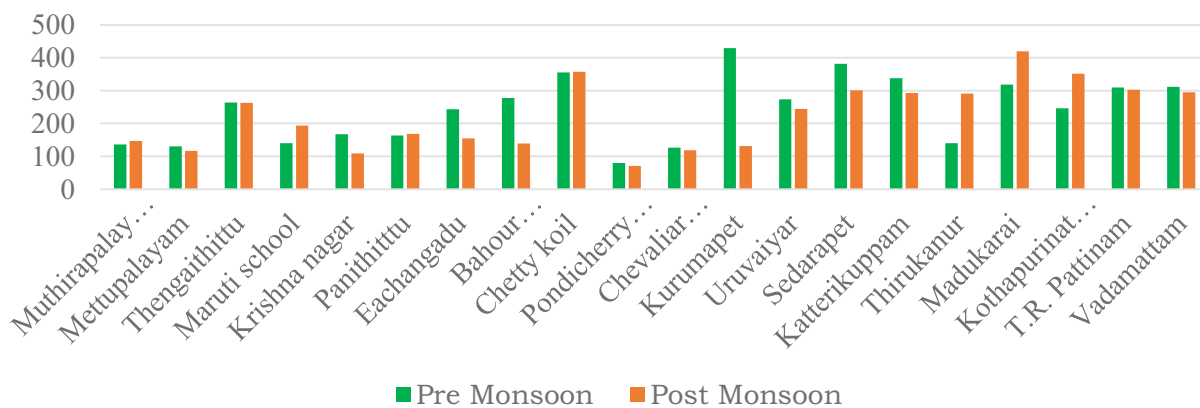


**Fig 14: Nitrate ( $\text{mg/l}$ )**



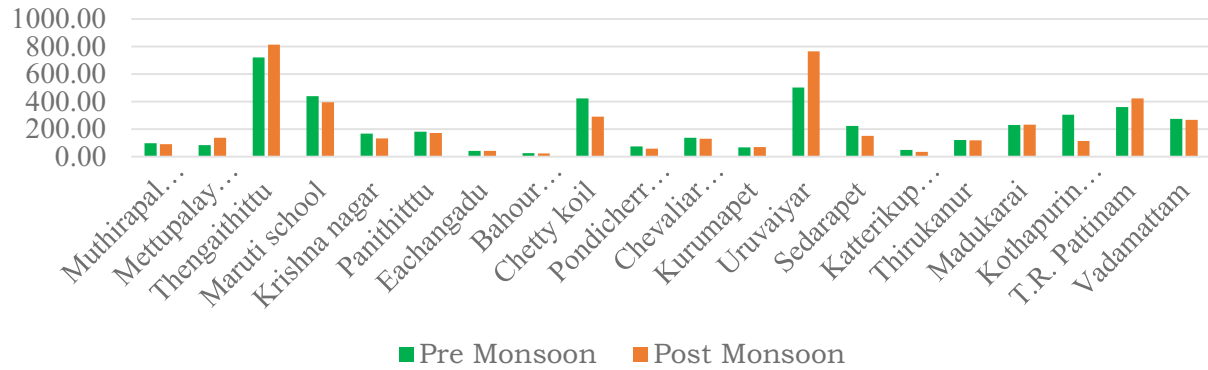
**Note:** Permissible Limit – 45 ( $\text{mg/l}$ )

**Fig 15: Total Alkalinity ( $\text{mg/l}$ )**



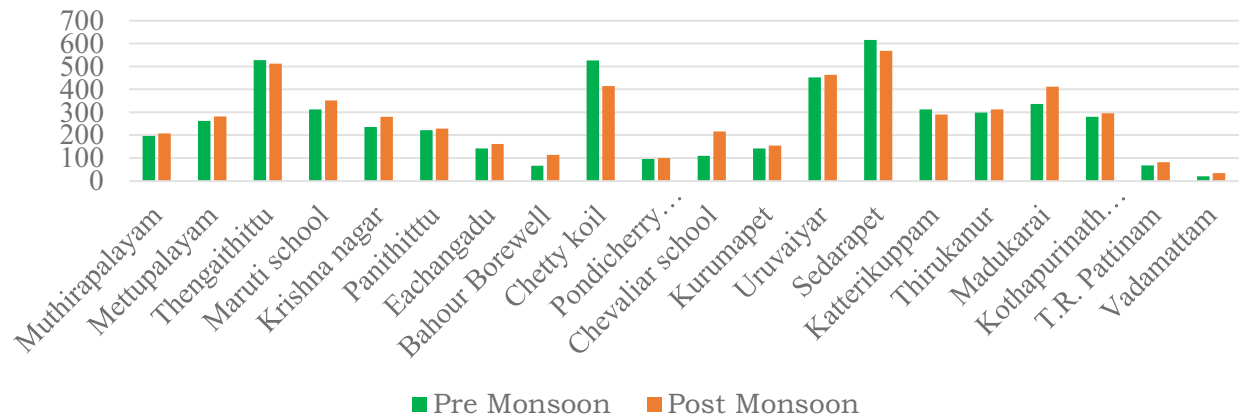
**Note:** Permissible Limit – 600 ( $\text{mg/l}$ )

**Fig 16: Chloride (mg/l)**



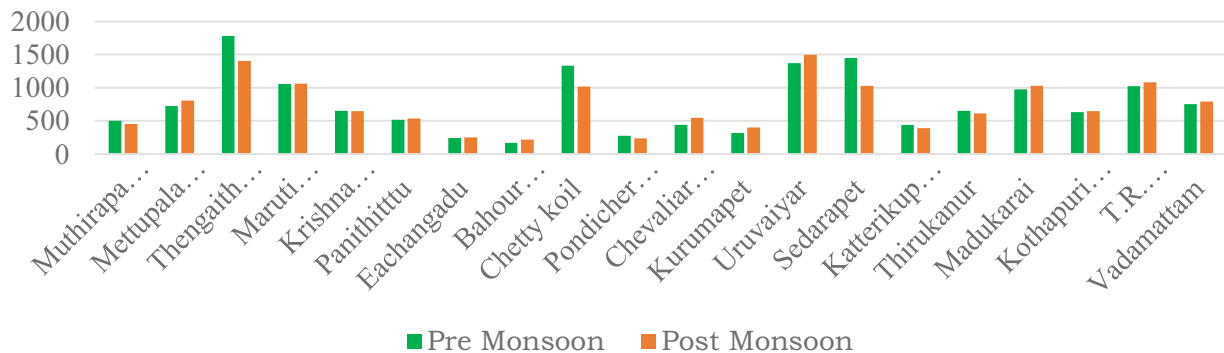
**Note:** Permissible Limit – 1000 (mg/l)

**Fig 17: Total Hardness (mg/l)**



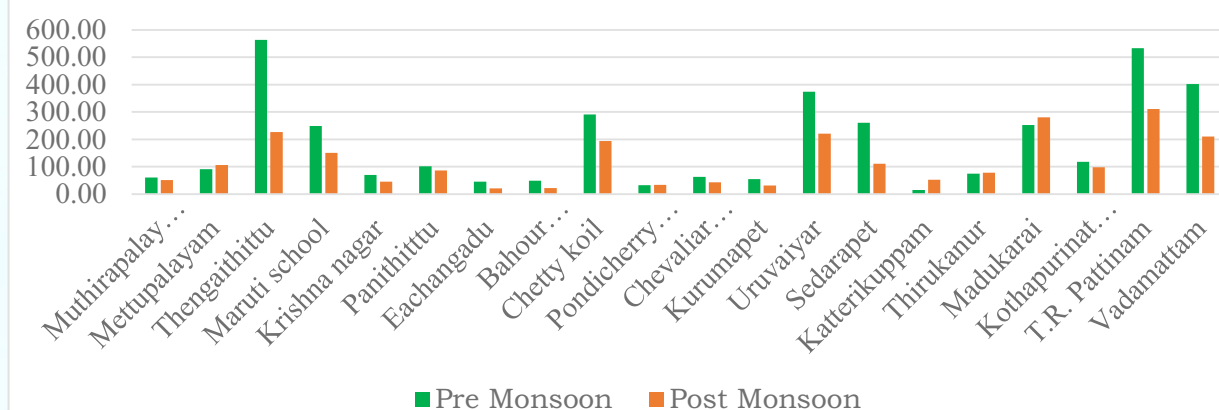
**Note:** Permissible Limit – 600 (mg/l)

**Fig 18: Total Dissolved Solids (mg/l)**

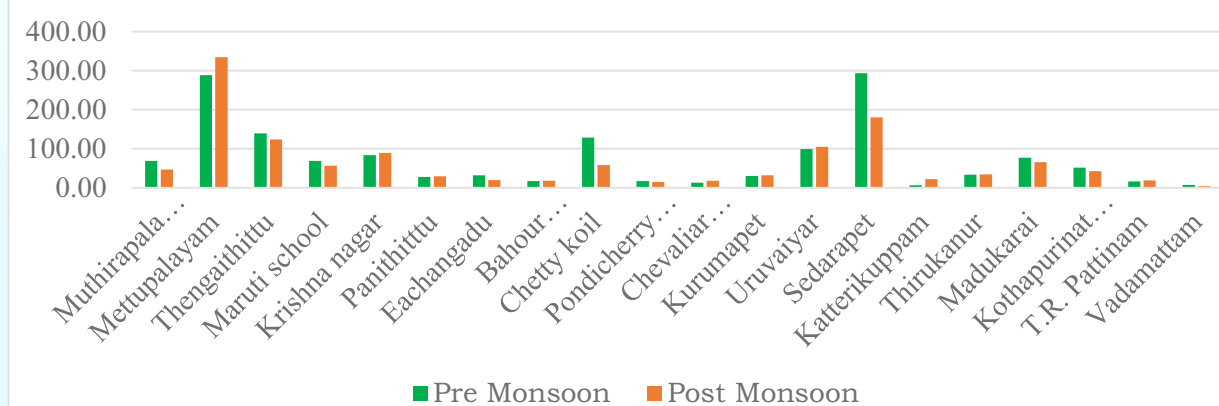


**Note:** Permissible Limit – 2000 (mg/l)

**Fig 19: Sodium (mg/l)**

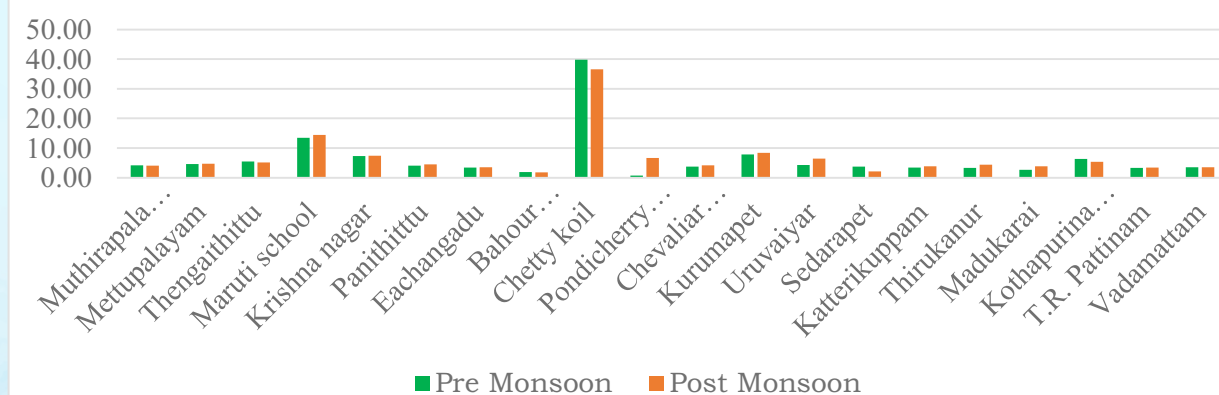


**Fig 20: Sulphate (mg/l)**

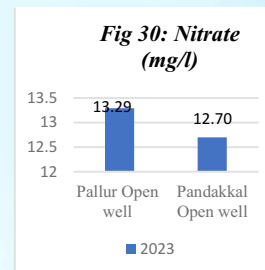
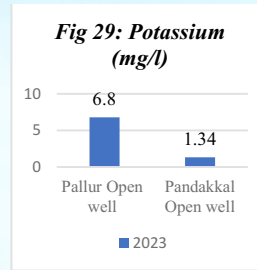
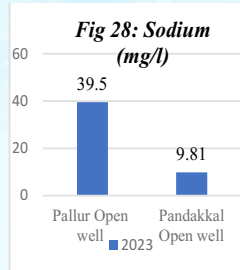
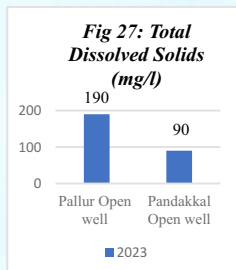
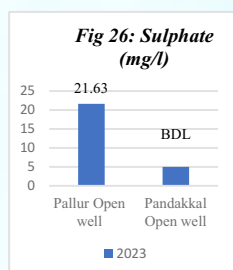
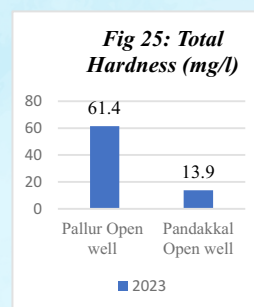
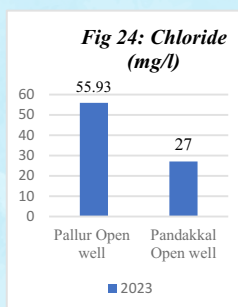
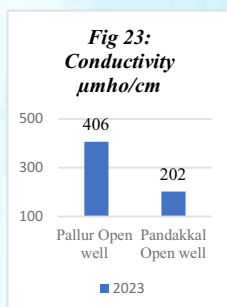
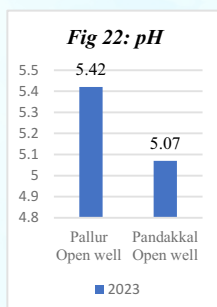


**Note:** Permissible Limit - 400 (mg/l)

**Fig 21: Potassium (mg/l)**



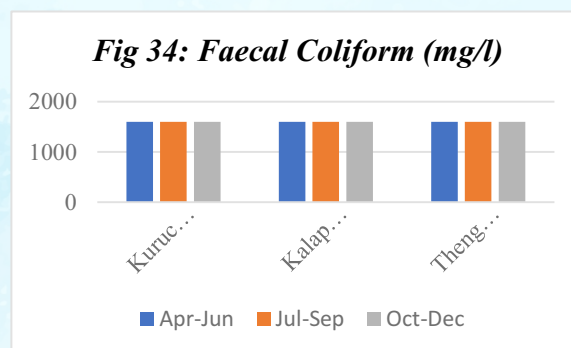
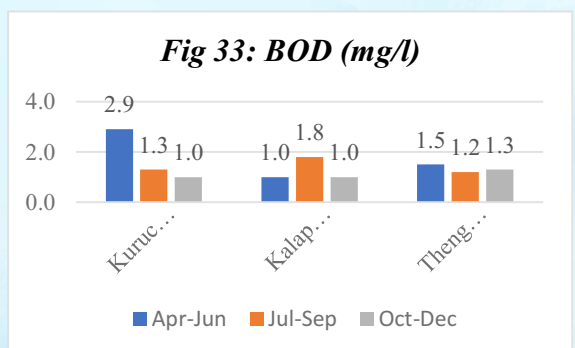
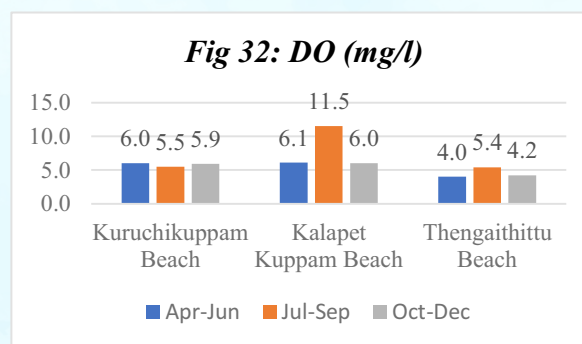
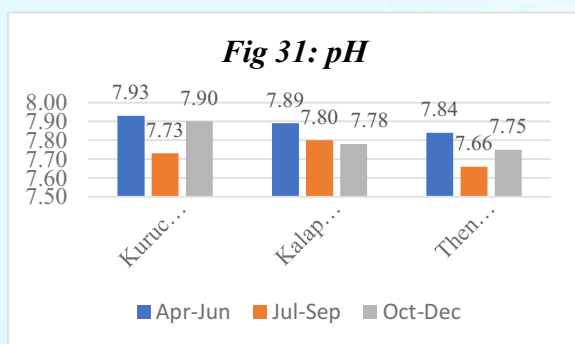
## Quality of open well water in Mahe region – 2023



## Coastal Water Quality (2023)

In 2023, regular monitoring of Coastal Water Quality were carried out at,

- Kurichikuppam Beach
- Kalapet Kuppam Beach
- Thengaithittu Beach



All the parameters are within the standard limit except Faecal Coliform which does not meet the primary water quality criteria for Class SW-II waters (for bathing, contact water sports and commercial fishing). The reason may be due to the discharge of domestic wastewater into the sea.

## **Challenges in Water Quality Management**

### **Saltwater Intrusion**

Saltwater intrusion into coastal aquifers remains a pressing issue in the U.T. of Puducherry. Over-extraction of groundwater, especially in coastal areas, has exacerbated this problem, leading to the salinization of drinking water sources.

### **Pollution from Untreated Sewage**

The discharge of untreated sewage into rivers and lakes is a significant source of water pollution. Despite existing treatment facilities, rapid urbanization and inadequate infrastructure have resulted in an increased organic load, affecting surface water bodies like the Sankarabarani River.

### **Agricultural Runoff**

Excessive use of chemical fertilizers and pesticides in agriculture has led to nutrient pollution, particularly nitrate and phosphate contamination in both surface and groundwater. The resultant eutrophication threatens aquatic ecosystems and impacts water quality in rural areas.

## **Government Initiatives and Recommendations**

### **Water Quality Monitoring**

The Government of Puducherry has strengthened its water quality monitoring programs, particularly through regular assessments conducted by the Puducherry Pollution Control Committee (PPCC). Advanced monitoring equipment and periodic water quality assessments are being deployed to track changes in both surface and groundwater quality.

### **Improved Wastewater Management**

Efforts are underway to upgrade and expand sewage treatment facilities in urban areas to reduce the discharge of untreated wastewater into rivers and lakes. However, further investments are necessary to meet the growing demand and reduce pollution loads.

### **Saltwater Intrusion Mitigation**

To address the issue of saltwater intrusion, the Puducherry government has initiated programs to promote sustainable groundwater management practices, including rainwater harvesting, artificial recharge structures, and controlled extraction in coastal areas.

### **Agricultural Best Practices**

There is an increasing focus on promoting organic farming practices and the judicious use of fertilizers through awareness programs and subsidies. The government encourages farmers to adopt soil health management techniques to reduce the dependency on chemical inputs.

## **Conclusion**

The status of water quality in Puducherry in 2023 reflects the dual challenges of managing natural and anthropogenic pressures. While there have been efforts to monitor and improve water quality, persistent issues such as saltwater intrusion, sewage pollution and agricultural runoff need continued attention. Strengthened infrastructure, public awareness, and multi-sectoral cooperation are essential to ensuring the long-term sustainability of water resources in the Union Territory.

## Puducherry EIACP Hub Environment Events

**Event:** Hands-on Training on Waste to Wealth & Craft making competition on 26.04.2024

**Resource Person:** Kalaimamani V. Umapathy, Fine art teacher from Indira Gandhi Government Higher Secondary School, Kathirkamam.

**Stakeholders:** School Students

**Venue:** Dr Abdul Kalam Science Centre & Planetarium, Lawspet.

**No. of Participants:** 115



**Event:** Awareness Programme on „Biodiversity Conservation For Youths on International Day for Biological Diversity & Elocution Competition on 22.05.2024.

**Resource Person:** Dr. M. Bubesh Guptha, Founder Director, Universal Eco Foundation, Puducherry & Dr. Vasantharaja, Assistant Professor from Tagore Arts College, Puducherry.

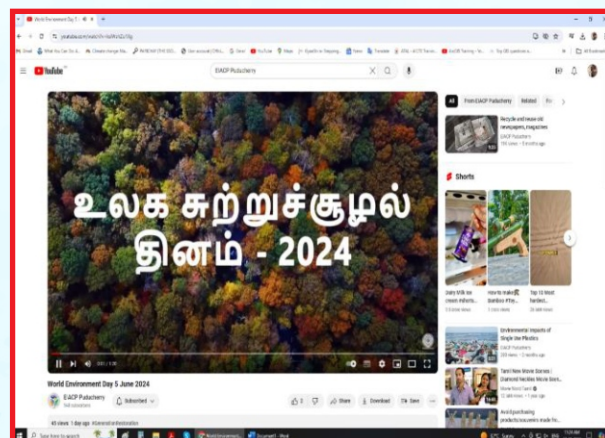
**Stakeholders:** College Students

**Venue:** Wildlife Art Gallery, Art And Craft Village Murungapakkam Puducherry.

**No. of Participants:** 86

**Created and released a World Environment Day theme video:**

In recognition of World Environment Day's theme, Puducherry EIACP PC Hub has created and released a captivating awareness video on 'Land Restoration, Desertification, and Drought Resilience' held on 26.05.2024. This video aimed to educate viewers about the importance of restoring degraded lands, combating desertification, and building resilience against droughts. The video was disseminated through Puducherry EIACP social media pages & LED Vehicle.



**Speech Competition:**

**Event:** Speech competition (English and Tamil) on the topic „Our Land. Our Future on 27.05.2024

**Stakeholders:** School Students from class 8 to 12

**Venue:** Dr. Abdul Kalam Science Centre and Planetarium, Lawspet.

**No. of Participants:** 23 students in the Tamil speech competition and 27 students in the English speech competition.

**Event:** Webinar on "Our Land, Our Future: A Focus on Puducherry's Environment" on 27.05.2024.

**Resource Person:** Dr. P. Ramanujam, a retired professor from Kanchi Mamunivar Government Institute for Post Graduate Studies And Research, Puducherry.

**Stakeholders:** Line Departments, Environmentalists, College & School Students.

**No. of Participants:** 67



**Event:** Quiz Competition on the theme „Our Land. Our Future“ on 28.05.2024.

**Stakeholders:** School Students from Category – I (Class 6 to 8) & Category – II (Class 9 to 12)

**Venue:** Dr Abdul Kalam Science Centre and Planetarium, Lawspet.

**No. of Participants:** 102

**Event:** Clean-up Drive Campaign at Mangrove area on 29.05.2024.

**Stakeholders:** Line Departments, Staff from University/Educational Institutions, NSS, NGO, Public etc.

**Venue:** Art and Craft Village, Murugapakkam, Puducherry.

**No. of Participants:** 120



**Event:** Awareness Talk on “Land Restoration, Desertification and Drought Resilience” on 30.05.2024.

**Resource Person:** Mr. T. Balaji, Senior Project Associate, Puducherry Climate Change Cell.

**Stakeholders:** University students

**Venue:** Department of Ecology & Environmental Sciences, Pondicherry University.

**No. of Participants:** 86



**Event:** Waste to Wealth Craft making competition on 04.06.2024.

**Stakeholders:** School students under Category – I (V Std to VII Std) and Category – I (VIII Std to IX Std).

**Venue:** Dr Abdul Kalam Science Centre & Planetarium, Lawspet, Puducherry.

**No. of Participants:** 90



**Event:** One-day conference on „Our Land, Our Future“ on World Environment Day, 2024 on 05.06.2024.

**Stakeholders:** Line Departments, Staff from Universities/Educational Institutions, NGOs, NSS Officers etc.

**Venue:** Hotel Accord, Puducherry.

**No. of Participants:** 260



**Event:** Coastal Clean-up drive on World Oceans Day on 08.06.2024.

**Stakeholders:** Line Departments, Staff from University/Educational Institutions, NSS, NGO, Public etc.

**Venue:** Veerampattinam to Chinna Veerampattinam Beach, Puducherry.

**No. of Participants:** 200



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